

Worker skills or firm wage-setting practices? Decomposing wage inequality across 20 OECD countries

Chiara Criscuolo, Alexander Hijzen, Balázs Muraközy, Cyrille Schwellnus
Erling Barth, Antoine Bertheau, Wen-Hao Chen, Richard Fabling
Priscilla Fialho, Jonathan Garita, Andrei Gorshkov, Katarzyna Grabska-Romagosa
Antton Haramboure, Ryo Kambayashi, Michael Koelle, Valerie Lankester
Timo Leidecker, Oskar Nordström Skans, Satu Nurmi
Vladimir Peciar, Capucine Riom, Duncan Roth, Catalina Sandoval
Balazs Stadler, Richard Upward, Wouter Zwysen *

Abstract

To what extent do differences in pay across firms contribute to overall wage inequality, and how does this vary across countries? We address this question by constructing a harmonised linked employer–employee dataset covering 20 OECD countries since the 2000s. On average across countries, differences in average wages between firms account for about half of overall wage inequality. Differences in firms’ pay premia account for about one third of the overall wage differences between firms. Over time, however, changes in these premia explain roughly two-thirds of the increase in wage differences between firms. The remaining share reflects differences in workforce composition across firms, including the sorting of higher-skilled workers into higher-paying firms. Firm wage premia dispersion is systematically higher in countries with lower collective bargaining coverage and less binding minimum wages.

JEL codes: D2, J31, J38.

Keywords: Wage inequality, firm wage premium, productivity.

*Full affiliations and acknowledgements: Chiara Criscuolo (OECD), Alexander Hijzen (OECD and IZA@Liser), Balázs Muraközy (University of Liverpool and KRTK), Cyrille Schwellnus (OECD), Erling Barth (Institute for Social Research Oslo and IZA@Liser), Antoine Bertheau (Banque de France), Wen-Hao Chen (National Taipei University), Richard Fabling (New Zealand Productivity Commission), Priscilla Fialho (OECD), Jonathan Garita (Central Bank of Costa Rica), Andrei Gorshkov (IFAU), Katarzyna Grabska-Romagosa (Maastricht University), Antton Haramboure (OECD), Ryo Kambayashi (Musashi University), Michael Koelle (OECD), Valerie Lankester (Central Bank of Costa Rica), Timo Leidecker (OECD), Oskar Nordström Skans (Uppsala University and IZA@Liser), Satu Nurmi (Statistics Finland/VATT), Vladimir Peciar (Ministry of Finance of the Slovak Republic), Capucine Riom (LSE), Duncan Roth (IAB, IZA@LISER, CESifo), Catalina Sandoval (Central Bank of Costa Rica), Balazs Stadler (OECD), Richard Upward (University of Nottingham) and Wouter Zwysen (ETUI).

Corresponding author: Antton Haramboure, OECD, 2 rue André Pascal, 75775 Paris Cedex 16, Antton.HARAMBOURE@oecd.org.

This paper was produced within the LinKEED network coordinated by the OECD. The harmonised country-level estimates are based on confidential linked employer–employee microdata accessed and analysed by authorised researchers in each participating country. Full acknowledgements and country-specific data statements are provided at the end of the paper. Declarations of interest: none. The opinions expressed are those of the authors and do not necessarily represent the official views of the OECD or affiliated institutions.

Delivering broadly shared economic growth has become more challenging in many countries, as productivity growth has slowed in a context of high or rising wage inequality. Designing policies that promote inclusive growth requires an understanding of how firms shape not only aggregate productivity but also the distribution of labour income. Firms influence the division of income between capital and labour (e.g. Autor et al., 2020; Kehrig and Vincent, 2019; Schwellnus et al., 2018), and a growing literature shows that they also play an important role in shaping wage inequality between workers (e.g. Barth et al., 2016; Song et al., 2019). However, most of this evidence is country-specific and not harmonised across settings. In some labour markets, high-paying firms appear to pull away from the rest, while in others wage differences across firms remain relatively compressed. Without a harmonised cross-country framework, it is difficult to assess which patterns are systematic and how institutional differences are related to them.

This paper investigates how much of wage inequality reflects differences in pay across firms rather than differences between workers, and how this varies across countries. In particular, we examine the extent to which wage differences across firms reflect differences in firms' pay-setting practices, as opposed to differences in the types of workers they employ, and how these firm-level components are associated with variation in labour market institutions.

We address these questions by constructing a harmonised linked employer–employee dataset covering 20 OECD countries from the 2000s onward, including Austria, Canada, Costa Rica, Denmark, Estonia, Finland, France, Germany, Hungary, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, the Slovak Republic, Spain, Sweden, the United Kingdom, and the United States. The data combine administrative and survey sources and include, in most cases, the universe or a large representative sample of private-sector workers and firms. The dataset has a panel structure, allowing us to examine both the level and the evolution of wage inequality over an extended period. A common harmonisation protocol ensures that wage measures and analytical methods are comparable across countries, while the decentralised implementation preserves data confidentiality. In any given year, the dataset covers approximately 26 million workers and 2 million firms across countries that differ substantially in their labour market institutions and inequality trends.

Using these data, we decompose overall wage inequality into between-firm and within-firm components, examining both their levels and their evolution over time. We then distinguish between inequality arising from firm-specific pay premia, reflecting differences in pay-setting practices, and inequality arising from differences in the types of workers employed by firms. By exploiting the panel structure of the data, we analyse how these components change over extended periods. We complement this analysis with robustness checks that use an alternative dispersion measure (P90/P10) and, for a subset of countries, Abowd–Kramarz–Margolis (AKM) worker–firm fixed-effects models that account for unobserved worker heterogeneity.

To situate our findings within the broader evidence base, we conduct a systematic review of existing country-level estimates and provide a harmonised comparison across countries. This allows us to assess how our results relate to the extensive single-country literature on firm contributions to wage inequality (e.g. Card et al., 2013; Barth et al., 2016; Song et al., 2019; Kline, 2025) as well as to the more limited cross-country evidence to date (Lazear and Shaw, 2009; Tomaskovic-Devey et al., 2020).

Finally, we relate cross-country differences in firm-related wage dispersion to variation in labour market institutions, including collective bargaining coverage, minimum wage policies, and employment protection. We estimate pooled cross-country regressions as well as long-difference specifications that exploit changes over time, controlling for differences in economic development, workforce characteristics, and common time effects. This enables us to examine whether institutional arrangements are systematically associated with both the level and the evolution of firm-related wage inequality across countries, while accounting for other structural differences between them.

Related literature and cross-country evidence on firm wage premia

A large literature uses linked employer–employee data to document the role of firms in shaping wage inequality within individual countries. Across a wide range of institutional settings, these studies consistently find that differences in average wages across firms account for a substantial share of overall wage dispersion—often on the order of 30–50 percent—and that firm-specific wage premia contribute meaningfully to these differences. At the same time, both the magnitude of firm-related inequality and its evolution over time vary considerably across countries.

In this literature, firm wage premia are typically interpreted as persistent wage differences across employers for observationally similar workers. Economists have proposed several mechanisms that may generate such premia. One view emphasises productivity-related rent sharing or monopsony power, whereby more productive or less competitive firms pay higher wages to similar workers (Burdett and Mortensen, 1998; Card et al., 2013; Di Addario et al., 2023). Another interpretation highlights compensating differentials, in which firms offering less desirable working conditions must pay higher wages to attract workers (Sorkin, 2018; Lachowska et al., 2023). Firm premia may also reflect differences in ownership structures, governance, or internal pay-setting practices.

Table 1 summarises the main findings from this literature for the countries in our sample, while Table A.1 provides a comprehensive overview of data sources, time periods, and estimation approaches for each study.¹ Several broad patterns emerge.

First, countries with more decentralised wage-setting systems—such as the United States, Canada, and the United Kingdom—tend to exhibit both higher levels and rising trends in between-firm wage inequality. For the United States, numerous studies document increasing dispersion across firms since the 1990s, driven by rising firm premia, stronger sorting, or both (Song et al., 2019; Card et al., 2013; Lachowska et al., 2023). Similar patterns are reported for Canada and the United Kingdom, where recent evidence points to growing inequality across workplaces and firms (Mehdi et al., 2023; Schaefer and Singleton, 2020; Beauregard et al., 2025).

Second, in countries with more coordinated wage-setting institutions—particularly in Northern and parts of Continental Europe—firm wage premia tend to be smaller and more stable over time. Evidence from Denmark and Sweden suggests that firm effects are persistent but relatively compressed, with only a limited contribution to rising wage inequality (Sørensen and Vejlin, 2011; Engbom et al., 2023; Barreto et al., 2025). In Italy and Portugal, where sectoral bargaining plays a central role, firm premia are present, but wage dispersion more often reflects differences across occupations or job titles constrained by negotiated wage structures (Devicienti et al., 2019; Card et al., 2016).

Third, recent work on Central and Eastern European countries documents comparatively high levels of between-firm wage inequality, in some cases followed by declining trends in the firm-related component during the 2010s. Studies for Bulgaria, Lithuania, Romania, and Slovakia report decreases in between-firm inequality or firm premia dispersion, frequently linked to institutional reforms, minimum wage policies, or catch-up dynamics (Magda et al., 2021; Nikulin, 2022).

While this literature provides rich country-specific insights, differences in data coverage, time periods, and methodological choices make systematic cross-country comparisons challenging. Even within the same country, estimates can vary depending on how samples are constructed, how wages are measured and cleaned, and which decomposition framework is applied, as reflected in the range of estimates reported in Tables 1 and A.1. As a result, it remains difficult to determine which

¹We conducted a thorough literature search for the countries considered in this paper. For each study, we identified the preferred estimates and recorded results for the most recent period reported. Where possible, we also documented trends between the first and last period available. These results are reported in Table A.1, while Table 1 summarises the most recent country-level patterns.

patterns are robust across countries and which reflect institutional or measurement differences.

Our contribution is to complement this literature with a harmonised cross-country analysis that applies consistent definitions and decomposition methods across 20 OECD countries. By reducing heterogeneity in data construction and empirical implementation, our framework provides a comparable benchmark that facilitates the identification of cross-country regularities in the contribution of firms to wage inequality and allows us to relate these patterns systematically to differences in labour market institutions.

Table 1: Comparison of our firm-effect results with the literature

Country	This study				Literature				
	Between (%)	Mincer FE(%)	AKM (%)	Trend in firm premia	Between (%)	Mincer FE(%)	AKM (%)	Trend in firm premia	Studies
Austria	44.7	41.9	10.4	Decreasing	45		16.5	No clear evidence	Horstmann (2023); Borovičková and Shimer (2017)
Canada	40.7	36.2		Increasing	33–35		6.2	Increasing	Avent-Holt et al. (2020); Mehdi et al. (2023)
Costa Rica	44.7	23.2	6.2	Decreasing				-	-
Denmark	22.5	12.2	5.3	Decreasing	39–42		13–19	Stable / mixed	Morin (2023); Avent-Holt et al. (2020); Sørensen and Vejlin (2011)
Estonia	50.7	50	19.1	Decreasing	39–46	19–23.5		Decreasing	Magda et al. (2021); Nikulin (2022)
Finland	36.8	26.9		Increasing				-	-
France	50	20.2	10.5	Mixed	31–47	13	5.8–10.1	Stable / mixed	Avent-Holt et al. (2020); Babet et al. (2025); Nikulin (2022)
Germany	51	30	16.6	Mixed	66		16.7–22	Increasing	Avent-Holt et al. (2020); Lochner and Schulz (2024); Mouton (2024); Card et al. (2013)
Hungary	54.1	41.3	20.8	Decreasing	47–51	17–20	18.3	Decreasing	Magda et al. (2021); Boza (2021); Nikulin (2022)
Italy	58.6	26.8	27.5	Increasing			21.8	Stable / decreasing	Devicienti et al. (2019)
Japan	55	39.9		Increasing	58			Stable	Akesaka and Miyoshi (2018); Avent-Holt et al. (2020)
Netherlands	32.1	24.1		Increasing	27–45		5	Increasing	Avent-Holt et al. (2020); Janietz and Bol (2020); Schneck (2023)
Norway	33.9	20.3	12.4	Increasing/stable	51			No clear evidence	Avent-Holt et al. (2020)
Portugal	51.8	28.9	15.9	Decreasing			9–19	Decreasing	Card et al. (2016); Silva et al. (2022b); Criscuolo et al. (2024)
Slovakia	53.8	49.2	21	Decreasing	47–48	22–23		Decreasing	Magda et al. (2021); Nikulin (2022)
Sweden	33.5	24.3	8.7	Mixed			12.1	Stable / increasing	Engbom et al. (2023)

Continued on next page

Country	This study				Literature				Studies
	Between (%)	Mincer FE(%)	AKM (%)	Trend in firm premia	Between (%)	Mincer FE(%)	AKM (%)	Trend in firm premia	
United Kingdom	52.4	26.3		Increasing	34–78	33.4		Increasing	Schaefer and Singleton (2020); Nikulin (2022)
United States	53.6	36		Increasing	41–42		3–11	Increasing	Song et al. (2019); Avent-Holt et al. (2020); Lachowska et al. (2023); Haltiwanger et al. (2024); Card et al. (2023)

Notes: Between (%) reports the share of overall wage variance explained by differences in average wages across firms. Mincer FE (%) reports the between-firm share after controlling for observable worker characteristics. AKM (%) reports the firm fixed-effect component from worker–firm models. For this study, level estimates refer to the most recent year available for each country. Trend in firm premia summarises the direction of change over the full sample period used in the analysis. Literature columns report the preferred estimates from published studies for the most recent period available in each study. Details of the studies are presented in Table A.1.

Econometric framework

Decomposing wage dispersion between and within firms

Wage inequality is measured as the total variance of logarithmic monthly wages. This measure is additively decomposable and scale-independent, which makes it particularly well-suited for separating between-firm and within-firm components of wage dispersion. In addition, we report results using alternative dispersion measures, such as the 90th/10th percentile ratio, to assess the robustness of our findings. The total variance of wages can be decomposed into the variance of average wages between firms and the variance of individual wages within firms

$$V(w_{ij}) = V(\bar{w}_j) + V(w_i - \bar{w}_j)$$

$$V^{total} = V^{between} + V^{within} \tag{1}$$

where w_i denotes the logarithmic wage of worker i in firm j and \bar{w}_j the average logarithmic wage in firm j . To disentangle the role of wage premia and workforce composition for between-firm wage dispersion, we first estimate firm wage premia and then decompose the between-firm variance of wages into one component due to differences in firms' wage premia and another due to differences in workforce composition across firms.

Estimating firm wage premia

In the baseline specification, covering all countries, we estimate firm wage premia separately for each year t using cross-sectional regressions conditional on observable worker characteristics. Specifically, we estimate a traditional human capital earnings equation augmented with firm fixed effects (Barth et al., 2016). Returns to worker characteristics and firm effects are therefore allowed to vary freely across years:

$$w_{ijt} = \sum_k x_{k,it} \beta_k^t + \gamma_{jt} + \varepsilon_{ijt} \quad (2)$$

where w_{ijt} denotes the logarithmic wage of worker i in firm j in year t ; $x_{k,it}$ denotes a set of observable worker characteristics k ; β_k^t denotes the estimated return to these characteristics in year t ; γ_{jt} denotes the estimated firm fixed effects and ε_{ijt} denotes the error term. The observable earnings characteristics included in the empirical model generally include education and/or occupation, age, and indicators for part-time work, all interacted with gender.²

For a subset of countries, we additionally estimate firm wage premia using an AKM two-way fixed-effects model (Abowd et al., 1999), which allows us to account for unobserved worker heterogeneity. The AKM specification is estimated over four-year periods to balance identification and precision.

Decomposing between-firm wage dispersion

Following Barth et al. (2016), the total variance of w_{ijt} can be written as follows:

$$V^{total} = V(\hat{s}) + V(\hat{\gamma}) + 2cov(\hat{s}, \hat{\gamma}) + V(\hat{\varepsilon}) \quad (3)$$

where $V(\hat{s})$ is the variance of predicted wages based on workers' observable characteristics; $V(\hat{\gamma})$ is the variance of estimated firm-specific wage premia; $cov(\hat{s}, \hat{\gamma})$ is the covariance of predicted wages with firm-specific wage premia and $V(\hat{\varepsilon})$ is the variance of residual wages.

Defining $\rho_\gamma \equiv \frac{cov(\hat{s}, \hat{\gamma})}{V(\hat{s})}$ and $\rho \equiv \frac{cov(\hat{s}, \hat{S})}{V(\hat{s})}$, where \hat{S} is the average of all individual workers' \hat{s} in the firm, the total variance of w_i can be rewritten as:

$$V^{total} = \underbrace{[V(\hat{s}) \rho + 2V(\hat{s}) \rho_\gamma + V(\hat{\gamma})]}_{V^{between}} + \underbrace{[V(\hat{s}) + V(\hat{\varepsilon}) - V(\hat{s}) \rho]}_{V^{within}} \quad (4)$$

where ρ_γ is the correlation of workers' predicted wages with the estimated firm fixed effects (a measure of worker-to-firm sorting) and ρ is the correlation of workers' predicted wages with the average predicted wage in their firm (a measure of worker-to-worker sorting).

Equation (4) shows that the between-firm variance can be decomposed into contributions from worker-to-worker sorting $V(\hat{s}) \rho$, worker-to-firm sorting $2V(\hat{s}) \rho_\gamma$ and the variance of firm-specific wage premia $V(\hat{\gamma})$. The within-firm variance can be decomposed into contributions from the returns to observed and unobserved earnings characteristics $V(\hat{s}) + V(\hat{\varepsilon})$ and worker-to-worker sorting $-V(\hat{s}) \rho$. The positive contribution of worker-to-worker sorting to overall wage inequality through between-firm wage inequality $V(\hat{s}) \rho$ is exactly offset by the negative contribution through within-firm wage inequality $-V(\hat{s}) \rho$. This reflects the fact that increased worker-to-worker sorting raises the dispersion of workforce composition between firms but makes workforce composition within firms more homogeneous, with no net effect on overall wage inequality.

The contribution of firm wage premia obtained from Equation (2) may represent an upper-bound estimate, as firm effects may partly capture unobserved worker characteristics. Conversely,

²In particular, we use a cubic function of age, categories for schooling (if available), categories of occupation (if available) and a full-time work dummy, if available. We interact all these variables with gender. The set of available variables is shown in Table B.3.

sorting components may be underestimated if sorting occurs on unobserved ability. An AKM two-way fixed-effects model addresses these concerns by including worker fixed effects in addition to firm effects. However, implementing the AKM specification in a fully harmonised way requires long worker panels with sufficiently connected worker–firm mobility networks (Andrews et al., 2008; Bonhomme et al., 2019), which are only available for a subset of countries in our dataset. Since our primary objective is to provide a consistent cross-country comparison across all 20 countries, we therefore present the harmonised cross-sectional specification as our baseline and use the AKM framework as a robustness exercise for the subset where comparable implementation is feasible.

Data

Data Sources. To implement the decomposition of wage inequality between and within firms, this paper makes use of linked employer-employee data for 20 countries drawn from administrative records designed for tax or social security purposes or, in a few cases, mandatory employer surveys (e.g. United Kingdom).³ Table 2 provides an overview of the main features of the datasets used (with more details provided in Table B.2 in the Annex). Each cross-section of the data covers about 26 million workers and 2 million firms across the 20 countries, for a total of 377 million worker-year observations in the entire unbalanced panel.

Table 2: Overview of harmonised linked-employer dataset

Country	Earnings data source	Sample structure	Time coverage	Number of workers	Number of firms
Austria	Social security administration	Universe	2002–2017	1,754,990	99,879
Canada	Tax administration	Universe	1991–2016	5,081,047	134,064
Costa Rica	Social security administration combined with register data	Universe	2006–2017	436,448	8,421
Denmark	Tax administration combined with register data	Universe	2001–2017	1,044,718	57,983
Estonia	Tax administration	Universe	2003–2017	311,684	24,511
Finland	Tax administration	Universe	2004–2018	690,381	15,375
France	Mandatory employer survey	8.3% random worker sample	2002–2017	565,506	66,232

Continued on next page

³In most countries, the project takes a distributed micro-data approach that relies on partners based in participating countries to provide relevant aggregations of individual-level data using a harmonised statistical code. Results for the United States, based on the same methodology that we use in this paper, are taken from Barth et al. (2016) and cover the years 1992 to 2007.

Country	Earnings data source	Sample structure	Time coverage	Number of workers	Number of firms
Germany	Social security administration	10% random worker sample	1996–2016	1,058,723	148,027
Hungary	Social security administration	50% random worker sample	2003–2018	600,598	25,229
Italy	Social security administration	6.7% random worker sample	2002–2015	461,714	84,806
Japan	Survey	Firm sample stratified by prefecture and industry	2001–2016	267,252	5,769
Netherlands	Social security administration	Universe	2010–2019	3,204,021	70,623
New Zealand	Tax administration	Universe	2000–2017	760,800	52,497
Norway	Tax administration	Universe	2004–2014	1,370,475	66,716
Portugal	Mandatory employer survey	Universe	2002–2017	1,304,983	36,347
Slovak Republic	Social security administration	Universe	2014–2019	914,331	42,143
Spain	Social security and tax administration	4% random worker sample	2002–2017	240,677	40,014
Sweden	Tax administration	Universe	2001–2015	1,659,705	104,609
United Kingdom	Mandatory employer survey	1% random worker sample	1997–2019	77,073	11,580
United States	Business Register, Economic Census, other surveys	Sample (see table note)	1992–2007	4,300,000	800,000
Total				26,105,126	1,894,825

Note: Number of firms and workers refer to the last year of the harmonised dataset used for analysis in each country. For the United States, we report the data from Barth et al. (2016), which relies on a combination of different data sources. For further information on the datasets please refer to Table B.2 and Table B.3.

In most countries, our data have the major advantage of being comprehensive, covering the entire population of workers and firms. The information is generally of high quality, notably with respect to wages, given the potentially important financial or legal implications of reporting errors and the extensive administrative procedures for quality control. Since tax and social security systems differ in their administrative requirements across countries, with potentially significant implications for cross-country comparability, we apply a number of sample restrictions, informed by the literature as well as intensive exploratory analysis using a small subset of countries, to harmonise the data.

Sample restrictions on firms. The analysis is restricted to the private sector,⁴ and excludes own-account workers by focusing on firms with two or more employees. Including own-account workers and public sector firms would increase the importance of between-firm wage inequality at the expense of the within component, since the self-employed constitute overwhelmingly single-worker firms and the distribution of public-sector wages are typically highly compressed.

Sample restrictions on workers and earnings. The main analysis focuses on total monthly earnings since information on working time is unavailable in several countries.⁵ In an attempt to exclude part-timers, all workers with earnings below 90% of the monthly earnings of a full-time worker at minimum wage are dropped. In the absence of a minimum wage, those below 45% of the monthly median wage for a full-time worker are dropped. Using hourly wages for the subset of countries where this is possible does not change the main results. Earnings information is reported in gross terms, i.e. total labour cost minus employer social security contributions and based on all taxable earnings, including overtime and other bonuses. To deal with the issue of top coding at the contribution threshold in social security data,⁶ censored wages are imputed through regression analysis using the predicted wage and the distribution of estimated error terms based on methods developed by Dustmann et al. (2009) and Card et al. (2013).⁷

The data typically covers the universe of workers and their employers, but in some cases, constitutes large representative samples of workers or firms. Worker-based samples only cover a fraction of workers in a firm, introducing measurement error in average firm wages. In worker-based samples, we correct for sampling error that biases down within-firm wage dispersion relative to between-firm wage dispersion using the correction proposed by Håkanson et al. (2015).⁸

The resulting datasets generally cover the past two decades in all countries except Costa Rica, Hungary, Japan, Norway and the Slovak Republic, where the sample period is about one decade. They are broadly consistent with other national and cross-country data sources regarding levels and changes in overall wage inequality. Except for Japan, all datasets follow workers across firms over time.

⁴This restriction reflects both data harmonisation constraints—linked employer–employee data for some countries are only available for the private sector—and conceptual considerations. Firm wage premia are most naturally interpreted in environments where wage-setting discretion operates at the firm level, whereas public-sector wages are often governed by centralized pay scales. Civil servants are not always directly identified in the data. When the information is available we drop them. In addition, in all countries we drop workers from the “public government and defence” sector.

⁵These countries are Austria, Canada, Costa Rica, Estonia, Finland, Hungary, New Zealand, the Slovak Republic, and Sweden. In Germany a part-time indicator is available, but no further information on hours worked.

⁶Up to 15% of earnings data in Germany are above the social security contribution threshold. In Austria, the data is left- and right-censored at the boundaries of the social security contribution basis. Italian social security data is also censored, but at a very high level affecting only a limited number of workers (around 750 euros per day).

⁷Censored wages are imputed by estimating Tobit regressions separately by year and categories of workers (e.g. gender and occupation), controlling for relevant information on the worker’s career and firm characteristics. The imputed wage is the sum of the predicted wage and a random component based on the distribution of the estimated error terms. This method performs well when compared to uncensored distributions regarding estimates of the overall variance, its trends over time and between and within-firm decompositions (de la Roca, 2017).

⁸The correction-adjusted decomposition of wage inequality between and within firms is given by:

$$\frac{1}{n} \sum_j \sum_i (w_i - \bar{w})^2 = \frac{1}{n} \sum_j n_j \left(\frac{N_j - 1}{N_j} \right) \left(\frac{1}{n_j - 1} \right) \sum_i (w_i - \bar{w}_j)^2 + \frac{1}{n} \sum_j n_j \left[(w_j - \bar{w})^2 - \left(\frac{N_j - n_j}{N_j n_j} \right) \left(\frac{1}{n_j - 1} \right) \sum_i (w_i - \bar{w}_j)^2 \right]$$

where w indicates earnings for person i in firm j , n indicates the number of observed workers in the firm and N the actual firm size. The first term on the right-hand side, shows the within-firm variance with a correction factor which disappears if all workers in the firm are observed ($N_j = n_j$), while the second term shows the corrected between-firm variance.

Decomposition results

Between and within firm wage dispersion

The between and the within components of overall wage dispersion are obtained directly from the data (see Equation (1)). On average, across countries, the dispersion of average wages between firms — not controlling for differences in worker composition — accounts for about half of the overall dispersion of wages (Figure 1, Panel A). While there are large cross-country differences in the overall *magnitude* of the between firm component (ranging from a variance of 0.05 in Sweden to 0.3 in the United States), these cross-country differences are correlated with differences in the overall variance of wages, meaning that the *share* of between-firm inequality in overall wage inequality is more compressed across countries than the *absolute* differences are.

These estimates are broadly consistent with the range documented in the existing literature (see Table 1). Across countries, previous studies typically attribute between 20% and 60% of aggregate wage inequality to differences between firms, depending on data sources and time periods. Our harmonised estimates fall within this range. Cross-country analyses based on employer survey data similarly report substantial between-firm components of wage dispersion (Zwysen, 2022; International Labour Organization, 2016; Tomaskovic-Devey et al., 2020; Lazear and Shaw, 2009).

Changes in the dispersion of average wages between firms also account for around half of the changes in overall wage inequality (Figure 1, Panel B). This is true both for countries where overall wage inequality increased over the observation period – slightly more than half of the countries covered – and for countries where overall wage inequality has declined. Again, these results are broadly consistent with those from previous studies. According to Lazear and Shaw (2009), changes in wage dispersion between firms account for at least 60-70% of changes in overall wage dispersion. Tomaskovic-Devey et al. (2020) report that the proportion of overall inequality that is attributable to the between-workplace component rose in twelve out of fourteen countries by 5% on average. In contrast, overall wage inequality rose by about 11%.⁹

A striking finding is that in most countries, between-firm wage dispersion and within-firm wage dispersion have tended to evolve in the same direction. This is true in 16 out of the 20 countries included in the sample, and both in countries where overall wage dispersion was falling and in countries where it was rising. This suggests that the underlying drivers of inequality increase inequality between workers within the same firm as well as inequality between firms. For example, an increase in the relative productivity of skilled workers could lead to higher between-worker inequality (a rising skill premium) and higher between-firm inequality, if more productive firms compete harder for skilled workers by offering higher wage premia and/or if workers of similar skill levels increasingly cluster in the same firms. The next subsection will examine in greater detail the extent to which between-firm wage dispersion is driven by the sorting of similar workers into firms versus differences in firm pay premia.

Our findings are robust to the choice of the sample period. The full estimates of overall wage inequality for each year and country included in this paper are shown in Figure C.1. The figure shows that trends in wage inequality have been remarkably stable over the past two decades, with trends either increasing or decreasing in a country over the entire period. The exception is Germany,

⁹Tomaskovic-Devey et al. (2020) also report that both overall and between-firm inequality increased in almost all countries, whereas we find that it increased in about half the countries and decreased in the other half. The difference between their and our results seems to be entirely explained by country coverage: both their study and ours report falling inequality in Hungary and France, and falling inequality in Japan since 2005 (when our data coverage starts). However, our study includes additional OECD countries not reported in Tomaskovic-Devey et al. (2020) where inequality has been falling: Estonia, New Zealand, the Slovak Republic, Spain, Portugal, and the United Kingdom.

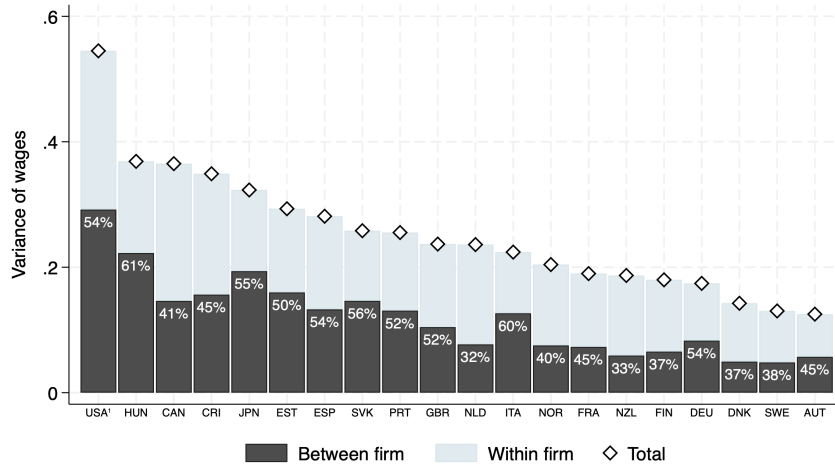
where wage inequality increased until the global financial crisis and has been falling since. Despite significant changes in inequality in some countries, the cross-country ranking of inequality remained roughly unchanged over the last two decades. Figure C.2 shows changes in wage inequality within and between firms for a comparable 10-year period between 2005 and 2015, rather than the first and last year in the data. The magnitude and the country ordering, as well as the within-between decomposition, are very similar to those shown in Figure 1 Panel B, except for Germany.

Figure C.3 reports the same analysis using an alternative measure of dispersion, the ratio of the 90th to the 10th percentile of the wage distribution (P90/P10). This robustness exercise can be implemented for 15 countries where firm-level wage distributions can be constructed consistently. We first compute the overall P90/P10 ratio at the worker level. We then compute the P90/P10 ratio across firm-level average wages, which provides a between-firm analogue based on the distribution of mean wages across firms. Unlike the variance, however, the percentile ratio does not admit an additive decomposition into between- and within-firm components, nor can it be further decomposed into sorting and firm-premium components as in the next section. The worker-level and firm-level P90/P10 measures are therefore reported separately.

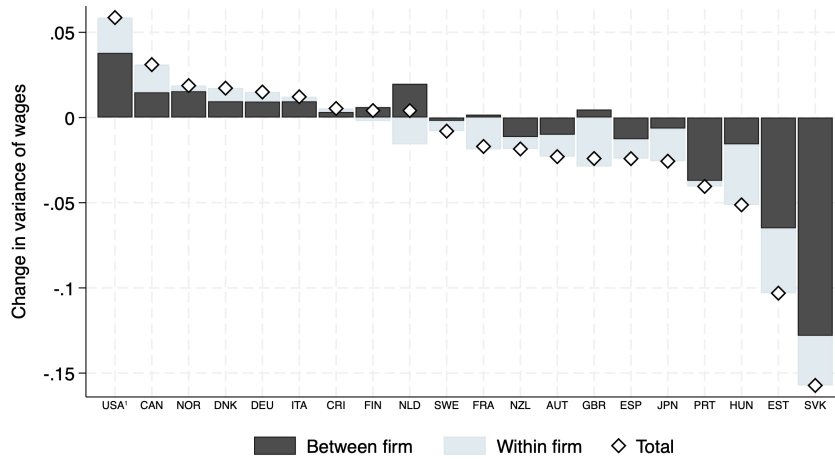
In levels, between-firm differences account for a substantial share of overall dispersion. Across countries, the between-firm P90/P10 typically ranges between 30% and 60% of the overall P90/P10 ratio, with less cross-country variation than observed in total inequality. This mirrors the variance-based results. In terms of changes over time, movements in the between-firm P90/P10 ratio closely track changes in overall dispersion. Countries experiencing increases (declines) in overall inequality also exhibit increases (declines) in between-firm dispersion, indicating that firm-level differences contribute systematically to the direction of inequality trends. The cross-country ordering and qualitative patterns are therefore largely preserved relative to the variance-based results shown in Figure 1.

Figure 1: A significant share of overall wage inequality is between firms

Panel A. Level of (log) wage variance, latest available year



Panel B. 10-year equivalent change in (log) wage variance



Note: Based on Equation (1). Panel A shows the total variance of log wages in the latest available year, with the percentages on top of the dark-shaded bars denoting the share of the between-firm component in total variance. Panel B shows the change in log wage variance between the first and latest available year for each country, standardised to a 10-year period by scaling the average annual change by 10. The dark-shaded component represents the between-firm contribution, while the light-shaded component represents the within-firm contribution. First year: 1992 for the United States; 1995 for Canada, Germany and Italy; 1996 for Spain; 1998 for the United Kingdom; 1999 for Sweden; 2000 for Austria, Finland and New Zealand; 2001 for Denmark and Netherlands; 2002 for Estonia, France and Portugal; 2003 for Hungary; 2004 for Norway; 2005 for Japan; 2006 for Costa Rica; 2014 for Slovakia. Latest available year: 2007 for the United States; 2011 for Hungary; 2013 for Japan; 2014 for Norway; 2015 for France, Italy and Sweden; 2016 for Canada, Germany, Netherlands and Spain; 2017 for Costa Rica, Denmark, Finland, New Zealand and Portugal; 2018 for Austria, Estonia, Slovakia and the United Kingdom. *Source:* Values for the United States are based on Barth et al. (2016).

The components of between-firm inequality: firm premia dispersion or workforce composition?

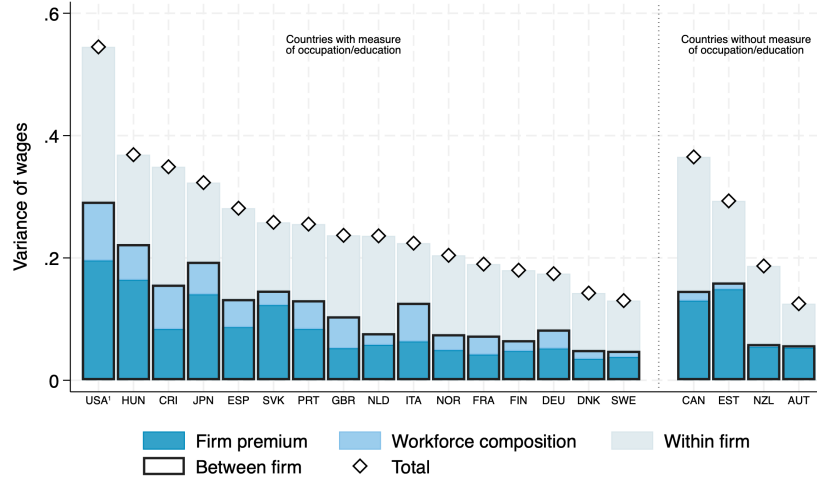
By accounting for the observable characteristics of workers in the wage equation (Equation (2)), the between-firm component of wage inequality can be decomposed further into differences in firm-specific wage premia and the sorting of workers with different observable characteristics into firms paying different average wages (Equation (4)). The role of unobservable characteristics is discussed further below.

On average, across countries, the *dispersion of firm wage premia* accounts for around two-thirds of the between-firm wage inequality, with worker sorting across firms accounting for about one-third (Figure 2). The pattern is very similar for wage inequality in levels or changes. The contribution of firm wage premia to between-firm wage inequality is fairly similar across countries where we have information on education or occupations. In Austria, Canada, Estonia and New Zealand, where only information on age and gender is available, unsurprisingly, the estimated contribution of firm wage premia in *levels* tends to become larger, as differences in the occupational or educational composition of workers are incorporated into the estimated firm wage premia.

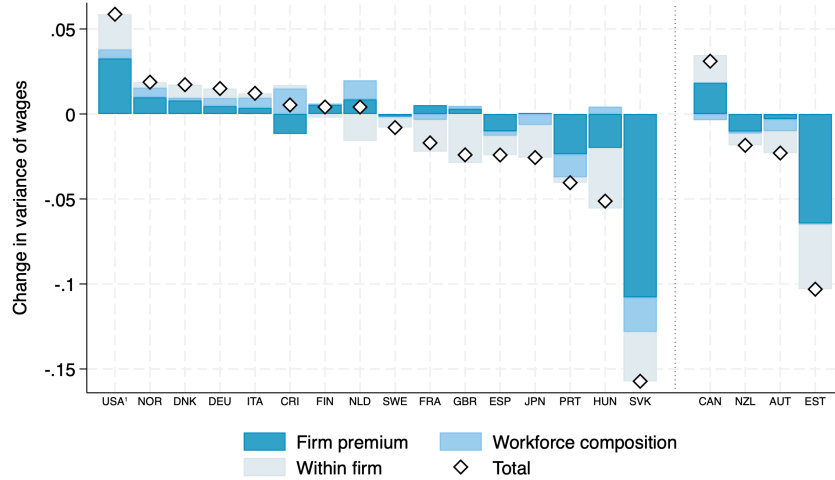
The remaining third of between-firm wage inequality, both in levels and changes, can be explained by observable differences in the workforce composition across firms. Workforce composition affects inequality between firms when workers with similar wages tend to cluster together in the same firms, i.e. when there is *sorting* of workers. However, only the sorting of higher-paid workers into higher-wage-premia firms leads to an increase in overall wage inequality. By contrast, when higher-paid workers cluster together, but not in any particular kind of firm – called worker-to-worker sorting – this only affects the distribution of within-firm versus between-firm wage dispersion, not overall wage inequality.

Figure 2: Distinguishing between firm-wage premia and worker sorting

Panel A. Contributions to the level of wage dispersion, latest available year



Panel B. Contribution to 10-year equivalent change in (log) wage variance



Note: Based on equation (2). Panel A shows the level of overall wage inequality in the latest available year, with the shaded components denoting the contributions of firm premia, sorting, and within-firm inequality. Panel B shows the change in overall wage inequality and its components between the first and latest available year for each country, standardised to a 10-year period by scaling the average annual change by 10. First year: 1992 for the United States; 1995 for Canada, Germany and Italy; 1996 for Spain; 1998 for the United Kingdom; 1999 for Sweden; 2000 for Austria, Finland and New Zealand; 2001 for Denmark and Netherlands; 2002 for Estonia, France and Portugal; 2003 for Hungary; 2004 for Norway; 2005 for Japan; 2006 for Costa Rica; 2014 for Slovakia. Latest available year: 2007 for the United States; 2011 for Hungary; 2013 for Japan; 2014 for Norway; 2015 for France, Italy and Sweden; 2016 for Canada, Germany, Netherlands and Spain; 2017 for Costa Rica, Denmark, Finland, Portugal and New Zealand; 2018 for Austria, Estonia, Slovakia and the United Kingdom.

Source: Figures for the United States are based on Barth et al. (2016).

Robustness to alternative methods of estimating wage premia

An alternative to estimating firm wage premia according to Equation (2) is to estimate the two-way fixed-effects “AKM model” proposed by Abowd et al. (1999), which augments Equation (2) with an individual worker fixed effect (μ_i):

$$w_{ijt} = \sum_k x_{k,it} \beta_k + \gamma_j + \mu_i + \theta_t + \varepsilon_{ijt} \quad (5)$$

This controls for any time-invariant factors, such as ability and skills, which relate to a worker’s individual labour productivity and are not already measured by workers’ observable characteristics. As before, the dispersion of firm wage premia corresponds to the variance of firm fixed effects, $\text{var}(\gamma_j)$. The advantage of this alternative approach over the approach from Barth et al. (2016) is that in the latter, unobserved worker skills may be captured by the firm fixed effects, thereby artificially inflating $\text{var}(\gamma_j)$. The disadvantage is that in small samples with few job switchers, the AKM model suffers from limited mobility bias which inflates the estimated contribution of firm wage premia (Andrews et al., 2008; Bonhomme et al., 2019). Consequently, when firms have few movers, the approach may overstate the role of wage premia dispersion in overall wage inequality (even when the sample of firms is large).¹⁰

Figure C.4 shows the correlation between firm wage premia estimated using the baseline Barth et al. (2016) method and those estimated using the AKM method, for the subset of 12 countries for which estimation of the AKM model was feasible. Including worker fixed effects reduces the contribution of firm wage premia to overall wage inequality by about half to about 15%. This may suggest that between-firm differences in wage dispersion reflect for about one third differences in wage premia dispersions, one third sorting based on unobservable worker characteristics and one third sorting based on observable worker characteristics. Note that while including worker fixed effects reduces the contribution of firm-wage premia in overall wage inequality, cross-country differences in the importance of wage premia dispersion remain broadly stable (Panel A). Italy is an outlier, which may be explained by limited mobility bias: it has the smallest sample among the countries covered in this part of the analysis (a 7% sample of workers) and the lowest job-to-job mobility (see Causa et al., 2021, for comparable job mobility estimates across EU countries).¹¹ For countries where no information on occupation or education of workers is available – Austria, Costa Rica and Estonia in this subsample – the Barth et al. (2016) method estimates are particularly large relative to the fitted line trend, which confirms the interpretation that differences in unobserved worker characteristics are partially incorporated into the estimated firm wage premia. However, Panel A of Figure C.4 suggests that this does not materially affect the overall cross-country pattern of firm wage dispersion.

¹⁰Moreover, the AKM model is only identified for a sub-sample of the entire available data – a connected set of workers and firms – although, in practice, this limitation might not be very significant in the case of large sample or population data. Furthermore, the AKM approach requires functional form assumptions of exogenous mobility and additively separable person and firm effects.

¹¹When Italy is excluded, the R-squared correlation coefficient in Figure C.4 Panel A increases from 0.61 to 0.84.

Panel B of Figure C.4 shows the correlation in *changes* in firm wage premia dispersion across the two methods. The within-country changes in firm wage premia dispersion across the two estimation methods are even more closely aligned than the levels, which is consistent with changes in worker sorting on unobservables not being a major driver of changes in wage inequality. Changes in between-firm inequality reflect for about two-thirds changes in wage premia dispersion and one third changes in the pattern of sorting across firms. This suggests that wage-setting practices are increasingly important for understanding wage inequality developments.

In further analysis, we show that changes in the importance of wage premia dispersion in overall dispersion are driven by manufacturing, while the importance of wage-premia dispersion in services has remained broadly constant (Figure C.5, Panel A). A similar picture emerges when looking at the contribution of firm wage premia only to between-firm inequality rather than overall inequality (Figure C.5, Panel B). This results suggests that the increasing role of firm wage premia both within manufacturing, and relative to the services sector (where pay composition remained stable), is a key driver behind the growing role of firms in explaining wage inequality in the sample of countries analysed.

Comparison with existing country-level evidence

Our harmonised estimates align closely with the main patterns documented in the country-level literature. Table 1 compares, country by country, (i) the between-firm share in overall wage variance, (ii) the between-firm share after conditioning on observable worker characteristics (“Mincer FE”), and (iii) the dispersion of firm pay premia from worker-firm models where available (AKM), together with corresponding ranges from published studies for broadly comparable periods (the details are reported in Table A.1). Across most countries, our harmonised estimates fall within the range of existing evidence reported in studies such as Barth et al. (2016), Song et al. (2019), Card et al. (2013), and Lachowska et al. (2023) for the United States, Schaefer and Singleton (2020) for the United Kingdom, and Magda et al. (2021) and Nikulin (2022) for Central and Eastern Europe.

Beyond headline levels, Table 1 sheds light on the relative importance of workforce composition and firm-specific pay premia in driving between-firm wage dispersion. In most countries, the raw between-firm share of overall wage variance lies between roughly 30 and 60 percent. Conditioning on observable worker characteristics typically reduces this share by around 10 to 20 percentage points, indicating that a non-negligible portion of cross-firm pay differences reflects systematic sorting of workers with different observable characteristics across firms. At the same time, the extent of this reduction varies meaningfully across countries. In settings such as France and the United Kingdom, conditioning substantially narrows the between-firm component, suggesting an important role for observable composition. In contrast, in countries such as Estonia and Slovakia, the between-firm share remains comparatively high even after conditioning, pointing to a larger role for firm-specific pay differences. Where AKM estimates are available, they remain within the range reported in country-specific studies such as Barth et al. (2016) and Song et al. (2019). Crucially, they preserve the broad cross-country patterns, as countries with high or low firm-related dispersion under the baseline measure exhibit similar outcome under the AKM specification.

The correspondence is particularly strong for qualitative trends. In countries such as the United States, Germany, Canada and the United Kingdom, where previous studies document rising dispersion across firms and/or strengthening sorting across employers (e.g. Song et al., 2019; Dustmann et al., 2009; Mehdi et al., 2023), we similarly find increasing between-firm inequality and increasing dispersion in firm wage premia. Conversely, in countries where the literature reports relatively stable or more compressed firm premia over time, including Denmark and Sweden (Sørensen and Vejlin, 2011; Engbom et al., 2023), we find similar patterns in our harmonised estimates. Taken

together, these comparisons suggest that our harmonised design reproduces the main country-level stylised facts while making them more comparable across settings.

Firm wage premia dispersion and wage setting institutions

Background

A consistent finding across countries is that labour market institutions, particularly the structure of wage-setting and collective bargaining, shape how firms contribute to wage inequality through multiple channels. Institutional arrangements influence both the sorting of workers across firms and the extent to which firms share rents with workers, and these mechanisms often operate jointly. Changes in collective bargaining coverage and the decentralization of wage-setting are associated with rising dispersion in average pay across firms, as documented for Germany and the Netherlands, where declining coordination has coincided with growing between-firm wage inequality (Card et al., 2014; Schneck, 2023; Dustmann et al., 2009). By contrast, countries with binding industry-wide agreements, such as Italy, exhibit more limited dispersion in firm-specific wage premia, with inequality instead emerging across occupations or job titles constrained by negotiated wage structures (Devicienti et al., 2019)

At the same time, the literature shows that wage-setting institutions also affect how productivity differences translate into wages within firms. Evidence from Portugal and Brazil highlights how bargaining regimes can compress firm-specific wage premia by limiting firms' ability to share surplus through wages, even when productivity differences persist (Card et al., 2016; Alvarez et al., 2018; Silva et al., 2022a). Cross-national analyses further indicate that weaker employment protections and declining bargaining power are associated with increases in both between- and within-firm inequality, suggesting that institutions jointly shape sorting patterns and rent-sharing outcomes rather than operating through a single channel (Tomaskovic-Devey et al., 2020). Overall, the literature points to wage-setting institutions as a key mediator of both the level of wage inequality and the relative importance of firm-level channels through which it arises.

Another key wage-setting institution is the statutory minimum wage. A large literature documents that minimum wages compress the lower tail of the wage distribution by raising wages at the bottom and truncating low-wage outcomes, thereby reducing overall wage dispersion and residual inequality (DiNardo et al., 1996; Lee, 1999; Autor et al., 2016). These effects are strongest in settings where the minimum wage is binding and widely enforced, and they operate primarily through compression within firms and worker groups.

At the same time, minimum wages may also affect between-firm wage inequality and firm-specific wage premia through several channels. By compressing wage policies among low-paying firms, generating spillovers to wages above the minimum, and potentially affecting worker sorting and firm composition, minimum wage policies can alter dispersion across firms as well (Autor et al., 2016; Cengiz et al., 2019). For example, Engbom and Moser (2022) show that large increases in the real minimum wage in Brazil were associated with substantial compression of earnings inequality, including spillovers above the minimum that reduced wage dispersion across firms. Related work documents how minimum wages can affect the lower tail of the wage distribution and contribute to overall wage compression in developing and emerging economies (e.g. Engbom and Moser, 2022, 2024).

Descriptive patterns

Motivated by the preceding literature on wage-setting institutions, we focus on two central policy dimensions—collective bargaining arrangements and statutory minimum wages—and examine how they are systematically associated with firm-level components of wage dispersion.

The first institutional feature we consider is the scope of collective wage-setting arrangements. Our primary measure is collective bargaining coverage based on OECD (2019a)¹² As a second institutional dimension, we examine the role of statutory minimum wages. We measure the bite of the minimum wage using the ratio of the statutory minimum wage to the median wage (Kaitz index), based on OECD data.

Figure 3, Panel A, illustrates the cross-sectional relationship between collective bargaining coverage and the variance of firm wage premia. The figure reveals a clear negative association, with countries characterized by low collective bargaining coverage tending to exhibit higher dispersion in firm premia, and countries with more extensive collective bargaining coverage displaying substantially lower dispersion. These patterns reflect broad differences in the extent to which wage-setting is governed by collective agreements that extend beyond the firm level.

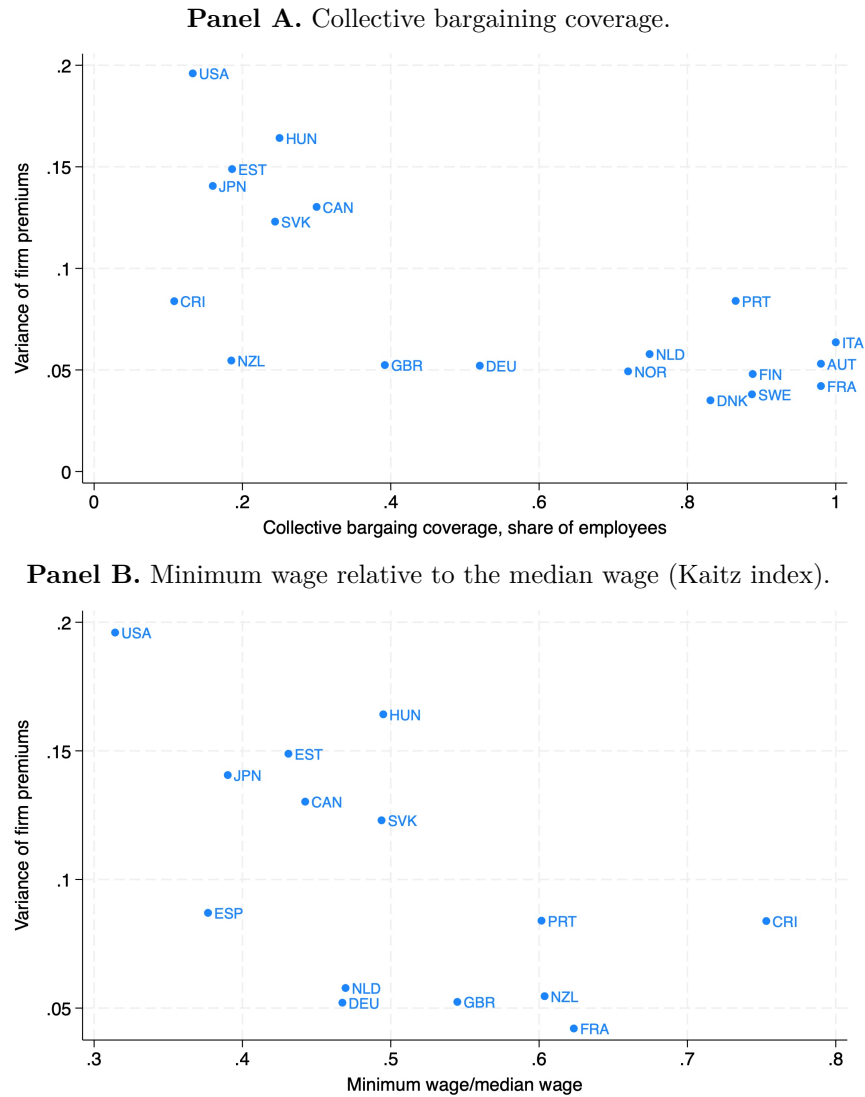
Panel B of the same figure plots the variance of firm premia against the Kaitz index for countries with a national minimum wage. Here too, we observe a negative relationship, suggesting that more binding minimum wages are associated with lower dispersion in firm wage premia.

Figure D.2 plots the relationship between the two institutional variables and the variance of firm wage premia estimated using the AKM procedure (Equation (5)) for the subset of countries where these estimates are available. Although coverage is limited to 11 countries, the figure reveals patterns similar to those observed in Figure 3, with lower dispersion of firm wage premia in countries with higher collective bargaining coverage and more binding minimum wages.

These results show that both higher collective bargaining coverage and more binding minimum wages are associated with lower overall wage dispersion and lower dispersion in firm wage premia. However, a negative relationship with dispersion levels does not necessarily imply that institutions alter the relative importance of firm-level wage setting within overall inequality. An institution may compress wages broadly without changing the share attributable to firms, or it may disproportionately affect the firm component. Figure D.1 and Table D.1 therefore examine how these institutions are related to the share of wage dispersion explained by firm fixed effects. For collective bargaining, the association with the firm share is weak, suggesting that countries with more decentralized wage setting tend to exhibit higher dispersion not only in firm wage premia but also in other components of wage dispersion. In contrast, the Kaitz index is negatively associated with the firm share, indicating that—at least in cross-sectional levels—more binding minimum wages are more closely related to reductions in firm-premium dispersion than to reductions in other sources of wage dispersion.

¹²The datasource is OECD/AIAS ICTWSS database, <https://www.oecd.org/en/data/datasets/oecdaias-ictwss-database.html>

Figure 3: Firm wage premia dispersion and labour market institutions



Note: Panel A plots the dispersion (variance) of estimated firm wage premia, based on Equation (4), against collective bargaining coverage. Panel B plots the dispersion of firm wage premia against the ratio of the minimum wage to the median wage with countries having a national minimum wage. In both panels, each observation corresponds to a country and refers to the last year for which wage dispersion data are available for that country.

Source: Firm premia for the United States are based on Barth et al. (2016).

Estimation procedure

To move beyond descriptive evidence and assess these relationships more systematically, we estimate pooled and long-difference regression models. To achieve this, we exploit the panel structure of our aggregated dataset. Given the high persistence of both the dispersion measures and the institutional variables, using annual observations would largely add noise without providing additional identifying variation. We therefore work with a medium-run panel that samples each country at four-year intervals. Specifically, if the last year for which wage dispersion measures are available for country c is denoted by T_c , we consider the sequence of years $\tau = T_c, T_c - 4, T_c - 8$, and so on.¹³ Finally, we restrict the analysis to years from 1999 onwards to ensure greater comparability of wage-setting institutions and data coverage across countries.

In our pooled regressions, we relate each measure of wage dispersion for country c in year τ to contemporaneous labour market institutions at the country level:¹⁴

$$V_{c\tau} = \beta_0 + \beta_I \text{Institution}_{c\tau} + \beta_{GDP} \ln \left(\frac{GDP}{capita} \right)_{c\tau} + \beta_{sch} \text{schooling}_{c\tau} + \psi_\tau + \epsilon_{c\tau}. \quad (6)$$

The dependent variable $V_{c\tau}$ denotes alternative measures of wage dispersion, including total wage variance V^{total} , the between-firm component $V^{between}$, and the variance of estimated firm wage premia $V(\hat{\gamma})$. The control $\ln \left(\frac{GDP}{capita} \right)_{c\tau}$ is PPP-adjusted GDP per capita from the World Bank and captures differences in countries' overall level of economic development, while $\text{schooling}_{c\tau}$ measures average years of schooling and controls for cross-country differences in educational attainment. The term ψ_τ denotes four-year period fixed effects,¹⁵ which absorb global secular trends and common macroeconomic shocks.

The institutional variables in our main analysis are collective bargaining coverage and the Kaitz index, both defined previously. For countries without a national minimum wage, we set the Kaitz index to the sample mean and include a dummy variable indicating the absence of a statutory minimum wage. This approach allows the coefficient on the Kaitz index to be identified from countries with a statutory minimum wage, while the indicator captures systematic differences for countries without one.

Although labour market institutions do vary over time within countries, these changes are typically gradual, so identification in this pooled specification comes primarily from cross-country differences, net of common time effects. We cluster standard errors at the country level to allow for serial correlation within countries. Finally, we weight observations by the number of workers observed in each country, reflecting the fact that wage dispersion measures are estimated more precisely in countries with larger underlying samples.

Our second specification relates medium-run changes in wage dispersion to institutional conditions measured at the start of the period. For simplicity, we refer to these as long-difference estimates, as the dependent variable is expressed as a four-year change.¹⁶

Specifically, we estimate the following regression:

$$\frac{V_{c,\tau+4} - V_{c,\tau}}{4} = \beta_I \text{Institution}_{c\tau} + \beta_{GDP} \ln \left(\frac{GDP}{capita} \right)_{c\tau} + \beta_{sch} \text{schooling}_{c\tau} + \psi_\tau + \epsilon_{c\tau}. \quad (7)$$

¹³This procedure can leave some early years unused. When the gap between the first observed year and the first four-year interval is at most three years, we retain the first observed year as well.

¹⁴When an institutional variable is not available for year τ , we use the most recent available value.

¹⁵Specifically, these are indicators for the periods 2000–2003, 2004–2007, and so on.

¹⁶Institutional variables do change over time, but these changes are typically gradual, implying limited within-country variation at annual frequencies. As a result, specifications that rely exclusively on short-run within-country variation are weakly identified. Focusing on medium-run changes in the outcome remains informative in this setting.

The dependent variable $\frac{V_{c,\tau+4}-V_{c,\tau}}{4}$ is the annualised change in the wage dispersion measure over a four-year interval. The institutional variable $Institution_{c\tau}$ is measured at the beginning of the period, so the coefficients relate subsequent changes in wage dispersion to pre-existing institutional conditions. As in the pooled specification, ψ_τ denotes four-year period fixed effects, which absorb common shocks affecting all countries over each four-year interval. We again cluster standard errors at the country level to allow for serial correlation within countries.

Regression results

Regression results are reported in Table 3. Panel A presents pooled cross-country estimates based on Equation (6), while Panel B reports long-difference estimates from Equation (7).

In each panel, the first three columns report regressions using total wage variance as the dependent variable, the next three use the between-firm component of wage variance, and the final three use the variance of estimated firm wage premia. Within each block of three columns, column (1), (4), and (7) include only collective bargaining coverage; columns (2), (5), and (8) include only minimum wage variables; and columns (3), (6), and (9) include both institutional measures simultaneously.

According to Panel A, countries with higher collective bargaining coverage exhibit lower overall wage dispersion. Comparing columns (1), (4), and (7) shows that roughly half of this association reflects a smaller between-firm component, and that approximately three quarters of this between-firm association is accounted for by lower dispersion in estimated firm wage premia.

Higher minimum wages are also associated with lower wage dispersion in the pooled regressions. As with collective bargaining coverage, approximately half of this relationship reflects differences in the dispersion of firm wage premia. Both institutional variables remain statistically significant when included jointly in the regression (columns (3), (6), and (9)), suggesting that they capture distinct dimensions of wage-setting institutions.

Panel B of Table 3 presents results from the long-difference specification. In this more demanding setting, most coefficients are estimated imprecisely. Nevertheless, higher collective bargaining coverage is associated with slower growth in wage dispersion over time, and this association is even more strongly concentrated in the firm-premium component than in the cross-sectional specification. In contrast, the long-difference estimates for minimum wages do not indicate a systematic association between changes in minimum wage institutions and medium-run changes in firm-level wage dispersion.

Table 3: Wage dispersion and labour-market institutions

(a) Pooled regression									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Total	Total	Total	Between	Between	Between	Firm Premium	Firm Premium	Firm Premium
CB coverage	-0.440*** [0.063]		-0.241*** [0.048]	-0.212*** [0.053]		-0.107** [0.046]	-0.152*** [0.034]		-0.054* [0.030]
Minimum wage/median wage		-1.003*** [0.218]	-0.732*** [0.189]		-0.662*** [0.159]	-0.542*** [0.111]		-0.508*** [0.081]	-0.448*** [0.066]
No minimum wage		-0.123*** [0.017]	-0.065*** [0.018]		-0.045*** [0.015]	-0.020 [0.020]		-0.037*** [0.010]	-0.024 [0.014]
Av. years of schooling	-0.053*** [0.014]	-0.008 [0.006]	-0.039*** [0.008]	-0.029** [0.011]	-0.010** [0.004]	-0.024*** [0.008]	-0.014 [0.008]	-0.001 [0.002]	-0.008 [0.005]
Log GDP/capita	0.211** [0.096]	-0.108* [0.053]	0.069 [0.051]	0.071 [0.077]	-0.100*** [0.034]	-0.021 [0.047]	0.031 [0.054]	-0.088*** [0.024]	-0.048 [0.032]
Observations	79	79	79	79	79	79	79	79	79
R-squared	0.76	0.81	0.90	0.65	0.77	0.82	0.63	0.83	0.85

(b) Long differences									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Total	Total	Total	Between	Between	Between	Firm Premium	Firm Premium	Firm Premium
CB coverage	-0.009*** [0.003]		-0.013** [0.005]	-0.004** [0.002]		-0.007* [0.004]	-0.004** [0.002]		-0.006* [0.003]
Minimum wage/median wage		-0.000 [0.012]	0.010 [0.010]		0.006 [0.006]	0.011 [0.007]		0.002 [0.005]	0.007 [0.006]
No minimum wage		-0.001 [0.001]	0.002 [0.001]		-0.001 [0.001]	0.001 [0.001]		-0.001 [0.001]	0.000 [0.001]
Av. years of schooling	-0.001* [0.001]	0.000 [0.000]	-0.002* [0.001]	-0.000 [0.000]	0.000 [0.000]	-0.001 [0.001]	-0.001 [0.000]	0.000 [0.000]	-0.001 [0.000]
Log GDP/capita	0.015*** [0.005]	0.008 [0.005]	0.018*** [0.006]	0.009** [0.003]	0.005 [0.003]	0.011** [0.004]	0.009*** [0.003]	0.005* [0.003]	0.010** [0.004]
Observations	60	60	60	60	60	60	60	60	60
R-squared	0.39	0.26	0.42	0.40	0.35	0.45	0.45	0.37	0.47

Notes: Panel A reports pooled cross-country regressions estimated using country-level wage dispersion measures; each observation corresponds to a country-year, with every fourth year included. These regressions correspond to Equation (6), which relates wage dispersion to contemporaneous institutional characteristics. The dependent variable in columns (1)–(3) is total wage variance, in columns (4)–(6) the between-firm component of wage variance, and in columns (7)–(9) the variance of estimated firm wage premia, based on Equation (4). “CB coverage” denotes the share of workers covered by collective bargaining agreements. “Minimum wage/median wage” is the ratio of the statutory minimum wage to the median wage (Kaitz index), and “No minimum wage” is a dummy indicating the absence of a national minimum wage.

Panel B reports long-difference regressions based on four-year changes, as specified in Equation (7). The dependent variable is a 4-year change in wage dispersion. Explanatory variables are measured at the beginning of each period, and all specifications include four-year period fixed effects. Standard errors are clustered at the country level. Observations are weighted by the number of workers used to estimate the wage dispersion measures, reflecting differences in estimation precision across countries. Significance levels are *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

We report additional analyses in Section Appendix D that examine alternative institutional measures and the robustness of our main findings.

First, in Table D.3, we replace the continuous measure of collective bargaining coverage with a dummy variable indicating whether wage determination is fully or largely decentralised, following the classification in OECD (2019b). While collective bargaining coverage captures the share of workers whose wages are subject to collective agreements, the decentralisation indicator reflects the institutional level at which wage bargaining takes place and therefore captures a distinct—though related—dimension of wage-setting systems.

Consistent with our baseline results, wage dispersion is higher in countries with more decentralised wage-setting arrangements, and a substantial share of this association is accounted for by greater dispersion in firm wage premia. In the long-difference specification, the corresponding estimates are smaller and only marginally significant, which is consistent with the high persistence of the decentralisation indicator and the resulting limited within-country identifying variation in medium-run changes.

We also consider employment protection legislation (EPL) as another institutional feature that may shape wage dispersion. While employment protection is correlated with other labour market institutions, Table D.5 examines its association with wage dispersion using the EPL R (version 1) indicator from OECD (2020). When included on its own, employment protection is negatively associated with overall wage dispersion, its firm-level components, and the growth of these measures over time. However, when collective bargaining coverage is included alongside employment protection, the estimated relationship between employment protection and wage dispersion becomes statistically insignificant, whereas the coefficient on collective bargaining coverage remains strongly negative. This pattern suggests that the association between employment protection and wage dispersion primarily reflects broader institutional environments more directly captured by collective bargaining arrangements.

In summary, countries with higher collective bargaining coverage and more binding minimum wages tend to exhibit lower wage dispersion. A substantial share of these associations reflects differences in the dispersion of firm wage premia, underscoring the importance of firm-level wage setting. Higher collective bargaining coverage is also associated with slower growth in wage dispersion over time, whereas we find no systematic relationship between changes in minimum wages and medium-run changes in dispersion.

These results should be interpreted as descriptive rather than causal. Labour market institutions are likely endogenous and highly persistent, and their effects are difficult to disentangle in cross-country data. Nonetheless, the findings point to collective bargaining in particular as a central institutional correlate of cross-country differences in firm-level wage dispersion.

Robustness checks

A potential concern is that cross-country differences in data availability and measurement may affect the comparability of estimated dispersion. Table D.9 addresses this issue by reporting regressions for the variance of firm wage premia (corresponding to columns (7)–(9) of Table 3) under alternative sample restrictions. In columns (1)–(3), we restrict the sample to countries without wage censoring, excluding Austria, Germany, and Italy. While the estimates are less precise, the results are broadly similar to those in the baseline specification. In columns (4)–(6), we retain only countries for which either schooling or occupation information is available, and in columns (7)–(9) we further restrict the sample to countries with explicit information on part-time status (see Table B.3). Across these alternative samples, the association between minimum wages and the dispersion of firm wage premia remains robust. For collective bargaining coverage, point estimates in the level specification are

similar in magnitude but become noisier, while in the long-difference specification they are close to zero. These patterns likely reflect that the sample restrictions disproportionately exclude non-European countries, substantially reducing cross-country variation in collective bargaining coverage.

A potential concern is that differences in the age composition of the workforce may be correlated with wage dispersion measures. Table D.7 therefore reports regressions that additionally control for the shares of young and old workers. We find that the share of young workers is systematically related to wage dispersion, with a higher share of young workers associated with lower overall dispersion, including lower dispersion in firm wage premia. Importantly, controlling for age composition does not materially affect the pooled regression results for collective bargaining coverage or the minimum wage. In the long-difference specification, however, the estimated association between collective bargaining coverage and changes in wage dispersion becomes smaller and statistically insignificant once age composition is included.

The P90/P10 ratio (the difference between the 90th and 10th percentile of the wage distribution) may be a more robust measure of wage dispersion than the variance, especially if wages are censored. Table D.11 repeats the main exercise for the overall wage dispersion as well as the between-firm measure. The results are qualitatively similar to the main results: both CB coverage and the level of minimum wage are negatively correlated with levels of wage dispersion, with the between-firm component explaining a significant part of this relationship. Collective bargaining coverage is also negatively correlated with the change in wage dispersion.

In our main specification, we weight regressions by the number of observations in each country-year. To assess robustness, we re-estimate all specifications without weights (Table D.13). The level results (Panel A) are similar to, though less precise than, those in the baseline specification. In the long-difference specifications, the coefficient on collective bargaining coverage remains negative, but estimates are generally imprecise and model fit is substantially lower.¹⁷

Conclusion

This paper provides a harmonised cross-country analysis of the role of firms in wage inequality across 20 OECD countries since the 2000s. Using linked employer–employee data and a consistent decomposition framework, we quantify the contribution of between-firm wage differences and firm-specific wage premia to overall wage dispersion and relate cross-country variation to labour market institutions.

Our first finding is that firms play an important role in explaining aggregate wage inequality. On average across countries, between-firm wage inequality—differences in average pay between firms—accounts for roughly one-half of overall wage inequality, both in levels and in changes over time. In most countries, changes in between-firm and within-firm wage dispersion move in the same direction, suggesting that common forces drive trends in wage inequality both across workers and across firms.

Our second main finding is that differences in firms’ wage-setting practices, rather than differences in worker skills alone, are particularly important for understanding changes in between-firm inequality over time. Differences in wage-setting practices—as captured by firm wage premia, i.e. the part of wages determined by the firm rather than by worker characteristics—account for around two-thirds of the change in between-firm wage inequality, but only about one-third of the level of

¹⁷In the long-difference specification, the minimum wage variable becomes positive and statistically significant when included jointly with the collective bargaining measure. This result is driven by a single high-leverage observation (Costa Rica), where the role of informal economy can explain the atypical value. Excluding this country yields coefficients close to zero and statistically insignificant.

between-firm inequality. The remaining share reflects differences in workforce composition across firms, including the sorting of higher-skilled workers into higher-paying firms.

Third, we document systematic associations between institutional features of wage-setting systems and the dispersion of firm wage premia. Firm wage premia dispersion tends to be higher in countries with lower collective bargaining coverage and less binding minimum wages. While these relationships are descriptive rather than causal, they indicate that institutional settings are systematically associated with the extent to which firms differentiate wages and translate productivity advantages into pay premia.

These findings imply that addressing wage inequality requires attention not only to worker characteristics but also to the firm dimension of wage determination. Policies that influence the scope for wage-setting discretion—such as collective bargaining arrangements and minimum wage institutions—as well as measures that facilitate worker mobility and promote productivity catch-up across firms may affect both aggregate productivity performance and the distribution of wages across firms.

From a policy perspective, the results underscore the importance of distinguishing between different sources of wage inequality and of comparing them across institutional settings using consistent methods. By applying a harmonised decomposition across 20 OECD countries, the paper shows that the role of firm wage premia in inequality levels and trends differs systematically across bargaining regimes and minimum wage frameworks. Such cross-country evidence is essential for interpreting inequality developments in an international context and for assessing which institutional margins—such as bargaining coverage or minimum wage design—are most closely associated with wage dispersion across firms. Without a harmonised framework, it is difficult to determine whether observed differences reflect genuine institutional variation or differences in measurement and methodology.

From an employer perspective, the findings highlight that wage-setting is not merely a background feature of the labour market but a quantitatively important margin that varies across institutional environments. In countries where collective bargaining is more decentralised and minimum wages are less binding, firm wage premia account for a larger share of pay dispersion, indicating greater scope for firms to differentiate wages across employers. In more centralized systems, where premia are comparatively compressed, differences in pay across firms are more limited. Institutional arrangements therefore shape the extent to which firms can use wages as a tool in attracting and retaining workers and influence how much pay dispersion emerges across firms within a country.

Acknowledgements and Data Statements

Acknowledgements and Data Statements

This paper was produced within the LinkEED network coordinated by the OECD. The harmonised country-level estimates are based on confidential linked employer–employee microdata accessed and analysed by authorised researchers in each participating country.

Country contributions were as follows: Canada – Wen-Hao Chen; Costa Rica – Jonathan Garita, Valerie Lankester, Catalina Sandoval; Denmark – Antoine Bertheau; Finland – Satu Nurmi; France – Capucine Riom; Germany – Duncan Roth; Hungary – Balázs Muraközy; Japan – Ryo Kambayashi; Netherlands –Katarzyna Grabska-Romagosa; New Zealand – Richard Fabling; Norway – Erling Barth; Portugal – Priscilla Fialho; Slovak Republic – Vladimir Peciar; Sweden – Andrei Gorshkov and Oskar Nordström Skans; United Kingdom – Richard Upward.

Funding

Erling Barth acknowledges funding from the Norwegian Research Council (grant 280307) and from CORE – Centre for Research on Gender Equality, Oslo.

Balázs Muraközy acknowledges funding from the National Research, Development and Innovation Fund of Hungary (project number 146238).

Country-Specific Data Statements

Canada. The research was undertaken while Wen-Hao Chen was a Senior Economist at Statistics Canada, Ottawa, Canada. The authors acknowledge and thank Statistics Canada for research support.

Hungary. The linked administrative data collection (Admin3) is the property of the respective data owners and their legal successors: NEAK, MÁK, NAV, ITM, and OH. The data used in this project were processed by the KRTK Data Bank.

Japan. The Japanese evidence builds on: Ryo Kambayashi, Satoshi Tanaka, and Shintaro Yamaguchi, “Report of Changes in Wage Inequality Between and Within-Firm: Evidence from Japan 1993–2013,” mimeograph, 9 September 2019.

New Zealand. These results are not official statistics. They have been created for research purposes using the Integrated Data Infrastructure (IDI), which is carefully managed by Stats NZ. The results are based in part on tax data supplied by Inland Revenue to Stats NZ under the Tax Administration Act 1994 for statistical purposes. Any discussion of data limitations relates to the use of the IDI for statistical purposes and does not reflect on the data’s ability to support Inland Revenue’s core operational requirements.

Norway. See funding statement above.

United Kingdom. This research uses data from the Annual Survey of Hours and Earnings (ASHE), 1997–2018: Secure Access, 13th Edition, UK Data Service, SN: 6689. Crown copyright material is reproduced with the permission of HMSO and the Queen’s Printer for Scotland. Neither the original data creators nor the UK Data Service bear responsibility for the accuracy or completeness of these materials.

References

- Abowd, J. M., Kramarz, F., and Margolis, D. N. (1999). High wage workers and high wage firms. *Econometrica*, 67(2):251–333.
- Akesaka, M. and Miyoshi, K. (2018). Wage inequality during the long-term stagnation in japan. Iser discussion paper, Osaka University.
- Alvarez, J., Benguria, F., Engbom, N., and Moser, C. (2018). Firms and the decline in earnings inequality in brazil. *American Economic Journal: Macroeconomics*, 10(1):149–189.
- Andrews, M. J., Gill, L., Schank, T., and Upward, R. (2008). High wage workers and low wage firms: Negative assortative matching or limited mobility bias? *Journal of the Royal Statistical Society: Series A*, 171(3):673–697.
- Autor, D., Dorn, D., Katz, L. F., Patterson, C., and Van Reenen, J. (2020). The fall of the labor share and the rise of superstar firms. *The Quarterly Journal of Economics*, 135(2):645–709.

- Autor, D. H., Manning, A., and Smith, C. L. (2016). The contribution of the minimum wage to u.s. wage inequality over three decades: A reassessment. *American Economic Journal: Applied Economics*, 8(1):58–99.
- Avent-Holt, D., Henriksen, L. F., Hägglund, A. E., Jung, J., Kodama, N., Melzer, S. M., Mun, E., Rainey, A., and Tomaskovic-Devey, D. (2020). Occupations, workplaces or jobs? An exploration of stratification contexts using administrative data. *Research in Social Stratification and Mobility*, 70:100456.
- Babet, D., Godechot, O., and Palladino, M. (2025). In the land of akm: Explaining the dynamics of wage inequality in france. *Journal of Labor Economics (Forthcoming)*.
- Barreto, C., Bertheau, A., Gulumser, D., Hijzen, A., Kunze, A., Lachowska, M., Lassen, A. S., Lattanzio, S., Lochner, B., Lombardi, S., et al. (2025). Firms and the gender wage gap: A comparison of eleven countries. *Federal Reserve Bank of Chicago Working Paper*.
- Barth, E., Bryson, A., Davis, J. C., and Freeman, R. (2016). It’s where you work: Increases in the dispersion of earnings across establishments and individuals in the united states. *Journal of Labor Economics*, 34(S2):S67–S97.
- Beauregard, P.-L., Lemieux, T., Messacar, D., and Saggio, R. (2025). Why do union jobs pay more? new evidence from matched employer-employee data. Technical report, National Bureau of Economic Research.
- Bonhomme, S., Lamadon, T., and Manresa, E. (2019). A distributional framework for matched employer–employee data. *Econometrica : journal of the Econometric Society*, 87(3):699–739.
- Borovičková, K. and Shimer, R. (2017). High wage workers work for high wage firms. NBER Working Paper 24074, National Bureau of Economic Research.
- Boza, I. (2021). Wage structure and inequality: The role of observed and unobserved heterogeneity (no. Technical report, KRTK-KTI Working Papers).
- Burdett, K. and Mortensen, D. T. (1998). Wage differentials, employer size, and unemployment. *International Economic Review*, 39(2):257–273.
- Card, D., Cardoso, A. R., and Kline, P. (2016). Bargaining, sorting, and the gender wage gap: Quantifying the impact of firms on the relative pay of women. *The Quarterly journal of economics*, 131(2):633–686.
- Card, D., Devicienti, F., and Maida, A. (2014). Rent-sharing, holdup, and wages: Evidence from matched panel data. *Review of Economic Studies*, 81(1):84–111.
- Card, D., Heining, J., and Kline, P. (2013). Workplace heterogeneity and the rise of west german wage inequality. *The Quarterly Journal of Economics*, 123(3):967–1015.
- Card, D., Rothstein, J., and Yi, M. (2023). Firms and the intergenerational transmission of inequality. Technical report, National Bureau of Economic Research.
- Causa, O., Luu, N., and Abendschein, M. (2021). Labour market transitions across OECD countries: Stylised facts. Technical Report 1692, OECD Publishing, Paris.
- Cengiz, D., Dube, A., Lindner, A., and Zipperer, B. (2019). The effect of minimum wages on low-wage jobs. *Quarterly Journal of Economics*, 134(3):1405–1454.

- Criscuolo, C., Freund, C., and Gal, P. (2024). The role of firms in wage inequality. Technical report, OECD.
- de la Roca, J. (2017). Selection in initial and return migration: Evidence from moves across spanish cities. *Journal of Urban Economics*, 100:33–53.
- Devicienti, F., Fanfani, B., and Maida, A. (2019). Collective bargaining and the evolution of wage inequality in italy. *British Journal of Industrial Relations*, 57(2):377–407.
- Di Addario, S., Kline, P., Saggio, R., and Sølvssten, M. (2023). It ain't where you work, it's where you live: Residential segregation and the wage gap. *Journal of Econometrics*, 232(1):68–92.
- DiNardo, J., Fortin, N. M., and Lemieux, T. (1996). Labor market institutions and the distribution of wages, 1973–1992: A semiparametric approach. *Econometrica*, 64(5):1001–1044.
- Dustmann, C., Ludsteck, J., and Schönberg, U. (2009). Revisiting the german wage structure. *The Quarterly Journal of Economics*, 124(2):843–881.
- Engbom, N. and Moser, C. (2022). Earnings inequality and the minimum wage: Evidence from brazil. *American Economic Review*, 112(12):3803–3847.
- Engbom, N. and Moser, C. (2024). Minimum wages and earnings inequality: Evidence from latin america. NBER Working Paper 34188, National Bureau of Economic Research.
- Engbom, N., Moser, C., and Sauermann, J. (2023). Firm pay dynamics.
- Garcia-Louzao, J. and Ruggieri, A. (2023). Labor market competition and inequality. Technical report.
- Håkanson, C., Lindqvist, E., and Vlachos, J. (2015). Firms and skills: The evolution of worker sorting. Technical Report 9, IFAU.
- Haltiwanger, J., Hyatt, H., and Spletzer, J. (2024). Rising top, falling bottom: Industries and rising wage inequality. *American Economic Review*, 114(10):3250–3283.
- Horstmann, M. (2023). *Earnings Inequality in Austria, 1997–2019*. Master's thesis, Johannes Kepler University Linz.
- Hou, S. and Heath Milsom, L. (2025). The role of firms and occupations in wage inequality. VfS Annual Conference 2025 (Cologne): Revival of Industrial Policy 325461, Verein für Socialpolitik / German Economic Association. RePEc:zbw:vfsc25:325461.
- International Labour Organization (2016). *Global Wage Report 2016/17: Wage Inequality in the Workplace*. International Labour Organization.
- Janietz, C. and Bol, T. (2020). Occupations, organizations, and the structure of wage inequality in the netherlands. *Research in Social Stratification and Mobility*, 70, 100468.
- Kehrig, M. and Vincent, N. (2019). Good dispersion, bad dispersion. Technical Report 25923, National Bureau of Economic Research.
- Kline, P. (2025). Labor market monopsony: Fundamentals and frontiers. *Handbook of Labor Economics*, 6:655–728.

- Lachowska, M., Mas, A., Saggio, R., and Woodbury, S. (2023). Do firm effects drift? evidence from washington administrative data. *Journal of Econometrics*, 233(2):375–395.
- Lazear, E. P. and Shaw, K. L. (2009). Wage structure, raises and mobility: An introduction to international comparisons of the structure of wages within and across firms. In Lazear, E. P. and Shaw, K. L., editors, *The Structure of Wages: An International Comparison*. University of Chicago Press.
- Lee, D. S. (1999). Wage inequality in the united states during the 1980s: Rising dispersion or falling minimum wage? *Quarterly Journal of Economics*, 114(3):977–1023.
- Lochner, B. and Schulz, B. (2024). Firm productivity, wages, and sorting. *Journal of Labor Economics*, 42(1):85–119.
- Magda, I., Gromadzki, J., and Moriconi, S. (2021). Firms and wage inequality in central and eastern europe.
- Mehdi, T., Murphy, B., and Miscione, S. (2023). Earnings inequality between and within firms in canada’s commercial sector. *Canadian Public Policy*, 49(1).
- Morin, A. (2023). Workplace heterogeneity and wage inequality in denmark. *Journal of Applied Econometrics*, 38(1):123–133.
- Mouton, A. (2024). What drives wage sorting? evidence from west germany. What Drives Wage Sorting? Evidence From West Germany. Evidence from West Germany.
- Nikulin, D. (2022). Wage inequality and firm sorting. Working Paper.
- OECD (2019a). Negotiating our way up: Collective bargaining in a changing world of work. OECD Publishing.
- OECD (2019b). Trade in value added (TiVA).
- OECD, editor (2020). *OECD Employment Outlook 2020: Worker Security and the COVID-19 Crisis*. OECD Publishing, Paris.
- Schaefer, D. and Singleton, C. (2020). Recent changes in british wage inequality: Evidence from large firms and occupations. *Scottish Journal of Political Economy*, 67(1):100–125.
- Schneck, S. (2023). Income loss among the self-employed: implications for individual wellbeing and pandemic policy measures. *Review of Economics of the Household*, 21(1):37–57.
- Schwellnus, C., Pak, M., Pionnier, P.-A., and Crivellaro, E. (2018). Labour share developments over the past two decades: The role of technological progress, globalisation and “winner-takes-most” dynamics. Technical Report 1503, OECD.
- Silva, J., Leitao, M., and Montana, J. (2022a). The role of firms in wage inequality dynamics.
- Silva, J., Leitão, R., and Montana, C. (2022b). Firm wage premia in portugal. *Labour Economics*, 76:102169.
- Song, J., Price, D. J., Guvenen, F., Bloom, N., and von Wachter, T. (2019). Firming up inequality. *The Quarterly Journal of Economics*, 134(1):1–50.

- Sørensen, K. L. and Vejlin, R. (2011). Worker and firm heterogeneity in wage growth: An akm approach. *LABOUR*, 25(4):485–507.
- Sorkin, I. (2018). Ranking firms using revealed preference. *Quarterly Journal of Economics*, 133(3):1331–1393.
- Tomaskovic-Devey, D., Rainey, A., Avent-Holt, D., and Yi, M. (2020). Between-workplace inequalities: How organizations structure wage inequality. *Proceedings of the National Academy of Sciences*, 117(47):29352–29359.
- Wolszczak-Derlacz, J. and Nikulin, D. (2022). Within-and between-firm wage inequalities and trade integration in gvc. *Journal of International Trade & Economic Development*, 31(8):1199–1223.
- Zwysen, W. (2022). Wage inequality within and between firms: Macroeconomic and institutional drivers in europe. *SSRN Electronic Journal*.

Appendix A Section: Detailed results from the literature

Table A.1: Firm effects and worker sorting: evidence from the literature

Country	Period	Study	Between firm (%)	Mincer +FE(%)	AKM (%)	Notes
Austria	2002–2014	Bonhomme et al. (2019)	40		18	
Austria	2013–2019	Horstmann (2023)	45		16.5	Levels only
Belgium	2014	Wolszczak-Derlacz and Nikulin (2022)	41	5.7		Levels only
Brazil	1996–2012	Alvarez et al. (2018)			16	Decreasing (compression of firm premia)
Bulgaria	2014	Magda et al. (2021)	66	30		Decreasing (decline in between-firm component)
Bulgaria	2014	Nikulin (2022)	69	3.2		Levels only
Canada	1991–2019	Mehdi et al. (2023)	33		6.2	Increasing (sorting across firms)
Canada	2013	Tomaskovic-Devey et al. (2020)	35.1			Increasing (between-workplace inequality rising)
Czechia	2013	Avent-Holt et al. (2020)	51.8			Levels only
Czechia	2014	Magda et al. (2021)	53	17		Decreasing (firm-related components decline)
Czechia	2014	Nikulin (2022)	40	20		Levels only
Denmark	1980–2006	Sørensen and Vejlin (2011)			13.4	Stable (firm effects stable over time)
Denmark	2000–2007	Morin (2023)	Men: 41.9, Women: 41.8		Men 14.6 (Women 18.7)	Stable / mixed (sorting rises firm premia stable)
Denmark	2013	Avent-Holt et al. (2020)	39.4			Levels only
Estonia	2014	Magda et al. (2021)	46	19		Decreasing (between-firm inequality declines)
Estonia	2014	Nikulin (2022)	39	23.5		Levels only

Continued on next page

Country	Period	Study	Between firm (%)	Mincer +FE(%)	AKM (%)	Notes
France	2013	Avent-Holt et al. (2020)	45.7			Levels only
France	2014–2019	Babet et al. (2025)	46.8		5.8	Increasing (sorting across firms)
France	2015–2019	Hou and Heath Milsom (2025)			10.1	Levels only
France	2014	Nikulin (2022)	31	13		Levels only
Germany	2002–2009	Card et al. (2013)			18-22	Increasing (sorting strengthens)
Germany	2010–2017	Lochner and Schulz (2024)			16.7	Increasing (between-firm inequality rises)
Germany	2010–2017	Mouton (2024)			17.2	Increasing (firm size premia increase)
Germany	2013	Avent-Holt et al. (2020)	66.2			Levels only
Hungary	2003–2017	Boza (2021)	47.5		18.3	Decreasing (firm-related components decline)
Hungary	2014	Magda et al. (2021)	51	17		Increasing (between-firm inequality rises)
Hungary	2014	Nikulin (2022)	47	20		Stable / mixed (firm premia stable sorting changes)
Israel	2013	Avent-Holt et al. (2020)	50.1			Levels only
Italy	1996–2001	Devicienti et al. (2019)			21.8	Levels only
Italy	1999–2016	Bonhomme et al. (2019)	38		14	
Japan	2012	Akesaka and Miyoshi (2018)		Men 39.5. (Women 44.7)		Stable / decreasing (firm premia compressed)
Japan	2013	Avent-Holt et al. (2020)	58.2			Stable (offsetting within- and between-firm changes)
Latvia	2014	Magda et al. (2021)	53	28		Levels only
Lithuania	2014	Magda et al. (2021)	53	32		Decreasing (between-firm inequality declines)

Continued on next page

Country	Period	Study	Between firm (%)	Mincer +FE(%)	AKM (%)	Notes
Lithuania	2014	Nikulin (2022)	57	29		Decreasing (firm-related components decline)
Lithuania	2015–2020	Garcia-Louzao and Ruggieri (2023)			31.3	Levels only
Netherlands	2009–2016	Schneck (2023)	31		5.2	Levels only
Netherlands	2013	Avent-Holt et al. (2020)	27.3			Decreasing (firm premia compressed with competition)
Netherlands	2015	Janietz and Bol (2020)	45			Levels only
Norway	2001–2014	Bonhomme et al. (2019)	37		12	
Norway	2013	Avent-Holt et al. (2020)	50.9			Increasing (between-firm inequality rises)
Poland	2014	Magda et al. (2021)	56	19		Levels only
Poland	2014	Nikulin (2022)	51	23.3		Decreasing (firm-related components decline)
Portugal	2002–2009	Card et al. (2016)			Men 19.9 (Women 17.2)	Levels only
Portugal	2005–2019	Silva et al. (2022a)			19.3	Levels only
Portugal	2010–2017	Criscuolo et al. (2024)			9	Decreasing (firm premia compressed)
Romania	2014	Magda et al. (2021)	66	30		Levels only
Romania	2014	Nikulin (2022)	59	34.2		Decreasing (between-firm inequality declines)
Slovakia	2014	Magda et al. (2021)	47	22		Levels only
Slovakia	2014	Nikulin (2022)	48	22.8		Decreasing (firm-related components decline)
Slovenia	2013	Avent-Holt et al. (2020)	42.7			Levels only
Spain	2014	Nikulin (2022)	57	22.5		Levels only
Sweden	1997–2016	Engbom et al. (2023)			12.1	Stable / increasing (firm premia persistent dispersion across firms rises)

Continued on next page

Country	Period	Study	Between firm (%)	Mincer +FE(%)	AKM (%)	Notes
Sweden	2001–2013	Bonhomme et al. (2019)	35		8	
UK	1996–2015	Schaefer and Singleton (2020)	34			Stable / mixed (within-firm first, then between-firm)
UK	2014	Nikulin (2022)	78	33.4		Levels only
USA	1996–2018	Haltiwanger et al. (2024)	42		3.1	Levels only
USA	2002–2014	Lachowska et al. (2023)			5.8	Increasing (industry-level dispersion rises)
USA	2005–2015	Bonhomme et al. (2019)	40		16	
USA	2007–2013	Song et al. (2019)	42		8.7	Increasing (between-firm inequality rises firm premia stable)
USA	2010–2018	Card et al. (2023)			10.8	Levels only
USA	2013	Avent-Holt et al. (2020)	42.2			Levels only
USA	2013	Avent-Holt et al. (2020)	40.8			Levels only

Appendix B Additional details about the data sources

Austria

Coverage and sample. The AMS-BSMAK Arbeitsmarktdatenbank contains administrative records for the universe of workers covered by the social security administration, with limited coverage of civil servants. We use data for 2002–2017.

Earnings. Earnings correspond to the annual social security contribution base, including special payments (e.g., bonuses and vacation payments), and are recorded at the worker–firm level together with the number of days employed. Earnings are left- and right-censored at the social security contribution thresholds.

Worker characteristics. Worker identifiers are based on social security numbers. The data contain limited information on academic degrees (e.g., PhD, engineering diploma) but no comprehensive information on education or occupation.

Firm identifiers and industry. Firms are identified via employer identifiers. Industry information is available at the 4-digit NACE level, with additional aggregations based on a national classification system.

Canada

Coverage and sample. The Longitudinal Worker Files (LWF) from Statistics Canada contain tax-based earnings records for the universe of workers, including both wage-employed and self-employed individuals. We use data for 1995–2016.

Earnings. Earnings include wages, salaries, and supplementary payments reported to the tax administration and are not subject to censoring.

Worker characteristics. There is no information on education or occupation.

Firm identifiers and industry. Workers are linked to firms through records of employment. Industry information is available at the 2-digit NAICS level. Firm identifiers are unique within each year, and consistent tracking of firms over time is not possible.

Costa Rica

Coverage and sample. The Register of Economic Variables (REVEC) from the Central Bank of Costa Rica combines social security administration data with firm registry data and covers the universe of formal workers in formal firms. We use data for 2006–2017.

Earnings. Annual earnings are recorded at the worker–firm level and are not subject to censoring. The number of months worked can be inferred from contribution records.

Worker characteristics. Occupation is available at the 4-digit COCR-2011 level (adapted to ISCO-08).

Firm identifiers and industry. Firms are identified through the business register. Industry information is available at the 4-digit ISIC Rev.4 level.

Denmark

Coverage and sample. The Integreret Database for Arbejdsmarkedsforskning (IDAN) contains the full population of jobs (worker–firm matches) observed at the end of November for all employees. We use data for 2001–2017.

Earnings. Earnings are recorded as hourly wages derived from annual labour earnings reported to the tax authorities and hours worked declared to the pension administration. Annual earnings are not subject to censoring.

Worker characteristics. Educational attainment is available from the matched UDDA database.

Firm identifiers and industry. Firms are identified based on the employer in November. Industry information is available at the 4-digit NACE Rev.2 level.

Estonia

Coverage and sample. The dataset from the Estonian Tax and Customs Board (Maksu- ja Tolliamet) contains monthly gross income records for all workers in Estonia, including the self-employed. We use data for 2003–2017.

Earnings. Earnings are recorded monthly and are not subject to censoring.

Worker characteristics. No information on occupation or education is available.

Firm identifiers and industry. Firms are linked through the Estonian Employment Register. Industry information is available at the 2-digit NACE level.

France

Coverage and sample. The Déclaration Annuelle des Données Sociales Unifiée (DADS) panel contains a 1/12 random sample of all French salaried workers born in October, drawn from a mandatory employer survey. The data exclude the self-employed and some workers in state-owned enterprises. We use data for 2002–2017.

Earnings. Earnings are recorded as annual wages with each employer, excluding bonuses. Information on hours and days worked is available, from which a full-time equivalent measure is constructed.

Worker characteristics. Occupations are classified according to PCS-2003. Information on education is obtained via a match with the Échantillon Démographique Permanent (EDP).

Firm identifiers and industry. Industry information is available at the 5-digit level. Firm size information from the full DADS postes dataset is included.

Finland

Coverage and sample. The Finnish linked employer–employee dataset combines administrative sources from Statistics Finland and covers the full population of employees in well-established firms, with some sectoral exceptions. We use data for 2004–2018.

Earnings. Annual earned income is recorded across all jobs and is not subject to censoring. Wages from each employer are available from payroll reports. Days and months worked are available for the employer at the end of the year.

Worker characteristics. Detailed occupation codes (ISCO) and information on education (level and field of study) are available.

Firm identifiers and industry. Firms are identified by the employer at the end of the year. Industry information is derived from the business register.

Germany

Coverage and sample. The Integrierte Erwerbsbiographien (IEH) from the Institut für Arbeitsmarkt- und Berufsforschung (IAB) contain administrative reports for private-sector employees. For computational reasons, we use a 10% sample covering 1996–2016.

Earnings. The dataset is spell-based, recording start and end dates of employment spells and taxable payroll earnings. Earnings are right-censored at the upper social security contribution threshold.

Worker characteristics. Occupation is classified according to the German KdB 2010 system. Basic information on education (secondary schooling, apprenticeships, tertiary degrees) is available.

Firm identifiers and industry. Firms are identified by the establishment on 31 December. Industry information is available at the 5-digit NACE Rev.2 level.

Hungary

Coverage and sample. The Admin II panel combines administrative records from OEP, ONYF, NAV, NMH, and OH. It is a 50% random sample of the Hungarian population aged 5–74 drawn in 2003 and followed until 2018.

Earnings. Monthly wages are recorded from social security payment records and are not subject to censoring. The number of days worked is observed.

Worker characteristics. Occupation is available at the 4-digit FEOR level. Education is recorded for some individuals, though not in a fully representative manner.

Firm identifiers and industry. Industry information is available at the 4-digit NACE Rev.2 level.

Italy

Coverage and sample. The LoSaI (Longitudinal Sample INPS) is a 1/15 sample of social security records from INPS. We use data for 2002–2015.

Earnings. Observations are at the worker–job level. Annual taxable earnings are recorded and are top-censored at a high threshold above €200,000. Start and end dates of employment relationships are available.

Worker characteristics. Occupation is recorded at a broad 1-digit level.

Firm identifiers and industry. Industry is recorded at the 2-digit Ateco 2002 level (national version of NACE Rev.1.1).

Japan

Coverage and sample. The Basic Survey of Wage Structure is a mandatory employer survey covering a 1% stratified sample of workers by province and industry. We use data for 2002–2015.

Earnings. Earnings correspond to January wages plus bonuses paid during the previous year. Working time refers to hours worked in June. There is no unique worker identifier over time.

Worker characteristics. No longitudinal worker identifiers are available.

Firm identifiers and industry. The linked employer–employee sample includes firms above 30 employees and meeting minimum asset thresholds, excluding most small firms.

Netherlands

Coverage and sample. The Dutch linked employer–employee dataset combines administrative modules and covers the full population of salaried workers required to pay social contributions. We use data for 2010–2019.

Earnings. Earnings and days worked are reported monthly and are available under several definitions (cash basis, taxable salary, social security contribution base).

Worker characteristics. Occupation is recorded using a proprietary classification scheme. Education levels (nine categories) are available for a subset of individuals.

Firm identifiers and industry. Firms are identified at the enterprise-unit level. Industry information is available at the 4-digit ISIC level.

New Zealand

Coverage and sample. The Integrated Data Infrastructure (IDI) combines Inland Revenue tax records and Business Register data and covers the universe of salaried workers. We use data for 2000–2017.

Earnings. Monthly PAYE earnings are not subject to censoring.

Worker characteristics. No information on working time, occupation, or education is available.

Firm identifiers and industry. Industry information is available at the most detailed ANZSIC'06 level.

Norway

Coverage and sample. The Norwegian linked employer–employee data combine administrative population registers. We use data for 2004–2014.

Earnings. Annual earnings are not subject to censoring and include contractual wages and bonuses but exclude overtime. Days worked, hours worked, and a part-time indicator are available.

Worker characteristics. Occupation is recorded at the 4-digit ISCO-08 level. Education is classified according to ISCED.

Firm identifiers and industry. Industry information is recorded at the establishment level.

Portugal

Coverage and sample. The Quadros de Pessoal is a mandatory annual employer survey excluding civil servants, domestic workers, and some agricultural workers. We use data for 2002–2017.

Earnings. Earnings and hours are recorded for October and are not subject to censoring. Earnings include base pay, regular and irregular benefits, and overtime.

Worker characteristics. Occupation is coded according to CPP-2009 (national ISCO-08).

Firm identifiers and industry. Industry is recorded at the 3-digit CAE Rev.2 level.

Slovakia

Coverage and sample. The database from the social insurance agency covers salaried and some self-employed workers for 2014–2019.

Earnings. Monthly contribution wage bases are recorded and are not subject to censoring. The number of contractual workdays is observed.

Worker characteristics. Education is available via merges with administrative registers. No occupation data are available.

Firm identifiers and industry. Industry information is available at the 5-digit NACE Rev.2 level.

Spain

Coverage and sample. The Muestra Continua de Vidas Laborales con Datos Fiscales (MCVL-CDF) is a 4% sample of workers registered with the social insurance administration, augmented with income tax records. We use data for 2002–2017.

Earnings. Taxable earnings are comprehensive and not subject to contribution thresholds. A full-time equivalent coefficient is available for each contract.

Worker characteristics. Occupation is recorded in 13 groups (approximately 1-digit ISCO). Detailed ISCED education codes are available.

Firm identifiers and industry. Industry information is recorded according to national classifications.

Sweden

Coverage and sample. The Longitudinell Integrationsdatabas för Sjukförsäkrings- och Arbetsmarknadsstudier (LISA) covers all public-sector workers and 50% of private-sector employees through stratified sampling. We use data for 2001–2015.

Earnings. Wages are recorded for September and are not subject to censoring. Bonuses and overtime are included. Job duration is available via a merge with RAMS.

Worker characteristics. Occupation is recorded at the 4-digit ISCO-08 level. Education information is available.

Firm identifiers and industry. Industry is recorded at the 3-digit ISIC level.

United Kingdom

Coverage and sample. The Annual Survey of Hours and Earnings (ASHE) contains a 1% random sample of PAYE income tax records combined with a mandatory employer survey. We use data for 1997–2019.

Earnings. Weekly taxable earnings are recorded for jobs held in April, along with associated work hours.

Worker characteristics. Occupation is classified at the 3-digit SOC level.

Firm identifiers and industry. Industry is recorded at the 5-digit SIC level.

United States

Coverage and sample. Estimation results for the United States are taken from Barth et al. (2016), based on the Longitudinal Business Database from the U.S. Census Bureau covering quarterly earnings for the universe of workers from 1992 to 2007.

Earnings. Quarterly earnings are used; see Barth et al. (2016) for details on construction and treatment.

Worker characteristics. See Barth et al. (2016).

Firm identifiers and industry. See Barth et al. (2016).

Table B.2: Overview of data sources

Country	Earnings data source	Employer	Sample structure	Longitudinal	Earnings data	Working time	Worker skills
Austria	AMS-BMASK administrative bank; Social security administration	Firm	Universe	Yes	Gross monthly earnings	Days worked but no information on hours or part-time status	No information
Canada	Longitudinal Worker Files (LWF); Register of Economic Variables (REVEC)	Firm	Universe	Yes	Annual earnings	No information	No information
Costa Rica	Social security administration combined with register data (ICER)	Firm	Universe	Yes	Gross monthly earnings	No information	Occupation
Denmark	Integrated Labour Market Database (IDA); Tax administration combined with register data	Firm	Universe	Yes	Hourly wage	Days worked	Education and occupation
Estonia	Tax administration	Firm	Universe	Yes	Taxable annual income (incl. bonuses)	Number of months	No information
France	Mandatory employer survey (DADS Panel)	Firm (aggregated from Establishment)	Random worker sample (1/12th)	Yes	Annual gross salary	Days worked; hours and part-time coefficient	Occupation
Finland	Finland Employer Payroll Register from Tax Administration	Firm	Universe	Yes	Annual gross earnings including cash benefits and bonuses	Days worked; hours or part-time indicator	Education
Germany	Employment History (IEB); Social security administration	Establishment	10% random worker sample	Yes	Taxable payroll earnings	Days worked; hours worked or information on hours	Education and occupation
Hungary	ADMIN-T-Panel of administrative data (OEPN, ONYX, NAV, NHN, OHI); Social security administration	Firm	50% random sample of population (drawn in 2003)	Yes	Gross monthly wage	Days worked; hours worked or information on hours	Occupation
Italy	Longitudinal Sample of Social Security Workers (LoSaI)	Firm (social security unit)	1/15th random sample of workers	Yes	Daily pay	Part-time indicator and coefficient	Limited measure of occupation

Continued on next page

Country	Earnings data source	Employer	Sample structure	Longitudinal	Earnings data	Working time	Worker skills
Japan	Basic Survey of Wage Structure	Establishment	Sampling by prefecture and industry	Yes at establishment level; no at individual level	Earnings in January; annual bonuses (previous year)	Hours worked	Years of education
Netherlands	SPOLIS, POLIS, BGA, ABR and Geoppert data	Enterprise (merged from aggregate Establishment)	Universe	Yes	Gross taxable wage, including bonuses and subsidies	Hours worked; indicator for part-time workers	Education (for about half the sample, with sample weights)
New Zealand	Inland Revenue (IR) & Business Register (BR)	Firm	Universe	Yes	Gross monthly earnings	No information	No information
Norway	Earnings data (Tax Register), augmented with employment history (National Education database)	Firm	Universe	Yes	Total annual earnings	Days worked; hours worked or indicator for part-time	Education and occupation
Portugal	Quadros de Pessoal	Mandatory employer survey	Universe	Yes	Earnings in reference month (generally October)	Hours worked; part-time indicator	Education, occupation and job
Slovak Republic	Slovak Linked Employer–Employee database; Social security administration	Firm	Universe	Yes	Gross monthly earnings	No information	Education
Spain	Muestra Continua de Vidas Laborales (MCVL); Social security system (sample used: 2001–2017)	Establishment and firm	Random 4% sample of people	Yes, including retrospective data from 1980	Annual earnings	Hours worked; indicator for part-time coefficient	Education and occupation
Sweden	Longitudinal integration database for sickness insurance and labour market studies (LISA); Tax administration	Firm	Universe	Yes	Annual earnings	Number of months	Education
United Kingdom	Annual Survey of Hours and Earnings (ASHE)	Firm	1% random sample of national insurance records	Yes	Weekly basic pay; overtime pay and incentive pay	Basic hours and total hours	Occupation
United States	Longitudinal Business Database; Business Register; Economic Census and other surveys	Firm	Universe	Yes	Only firms, not workers; quarterly earnings	No information	Education

Note: Where multiple databases are indicated in a single row (e.g. New Zealand), the paper matches all the databases in the row and uses this matched database throughout the paper. In France, DADS Panel is used for consistency. Results for the United States are based on Barth et al. (It's Where You Work: Increases in the Dispersion of Earnings across Establishments and Individuals in the United States, 2016). For Hungary, the sample was drawn once in 2003, without subsequent replacement. For Japan, the sampling probability depends on prefecture and industry, the two sample strata. For the United Kingdom, the sampling frame refers to national insurance records. For Sweden, the sampling structure is stratified by firm size, and workers in larger firms are oversampled.

Table B.3: Observable variables by country

Country	Age	Gender	Education	Occupation	Part time
Austria	✓	✓			✓
Canada	✓	✓			
Costa Rica	✓	✓		✓	
Denmark	✓	✓	✓	✓	✓
Estonia	✓	✓			
Finland	✓	✓	✓		
France	✓	✓		✓	✓
Germany	✓	✓	✓	✓	✓
Hungary	✓	✓		✓	
Italy	✓	✓		✓	✓
Japan	✓	✓	✓		
Netherlands	✓	✓	✓		✓
New Zealand	✓	✓			
Norway	✓	✓	✓	✓	✓
Portugal	✓	✓	✓	✓	✓
Slovak Republic	✓	✓	✓		
Spain	✓	✓	✓	✓	✓
Sweden	✓	✓	✓	✓	✓
United Kingdom	✓	✓		✓	✓
United States	✓	✓			

Note: The table shows the workers' earnings characteristics that are available to compute the variance decomposition described in Figure 2. See Table 2 for data sources.

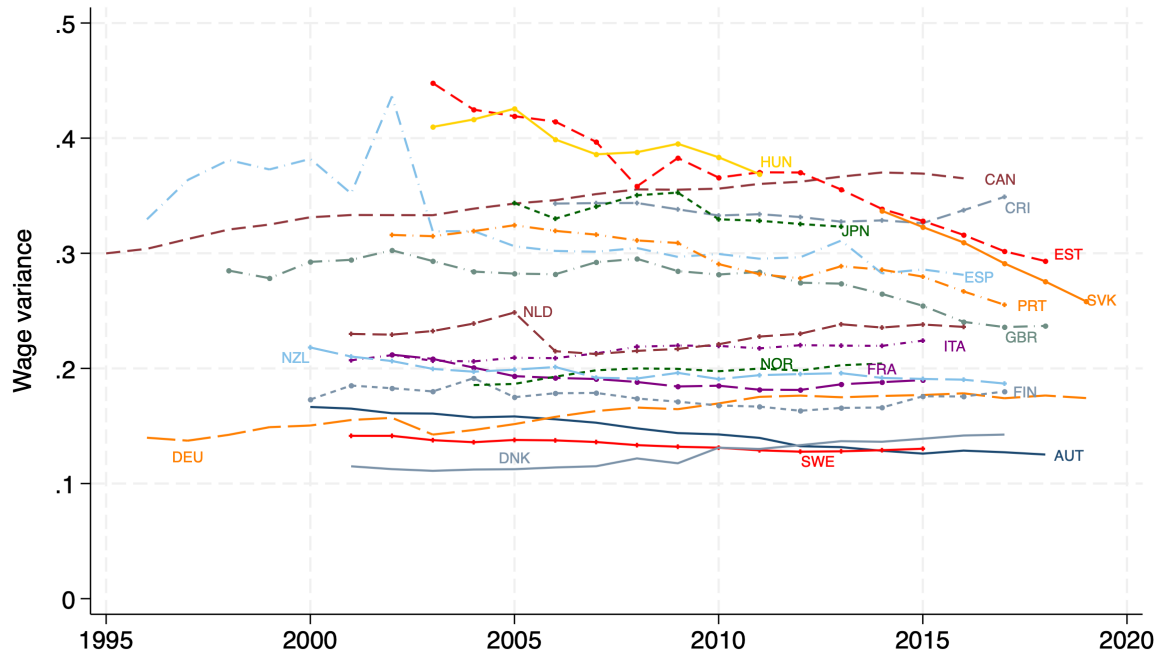
We aggregate occupations into three groups: (i) highly skilled (typically requiring tertiary education): ISCO occupational groups 1 “Managers”, 2 “Professionals”, 3 “Technicians and Associate Professionals”; (ii) middle skilled (typically requiring lower, upper secondary and post-secondary non-tertiary education): ISCO occupational groups 4 “Clerical Support Workers”, 5 “Services and Sales Workers”, 6 “Skilled Agricultural, Forestry and Fishery Workers”, 7 “Craft and Related Trades Workers”, 8 “Plant and Machine Operators, and Assemblers”; (iii) lower skilled (typically requiring less than secondary education): ISCO occupational group 9 “Elementary Occupations”.

Educational attainment is also aggregated into three similar groups: (i) highly skilled (tertiary qualifications); (ii) middle skilled (secondary or post-secondary non-tertiary qualifications); (iii) lower skilled (less than secondary qualifications).

When occupation or education are coded according to national or administrative classification systems rather than international ones (ISCO/ISCED), the aggregation is done using the same principles.

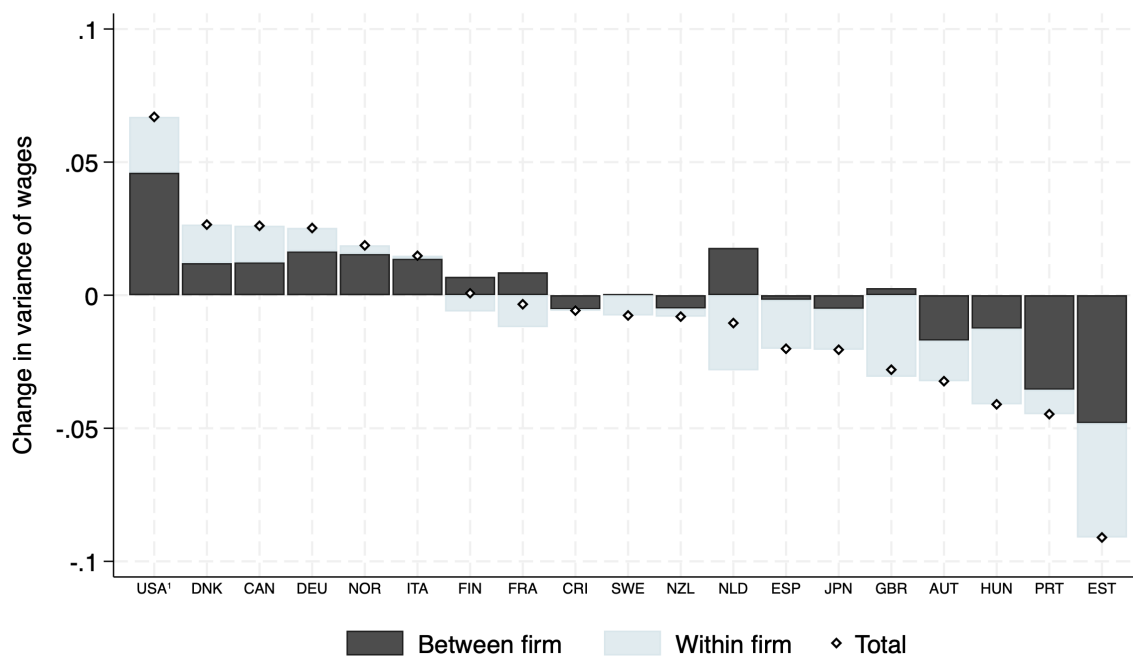
Appendix C Additional decomposition results

Figure C.1: Total log wage variance, all years and countries



Note: This graph shows the variance of log real wages for each country and year in the data used for this paper, for 19 OECD member countries. Countries are identified by the ISO-3 codes: Austria (AUT), Canada (CAN), Costa Rica (CRI), Denmark (DNK), Estonia (EST), Finland (FIN), France (FRA), Germany (DEU), Hungary (HUN), Italy (ITA), Japan (JPN), Netherlands (NLD), Norway (NOR), New Zealand (NZL), Portugal (PRT), Slovak Republic (SVK), Spain (ESP), Sweden (SWE), United Kingdom (GBR). Year-by-year time series not available for the United States.

Figure C.2: Change in (log) wage variance during the last decade

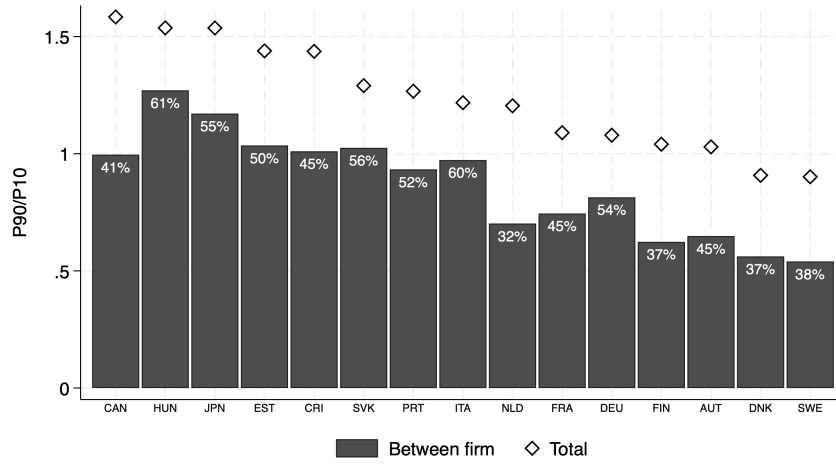


Note: 2005–2015, based on Equation (1). The net height of the bars (represented by the diamond) shows the change in the total variance of log wages, with the dark-shaded component showing the change in the between-firm variance and the light-shaded bar showing the change in the within-firm variance. This is similar to Figure 1B, but applies a consistent 10-year observation period. The period is 2005–2015 for all countries where available, with the exceptions of Norway (2004–2014), Costa Rica (2006–2016), Japan (2005–2013), Hungary (2003–2011), and the United States (1997–2007). The observation period for the Slovak Republic is below 10 years.

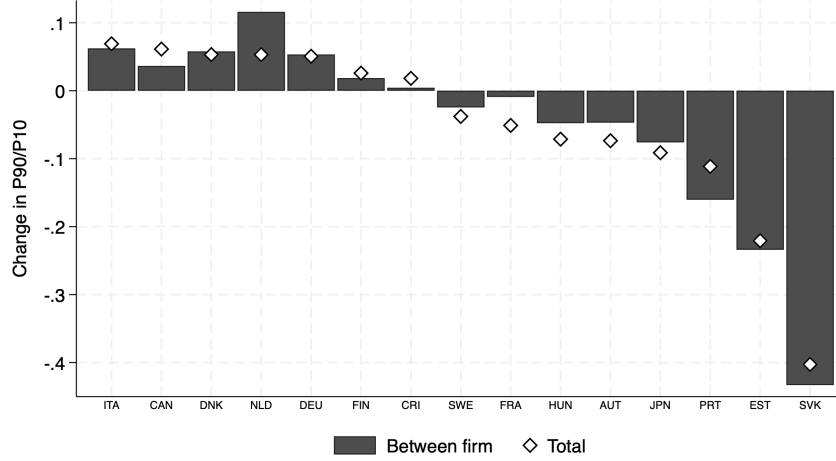
Source: Values for the United States are based on Barth et al. (2016).

Figure C.3: Level and change in P90/P10

Panel A. Level of P90/P10, latest available year.



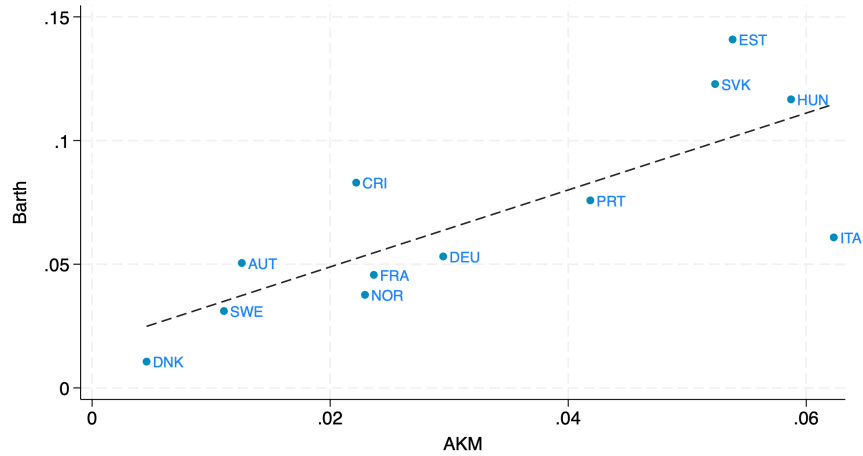
Panel B. 10-year equivalent change in P90/P10 of log wage



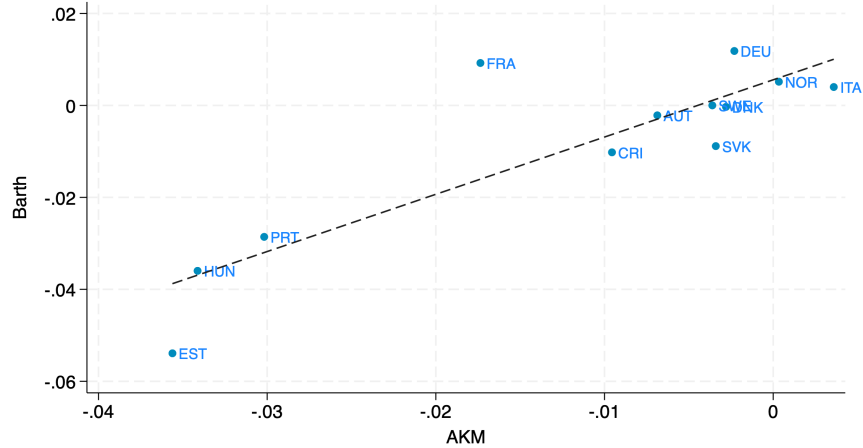
Note: Based on Equation (1). Panel A shows the level of the P90/P10 ratio in the latest available year, with the percentages on top of the dark-shaded bars denoting the share of the between-firm component in total inequality. Panel B shows the change in the P90/P10 ratio between the first and latest available year for each country, standardised to a 10-year period by scaling the average annual change by 10. The dark-shaded bars denote the between-firm component of the change, while the diamonds indicate the overall change in the P90/P10 ratio. See also Figure 2 for further details.

Figure C.4: Cross-country pattern of firm wage premia is robust to AKM

Panel A. Cross-sectional firm premium dispersion



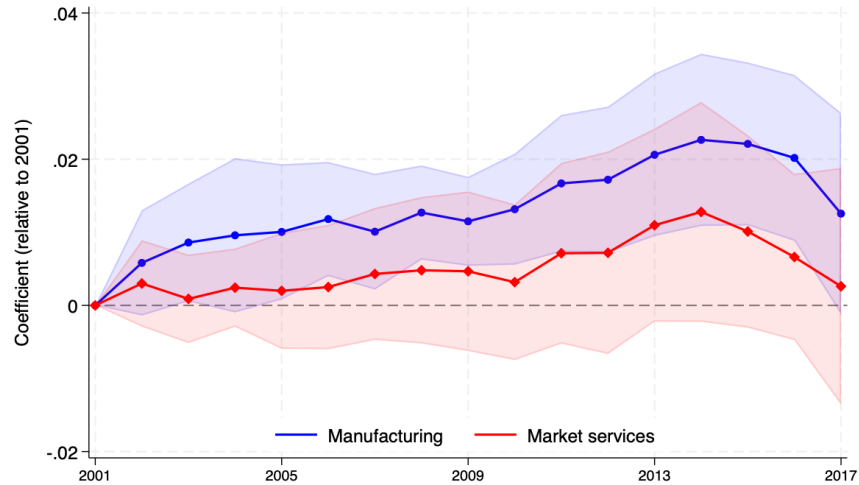
Panel B. Changes in firm premium dispersion



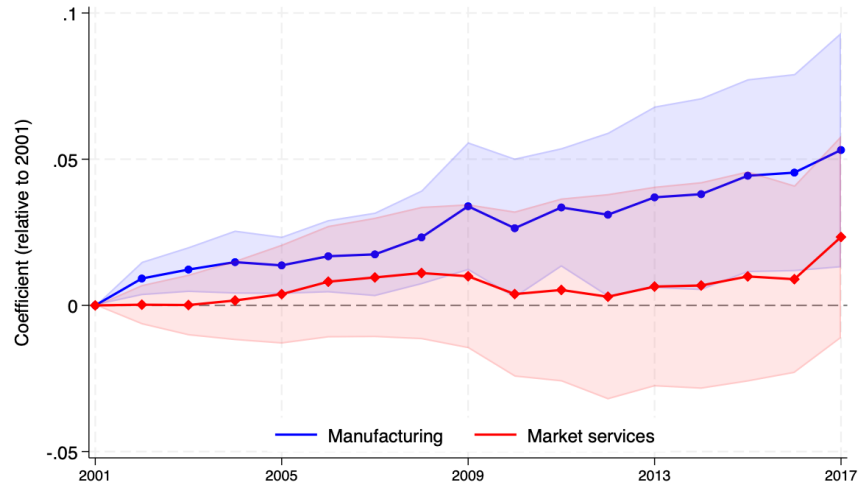
Note: The scatter plot shows firm wage premium dispersion estimated using the baseline Barth et al. (2016) method, see Equation (4) (on the y-axis) against firm wage premia dispersion in the same country using the alternative AKM method. In Panel A, the cross-section corresponds to the last available year in each country. In Panel B, the changes correspond to the difference in variance between the last and first years available. The dashed lines show the best linear fit. R-squared in Panel A is 0.61 for all countries (0.84 when Italy is excluded); R-squared in Panel B is 0.75. The sample is restricted to a subset of 12 countries (out of 20) where an AKM model could be estimated.

Figure C.5: The contribution firm premia to pay dispersion in manufacturing is on the rise

Panel A. Contribution of firm premia to overall pay dispersion.



Panel B. Contribution of firm premia to the between firm pay dispersion.

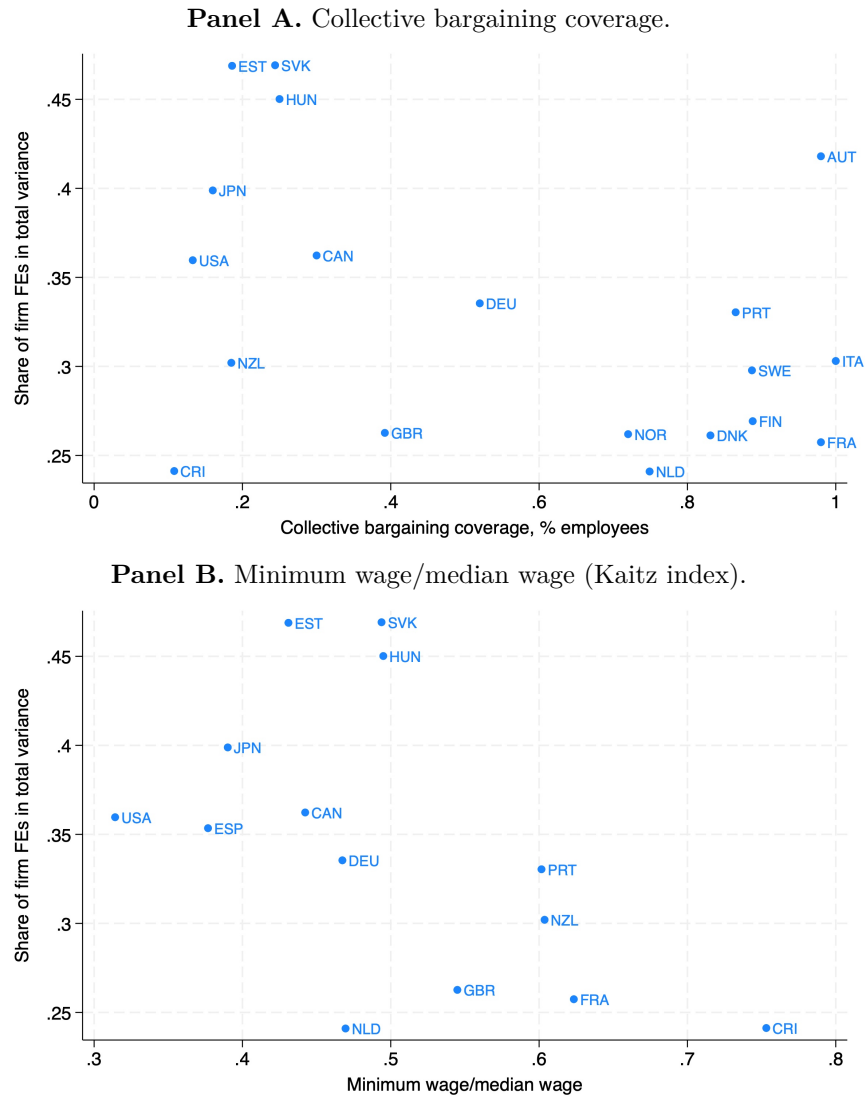


Note: Based on regressions of the share of firm wage premia dispersion in overall wage dispersion (panel A) and between firm dispersion (Panel B) in industry i , country c , and year t on sector-specific time trends (sector-time fixed effects) and country-industry fixed effects. The dots represent coefficients on sector-specific time dummies for manufacturing and market service industries, respectively, estimated in a single joint regression model with interaction terms. Coefficients are normalised (2001 = 0). Bars denote 95% confidence intervals with standard errors clustered at the country level. The regression is weighted by the number of observation in each industry-country. The country sample excludes Denmark and the United Kingdom, for which industry-level data are not available in the pooled cross-country dataset.

Source: Firm premia for the United States are based on Barth et al. (2016).

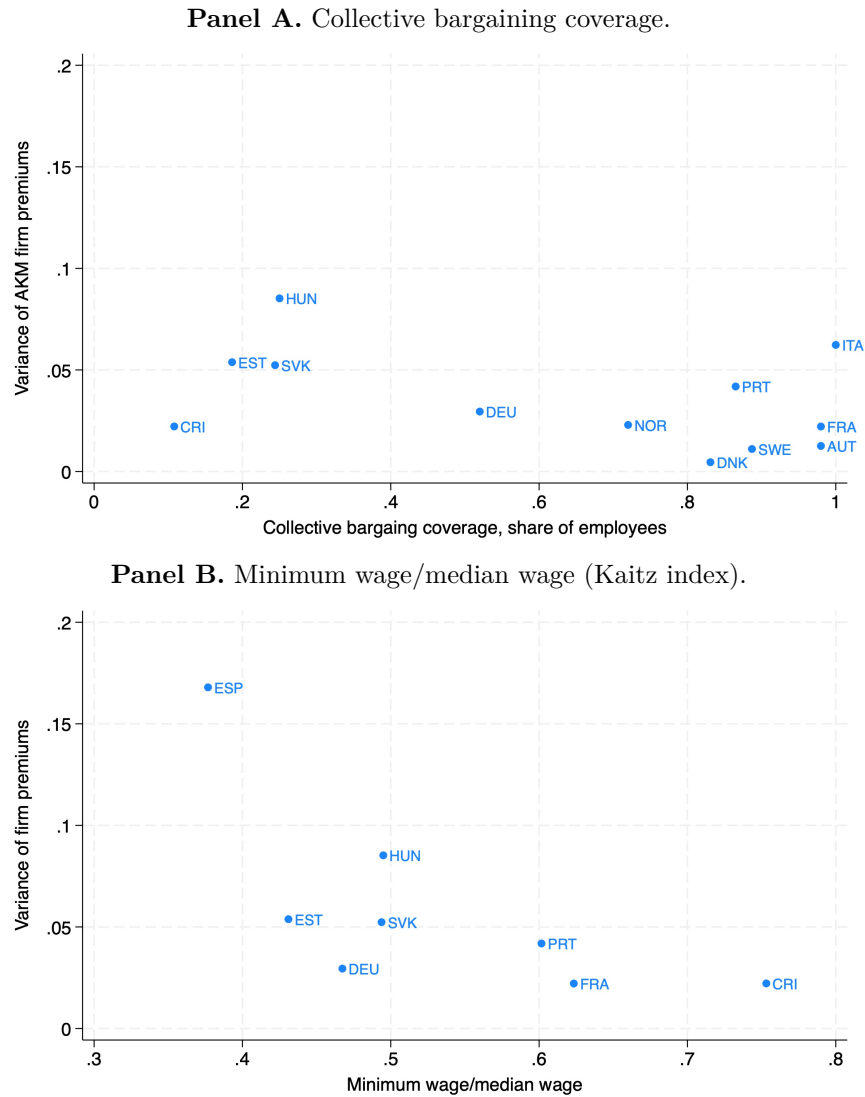
Appendix D Additional results on institutions

Figure D.1: Share of wage variance explained by firm fixed effects and institutions



Note: Panel A plots the share of wage dispersion explained by firm FEs against collective bargaining coverage. Panel B plots the same measure against the ratio of the minimum wage and the median wage (Kaitz index). In both panels, each observation corresponds to a country and refers to the last year in which wage dispersion data are available for that country.

Figure D.2: Dispersion of the estimated AKM firm components and institutions



Note: Panel A plots the dispersion (variance) of AKM firm premia against collective bargaining coverage. Panel B plots the dispersion of AKM firm premia against the ratio of the minimum wage and the median wage (Kaitz index). In both panels, each observation corresponds to a country and refers to the last year in which wage dispersion data are available for that country.

Table D.1: Institutions and the share of wage variance explained by firm effects

(a) Pooled regressions			
	(1)	(2)	(3)
	Total	Total	Total
CB coverage	-0.043 [0.066]		0.042 [0.077]
Minimum wage/median wage		-0.565*** [0.076]	-0.613*** [0.103]
No minimum wage		0.011 [0.036]	0.001 [0.043]
Av. years of schooling	0.007 [0.013]	0.004 [0.008]	0.010 [0.010]
Log GDP/capita	-0.105 [0.067]	-0.169** [0.076]	-0.199*** [0.048]
Observations	79	79	79
R-squared	0.24	0.42	0.43

Notes: This table repeats the regressions in Table 3 Panel A, but the dependent variable is the share of wage variance explained by firm effects.

Table D.3: Decentralized wage setting

(a) Pooled regressions									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Total	Total	Total	Between	Between	Between	Firm Premium	Firm Premium	Firm Premium
CB decentralized	0.247*** [0.043]		0.127*** [0.026]	0.113*** [0.035]		0.041 [0.026]	0.092*** [0.017]		0.038*** [0.013]
Minimum wage/median wage		-1.003*** [0.218]	-0.726*** [0.205]		-0.662*** [0.159]	-0.573*** [0.142]		-0.508*** [0.081]	-0.424*** [0.076]
No minimum wage		-0.123*** [0.017]	-0.071*** [0.014]		-0.045*** [0.015]	-0.029* [0.015]		-0.037*** [0.010]	-0.021* [0.011]
Av. years of schooling	-0.041** [0.015]	-0.008 [0.006]	-0.030*** [0.008]	-0.022* [0.011]	-0.010** [0.004]	-0.017** [0.007]	-0.011 [0.007]	-0.001 [0.002]	-0.008** [0.003]
Log GDP/capita	0.169* [0.093]	-0.108* [0.053]	0.039 [0.047]	0.042 [0.075]	-0.100*** [0.034]	-0.052 [0.045]	0.026 [0.049]	-0.088*** [0.024]	-0.044 [0.030]
Observations	79	79	79	79	79	79	79	79	79
R-squared	0.75	0.81	0.88	0.60	0.77	0.79	0.68	0.83	0.86

(b) Long differences									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Total	Total	Total	Between	Between	Between	Firm Premium	Firm Premium	Firm Premium
CB decentralized	0.003* [0.002]		0.005 [0.003]	0.001* [0.001]		0.002 [0.002]	0.002** [0.001]		0.003 [0.002]
Minimum wage/median wage		-0.000 [0.012]	0.010 [0.012]		0.006 [0.006]	0.011 [0.008]		0.002 [0.005]	0.008 [0.006]
No minimum wage		-0.001 [0.001]	0.001 [0.002]		-0.001 [0.001]	0.000 [0.001]		-0.001 [0.001]	0.000 [0.001]
Av. years of schooling	-0.001 [0.001]	0.000 [0.000]	-0.001 [0.001]	-0.000 [0.000]	0.000 [0.000]	-0.000 [0.000]	-0.000 [0.000]	0.000 [0.000]	-0.000 [0.000]
Log GDP/capita	0.011** [0.005]	0.008 [0.005]	0.013** [0.005]	0.007* [0.003]	0.005 [0.003]	0.008** [0.003]	0.007** [0.003]	0.005* [0.003]	0.008** [0.003]
Observations	60	60	60	60	60	60	60	60	60
R-squared	0.31	0.26	0.33	0.36	0.35	0.40	0.41	0.37	0.43

Notes: This table repeats the regressions in Table 3, but replaces the continuous collective bargaining coverage measure with a dummy showing whether the wage setting institutions in a country are fully or largely decentralized according to OECD (2019b).

Table D.5: Wage dispersion and employment protection legislation

(a) Levels (last available year)						
	(1)	(2)	(3)	(4)	(5)	(6)
	Total	Total	Between	Between	Firm Premium	Firm Premium
EPL (R)	-0.068** [0.025]	-0.009 [0.018]	-0.029* [0.015]	0.003 [0.012]	-0.022* [0.011]	0.000 [0.011]
CB coverage		-0.417*** [0.075]		-0.219*** [0.058]		-0.153*** [0.039]
Av. years of schooling	-0.018 [0.017]	-0.054*** [0.015]	-0.010 [0.012]	-0.029** [0.011]	-0.001 [0.009]	-0.014 [0.009]
Log GDP/capita	-0.108 [0.091]	0.200* [0.097]	-0.088 [0.060]	0.074 [0.078]	-0.082* [0.047]	0.031 [0.055]
Observations	79	79	79	79	79	79
R-squared	0.46	0.77	0.40	0.65	0.42	0.63

(b) Long differences						
	(1)	(2)	(3)	(4)	(5)	(6)
	Total	Total	Between	Between	Firm Premium	Firm Premium
EPL (R)	-0.002*** [0.001]	-0.001 [0.001]	-0.001** [0.000]	-0.001 [0.001]	-0.001*** [0.000]	-0.001** [0.000]
CB coverage		-0.005* [0.003]		-0.002 [0.002]		-0.002 [0.001]
Av. years of schooling	-0.001 [0.001]	-0.001** [0.001]	-0.000 [0.000]	-0.001 [0.000]	-0.001* [0.000]	-0.001** [0.000]
Log GDP/capita	0.009*** [0.003]	0.013*** [0.003]	0.006*** [0.002]	0.008*** [0.002]	0.006*** [0.002]	0.008*** [0.002]
Observations	60	60	60	60	60	60
R-squared	0.40	0.44	0.44	0.45	0.50	0.51

Notes: This table reports regressions similar to Table 3, but includes the strength of employment protection legislation together with collective bargaining coverage. Employment protection legislation is measured by *EPL (R)*, which stands for *EPL_R_VERSION1*, which measures the strictness of employment protection for individual dismissals of workers on open-ended (permanent) contracts. This index captures statutory provisions related to procedural requirements, notice periods, severance pay, and protection against unfair dismissal, and is available for the period 1985–2019. This measure follows the updated OECD methodology described in *Recent Trends in Employment Protection Legislation*, Chapter 3 of the OECD (2020), and is available for the period 2013–2019. Higher values of the index indicate stricter employment protection. Significance levels are: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table D.7: Controlling for workforce composition

(a) Levels									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Total	Total	Total	Between	Between	Between	Firm Premium	Firm Premium	Firm Premium
CB coverage	-0.477*** [0.064]		-0.273*** [0.054]	-0.268*** [0.048]		-0.171*** [0.041]	-0.182*** [0.029]		-0.086*** [0.025]
Minimum wage/median wage		-0.995*** [0.233]	-0.697*** [0.175]		-0.666*** [0.154]	-0.479*** [0.086]		-0.506*** [0.080]	-0.412*** [0.057]
No minimum wage		-0.119*** [0.020]	-0.062*** [0.014]		-0.050*** [0.010]	-0.014 [0.008]		-0.038*** [0.007]	-0.020** [0.008]
Log GDP/capita	0.264** [0.103]	-0.112** [0.052]	0.107* [0.055]	0.145* [0.070]	-0.086*** [0.028]	0.052 [0.044]	0.074 [0.052]	-0.080*** [0.018]	-0.011 [0.031]
Mean years schooling	-0.051*** [0.014]	-0.008 [0.007]	-0.039*** [0.008]	-0.030*** [0.009]	-0.007* [0.004]	-0.026*** [0.006]	-0.013 [0.008]	0.002 [0.003]	-0.008* [0.004]
Youth emp. share (15–24)	-0.794* [0.451]	0.177 [0.327]	-0.448* [0.246]	-1.026*** [0.243]	-0.441** [0.166]	-0.833*** [0.162]	-0.630** [0.228]	-0.254** [0.105]	-0.451*** [0.132]
Older emp. share (55–64)	-0.491 [0.313]	-0.160 [0.301]	-0.257 [0.224]	-0.326 [0.207]	-0.153 [0.170]	-0.213 [0.161]	-0.383** [0.179]	-0.242** [0.115]	-0.272* [0.150]
Observations	79	79	79	79	79	79	79	79	79
R-squared	0.79	0.82	0.90	0.78	0.80	0.90	0.72	0.85	0.89

(b) Long differences									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Total	Total	Total	Between	Between	Between	Firm Premium	Firm Premium	Firm Premium
CB coverage	-0.005 [0.003]		-0.007 [0.005]	-0.001 [0.002]		-0.003 [0.003]	-0.002 [0.002]		-0.003 [0.003]
Minimum wage/median wage		0.002 [0.010]	0.007 [0.010]		0.008 [0.007]	0.010 [0.007]		0.003 [0.006]	0.005 [0.006]
No minimum wage		-0.000 [0.001]	0.001 [0.001]		-0.000 [0.001]	0.000 [0.001]		-0.001 [0.000]	0.000 [0.001]
Log GDP/capita	0.011** [0.004]	0.006** [0.002]	0.012** [0.005]	0.006** [0.003]	0.005** [0.002]	0.007** [0.003]	0.007** [0.003]	0.005*** [0.002]	0.007** [0.003]
Mean years schooling	-0.001 [0.001]	-0.000 [0.000]	-0.001 [0.001]	-0.000 [0.000]	-0.000 [0.000]	-0.000 [0.000]	-0.001 [0.000]	-0.000 [0.000]	-0.001 [0.000]
Youth emp. share (15–24)	0.062** [0.026]	0.076*** [0.024]	0.058** [0.027]	0.042* [0.021]	0.046** [0.019]	0.039* [0.021]	0.027 [0.016]	0.034** [0.015]	0.025 [0.016]
Older emp. share (55–64)	0.029 [0.020]	0.026 [0.025]	0.026 [0.021]	0.015 [0.015]	0.012 [0.017]	0.012 [0.015]	0.008 [0.010]	0.007 [0.011]	0.007 [0.010]
Observations	60	60	60	60	60	60	60	60	60
R-squared	0.51	0.48	0.52	0.52	0.53	0.55	0.51	0.50	0.52

Notes: This table repeats the regressions in Table 3, but adds controls for the share of young and old workers in the initial year of each period.

Table D.9: Variance of firm fixed effects: Excluding countries with missing data

(a) Levels									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	No cens.	No cens.	No cens.	Skill info	Skill info	Skill info	Part time info	Part time info	Part time info
CB coverage	-0.156*** [0.037]		-0.053 [0.033]	-0.081* [0.043]		-0.039 [0.041]	-0.071 [0.040]		-0.051 [0.037]
Minimum wage/median wage		-0.495*** [0.081]	-0.439*** [0.072]		-0.304*** [0.043]	-0.286*** [0.039]		-0.224*** [0.046]	-0.173*** [0.049]
No minimum wage		-0.045*** [0.010]	-0.032* [0.015]		-0.031*** [0.010]	-0.027* [0.013]		-0.010 [0.006]	-0.003 [0.005]
Av. years of schooling	-0.012 [0.010]	0.000 [0.003]	-0.007 [0.005]	-0.008 [0.006]	-0.000 [0.003]	-0.005 [0.006]	-0.014*** [0.003]	-0.009* [0.004]	-0.013*** [0.003]
Log GDP/capita	0.025 [0.056]	-0.089*** [0.027]	-0.051 [0.034]	-0.031 [0.024]	-0.093*** [0.028]	-0.061 [0.040]	-0.006 [0.014]	-0.036 [0.030]	-0.021 [0.015]
Observations	64	64	64	58	58	58	46	46	46
R-squared	0.62	0.84	0.86	0.65	0.81	0.83	0.80	0.83	0.86

(b) Long differences									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	No cens.	No cens.	No cens.	Skill info	Skill info	Skill info	Part time info	Part time info	Part time info
CB coverage	-0.005** [0.002]		-0.006 [0.004]	0.000 [0.003]		-0.001 [0.003]	-0.000 [0.002]		0.001 [0.002]
Minimum wage/median wage		0.002 [0.005]	0.006 [0.006]		0.011 [0.007]	0.012 [0.007]		0.003 [0.004]	0.002 [0.005]
No minimum wage		-0.001 [0.001]	0.000 [0.001]		0.001 [0.001]	0.001 [0.001]		-0.000 [0.000]	-0.001 [0.001]
Av. years of schooling	-0.001 [0.000]	0.000 [0.000]	-0.001 [0.001]	-0.000 [0.000]	-0.000 [0.000]	-0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]
Log GDP/capita	0.010** [0.003]	0.006* [0.003]	0.010** [0.004]	0.004* [0.002]	0.004* [0.002]	0.005 [0.003]	0.003 [0.002]	0.004** [0.002]	0.003* [0.002]
Observations	48	48	48	44	44	44	36	36	36
R-squared	0.49	0.41	0.51	0.34	0.40	0.40	0.48	0.51	0.51

Notes: This table repeats the regressions in columns (6)-(9) of Table 3, but excludes countries with censored wage data (columns 1-3), with missing education and occupation info (columns 4-6) and missing information on part-time status (columns 7-9), based on the information in Table B.3.

Table D.11: Regressions with p90/p10

(a) Levels						
	(1)	(2)	(3)	(4)	(5)	(6)
	Total	Total	Total	Between	Between	Between
CB coverage	-1.131*** [0.198]		-0.504*** [0.160]	-0.633*** [0.150]		-0.107 [0.174]
Minimum wage/median wage		-2.026*** [0.405]	-1.520*** [0.265]		-1.567*** [0.291]	-1.460*** [0.283]
No minimum wage		-0.327*** [0.066]	-0.218*** [0.072]		-0.193*** [0.061]	-0.170* [0.090]
Log GDP/capita	0.486 [0.282]	-0.412*** [0.125]	0.029 [0.160]	-0.059 [0.235]	-0.543*** [0.143]	-0.449*** [0.106]
Av. years of schooling	-0.123** [0.042]	0.003 [0.018]	-0.064** [0.023]	-0.070* [0.039]	-0.010 [0.018]	-0.024 [0.028]
Observations	65	65	65	65	65	65
R-squared	0.76	0.83	0.87	0.69	0.81	0.82
(b) Long differences						
	(1)	(2)	(3)	(4)	(5)	(6)
	Total	Total	Total	Between	Between	Between
CB coverage	-0.023*** [0.007]		-0.044*** [0.010]	-0.015* [0.007]		-0.037*** [0.011]
Minimum wage/median wage		0.005 [0.048]	0.056 [0.034]		0.051 [0.046]	0.095** [0.036]
No minimum wage		-0.003 [0.003]	0.007* [0.003]		-0.003 [0.003]	0.005 [0.004]
Log GDP/capita	0.041*** [0.013]	0.018 [0.011]	0.055*** [0.013]	0.034** [0.013]	0.018 [0.011]	0.049*** [0.013]
Av. years of schooling	-0.003* [0.002]	0.001 [0.002]	-0.005** [0.002]	-0.001 [0.002]	0.002 [0.001]	-0.003 [0.002]
Observations	50	50	50	50	50	50
R-squared	0.32	0.21	0.40	0.34	0.34	0.46

Notes: This table repeats the regressions in Table 3, but includes the difference between the 90th and 10th percentile of the wage distribution rather than the variance. The between component is the p90/p10 difference in mean firm wages.

Table D.13: Regressions (unweighted)

(a) Levels									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Total	Total	Total	Between	Between	Between	Firm Premium	Firm Premium	Firm Premium
CB coverage	-0.220** [0.086]		-0.124** [0.055]	-0.093 [0.059]		-0.034 [0.035]	-0.048 [0.051]		0.003 [0.034]
Minimum wage/median wage		-0.626*** [0.164]	-0.578*** [0.160]		-0.494*** [0.097]	-0.481*** [0.094]		-0.406*** [0.067]	-0.407*** [0.069]
No minimum wage		-0.095*** [0.016]	-0.077*** [0.013]		-0.045*** [0.015]	-0.040** [0.017]		-0.034** [0.012]	-0.034** [0.013]
Av. years of schooling	-0.019 [0.017]	-0.010* [0.006]	-0.024** [0.009]	-0.007 [0.012]	-0.008** [0.004]	-0.012* [0.006]	0.005 [0.012]	0.000 [0.003]	0.001 [0.006]
Log GDP/capita	0.001 [0.102]	-0.121*** [0.032]	-0.025 [0.062]	-0.049 [0.069]	-0.096*** [0.027]	-0.070 [0.042]	-0.073 [0.066]	-0.089*** [0.025]	-0.091* [0.044]
Observations	79	79	79	79	79	79	79	79	79
R-squared	0.58	0.78	0.83	0.49	0.79	0.80	0.45	0.77	0.77

(b) Long differences (unweighted)									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Total	Total	Total	Between	Between	Between	Firm Premium	Firm Premium	Firm Premium
CB coverage	-0.007 [0.004]		-0.010** [0.004]	-0.004 [0.003]		-0.006** [0.003]	-0.004 [0.003]		-0.005* [0.003]
Minimum wage/median wage		0.019 [0.013]	0.022** [0.008]		0.015 [0.008]	0.016** [0.006]		0.011 [0.007]	0.012** [0.005]
No minimum wage		0.002 [0.001]	0.003*** [0.001]		0.001 [0.001]	0.001 [0.001]		0.000 [0.001]	0.001 [0.001]
Av. years of schooling	-0.001* [0.001]	-0.000 [0.000]	-0.001** [0.001]	-0.001 [0.001]	-0.000 [0.000]	-0.001* [0.000]	-0.001 [0.001]	-0.000 [0.000]	-0.001* [0.000]
Log GDP/capita	0.013** [0.005]	0.005* [0.003]	0.013*** [0.004]	0.009** [0.003]	0.004* [0.002]	0.009*** [0.003]	0.009** [0.004]	0.005** [0.002]	0.009** [0.003]
Observations	60	60	60	60	60	60	60	60	60
R-squared	0.29	0.33	0.45	0.33	0.37	0.46	0.40	0.39	0.47

Notes: This table repeats the regressions in Table 3, but without weighting the estimates with the number of observations.