# Supplementary online appendices

## Appendix A. Summary of national collective bargaining systems

Table SA1. Collective bargaining across selected EU countries (2006–18)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Belgium** | **Czechia** |  | **France** |  | **Germany** | **Spain** | **United Kingdom** |
| **Level of contractual negotiations** | Highly structured: (i) a central level at the top covering the whole of the private sector; a industry-level bargaining beneath, covering specific industrial sectors; and company-level negotiations (in some companies) at the bottom. | Uncoordinated wage setting directly between firms and individuals. Principal level of collective bargaining: company. |  | Peculiarly complex system of industrial relations: all the levels of collective negotiations (intersectoral, industry or firm-level) are closely intertwined and they occur at both the national or local level |  | Industry level between trade unions and employers’ organizations; agreements allow for flexibility at the company level. | Negotiations take place at national, industry and company level, with a national agreement generally providing a framework for lower-level bargaining | Wage bargaining is mostly uncoordinated, with most workers negotiating work contracts individually with employers. |
| **Collective bargaining (% firms) and Collective bargaining coverage rate (% employees)** | 66.08% of companies apply a collective agreement negotiated at higher level than the establishment or the company (in 2009); Collective bargaining coverage rate is about 96% (ILOSTAT, Records from the National Labour Council). | 80% of companies conduct wage negotiations at the firm or the establishment level; for 2018, about 44.5% of all employees covered by collective bargaining, with 40.2% not covered, and 15.3% where the position was unclear. |  | More than 50% of companies declared centralised bargaining in 2009; collective bargaining coverage rate is about 98% over the period (ILOSTAT - Administrative Records of the DARES) |  | 25% of workplaces are covered by industry-level agreements and 2% covered by company agreements (IAB Establishment panel 2018); collective bargaining coverage rate ranges from 62% in 2006 to 54% in 2018 (ILOSTAT – Establishment survey). | 66.09% of firms reported negotiating wages outside firms in 2009; collective bargaining coverage rate rose from 75.4% in 2006 to 80% in 2018 (ILOSTAT – Collective Agreements). | 53.4% of companies signed firm-level agreements (in 2009); collective bargaining coverage rate down from 33% in 2006 to 26% in 2018 (ILOSTAT – Labour Force Survey). |
| **Topics covered by collective agreements** | Elements of pay and working conditions, including national minimum wage, job creation measures, training and childcare provision set at the national level; industry and company bargaining mostly address non-pay issues. | Pay is the main subject of collective bargaining although negotiations also cover other issues such as working time, work organization, health and safety, work–life balance and employers’ contributions to pensions. |  | Industry-level negotiation obligatory for pay; equality between women and men and other inequalities; working conditions, staffing and career development and exposure to occupational risks; disabled workers; occupational training; job classification; employee saving schemes; and arrangements for organizing part-time work. |  | Wide range of issues such as pay, pay structures, working time, treatment of part-timers and training, appointments and dismissals, premium payments for night and shift work, holidays and sick pay. | The national agreements covering the whole economy deal with non-pay issues such as training, equality and remote working, and, in a series of three-year deals since 2002, have set broad guidelines on pay increases. Lower-level agreements normally cover pay and working time. | Some negotiations cover all aspects of pay and conditions, but others are limited to only a few areas, principally pay. |
| **Derogation clauses** | Opening clauses dealing with wages appeared in sector-level agreements. Scarcely used in practice, covering six (sub)sectors: engineering; metal manufacturing; food manufacturing; retail of food products; large retail stores; department stores. | Legal provision of the favourability principle prevents firm-level agreements to set less favourable terms than those provided in agreements stipulated at higher levels. |  | Inversion of the favourability principle introduced in 2004, enabling firm-level agreements to derogate from any condition settled at a more centralized levels. Four major issues exempted from any derogation at company level: minimum wages; job classifications; supplementary social protection measures; multi-company and cross-sector vocational training funds. However, in 2016 the new labour law gives primacy to company-level agreements over the branch and industry-wide agreements on working time (including extra hours premiums), paid holidays and bonuses. Individual companies can sign agreements derogating from branch-level provisions on these matters. |  | Favourability principle prevents firm-level agreements setting less favourable terms than those provided in agreements stipulated at higher levels. Wage derogations allowed at company level in times of serious economic difficulties and also in times of more general competitive problems. | A company agreement might depart from the wages fixed by a collective agreement negotiated at a higher level, when the economic situation and prospects of the company could be damaged and affect jobs as a result of the application of those wages. Only 18% of agreements in force in 2018 included such clauses. | Agreements do not establish legally binding norms and, as a rule, they contain no contractual obligations, they are not subject to legal regulation, and pay rates cannot be claimed in court. |
| **Main changes over the period** | Strong fall in union membership between 2010 and 2016, with the largest falls in the period 2014 to 2016. |  |  | The framework for collective bargaining substantially changed with major legislation being introduced in May 2004, January 2007, August 2008, June 2013, August 2016 and September 2017: increasing importance of company-level agreements at the expense of industry level negotiations. |  | Germany has had a minimum wage since 1 January 2015, although industry-level collective agreements paying less than the minimum wage continued to be valid until 1 January 2017. | Changes in the model of wage indexation following the 2008 financial crisis: two three-year deals signed in 2012 and 2015 provided for more modest increases |  |

## Sources: Our own compilation based on the following data sources and reports: the Labour Market Reforms (LABREF) database maintained by the European Commission; IAB Establishment panel (*IAB Betriebs panel*) 2018, ILOSTAT Industrial Relations Data (IRdata); the European Company Survey (ECS), run by the Eurofound Industrial Relations Observatory; the Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts (ICTWSS) database. We also draw on the broader discussion of legal and institutional aspects featuring the bargaining systems of different countries developed in (Fulton 2013 and 2015) and (Visser 2013).

## Appendix B. Descriptive statistics of Structure of Earnings Survey data

Table SB1 below shows shares of employees and firms in the different categories of bargaining in our working sample, by country and by year, also including firms that do not apply any form of collective bargaining (i.e. they contract wages separately with each single employee). Notice that for all countries except Germany it was possible to assign all firms to one of the three main types of wage bargaining (“centralized”, “firm-level” or “none”). For a minority of German firms, the type of bargaining is missing for anonymity reasons in cases where a given combination of region and NACE classification has less than three firms applying a company agreement.

Table SB1. Working sample: Total number and share of firms and employees by wage bargaining type, by country and year

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | **Bargaining type (%)** | **Total (N)** | **Missing (N)** |
|  |  | **Centralized** | **Firm-level** | **None** |  |  |  |
| Country | Year | Firms | Employees | Firms | Employees | Firms | Employees | Employees | Firms | Firms |
| Belgium | 2006 | 82.0 | 79.5 | 18.0 | 20.5 | 0.0 | 0.0 |  165 191  |  8 947  | – |
| 2010 | 81.1 | 78.8 | 18.9 | 21.2 | 0.0 | 0.0 |  137 254  |  6 885  | – |
| 2014 | 82.5 | 80.4 | 17.5 | 19.6 | 0.0 | 0.0 |  139 994  |  7 042  | – |
| 2018 | 70.0 | 71.2 | 19.6 | 19.9 | 10.4 | 8.9 |  185 211  |  7 800  | – |
| Czechia | 2006 | 2.6 | 6.2 | 7.3 | 47.8 | 90.1 | 46.0 |  1 970 864  |  18 059  | – |
| 2010 | 2.9 | 4.6 | 8.3 | 49.4 | 88.8 | 46.0 |  1 993 625  |  18 046  | – |
| 2014 | 3.0 | 3.9 | 32.5 | 63.4 | 64.5 | 32.7 |  2 199 791  |  16 777  | – |
| 2018 | 3.2 | 7.0 | 29.5 | 58.1 | 67.3 | 34.9 |  2 431 394  |  17 268  | – |
| France | 2006 | 88.3 | 76.2 | 6.4 | 16.8 | 5.3 | 7.0 |  113 641  |  15 386  | – |
| 2010 | 89.1 | 81.9 | 10.1 | 17.2 | 0.9 | 0.9 |  220 369  |  30 693  | – |
| 2014 | 85.3 | 83.1 | 13.6 | 15.7 | 1.1 | 1.2 |  249 742  |  26 445  | – |
| 2018 | 88.2 | 84.3 | 11.7 | 15.6 | 0.1 | 0.1 |  232 683  |  20 951  | – |
| Germany | 2006 | 20.3 | 58.4 | 6.5 | 5.6 | 73.2 | 36.0 |  2 892 881  |  37 132  | 2 369 |
| 2010 | 27.0 | 45.5 | 6.0 | 7.1 | 66.9 | 47.4 |  1 701 358  |  29 603  | 2 616 |
| 2014 | 26.5 | 46.3 | 3.7 | 4.8 | 69.8 | 48.9 |  881 343  |  51 046  | 4 003 |
| 2018 | 23.2 | 44.3 | 2.5 | 3.3 | 74.3 | 52.4 |  849 175  |  49 500  | 4 971 |
| Spain | 2006 | 87.5 | 80.5 | 12.5 | 19.5 | 0.0 | 0.0 |  235 272  |  27 301  | – |
| 2010 | 76.9 | 65.3 | 15.9 | 26.6 | 7.2 | 8.1 |  216 769  |  25 104  | – |
| 2014 | 73.9 | 65.1 | 18.1 | 25.5 | 8.0 | 9.4 |  203 011  |  20 254  | – |
|  | 2018 | 74.1 | 65.3 | 17.6 | 24.6 | 8.3 | 10.1 |  212 002  |  20 371  | – |
| United Kingdom | 2006 | 22.4 | 23.0 | 28.1 | 24.8 | 49.4 | 52.2 |  121 042  |  21 983  | – |
| 2010 | 17.1 | 28.1 | 20.7 | 35.7 | 62.2 | 36.2 |  71 579  |  10 484  | – |
| 2014 | 23.7 | 33.6 | 28.9 | 26.0 | 47.4 | 40.4 |  64 846  |  9 872  | – |

Source: SES 2006, 2010, 2014 and 2018 wave data.

Table S[B2](#tab:summary_cpa_wage) below shows the average values of our main measure of inequality (i.e. the interdecile range of the within-firm distribution of mincer-adjusted residual wages), computed across firm-level bargaining (FLB) status, that is across firms that either apply only centralized bargaining (FLB = 0) or also bargain locally at the firm level (FLB = 1), by country and year.

Tables B3, B4 and B5 provide basic descriptive statistics of the control variables in the regression analysis, by country and pooling different SES waves.

Table SB2. Average by FLB status, by country and year

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Type of bargaining | Year | Belgium | Czechia | France | Germany | Spain | United Kingdom |
| Centralized (FLB = 0) | 2006 | 0.383 | 0.529 | 0.472 | 0.496 | 0.409 | 0.529 |
| 2010 | 0.357 | 0.521 | 0.450 | 0.492 | 0.402 | 0.487 |
| 2014 | 0.305 | 0.490 | 0.532 | 0.383 | 0.408 | 0.451 |
| 2018 | 0.312 | 0.462 | 0.550 | 0.360 | 0.413 | – |
| Firm-level (FLB = 1) | 2006 | 0.395 | 0.506 | 0.440 | 0.487 | 0.486 | 0.510 |
| 2010 | 0.366 | 0.518 | 0.404 | 0.500 | 0.485 | 0.416 |
| 2014 | 0.300 | 0.381 | 0.450 | 0.441 | 0.475 | 0.388 |
| 2018 | 0.310 | 0.380 | 0.468 | 0.426 | 0.485 | – |

Source: Our own calculations based on SES 2006, 2010, 2014 and 2018 wave data.

Table SB3. Share of firms by firm-size classes, by country (percentages)

| Firm size | Belgium | Czechia | France | Germany | Spain | United Kingdom |
| --- | --- | --- | --- | --- | --- | --- |
| 1–49 | 29.98 | 69.82 | 22.10 | 52.00 | 48.48 | 13.94 |
| 50–249 | 30.07 | 19.86 | 27.58 | 22.54 | 22.48 | 11.51 |
| 250 | 39.95 | 10.32 | 50.33 | 25.46 | 29.05 | 74.55 |

Source: Our own calculations based on SES 2006, 2010, 2014 and 2018 wave data.

Table SB4. Means and standard deviations of continuous variables entering as controls in regression analysis, by country

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Country |  | Belgium | Czechia | France | Germany | Spain | United Kingdom |
| Mean experience (years) | mean | 9.682 | 9.010 | 11.069 | 8.707 | 8.064 | 7.333 |
| SD | 5.259 | 5.070 | 6.454 | 6.912 | 6.533 | 5.420 |
| % employees with tertiary education | mean | 0.359 | 0.259 | 0.480 | 0.182 | 0.338 | 0.388 |
| SD | 0.328 | 0.256 | 0.318 | 0.253 | 0.339 | 0.271 |
| % employees with secondary education | mean | 0.410 | 0.653 | 0.364 | 0.679 | 0.204 | 0.496 |
| SD | 0.291 | 0.255 | 0.274 | 0.265 | 0.259 | 0.264 |
| % managers and professionals | mean | 0.217 | 0.395 | 0.387 | 0.131 | 0.161 | 0.281 |
| SD | 0.288 | 0.311 | 0.302 | 0.220 | 0.255 | 0.280 |
| % part-time employees | mean | 0.235 | 0.119 | 0.157 | 0.381 | 0.167 | 0.266 |
| SD | 0.260 | 0.164 | 0.229 | 0.328 | 0.260 | 0.276 |
| % permanent contracts | mean | 0.934 | 0.771 | 0.916 | 0.858 | 0.766 | 0.933 |
| SD | 0.156 | 0.226 | 0.176 | 0.198 | 0.299 | 0.169 |

Source: Our own calculations based on SES 2006, 2010, 2014 and 2018 wave data.

Table SB5. Share of firms by classes of employee modal-age, by country

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Modal age workers: | Belgium | Czechia | France | Germany | Spain | United Kingdom |
| 14–19 | 0.25 | 0.08 | 0.32 | 0.68 | 0.21 | 3.48 |
| 20–29 | 13.36 | 6.36 | 10.53 | 15.87 | 14.65 | 21.44 |
| 30–39 | 29.86 | 17.41 | 27.33 | 18.37 | 37.27 | 24.28 |
| 40–49 | 35.27 | 34.82 | 31.73 | 31.65 | 30.54 | 26.96 |
| 50–59 | 20.94 | 38.85 | 27.17 | 27.99 | 15.70 | 19.37 |
| 60+ | 0.32 | 2.49 | 2.92 | 5.43 | 1.64 | 4.48 |

## Source: Our own calculations based on SES 2006, 2010, 2014 and 2018 wave data.

## Appendix C. Estimation of propensity score for firm-level bargaining

To address possible endogeneity driven by the potential self-selection of firms into a particular bargaining regime (, we apply a two-step procedure based on propensity score estimates.
We first estimate, separately by country, a preliminary first-step probit

where is the dummy for the *observed* presence of firm-level bargaining in firm , is the probit link function, and a set of covariates that affect the choice of bargaining at firm-level.

In the second step, the predicted probabilities (propensity scores) obtained for each firm are included as an additional control variable in the regressions estimating the effect of FLB on within-firm inequality (equations 3 and 4 in the article) and on wage deciles (equations 5 and 6). Conditioning on the *p*-scores – in addition to other controls – solves selection due to unobserved factors, if firm-level bargaining status is essentially assigned at random based on observables. Thus, a simple ordinary least squares (OLS) estimation of the “p-score augmented” second step regressions will return correct estimates of the *FLB* dummy coefficient. Notice that the predictors are for the most part the same as the controls appearing in the set in the main equations. However, to ease identification, we exclude the average tenure of the workforce, as it is reasonable to assume that tenure affects wages and wage inequalities but that it does not directly impact the decision to adopt firm-level bargaining.

Table SC1. Probit estimates of FLB propensity

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Belgium | Czechia | France | Germany | Spain | United Kingdom |
| Modal age of workers20–29 | 0.0521 | 1.257\*\* | 0.362\* | –0.330 | –0.316 | 0.0392 |
|  | (0.288) | (0.604) | (0.216) | (0.233) | (0.248) | (0.200) |
| 30–39 | 0.111 | 1.132\* | 0.436\*\* | –0.294 | –0.420\* | –0.00403 |
|  | (0.288) | (0.598) | (0.215) | (0.234) | (0.247) | (0.197) |
| 40–49 | 0.139 | 1.182\*\* | 0.477\*\* | –0.00682 | –0.368 | –0.0562 |
|  | (0.288) | (0.597) | (0.215) | (0.233) | (0.247) | (0.196) |
| 50–59 | 0.0906 | 1.135\* | 0.671\*\*\* | –0.0647 | –0.455\* | –0.00569 |
|  | (0.288) | (0.597) | (0.215) | (0.233) | (0.248) | (0.197) |
| 60+ | –0.230 | 1.181\* | 0.448\*\* | –0.130 | –0.416 | 0.137 |
|  | (0.402) | (0.618) | (0.222) | (0.237) | (0.256) | (0.216) |
| % employees with tertiary education | 0.116 | –0.235 | –0.779\*\*\* | 0.147 | 0.276\*\*\* | 0.424\*\*\* |
| (0.0887) | (0.244) | (0.0553) | (0.132) | (0.0396) | (0.144) |
| % employees with secondary education | 0.333\*\*\* | –0.0283 | –0.120\*\* | 0.814\*\*\* | 0.112\*\*\* | 0.434\*\*\* |
|  | (0.0615) | (0.227) | (0.0493) | (0.0989) | (0.0376) | (0.140) |
| % managers and professionals | 0.165 | 0.340\*\* | 0.112\*\* | 0.468\*\*\* | –0.316\*\*\* | –0.270\*\*\* |
|  | (0.110) | (0.164) | (0.0514) | (0.101) | (0.0572) | (0.0936) |
| % part-time employees | 0.0803 | 0.548\*\* | 0.194\*\*\* | 0.0656 | –0.125\*\*\* | 0.0158 |
|  | (0.0638) | (0.249) | (0.0468) | (0.0440) | (0.0427) | (0.0893) |
| % permanent contracts | 0.645\*\*\* | –1.066\*\*\* | 0.690\*\*\* | –0.104 | –0.212\*\*\* | 0.507\*\*\* |
|  | (0.109) | (0.115) | (0.0587) | (0.0662) | (0.0437) | (0.153) |
| Firm size: *50–249 employees* | 0.240\*\*\* | 0.190\*\*\* | 0.425\*\*\* | 0.207\*\*\* | 0.624\*\*\* | –0.226 |
|  | (0.0354) | (0.0584) | (0.0348) | (0.0376) | (0.0260) | (0.347) |
| ≥ *250 employees* | 0.358\*\*\* | 0.861\*\*\* | 0.570\*\*\* | 0.448\*\*\* | 1.117\*\*\* | –0.281 |
|  | (0.0358) | (0.0769) | (0.0336) | (0.0355) | (0.0251) | (0.339) |
| Public firm | 0.661\*\*\* | –0.671\*\*\* | –1.582\*\*\* | 1.244\*\*\* | –0.785\*\*\* | 0.857\*\*\* |
|  | (0.0898) | (0.113) | (0.0334) | (0.0573) | (0.0432) | (0.0581) |
| Constant | –3.035\*\*\* | –0.339 | 0.521\*\* | –4.155\*\*\* | –0.367 | 0.213 |
|  | (0.455) | (0.651) | (0.235) | (0.535) | (0.268) | (0.476) |
| Observations | 12 350 | 11 597 | 47 101 | 21 383 | 30 048 | 5 181 |
| Area under ROC curve | 0.654 | 0.869 | 0.932 | 0.814 | 0.824 | 0.866 |

\*, \*\* and \*\*\* indicate statistical significance at the 5, 1 and 0.1 per cent levels, respectively.

Notes: Dependent variable = *FLB* dummy. Estimates include full set of region (NUTS-1) and sector (1-digit NACE) fixed-effects. Standard errors appear in parentheses.

Source: Our own calculations based on SES 2006, 2010, 2014 and 2018 wave data.

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