Rising between-workplace inequalities in high-income countries

Donald Tomaskovic-Devey1, Anthony Rainey2, Dustin Avent-Holt3, Nina Bandelj4, István Bozadj, David Cort4, Olivier Godechot4, Gergely Hajdu3, Martin Hällsten4, Lars Folke Henriksen4, Are Skeie Hermansen4, Feng Hou5, Jiwook Jung6, Aleksandra Kanjuo-Mrcela1, Joe King5, Naomi Kodama5, Tali Kristal7, Alena Krížkova6, Zoltán Lippényi8, Silvia Maja Melzer4, Eunmi Mun4, Andrew Penner7, Trond Petersen7, Andreja Poje9, Mirna Safi9, Max Thaning9, and Zaibu Tufail9

1Department of Sociology, University of Massachusetts, Amherst, MA, 01003; 2Department of Social Sciences, Augusta University, Augusta, GA 30912; 3Department of Sociology, University of California, Irvine, CA, 92617; 4Department of Economics and Business, Central European University, Budapest 1051, Hungary; 5Observatoire sociologique du changement, MaxPo, Sciences Po, Centre national de la recherche scientifique, Paris 75007, France; 6Department of Economics, Vienna University of Economics and Business, Vienna AU-1020, Austria; 7Department of Sociology, Stockholm University, Stockholm 114 18, Sweden; 8Department of Organization, Copenhagen Business School, Copenhagen DK-2000, Denmark; 9Department of Sociology and Human Geography, University of Oslo, Oslo N-0851, Norway; 10Social Analysis and Modelling Division, Statistics Canada, Ottawa, Canada K1A 0T6; 11School of Labor and Employment Relations, University of Illinois, Urbana-Champaign, Urbana, IL, 61801; 12Faculty of Social Sciences, University of Ljubljana, 1000 Ljubljana, Slovenia; 13Institute for Defense Analyses, Alexandria, VA, 22311-1882; 14College of Economics, Nihon University, Tokyo 101-8360, Japan; 15Department of Sociology, University of Haifa, Haifa 31905, Israel; 16Institute of Sociology, Czech Academy of Sciences, Prague 11000, Czech Republic; 17Department of Sociology, University of Groningen, Groningen 9712 TG, The Netherlands; 18Department of Sociology, University of Barcelona, Barcelona 08007, Spain; 19Department of Sociology, University of California, Berkeley, CA, 94720-1980; and 20Association of Free Trade Unions of Slovenia, 1000 Ljubljana, Slovenia

Edited by Michael Hout, New York University, New York, NY, and approved March 6, 2020 (received for review October 17, 2019)

It is well documented that earnings inequalities have risen in many high-income countries. Less clear are the linkages between rising inequality income and workplace dynamics, how within- and between-workplace inequality varies across countries, and to what extent these inequalities are moderated by national labor market institutions. In order to describe changes in the initial between- and within-firm market income distribution we analyze administrative records for 2,000,000,000+ job years nested within 50,000,000+ workplace years for 14 high-income countries in North America, Scandinavia, Continental and Eastern Europe, the Middle East, and East Asia. We find that countries vary a great deal in their levels and trends in earnings inequality but that the between-workplace share of wage inequality is growing in almost all countries examined and is in no country declining. We also find that earnings inequalities and the share of between-workplace inequality are lower and grew less strongly in countries with stronger institutional employment protections and rose faster when these labor market protections weakened. Our findings suggest that firm-level restructuring and increasing wage inequalities between workplaces are more central contributors to rising income inequality than previously recognized.

Rising income inequalities are increasingly recognized as social, political, and macroeconomic problems for high-income nations (e.g., refs. 1–3). Using linked employer-employee (LEE) administrative data for 14 countries (Canada, Czechia, Denmark, France, Germany, Hungary, Israel, Japan, the Netherlands, Norway, Slovenia, South Korea, Sweden, and the United States) we describe changes in the initial market income distribution produced by workplaces over roughly the last quarter century. Almost all rising wage inequalities in the United States are between firms (4), with the increased market power of super star firms (5) and outsourcing and subcontracting of production to low-wage employers (6) as the two most plausible mechanisms. We explore the global extent of this trend and the degree to which it is moderated by national labor market institutions.

Altogether we find it is considerably national variation in low-wage work, as well as earnings inequality levels and trends (e.g., refs. 8 and 9). The

Have nearly complete, highly accurate information on individual earnings, making it possible to examine the job-level (person–employer match) wage distribution, changes in that distribution, and their association with organizational characteristics. LEE data allow us to locate inequalities in the firms that produce them. An analytic focus on employers is crucial if countries are to develop labor market or industrial policies that focus on the quality of jobs.

In some influential accounts rising inequality is treated as ubiquitous and almost inevitably increasing across high-income capitalist nations (e.g., ref. 3). Others have pointed out that there is considerable national variation in low-wage work, as well as earnings inequality levels and trends (e.g., refs. 8 and 9).

Significance

Understanding the causes of rising inequality is of concern in many countries. Using administrative data, we find that the share of inequality that is between workplaces is growing in 12 of 14 countries examined, and in no country has it fallen. Countries with declining employment protections see growth in both between- and within-workplace inequalities, but this impact is stronger for between-workplace inequalities. These results suggest that to reduce market income inequality requires policies that raise the bargaining power of lower-skilled workers. The widespread rise in between-workplace inequality additionally suggests policy responses that target the increasing market power of firms in concentrated markets as well as curb the ability of powerful firms to outsource low skill employment.

Author contributions: D.T.-D., A.R., D.A.-H., N.B., D.C., O.G., G.H., M.H., A.S.H., F.H., J.J., A.K.-M., J.K., N.K., A.K., Z.L., S.M.M., E.M., A. Penner, T.P., A. Poje, M.S., and Z.T. designed new reagents/analytic tools; D.T.-D., A.R., and F.H. analyzed data; and D.T.-D., A.R., J.K., and S.M.M. contributed new reagents/analytic tools; D.T.-D., A.R., J.K., and S.M.M. contributed to writing the paper and D.T.-D., A.R., J.K., and S.M.M. contributed new reagents/analytic tools; D.T.-D., A.R., J.K., and S.M.M. contributed new reagents/analytic tools; D.T.-D., A.R., J.K., and S.M.M. contributed new reagents/analytic tools; D.T.-D., A.R., J.K., and S.M.M. contributed new reagents/analytic tools; D.T.-D., A.R., J.K., and S.M.M. contributed new reagents/analytic tools.

Conflict of interest statement: The authors declare no competing interest.

D.A.-H., O.G., M.H., A.S.H., F.H., J.J., A.K.-M., J.K., N.K., A.K., Z.L., S.M.M., E.M., A. Penner, T.P., A. Poje, M.S., and Z.T. wrote the paper.

This open access article is distributed under Creative Commons Attribution-NonCommercial-NoDerivatives License 4.0 (CC BY-NC-ND).

Significance

Understanding the causes of rising inequality is of concern in many countries. Using administrative data, we find that the share of inequality that is between workplaces is growing in 12 of 14 countries examined, and in no country has it fallen. Countries with declining employment protections see growth in both between- and within-workplace inequalities, but this impact is stronger for between-workplace inequalities. These results suggest that to reduce market income inequality requires policies that raise the bargaining power of lower-skilled workers. The widespread rise in between-workplace inequality additionally suggests policy responses that target the increasing market power of firms in concentrated markets as well as curb the ability of powerful firms to outsource low skill employment.

This article contains supporting information online at https://www.pnas.org/lookup/suppl/doi:10.1073/pnas.1918249117/-/DCSupplemental.
former stress institutional similarities among capitalist countries and the centripetal forces of globalization and technological change, both of which are understood to reduce the demand for routine production roles. The latter stress national variation in change, both of which are understood to reduce the demand for and the centripetal forces of globalization and technological former stress institutional similarities among capitalist countries and trends in earnings inequalities for all job

relative to employers.

workplace wage dispersion are closely aligned with declining between-workplace wage dispersion. In all of those 12 countries organizational structure of production is shifting toward increasing increasingly, we find in 12 of the 14 countries examined that the orga-

nizational structure of production is shifting toward increasing
towards globalization and technological

and for subsamples of full-time job–person matches

and for subsamples of full-time job–person matches
Hungary and Canada. Between-workplace wage dispersion occurs even in countries which have very high initial proportions. Germany and Japan’s between-workplace inequality proportion grew from 55.9 to 66.2% and 52.4 to 58.0%, respectively. Czechia, Germany, the Netherlands, and Sweden all show the largest increases in the between-workplace component, growing by 9% or more. Denmark, France, Israel, Norway, South Korea, and the United States all experienced growth of 5% or more in the between-workplace inequality component. Although between-workplace inequality declined over Slovenia’s entire economy, their private sector experienced a rise in between-workplace inequality of about 2.5%.

The between-workplace component in both Canada and Hungary, on the other hand, has remained stable overall. Importantly, not a single country experienced a decline in either the level or proportion of the between-workplace component of inequality. Wage inequality dynamics in the last 2 decades have been driven increasingly by the relative importance of between-workplace earnings dispersion in most countries examined.

If between-workplace earnings dispersion is driven primarily by market pressures, it should be confined largely to the private sector. On the other hand, if public sectors are responding to institutional pressures to look more like the private sector, we might find that this pattern happens there as well. In all countries, between-workplace wage dispersion is larger in the private sector than in the public sector. For six of these countries, between-workplace wage dispersion has also grown at a faster rate in the private sector. In 8 of the 14 countries, dispersion is occurring in the public sector as well. Only in Hungary and Slovenia do we observe declines in the between-workplace component in the public sector (around 5% for both countries).

Institutional Variation. Much prior research has shown that wage inequalities and particularly the prevalence of low wages tend to be lower in countries with national or industrial institutions that increase the bargaining power of employees relative to employers (e.g., refs. 24 and 25). We ranked each country in terms of six labor market institutional protections: the centralization of collective bargaining units and worker’s councils; the level at which businesses, labor, and government engage in wage coordination (national, industry, workplace, and individual); the proportion of the economy that is affected by corporatist arrangements, such as industry-wide wage bargaining; the percentage of workers covered by collective bargaining agreements; regular contract individual’s legal employment protections; and

![Fig. 1. National trends in the total variance of log wages (Left) and between-workplace variance for all jobs (Right). USA-Song denotes Song et al. (4) estimates, which span 1993 to 2013. USA-Census denotes estimate from the US Census, which begin in 2005 and end in 2013. South Korea’s estimates are limited to full-time jobs only, and 2005 estimates are missing.](image-url)
temporary contract individual’s legal employment protections (see SI Appendix, SI Appendix 3, for full details).

Fig. 3 shows trends in institutional protections for each country, as well as trends in the between-workplace share of total wage inequality. At the beginning of our period, the countries fell into three distinct institutional groupings: The United States and Canada both had very low scores, reflecting an almost total absence of institutional employment protections. These two countries also remain stably low through our time period. The next set of countries, Sweden, Norway, Germany, Slovenia, the Netherlands, France, and Denmark, all began with quite high institutional employment protections. Of these, Germany, Sweden, and Norway all experienced strong declines. France, the Netherlands, and Denmark maintained their robust institutional labor market protections. Slovenia’s protections collapsed in the early 1990s, only to be built back up to their former strength by the early 2000s. Czechia, Hungary, Israel, South Korea, and Japan start in between the extremes of the two former groups.

Fig. 2. The proportion of total inequality that is between firms for the total (Left), private (Middle), and public sectors (Right). Estimates are for all jobs except for South Korea, which are full-time jobs only. Japan, South Korea, and USA-Song only have private sector estimates. South Korea is missing for 2005.

Fig. 3. The relationship between institutional employment protections and the between-workplace component. All estimates are on all job samples, except for South Korea, which is full-time jobs only. US (4), Japanese, and South Korean estimates are private sector only and missing for 2005.
Czechia and Japan both remain relatively stable, whereas Hungary steadily increased the strength of its institutional protections, and Israel and South Korea weakened theirs.

Fig. 3 displays a general pattern of association between shifts in institutional protections and changes in the between-workplace inequality share. When labor market institutions weaken, between-workplace inequalities tend to rise. In Denmark, France, Germany, Israel, Japan, the Netherlands, Norway, Sweden, and South Korea, when labor market institutions weakened, workplace inequalities rose. In Canada and the United States where institutions remain stably weak, we see little change. Institutional protections strength in Czechia, Hungary, and Slovenia. In Hungary the between-workplace share of inequality is flat; in Slovenia it declined overall but grew in the private sector. Czechia is the anomaly, with a strong rise in between-workplace inequality despite strengthening labor market institutions.

To more formally investigate this process, we estimated a series of error correction statistical models to explore the potential impact of institutional change on rising within- and between-workplace inequalities. The first stage of the error correction model takes the following form:

$$\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \beta_1 \Delta X_{t-1} - \gamma_1 Y_{t-1} - \gamma_2 X_{t-1} + \epsilon_t.$$  

The model estimates the impact of levels and change in institutional protections on change in inequality, controlling for both the lagged value of inequality and a country fixed effect to absorb stable unobserved country attributes. See ref. 26 for more information.

From the first stage model we can directly estimate the short-term coefficient and SE of $\Delta X$ (institutional change). In a second stage, the long run effect of institutional change is calculated as $\beta_1 X_{t-1}$ divided by the error correction rate ($\alpha_1 Y_{t-1}$). We then use the Bewley model (27) to estimate the SE of the long-run effect of $X$. Code for these estimations is provided in SI Appendix, Appendix 5.

To rule out the most prominent alternative explanations we control for changes in unemployment, labor force participation, and female labor share. We do not have country year measures of concentrated economic power, and so our models remain vulnerable to omitted variable bias. The ability of powerful firms to outsource production is likely to be restricted when countries have strong labor market institutions. The focus on logged earnings and models that include lagged dependent variables and country fixed effects, as well as jackknife estimations to rule out influential case explanations, increase confidence that our estimates are likely to be reasonable, if not definitive.

We hypothesize that declining institutional protections will be associated with a rising proportion of between-workplace inequality. We also estimate models of the total, between, and within inequality components. None of these models are strictly speaking causal models as we think that the mechanisms that produce rising between-workplace inequality are primarily organizational. Rather, shifts in institutional protections are indicators of an economic environment that is more or less conducive to organizational strategies of outsourcing, franchising, subcontracting, and the like, as well as more individual and firm-level wage bargaining.

Table 1 reports the results. In no case do we see instantaneous inequality responses, which rules out the interpretation that rising between-firm inequality encourages declining institutional protections. We do see long-term shifts in inequalities accompanying changes in institutional labor market protections in all models. Rising proportions of country between-workplace inequalities respond most strongly to declining institutional protections, and this result is on average stronger in the private sector than in the public sector. In response to declining employment protections, between-workplace variance in inequality rises in both the private and public sectors. The same is true for within-workplace inequalities, although the estimated effect sizes are relatively weaker, as is model fit.

**Discussion**

Market wage inequalities are not rising in all countries. The pattern of rising between-workplace wage dispersion, however, is more ubiquitous. In 12 of 14 countries examined, between-workplace inequalities are rising in the private sector. In eight this pattern is also present in the public sector. No country shows a clear decline in the between-workplace proportion of wage inequality.

Institutions that support the bargaining power of labor and the employment security of individuals strongly condition the levels of potential inequality both between and within firms. These institutions include collective bargaining through labor unions, national-level wage bargains, high minimum wages, the existence and power of worker's councils in the workplace, and employee protections from dismissals. The United States and Canada stand out for their low levels of employment protection and high levels of wage inequalities. However, even in the United States, there is evidence from the 1970s, prior to the 1980s collapse of unionization, that collective bargaining was associated with lower between-workplace inequality (28). The erosion of institutional protections in multiple countries appears to have given individuals greater leeway to engage in organizational practices which generate increased wage inequalities, presumably via such mechanisms as outsourcing, franchising, independent contractors, and labor subcontracting, all of which decouple less powerful workers from dominant firm production and silence their potential claims on the lead firm's income.

Prominent research on Germany suggests that weakening labor market institutions and union bargaining power are linked to rising between-workplace inequalities (12). Other research has found that when institutional protections weaken, organized labor is less able to extend protection to low-skilled workers, leaving those workers increasingly vulnerable to outsourcing and independent contracting (29–31). It is the linkage between these institutional processes and rising between-firm inequality that we have the strongest confirmatory evidence. We strongly suspect that weak or declining institutional employment protections increase high-wage firms' incentive to restructure production via outsourcing and other forms of externalized production. Conversely, weak institutional protections enable the creation of low-wage firms to absorb this work. Doellgast (30), for example, shows that declining union power in the German telecommunication industry facilitates labor outsourcing. Similarly, Weil (6) for the United States stresses the absence of union and other employment protections for the outsourcing of production and risk to dependent supplier firms.

We do not observe rising firm market power in this paper. There is evidence elsewhere of rising product market concentration in our study period in Europe, the United States, and Japan (5, 32, 33). The rising market power of firms has been found to raise wages in those firms (5, 14, 15). We suspect that this market power also makes it easier for those firms to source or outsource risk and production to dependent supplier and franchisee firms (6, 19). There is good evidence for the United States, at least, that the concentration of revenue in the largest firms has increased even as employment has shrunk (34). It is also possible that these and other market processes have led to a rising economic return to educated labor (16). Other research has suggested that sectoral and industrial change, which is clearly implicated by the outsourcing mechanism, may also be important drivers of between-country inequality trajectories (35).

This paper has not adjudicated between these various mechanisms but has shown that rising between-workplace inequality is
Table 1. Error correction times series estimates regressing change in inequality on lagged inequality, lagged institutional protections, and changes in institutional protections

| Proportion of total inequality between workplaces | Short-term impact of institutional protections | Long-term impact of institutional protections | P value: long-term impact | Model fit (adj. r²) | Country years |
|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|--------------------------|-------------------|--------------|
| All sectors                                   | −0.032 (0.039)                                | −0.071 (0.014)                                | 0.000                    | 0.732             | 162          |
| Private sector                                | −0.044 (0.043)                                | −0.104 (0.012)                                | 0.000                    | 0.739             | 161          |
| Public sector                                 | 0.015 (0.039)                                 | −0.069 (0.023)                                | 0.014                    | 0.490             | 117          |
| Between-workplace variance                    | −0.021 (0.019)                                | −0.182 (0.009)                                | 0.000                    | 0.881             | 162          |
| Private sector                                | −0.023 (0.024)                                | −0.195 (0.009)                                | 0.000                    | 0.868             | 161          |
| Public sector                                 | −0.005 (0.013)                                | −0.129 (0.009)                                | 0.000                    | 0.810             | 117          |
| Within-workplace variance                     | 0.001 (0.018)                                 | −0.068 (0.009)                                | 0.000                    | 0.736             | 162          |
| Private sector                                | 0.005 (0.020)                                 | −0.061 (0.009)                                | 0.000                    | 0.738             | 161          |
| Public sector                                 | 0.013 (0.031)                                 | −0.059 (0.012)                                | 0.001                    | 0.514             | 117          |

Table reports coefficients, with SEs in parentheses. The institutional scale is available until 2010, and so our analyses begin with the first observation for a country and end in 2010. Israel was not included because of missing information on employment protection legislation. For all sectors and private sector estimations, Song et al. (4) estimates were used; for public sector models, US Census estimates were used. All models control for yearly unemployment rates and labor force participation and are robust to additional statistical control for changes in female labor force participation as well as jackknife estimations.

widespread. We look forward to the next round of research to unpack the (likely) nationally contingent impact of institutional, firm market power, and business strategy mechanisms.

Our results suggest that policies aimed at reducing rising inequalities in national production systems might focus on between-firm and workplace inequalities via mechanisms that strengthen the bargaining power of employees and address the ability of powerful firms to outsource risk while absorbing revenue. Strengthening institutional protections for lower-skilled workers will not only improve their wages and job security but also reduce the ability of more powerful firms to outsource production to lower-wage firms. Policies to limit the market power of dominant firms may moderate both the earnings going to the top of those firms and their ability to externalize labor costs.

Materials and Methods
Data Availability. Source data for this paper are highly confidential and available only under license from the country of origin. We provide country-year aggregate data for all data points discussed in the paper in SI Appendix, Appendices 2 and 3.

Data Harmonization. We endeavored to harmonize all measurement and sampling decisions, excepting only the definition of full, part-time, and marginal job wage; in those cases, national definitions were given priority. SI Appendix, Appendix 1, details country-specific sampling, operationalizations of all variables, and the consequences of sample restrictions for final sample size and describes country-specific variation in sample coverage.

In all analyses we exclude marginal jobs with very low wages, individuals below age 16, and workplaces with only one employee after the prior two exclusions.

Samples. For Canada, Denmark, France, Israel, the Netherlands, Norway, Slovenia, Sweden, and the United States we have population or near-population administrative data covering nearly all workplaces and nearly all employees. In Czechia, Germany, Japan, and Korea we analyze very large random samples of workplaces and their employees. In Hungary we have a random sample of 50% of all employees with firm identifiers.

Japan and South Korea only have private-sector estimates available. The other 12 countries have both public and private sector estimates. We begin in the early 1990s because that is when most national economies began to generate LEE data. More detail on country-specific data descriptions can be found in SI Appendix, Appendix 1.

In all countries we excluded jobs with earnings so low that they might represent reporting error or extremely short job spells. In the United States, Canada, and Israel these were done with income cutoffs and produced substantial exclusions, presumably of short-duration job spells. In the other countries, low-income cutoffs were also used, but these identified very few marginal jobs, which we suspect represent employer reporting error (SI Appendix, Appendix 1).

In all countries, informal economic activity is not captured.

We use two sets of estimates for the United States. Estimates provided by Song et al. (4) range from 1993 to 2013 and include only the private sector. We supplement the Song et al. estimates with estimates provided by J.K. while employed by the US Census Bureau. These Census Bureau estimates cover only 2005 to 2013 but provide information on both the private and public sectors, as well as estimates for the subset of full-time jobs.

Statistical Significance. Because we have population data or very large samples we do not test for statistical significance in our trend analyses. Our smallest country-year sample is for Korea in 2003 with 362,789 jobs and 52,085 workplaces. We do test for statistical significance in country-year models that examine the relationship between changes in labor market institutions and inequality components. We provide the statistical code used to produce these estimates in SI Appendix, Appendix 5.

Units of Observation. Our core observational units are jobs within establishments. A job is a person–workplace match in a specific year. We focus on all jobs, which includes part-time and part-year job spells, as well as the subsample of full-time only jobs. Our focus on jobs highlights the output of the economy in terms of the employment opportunities that individuals and households confront.

Job Earnings Measurement. All earnings data are based on personnel records and reported by employers and so have very little measurement error. Our preferred earnings concept is logged hourly earnings. We include all earnings associated with a job spell including regular, overtime, and bonus earnings.

In nine countries we observe hourly earnings. For Germany and Hungary we observe daily earnings. In the United States, Canada, and Israel we observe yearly earnings associated with a job spell and have no information on hours or days worked. For these countries we use low wage cutoffs to define both marginal and full-time jobs (see SI Appendix, Appendix 4, for more detail). In these three countries we cannot clearly distinguish between jobs that are not full-time including both year-long part-time, low-earning part-year jobs, and some combinations of the two. For these countries we ran robustness checks for different definitions of marginal jobs and trends for total inequality and between and within components were very similar.

Organizational Units. For 12 countries we observe establishments, that is, actual workplaces. In Canada we use firm within state as a proxy for establishment. In the United States we use simply firm identifiers as our data lack state-identifying information. For those countries for which we have both firm and establishment identifiers, we are able to show that establishment and firm-level estimates track quite closely, and the inequality trends of the countries do not differ substantively between establishment and firm organizational concepts.
Earnings Inequality Measurement. We measure earnings inequality as the variance in logged wages, computed as \(\sigma^2 = \sum_j \left( \frac{1}{N_j} \sum_i \left( w_{ij} - \bar{w}_j \right)^2 \right) \), where \(\sigma^2\) is the variance, \(X\) is the observed logged wage for each job match, \(\mu\) is the mean logged wage for all job matches, and \(N\) is the total number of job matches. The variance in log wage is scale invariant, directly decomposable into component parts, and particularly sensitive to income transfers lower in the income distribution (36). Thus, it is particularly useful for comparisons across time and countries, can be directly decomposed into between- and within-firm components, and is most appropriate when the normative concern is income distribution (36). Thus, it is particularly useful for comparisons across component parts, and particularly sensitive to income transfers lower in the income distribution (36).

We follow Lazear and Shaw (10) in decomposing the logged earnings variance into within-workplace and between-workplace inequality with the following formula:

\[
\sigma^2 = \sum_j \rho_j \sigma^2_j + \sum_j \rho_j (\bar{w}_j - \bar{w})^2
\]

where \(\rho\) is the share of the workers in the economy who are working in firm \(j\), \(\sigma^2_j\) is the variance of wages in firm \(j\), \(\bar{w}_j\) is the mean wage for firm \(j\) (across its workers), and \(\bar{w}\) is the mean wage for the entire economy across its workers and firms (ref. 10, pp. 7–8).

Because wages in all countries are right skewed, with more people below the mean than above, variance measures are particularly sensitive to the levels and shifts in inequality among the majority of workers who earn less than their country’s average wage. Most social welfare and labor market policies are focused on this population of earners. Our analyses do not include debates about earnings trends for top earners, CEOs, or movie or sporting stars.

Institutional Protection Measure. Prior research in institutional relations (22) and comparative political economy (8) have stressed the importance when explaining national variation in employment outcomes to focus on the packages of policy configurations that employers and employees confront.

We follow this practice, measuring the strength of national institutional employment protections with a six-item scale. The first indicator is collective bargaining coverage (taken from the Database on Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts (40)). Collective bargaining coverage measures the percentage of all workers under a collective bargaining contract and functions as a measure of union bargaining strength across the national economy. The next two components of the scale both concern the levels of legal protection employees have from collective or individual dismissals. One concerns employees working “regular” contracts, the second temporary employment. These are primarily indicators of individual bargaining power and job security. The final three items come from Jahn’s corporatism scale (41) which includes indicators of the organizational structure and power of collective bargaining groups and worker’s councils, the functional level at which the government engages in wage coordination with interest groups, and the level (cross-industry, sectoral, and firm) of wage bargaining. We weight each of the six items equally in a standardized scale. All of the items are strongly positively correlated with each other, and the scale Cronbach alpha is 0.892. The items are described in depth, and their values for each country year can be found in SI Appendix, Appendix 3.

ACKNOWLEDGMENTS. The research and writing of this paper has been supported by many institutions. Monetary support from the US National Science Foundation (grant 1520284), the Alexander von Humboldt Foundation (grant ARB227), the European Research Council Advanced Grant (grant 340045), the Independent Research Fund Denmark (grant 5052-00143b), Swedish Ford Foundation (grant 2015-00807), the European Social Fund and the Danish Regional Development Agency (grant 0900-003702) institutional support: Rozvoj Vyzkumne Organizace (RVO: 68378805), Research Council of Norway (grant 287016), and the French Research Agency (Grant ANR-17-CE41-0009-01). This paper is released to inform interested parties of research and to encourage discussion. The views expressed are those of the authors and not necessarily those of the US Census Bureau. Tabular materials presented in this paper were approved for release by the US Census Bureau’s Disclosure Review Board (CBDR-FY18-25B). Yannick Savina of Sciences Po produced the figures used in the paper.