

Lammers, Alexander

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Labor-Management Relations in the New Economy^{*}

Alexander Lammers[†]

ifes Institute for Empiricism & Statistics,
FOM University of Applied Sciences, Essen,
and Global Labor Organization (GLO)

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Abstract

This chapter reviews the growing literature on the linkages between labor-management relations and technological change in the new economy. The new economy is characterized by the rise of industrial robots, artificial intelligence, digital platforms and remote work, all of which reshape the world of work considerably. Results so far indicate that labor market institutions such as trade unions, works councils, collective bargaining systems as well as alternative forms of worker representation are of considerable importance for the way in which the benefits and costs of technological change are distributed among workers, firms and society. Evidence for Germany suggests that works councils may act as complements to automation by facilitating training, promoting the adoption of higher-quality technologies and protecting incumbent workers. Evidence for the United States, by contrast, points to net negative employment and wage effects of automation in the absence of strong institutional buffers. Furthermore, the chapter discusses why artificial intelligence and algorithmic management raise qualitatively new questions for labor relations, why generative artificial intelligence shifts automation exposure toward high-skill occupations which have historically been least organized, how platform work affects traditional employment relationships, and how remote work as well as the green transition generate new fields of labor activism. Comparative evidence from coordinated, liberal, East Asian and emerging economies finally shows that technological progress in itself does not determine outcomes. It is rather the institutional setting which decides whether the gains are shared broadly or accrue to a narrow group.

JEL Codes: J50, J51, J53, O33, M54

Keywords: labor-management relations, worker representation, works councils, trade unions, automation, artificial intelligence, platform work, remote work

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[†] Corresponding address: ifes Institute for Empiricism & Statistics, FOM University of Applied Sciences, Herkulesstraße 32, 45127 Essen, Germany. GLO Affiliate, Global Labor Organization (GLO). Email: Alexander.Lammers@fom-net.de

Introduction

Technological change at the workplace is an important aspect of labor relations in all industrialized countries and currently takes several distinct forms. Industrial robots have become a pervasive feature of manufacturing, with the global operational stock surpassing four million units in 2023 and average robot density in manufacturing more than doubling within seven years (International Federation of Robotics [2024](#)). Artificial intelligence (AI) and machine learning automate cognitive tasks which were long considered the exclusive domain of human workers (Eloundou et al. [2024](#); Webb [2020](#)). Digital labor platforms have created entirely new forms of work challenging the traditional employment relationship (De Stefano [2016](#)). Finally, remote work, accelerated by the COVID-19 pandemic, has altered the spatial and temporal organization of labor considerably, and work from home has stabilized at more than a quarter of paid workdays in the United States (US) instead of reverting to pre-pandemic levels (Barrero et al. [2023](#); Hipp and Krzywdzinski [2023](#)). These developments are commonly subsumed under the term “new economy” and raise the question how labor-management relations are affected by them.

Results so far indicate that the labor market consequences of technological change are by no means technologically determined. They rather depend on the institutional framework within which new technologies are adopted and implemented (Autor et al. [2020](#)). The dominant analytical lens is the task-based framework developed by Acemoglu and Restrepo ([2019](#)): automation displaces workers from tasks they previously performed, but this displacement may be offset by the creation of new tasks in which labor holds a comparative advantage as well as by the productivity gains automation generates. That framework is economic rather than institutional. The argument developed in the following is that the institutions governing the workplace determine to what extent these offsetting forces are realized in practice and how their benefits and costs are distributed. Clearly, whether such transitions are managed cooperatively or lead to conflict and displacement depends to a large extent on the presence and the strength of labor-management institutions.

The aim of this chapter is to provide a comprehensive review and evaluation of the state of the art of research on labor-management relations in the new economy. It surveys global evidence on how labor institutions, that is trade unions, works councils, collective bargaining systems as well as alternative forms of worker representation, shape and are shaped by technological change. In doing so, the full spectrum of new economy technologies is covered:

industrial robots and automation, artificial intelligence and algorithmic management, digital labor platforms, remote work and the green transition.

The chapter is organized as follows. Section “[Automation, Robots, and Labor Markets](#)” examines the labor market effects of industrial robot adoption and evaluates the evidence on whether labor institutions moderate these effects. Section “[Worker Representation and Technology Adoption](#)” reviews the relationship between technology adoption decisions and worker representation in its statutory as well as its voluntary form. Section “[Artificial Intelligence and Algorithmic Management](#)” discusses the qualitatively new questions which AI, generative AI and algorithmic management raise for labor relations and surveys emerging collective bargaining responses. Section “[Platform Work and the Gig Economy](#)” analyzes how platform-based labor markets affect traditional employment relationships and which regulatory and collective responses have emerged. Section “[Remote Work, Green Transition, and Emerging Issues](#)” covers newer dimensions of the new economy, including remote work and the just transition. Section “[Comparative Institutional Perspectives](#)” compares how different institutional systems, namely coordinated, liberal, East Asian and emerging economies, shape the relationship between technological change and labor outcomes. Section “[Summary](#)” summarizes the key findings and discusses directions for future research.

Automation, Robots, and Labor Markets

The Labor Market Effects of Automation

The analytical foundation for understanding the labor market effects of automation is the task-based framework developed by Acemoglu and Restrepo (2019). In this framework, automation displaces workers from tasks they previously performed, which is called the displacement effect. Such displacement may be offset by the creation of new tasks in which labor has a comparative advantage, the so-called reinstatement effect, as well as by productivity gains which increase overall demand. Hence, the net effect on employment and wages depends on the balance between these forces. The framework is economic rather than institutional and therefore leaves open the question pursued in this chapter, namely whether the institutional context in which adjustment takes place determines to what extent the offsetting forces are realized, and for whom.

The contrast between Germany and the United States illustrates this institutional dependence. Dauth et al. (2021) study the adjustment of German local labor markets to

industrial robots over the period 1994–2014, a period in which the German robot density roughly quadrupled from about two to 7.6 robots per thousand workers. They find that each additional robot displaces roughly 1.7 manufacturing jobs in their preferred specification. The working-paper version of the study, which reports the density figures and a somewhat larger displacement estimate of two jobs per robot, puts the implied loss at some 275,000 manufacturing jobs over the two decades, or roughly 23 percent of the overall decline in German manufacturing employment (Dauth et al. [2017](#)). However, these manufacturing job losses are fully offset by job creation in the service sector at the regional level. Incumbent workers exhibit increased job stability and often transition to new tasks within their original plants, and those retained by their plants see positive earnings effects. Earnings losses are concentrated among workers forced to switch plants or industries, particularly machine operators. Moreover, the burden of adjustment falls disproportionately on young labor market entrants, who face reduced opportunities in manufacturing.

The picture for the United States differs considerably. Acemoglu and Restrepo ([2020](#)) find that one additional robot per thousand workers reduces the employment-to-population ratio by 0.2 percentage points and wages by 0.42 percent, with effects concentrated in manufacturing and routine manual occupations. In contrast to the German case, these losses are not offset by compensating job creation elsewhere, so that the net effects on both employment and wages are negative. Acemoglu and Restrepo ([2022](#)) further decompose changes in the US wage structure. Task displacement, that is the automation of tasks previously performed by worker groups specialized in routine work in rapidly automating industries, accounts for 50 to 70 percent of the observed changes in the US wage structure between 1980 and 2016 and, once general equilibrium effects are taken into account, for roughly 80 percent of the rise in the college wage premium. In fact, the displacement effect has accelerated while the creation of new labor-intensive tasks has slowed (Acemoglu and Restrepo [2019](#)), which in turn contributes to rising wage inequality.

At the firm level, Battisti et al. ([2023](#)) use linked employer-employee data from Germany in order to trace individual workers through the moment their employer introduces technological and organizational change. They find that the decline in routine work is predominantly a within-firm phenomenon, since within-firm changes account for at least 85 percent of the fall in the routine employment share among surviving firms and for at least 80 percent of the overall decline in that share. Routine workers do not, on average, face higher non-employment risk or lower earnings growth, because firms offer retraining opportunities which enable occupational upgrading. However, older workers above the age of 55 are an

important exception. For them, technological change significantly raises the probability of permanent labor market withdrawal.

Overall, this comparative evidence indicates that the same technologies produce fundamentally different labor market outcomes depending on the institutional environment. German institutions such as works councils, the apprenticeship training system and coordinated collective bargaining appear to facilitate within-firm adjustment and to prevent mass displacement, whereas the absence of comparable institutional buffers in the United States is associated with net negative employment and distributional effects.

Do Labor Institutions Moderate Automation Effects?

A considerable number of empirical studies directly examines whether and how labor institutions moderate the labor market effects of automation. The evidence spans several institutional dimensions, namely works councils, trade unions and collective bargaining systems.

Findeisen et al. (2025) provide the most detailed evidence so far. Combining individual-level German administrative records with plant-level data on robot adoption, they find that works councils significantly reduce the separation risk for incumbent workers during automation events. Older workers, who face the greatest difficulty in reallocating to new employers, benefit most. Interestingly, the retention effect is not confined to routine-intensive occupations but rises similarly for routine and non-routine workers. Routine-manual task content matters, however, for pay, since works councils prevent the wage cuts which routine-manual workers otherwise absorb during automation events. Moreover, works councils do not hinder robot adoption at all. Establishments with a works council invest in the quality rather than in the quantity of the robots they acquire, expand worker training during automation transitions and record higher productivity growth thereafter. On this evidence worker representation and automation are complements rather than substitutes, with works councils facilitating cooperative solutions where the interests of owners and workers diverge.

The role of works councils in promoting training during technological transitions is further documented by Lammers et al. (2023). Works councils act as an advocacy channel which ensures that employees, and particularly those in low-skilled jobs, gain access to firm-provided further training. However, this effect is conditional. It is confined to establishments whose technology lags their industry, whereas establishments at or above the industry technology level provide training with or without a works council, since there the training

interests of employer and workforce already coincide. Hence, worker representation matters most where management has the weakest independent incentive to invest in human capital.

Nevertheless, the relationship between works councils and technology is not uniformly positive. Genz et al. (2019) find an ambivalent pattern. The mere presence of a works council is associated with lower levels of digital technology adoption, but this negative baseline effect is reversed in establishments employing a high share of workers who perform physically demanding tasks. Where digitalization reduces physical strain and health risks, works councils actively support technology adoption. Apparently, works councils engage in a cost-benefit calculation from the workers' perspective and support technologies which improve working conditions while resisting those which primarily threaten jobs.

At the cross-country level, several studies examine whether trade unions and collective bargaining systems moderate the employment effects of automation. Haapanala et al. (2023) analyze data from 28 advanced democracies and find that stronger unions are associated with greater declines in industry-sector employment among young and low-educated workers as robot exposure increases. This points to an insider-outsider dynamic, since unions protect established workers through seniority rules and adjustment agreements, but at the cost of a reduced hiring of new entrants into the industrial sector.

Leibrecht et al. (2023) offer an important refinement. Using data from 37 countries of the Organisation for Economic Co-operation and Development (OECD) and the European Union (EU), they find that it is coordinated collective bargaining and not union strength per se which mutes the positive association between automation and unemployment, particularly for medium-skilled workers. Strong unions alone do not amplify the adverse effects of automation on outsiders. It is rather coordination which facilitates wage moderation, organized retraining and orderly sector-level transitions. The apparent tension between the finding of Haapanala et al., where union density exacerbates sectoral dualization, and the finding of Leibrecht et al., where coordination buffers unemployment, can be reconciled. Union density may protect insiders at the sectoral level, while coordinated bargaining channels displaced workers into alternative employment and thereby prevents the sectoral effect from becoming aggregate unemployment.

Lewandowski and Szymczak (2026) add a further dimension. They show that industrial robots significantly increase the share of atypical employment, mainly fixed-term work, and attribute 1–2 percentage points of the average atypical employment share across 13 EU countries to automation. A higher trade union density mitigates this effect, whereas employment protection legislation plays no significant moderating role. The effect is

especially pronounced in Central and Eastern European countries with low unionization. For the United States, Parolin (2020) provides longitudinal evidence that union membership substantially slows the displacement of routine workers. Nearly 72 percent of unionized routine workers were still in a routine occupation ten years later, compared with only 46 percent of their non-unionized counterparts. In panel estimates with individual fixed effects, union membership raises the probability of remaining in routine work by roughly 13 percentage points and lowers the probability of experiencing unemployment by 5 percentage points.

Does Automation Reshape Labor Institutions?

The relationship between automation and labor institutions is not unidirectional. A smaller but growing literature examines how technological change feeds back on the institutions themselves.

Agnolin et al. (2025) construct a novel sub-national, industry-level panel dataset on union density across 15 Western European countries and find that robot exposure is a significant driver of union decline. A one-standard-deviation increase in robot exposure reduces union density by approximately 34.4 percent of a standard deviation. This effect operates primarily through a compositional channel, since automation reallocates employment away from traditionally highly unionized industries toward less unionized sectors. Hence, there may be a vicious cycle in which automation weakens the very institutions which could help workers to negotiate over the distribution of the gains from technological change.

From a different theoretical perspective, Presidente (2023) examines whether labor-friendly institutions incentivize firms to invest in automation as a strategy to reduce their vulnerability to the bargaining power of labor. This is the so-called “holdup” channel. The analysis finds a positive relationship between labor-friendly institutions and investment in industrial robots, particularly in industries with high sunk costs where firms are most vulnerable to rent appropriation. Consequently, policies strengthening worker bargaining power may paradoxically accelerate automation.

The erosion of bargaining power has broader macroeconomic consequences. Kraft and Lammers (2021) investigate the effect of weakened worker outside options on the declining German labor share and identify the 2005 Hartz IV reform endogenously as a structural break in the German labor share series. They estimate that the reform reduced the labor share by between 1.6 and 2.7 percentage points, depending on the method and the level of aggregation.

The distributional consequences of weakened bargaining power are thus measurable independently of technology. Moreover, they are compounded where automation simultaneously displaces workers and erodes the institutions which might otherwise counteract wage stagnation.

Evidence from China illustrates how these dynamics play out in the absence of independent labor institutions. Liu and Zhang (2023) find that provinces and industries with more labor protest are associated with higher concentrations of robots. In the Chinese context, where independent unions do not exist and works councils are absent, worker protests are the primary mechanism for wage demands. They generate negative publicity which accelerates the incentives of employers to automate. This is the holdup dynamic in its clearest form. Without institutional channels which allow distributional conflicts to be resolved cooperatively, automation becomes the preferred response of the employer to labor unrest.

Worker Representation and Technology Adoption

Statutory Representation and Complementarity

A central question in the literature is whether worker representation hinders or facilitates technological progress. The traditional “holdup” view holds that worker voice institutions deter investment by enabling workers to appropriate the returns from firm-specific investments. However, a considerable body of evidence supports the opposite conclusion.

Belloc et al. (2022) develop an evolutionary game-theoretic model and test it on two waves of the European Working Conditions Survey, each covering nearly 44,000 workers across 35 European countries. Employee representation is associated with a 3.5 percentage point lower probability of being exposed to high automation risk, which is defined as holding a job whose estimated automation probability is 0.7 or above. The estimate rises to 13 percentage points in a recursive bivariate probit which treats representation and automation risk as jointly determined. The mechanism is institutional complementarity. Employee representation leads to task enrichment, that is to more complex, autonomous and cognitively demanding jobs, which in turn makes those jobs less susceptible to automation. Two stable organizational equilibria emerge, one combining employee representation with complex, low-automation-risk jobs, and another combining the absence of representation with routine, high-automation-risk jobs.

Belloc et al. (2023) reverse the question and ask whether employee representation promotes the adoption of advanced technologies. Using a cross-sectional sample of more than 20,000 European establishments, complemented by a regression discontinuity design on a panel of Italian firms which exploits the size threshold governing employee representation bodies under Italian labor law, they find a positive and significant association between shop-floor employee representation and the utilization of emerging technologies. The latter comprise industrial robots as well as advanced digital tools such as data analytics, the internet of things and virtual reality. The mechanisms include the role of employee representation in facilitating information transmission and in coordinating training and the reorganization of work. Both papers by Belloc et al. therefore point to a “high-road” equilibrium in which establishments with employee representation invest more in technology and redesign jobs so that workers complement rather than compete with new technologies.

These findings are broadly consistent with the evidence on the economic effects of codetermination. Jäger et al. (2022) survey this evidence and conclude that codetermination has zero or small positive effects on wages and job stability, that it leaves firm performance and capital investment unaffected or very slightly improved, and that country-level introductions have no detectable effects on aggregate outcomes. However, this assessment is not undisputed. A systematic review of the German experience with mandated works councils finds generally positive effects, although these depend on a series of moderating factors (Jirjahn and Smith 2018). A prominent study on board-level codetermination supports their assessment. Jäger et al. (2021) exploit a 1994 German reform which abolished the one-third board-level representation mandate for stock corporations incorporated after a cutoff date and compare firm cohorts on either side of it. They find no effect of board-level codetermination on wages, on the within-firm wage structure, on rent sharing or on the labor share. Contrary to the holdup hypothesis they find, if anything, an increase in capital formation, since the capital stock, the capital-labor ratio and the capital share all rise. The significance of this body of work for the present chapter is therefore not that shared governance raises wages. It is rather that the standard economic objection to worker voice, namely that it deters investment by exposing firms to rent appropriation, finds no empirical support.

Alternative and Voluntary Representation

The evidence on statutory works councils raises the question what happens in the majority of firms which lack formal worker representation. Germany, where works councils are the

principal form of mandated nonunion representation (Jirjahn and Smith 2018), illustrates how large that group is. Despite the legal entitlement to establish a works council in all establishments with five or more employees, only about 7 percent of eligible private-sector establishments had one in 2024. Since larger establishments are far more likely to be covered, some 37 percent of employees were nonetheless represented by a works council. Both shares have fallen steadily since the 1990s, when roughly 12 percent of establishments and about half of all employees were covered (Hohendanner and Kohaut 2025). This widening “representation gap” is particularly pronounced in smaller firms, in the service sector and in newer establishments, which are exactly the segments of the economy most associated with the new economy.

Kraft and Lammers (2019) address this gap by disentangling the effects of statutory works councils and voluntary, management-initiated representation bodies such as round tables or employee spokespersons on innovation in German establishments. Drawing on 6,309 observations of 2,617 establishments from the Institute for Employment Research (IAB) Establishment Panel for 2010–2016, and using recursive bivariate and multivariate probit models in order to address the endogeneity of representation, they find that voluntary employee representation supports incremental as well as radical product and process innovation, with the effect considerably more pronounced once endogeneity is accounted for. Statutory works councils, by contrast, show a positive effect only on incremental innovation. Both forms stand in a substitutive rather than in a complementary relationship, which suggests that voluntary representation may serve as a functional alternative where statutory works councils are absent.

Lammers and Giebel (2024) provide further evidence on the dynamics of voluntary representation. Investigating how the Global Financial Crisis influenced the creation and the dissolution of employer-led internal communication committees, they find that negatively affected establishments were 1.8–2.0 percentage points more likely to introduce such committees during the acute crisis years of 2008 and 2009. Contrary to a straightforward substitution logic, the crisis response was just as strong in establishments which already had a works council, but it did not persist into the post-crisis period where one was present. On this evidence voluntary bodies emerge endogenously in response to economic shocks and function as short-term adaptive devices for managing heightened uncertainty rather than as durable substitutes for statutory representation. It is likely that such a pattern recurs during the technological disruptions of the new economy.

The cross-national picture is more complex. In the United States, employer-dominated labor organizations, the so-called “company unions”, are prohibited under Section 8(a)(2) of the National Labor Relations Act, which reflects historical concerns about employer manipulation (Kaufman and Taras 2000). This legal prohibition limits the scope for voluntary representation to emerge as a functional substitute for declining union coverage. Gollan and Lewin (2013) introduce a symposium of eight studies of non-union employee representation drawing on data from the United States, the United Kingdom, Canada and Australia, which together form the most comprehensive evidence base assembled on representation in firms without unions. The critical question remains whether voluntary forms of representation serve genuine worker interests or primarily management objectives. The answer likely depends on the broader institutional context within which they operate.

Artificial Intelligence and Algorithmic Management

AI as a Qualitatively Different Challenge

While the previous sections focused primarily on industrial robots and the automation of manual tasks, artificial intelligence poses a qualitatively different challenge for labor-management relations. Webb (2020) develops a novel measure of occupational AI exposure using patent text analysis and finds that AI exposure peaks around the ninetieth percentile of the wage distribution, that is among high-skill occupations. This stands in stark contrast to industrial robots, whose exposure is concentrated among low-wage workers with less than a high school education, and to conventional software, whose exposure peaks in middle-wage routine occupations. If AI disproportionately affects professional and managerial occupations, the constituencies potentially interested in worker representation may expand beyond traditional blue-collar strongholds.

Beyond displacement, AI introduces a new dimension of employer control through algorithmic management. De Stefano and Taes (2023) argue that the use of AI for worker surveillance, performance evaluation, task allocation and disciplinary action creates serious risks for fundamental rights, including non-discrimination, freedom of association and privacy. In contrast to traditional management practices, algorithmic systems may operate continuously, process vast amounts of data and make consequential decisions about workers with limited transparency or accountability.

The US experience illustrates how algorithmic management may be used against worker organizing. Wiggin (2025) provides a detailed case study of the anti-union campaign of Amazon during the 2021 representation election in Bessemer, Alabama. The study documents how Amazon used algorithmic management tools in order to create an atmosphere of pervasive surveillance and then engaged in “algorithmic slack-cutting”, that is a temporary relaxation of algorithmic control, in order to restore worker consent before the vote, while simultaneously using a human resources management app to disseminate anti-union messages directly to workers. This is a distinctly American phenomenon, since in European institutional contexts the same technologies are subject to negotiated governance rather than to unilateral employer deployment.

At the individual worker level the consequences of new workplace technologies are immediate and measurable. Giebel and Lammers (2025) find sharp increases in the year a new technology is introduced. Overtime hours rise by 4.4 percent, the probability of participating in training by 4.0 percentage points and the share of workers reporting higher work intensity by 10.2 percentage points. These effects are concentrated among workers whose tasks have a high substitution potential, and there are no comparable effects in subsequent years. Such worker-level costs of technological adoption create a demand for representation, be it statutory or voluntary, which ensures that the adjustment burden is shared equitably.

Generative AI and the Reorganization of Cognitive Work

The diffusion of generative artificial intelligence since 2022 has sharpened these questions considerably. Eloundou et al. (2024) assess US occupations at the task level against the capabilities of large language models and count a task as exposed when a model or a model-powered tool would at least halve the time required to complete it at equivalent quality. On that definition exposure reaches deep into the occupational structure and extends to a large majority of the workforce. In contrast to exposure to industrial robots, it rises with wages. The measure is deliberately agnostic as to whether the technology displaces workers or augments them, a distinction which the ensuing public debate has often collapsed. Hence, the constituency affected by automation shifts toward exactly those professional and managerial occupations which have historically been least organized.

The emerging experimental evidence points to a second distinctive feature. In a pre-registered experiment with college-educated professionals performing occupation-specific writing tasks, Noy and Zhang (2023) find that access to a generative writing assistant reduced

completion time by 40 percent and raised output quality by 18 percent, while narrowing the performance dispersion between participants. Brynjolfsson et al. (2025) report the same compression in a field setting. Across more than 5,000 customer support agents, access to a conversational assistant raised the number of issues resolved per hour by 15 percent on average, but the gains accrued overwhelmingly to less experienced and lower-skilled workers, whereas the most experienced and highest-skilled agents saw only small speed gains alongside small declines in output quality. Whereas earlier automation displaced routine work and widened wage dispersion (Acemoglu and Restrepo 2022), generative AI has compressed productivity differences within occupations, at least in these settings.

However, this compression is by no means automatic or universal. Dell’Acqua et al. (2026) demonstrate in a field experiment with management consultants that performance gains hold only for tasks inside the current capability frontier. On a task deliberately placed beyond it, assisted participants were substantially less likely to reach the correct solution. In a field experiment with entrepreneurs in Kenya, Otis et al. (2026) find no average effect on business performance and a divergence rather than a convergence of outcomes, since high and low performers differed in which advice they chose to act on. At the macroeconomic level, Acemoglu (2025) cautions that aggregating existing task-level estimates yields total factor productivity gains of well under one percent over a decade, which is far below the transformative effects often claimed.

For labor-management relations the decisive question is who governs the deployment. Humlum and Vestergaard (2025) survey 18,000 Danish workers in exposed occupations and find adoption to be markedly unequal, with a large gender gap in workplace use. Moreover, workers report that employer restrictions and unmet training needs rather than the technology itself limit the productivity potential they perceive. Access to generative tools, the training required to use them well and the redesign of tasks around them are therefore matters of managerial prerogative which fall squarely within the traditional domain of worker representation. Iyer and Kuriakose (2026) make this contingency explicit for creative work. Where workers participate in decisions about how generative systems are introduced, the technology tends toward complementarity and an improved task-technology fit, whereas an exclusion from implementation decisions is associated with skill substitution, work intensification and fragmented workflows. Hence, the effect of the technology on workers again depends on the institutional channel through which it is introduced.

Collective Bargaining over AI

A still young literature examines how collective bargaining may serve as a governance mechanism for workplace AI. De Stefano and Taes (2023) make the theoretical case that collective bargaining is the most suitable instrument for regulating algorithmic management, since it can set specific limits on AI-enabled surveillance, establish transparency criteria and materially improve labor protections in ways which legislation alone cannot achieve. They caution that the draft AI Act of the EU risks functioning as a ceiling rather than as a floor, trumping more protective national regulation and trade union action, whereas the Platform Work Directive, by introducing collective rights, is better placed to complement social dialogue.

The Nordic countries provide a model case. Ilsøe et al. (2024) find that Danish and Swedish social partners are skeptical of a legislative regulation of AI and strongly prefer negotiated solutions through tripartite and bipartite institutions, which is consistent with the Nordic voluntarist tradition. Denmark has to a greater extent negotiated solutions through the collective agreement system, while Sweden has a longer history of tripartite commissions addressing digitization. The debate centers on data ethics, platform work and generative AI.

In Germany, Krzywdzinski et al. (2023) document how trade unions are developing strategies in order to promote “human-centred AI” in the workplace. Drawing on the practical experience of the “Future of Work” department of IG Metall, they argue that a traditional reactive co-determination, which responds to technology only after it has been introduced, is insufficient. Instead, a proactive and process-oriented worker participation has to be embedded already during the technology planning and design phase. This requires works councils which are both technically competent and strategically positioned to identify problems early in corporate planning.

The comparative picture reveals substantial variation. Molina et al. (2023) analyze collective bargaining responses to AI across Denmark, Germany, Hungary and Spain and find that national responses largely reproduce the institutional repertoire each system already possesses. Where the state or multi-employer bargaining is strong, actors reach for “protective” standards, that is for minimum guarantees extended to large groups of workers. Where company-level institutions are strong, they reach instead for “participatory” rights of consultation and co-determination. Neither repertoire has proved sufficient on its own, since even systems with strong protective and participatory standards encounter substantial difficulty in regulating algorithmic systems. For the United States, Kresge (2020) maps

concrete collective bargaining agreement provisions on technology and documents strategies for establishing rights regarding technology adoption decisions, for mitigating the impact of new technologies and for governing algorithmic workforce management.

Platform Work and the Gig Economy

The Challenge of Worker Classification and Representation

Digital labor platforms are perhaps the most disruptive new economy challenge for labor-management relations. De Stefano (2016) identifies the rise of a “just-in-time workforce” in which on-demand and crowd workers are classified as independent contractors rather than as employees and are thereby excluded from the protections of labor law, from collective bargaining rights and from social security systems. The paper argues against creating a new intermediate category between employee and independent contractor, on the grounds that such categories may themselves obstruct full protection. It holds instead that the existing legal tests for employee status, in particular the control test, which asks whether work is performed under the direction of the employer, can well be applied to platform work. Where those tests fail, De Stefano favors a presumption of employment status and, most importantly, the extension of fundamental labor rights, including freedom of association and collective bargaining, to all workers irrespective of their employment status.

The classification question has direct implications for collective bargaining. Stylogiannis (2023a) argues that freedom of association and collective bargaining are human rights of universal personal scope and that platform workers are therefore entitled to them irrespective of their employment status. Competition law has been the sharpest legal obstacle to exercising that entitlement, since agreements concluded by the nominally self-employed may be treated as price fixing between undertakings. However, Stylogiannis (2023b) shows that removing the competition-law barrier would not suffice by itself. The structure of existing industrial relations systems, which is designed around the employment relationship, makes the effective exercise of bargaining rights difficult for self-employed platform workers even where competition law is set aside.

Regulatory Responses and Emerging Bargaining

Despite these structural barriers, collective bargaining initiatives are emerging in the platform economy. Lamannis (2023) maps the social dialogue and the bargaining experiences which have emerged in the European platform economy and finds that traditional unions have taken the lead and that most initiatives are collective agreements concluded at company level. Interestingly, it is the smaller platforms which have proved willing to negotiate, while the largest players continue to avoid both collective bargaining and the labor law protections which would follow from it. Ilsøe and Söderqvist (2023) examine why some platforms in Denmark and Sweden concluded collective agreements while others evaded the industrial relations system entirely, and identify public backlash, pressure from established social partners and first-mover advantage as the conditions under which integration occurred. Their analysis is a reminder that even in the Nordic countries, with their dense bargaining coverage, the incorporation of platform firms has been the exception rather than the rule.

Organizing itself has taken forms which differ from the traditional union model. Tassinari and Maccarrone (2020) show that workplace solidarity developed among food delivery couriers in Italy and the United Kingdom (UK) despite the individualization, the spatial dispersion and the algorithmic monitoring which characterize app-mediated work. In their account, the antagonisms generated by the labor process itself provided the basis for collective action. Cini et al. (2022) trace why the organizational vehicles differed, namely initial self-organization in Italy and mobilization through rank-and-file unions in the United Kingdom, and attribute this divergence to the capacities of grassroots unions and to local traditions of militancy rather than to the labor process or to the national institutional setting. Platform work thus generates collective action, but the channels through which it is expressed are contingent on the organizational resources available locally.

Regulatory responses have advanced furthest in Europe. The 2021 “Riders’ Law” of Spain was the first statute which combined a presumption of employment for delivery platform workers with a right of worker representatives to be informed about the parameters and the rules underlying the algorithms affecting working conditions. It thereby links employment status to algorithmic transparency and vests that transparency right in collective rather than in individual hands (Todolí-Signes 2021). However, the evidence on its implementation suggests that its effects have remained limited. López-Andreu and Barranco (2026) find that platforms responded through organizational restructuring, algorithmic opacity and performative compliance which preserved the substance of algorithmic control. Statutory rights therefore

require enforcement capacity and workplace organization in order to become effective. At the EU level, the Platform Work Directive adopted in 2024 extends a rebuttable presumption of employment and rules on algorithmic management across the internal market. Adams-Prassl et al. (2025), introducing a special issue on the Directive, situate its employment status presumption, its algorithmic management provisions and its personal scope in the broader debate about protecting platform workers. At the comparative level, Thelen (2018) analyzes how the same platform business model was politically contested and regulated in strikingly different ways in Germany, Sweden and the United States, which demonstrates that platform labor relations are shaped by institutional and political contexts rather than being technologically determined.

The challenges are most acute in developing countries. Graham et al. (2017) draw on a multi-year study of digital workers in Sub-Saharan Africa and Southeast Asia and show that digital labor platforms deliver real economic benefits to some workers. However, those workers are generally classified as independent contractors and national labor laws are rarely applied to them. Moreover, an oversupply of labor, pervasive information asymmetries and opaque intermediated production networks undermine their bargaining power. Rani and Furrer (2021) extend this analysis using an International Labour Organization (ILO) survey of 675 workers on five globally operating platforms across 27 developing countries and show how algorithmic management governs access to tasks, remuneration and working time with little transparency or recourse for workers. In these settings platform work layers a digitally mediated form of unprotected work onto labor markets in which informality is already the norm, without the baseline protections which European platform workers can fall back on.

Remote Work, Green Transition, and Emerging Issues

Remote Work and Labor Activism

The rapid expansion of remote work, which was accelerated by the COVID-19 pandemic, has created new challenges as well as new opportunities for labor-management relations. The shift has proven durable rather than transitory. Barrero et al. (2023) document that full days worked from home account for roughly 28 percent of paid workdays among US workers, which is about four times the pre-pandemic rate, and explain why the change persisted instead of reverting. Some evidence on its consequences for firms undercuts the assumption that remote work has to be traded off against performance. In a randomized trial covering more

than 1,600 employees, Bloom et al. (2024) find that hybrid work reduced quit rates by roughly one third and raised job satisfaction, with no detectable effect on performance ratings, promotions or measured output. However, the evidence on the consequences of remote work remains mixed overall. Its allocation therefore becomes a distributive question, that is a question of which employees receive it, on what terms and under what monitoring, and hence a bargaining question. For Germany, Goerke et al. (2026) find that employees covered by a collective bargaining agreement are less likely to work from home, whereas the presence of a works council is positively associated with both the incidence and the frequency of working from home.

Hipp and Krzywdzinski (2023) argue that regulating remote work constitutes a new field of activism for unions and collective bargaining, and identify the questions which require negotiation: how working time and rest periods are handled, whether and how performance is monitored, how privacy and data protection are secured, who bears the costs of equipping a home workplace, and how boundaries are drawn against an always-on culture. They expect remote work to strengthen collective bargaining in the European setting for three reasons. First, by advocating access to remote work and by regulating its terms, employee representatives address the interests of white-collar employees, engineers and academics, that is of groups which have historically been poorly organized. Second, the digital channels which remote work normalizes also give representatives new ways of reaching workers with whom they previously had little contact. Third, and most concretely, employers themselves have an incentive to bargain. In Germany deviations from the working time rules of the EU directive are permissible only through a collective agreement, and in Spain national legislation obliges firms to cover remote work costs and to grant access to training without specifying how, which leaves the specifics to sectoral or company-level agreements.

Two of these issues have developed into distinct regulatory arenas. The right to disconnect, which was pioneered in French and Spanish legislation and has since been taken up in several other European countries, has moved from statute into company-level agreements, with collective bargaining specifying the working time boundaries which general legislation leaves open (Eurofound 2023; Lerouge and Trujillo Pons 2022). Remote monitoring has developed in the opposite direction. Aloisi and De Stefano (2022) argue that the pandemic-driven expansion of digital surveillance, which reached essential workers in warehouses and delivery as well as professionals working from home, reconfigured workplace power relations in ways which data protection law alone cannot address, and they identify social dialogue and worker involvement as the more promising route for governing monitoring technologies. Remote

work therefore does not simply relocate the employment relationship. It rather converts questions previously settled by workplace custom into explicit objects of negotiation.

Lloyd and Payne (2023, 2026) provide comparative evidence from Norway and the United Kingdom. In Norway, where strong institutional supports exist, workplace-level union strength significantly amplifies the capacity of unions to shape digitalization outcomes. In the liberal market context of the UK, even a relatively strong workplace union presence carries far less weight in the absence of supportive national institutions. Hence, “country effects” and workplace union strength interact, and supportive macro-institutions are necessary but not sufficient. This finding applies broadly across new economy domains.

The Green Transition and Just Transition

The transition to a low-carbon economy is a further frontier for labor-management relations in the new economy. Thomas (2021) traces how international trade unions have shaped the “just transition” concept within the climate negotiations of the United Nations and shows that union climate policies emerge from a tension between the economic security of workers and climate protection. As a consequence, the resulting just transition framework remains inherently ambiguous.

Moving from rhetoric to practice, Schmidt and Braga (2025) analyze 512 collective agreements and six country case studies in order to identify how just transition is operationalized through collective bargaining. Key themes are upskilling and retraining provisions, consultation processes on redundancies and early retirement, as well as mechanisms for transitioning workers to greener jobs. Most agreements, however, contain only broad or symbolic commitments. Collective bargaining may therefore serve as a practical vehicle for implementing just transition goals, but its effectiveness depends on the strength of the underlying labor relations institutions. At the establishment level, worker representation appears to support rather than to obstruct environmental investment. Askildsen et al. (2006) find for German establishments that works councils are associated with higher environmental investment, particularly where councils are active in environmental matters, and Bisi et al. (2025) find that Italian firms with employee representation are more likely to pursue green investments. Moreover, union members are more supportive of environmental protection than non-members (Ringqvist 2022, 2024), and stronger industrial relations institutions are associated with greater public support for carbon taxation (Ringqvist 2026).

Comparative Institutional Perspectives

The evidence reviewed in this chapter indicates that labor market institutions are of considerable importance in the new economy. However, their effectiveness depends to a large extent on their specific design and on the broader national context within which they operate.

In coordinated market economies such as Germany, the dual-channel system of works councils and collective bargaining has proven remarkably adaptive. Works councils facilitate within-firm adjustment to automation through retraining and task reallocation (Findeisen et al. 2025; Lammers et al. 2023), while coordinated collective bargaining mutes the aggregate unemployment effects of technological change (Leibrecht et al. 2023). Where statutory works councils are absent, voluntary representation bodies may partially fill the gap (Kraft and Lammers 2019; Lammers and Giebel 2024), although their long-term effectiveness remains an open question. The ability of the German system to combine worker protection with technology adoption constitutes a “high-road” model, which is nevertheless not without tensions, since insider-outsider dynamics may disadvantage younger and less-established workers (Dauth et al. 2021; Haapanala et al. 2023).

The Nordic countries, that is Denmark, Sweden and Norway, offer a variant of the coordinated model which is characterized by voluntarism and a high union density. Social partners in these countries have been proactive in negotiating over AI and algorithmic management and prefer bipartite and tripartite agreements to a legislative regulation (Ilsøe et al. 2024). The Norwegian case demonstrates that strong national institutions amplify the effect of workplace-level union strength on shaping digitalization (Lloyd and Payne 2026).

Liberal market economies such as the United States and the United Kingdom present a contrasting picture. In the United States automation produces net negative employment and wage effects (Acemoglu and Restrepo 2020), union density has declined to historic lows, and algorithmic management is deployed as a tool against worker organizing (Wiggin 2025). Naidu (2022) takes the recent wave of US organizing at companies such as Amazon and Starbucks as the starting point for asking whether a revival of the labor movement is possible, and notes that employer opposition and US labor law create formidable obstacles, but that tight labor markets and the activism of younger workers provide countervailing forces. In the United Kingdom, even a relatively strong workplace union presence counts for much less where national-level institutions are weak (Lloyd and Payne 2023, 2026).

The East Asian economies exhibit yet another pattern and, on closer inspection, considerable variation among themselves. In China the state simultaneously promotes

automation and suppresses independent labor organization. Lei (2022) documents how the Chinese “techno-developmentalism” creates symbiotic state-capital relations which marginalize low-skilled workers, with automation decisions driven by state subsidies and nationalist ambitions rather than by efficiency alone. Liu (2023) shows that state censorship of online labor activism and ambiguous court decisions discourage workers from organizing, even as extreme working conditions, that is the “996” culture in the technology sector, persist. Without institutional channels for a cooperative conflict resolution, automation becomes the unilateral response of the employer to labor unrest (Liu and Zhang 2023).

Japan and South Korea show that a high automation intensity is compatible with radically different labor relations outcomes. Both countries are among the most robot-intensive economies in the world, and South Korea reports by far the highest robot density of any country, namely more than six times the global average (International Federation of Robotics 2024). Yet the institutional mediation of that intensity differs sharply. In Japan, enterprise unionism, joint labor-management consultation and long-term employment norms channel technological change into internal redeployment. Morishima (1991) shows in the classic study of Japanese joint consultation that information sharing by management shortened negotiations and moderated union wage demands, which is the opposite of the effect information sharing produced in comparable US settings. This explains why consultation channels in Japan tend to generate cooperative rather than adversarial responses to managerial initiative. Consistent with this, Adachi et al. (2024) find that over four decades of Japanese robot adoption robots and labor behaved as gross complements rather than as substitutes, and Krzywdzinski (2021) shows in a comparison of the German, Japanese and US automobile industries that occupational structures evolved along nationally distinct paths rather than converging on a common technological logic. The limits of this model lie at its boundaries. Kambayashi and Kato (2017) document that job security in Japan remained remarkably stable for prime-age male employees with long tenure even through the “Lost Decade”, while it deteriorated for mid-career hires and younger workers. This is the same insider-outsider division which is observed in coordinated European economies.

South Korea combines a comparable automation intensity with adversarial workplace relations. Jo et al. (2016) document how Hyundai Motor developed an “engineer-led” production system in which flexible automation economized on shop-floor skills, against a background of hostile industrial relations. Automation was thus deployed around shop-floor conflict rather than as a complement to worker competence. This is the holdup mechanism identified by Presidente (2023) in its most concrete organizational form, and it closely

parallels the Chinese dynamic in which protest accelerates robotization (Liu and Zhang 2023). Kim (2024) finds that robot exposure in Korea did not depress aggregate local labor demand, but that it did reduce labor demand in manufacturing and in routine occupations. Lee et al. (2025) show that reform efforts to extend protection beyond the organized core made early progress but failed to consolidate. They were constrained not only by employer opposition, but also by a coalition of labor market insiders and radical outsiders within the labor movement which undermined social dialogue, so that labor market dualization and with it the exposure of non-regular workers persisted. Overall, the East Asian cases indicate that neither state developmentalism nor automation intensity determines outcomes. What varies is whether workplace institutions convert distributional conflict into negotiation or into a managerial incentive to engineer labor out of the process.

In emerging and developing economies the institutional baseline varies enormously. Hayter and Lee (2018) document that India, China, Brazil, South Africa and Turkey each have fundamentally different starting points for labor relations, which makes universal policy prescriptions problematic. Platform work in these contexts extends unprotected and precarious work into settings where labor law was already weakly enforced and thus reproduces rather than remedies informality (Graham et al. 2017; Rani and Furrer 2021). Overall, the same technologies produce radically different outcomes for workers depending on whether institutional mechanisms exist which give workers a voice in how those technologies are implemented.

Summary

This chapter has reviewed the rapidly growing literature on labor-management relations in the new economy. Several key findings emerge from the evidence.

First, the labor market effects of automation are not technologically determined but institutionally mediated. The same industrial robots which produce net negative employment and wage effects in the United States are associated with neutral aggregate employment outcomes in Germany, where works councils, the apprenticeship training system and coordinated collective bargaining facilitate within-firm adjustment. Works councils protect incumbent workers during automation transitions, promote training, encourage the adoption of higher-quality technologies and are associated with higher productivity growth. Worker representation and automation are therefore complements rather than substitutes.

Second, the relationship between labor institutions and technology runs in both directions. While institutions shape how technology affects workers, automation also reshapes institutions, most notably by driving union decline through the compositional reallocation of employment away from traditionally unionized sectors. Hence, there may be a vicious cycle in which technological change weakens the very institutions which could buffer its effects.

Third, artificial intelligence and algorithmic management pose qualitatively new challenges. In contrast to industrial robots and earlier software, whose exposure was concentrated in lower- and middle-wage routine work, AI exposure rises with wages and reaches deep into professional occupations. Moreover, it introduces new forms of employer control through a continuous surveillance and through algorithmic decision-making. Generative AI adds a further dimension, since the experimental evidence suggests that it may compress productivity differences within occupations and thus benefits less experienced workers most. However, the size and even the sign of these effects depend on the task, on the setting and, most consequentially for labor relations, on who decides how the technology is introduced, which workers gain access to it and what training accompanies it. Collective bargaining over AI is emerging as a governance mechanism, with Nordic and German social partners developing proactive strategies, whereas US employers have in some cases used algorithmic management against union organizing.

Fourth, platform work disrupts traditional labor-management relations by classifying workers as independent contractors, who are thereby excluded from collective bargaining rights and from social protections. Regulatory responses such as the EU Platform Work Directive are beginning to address this gap, but the challenges are most severe in developing countries where platform work layers onto labor markets in which informal and unprotected work is already the norm.

Fifth, where statutory works councils are absent, which is the case in the majority of German establishments and in most firms globally, voluntary and alternative forms of representation may partially fill the representation gap. Results so far indicate that voluntary representation bodies foster innovation and emerge endogenously during periods of crisis, although questions remain whether they serve genuine worker interests or primarily management objectives.

Sixth, comparative evidence shows that the institutional response to technological change varies considerably across national systems. Coordinated market economies combine worker protection with technology adoption, Nordic voluntarist systems negotiate AI governance through social dialogue, and liberal market economies exhibit weaker protections and greater

inequality. The East Asian cases are particularly informative, since they share a high automation intensity while differing in their labor relations. Japanese consultation and long-term employment norms channel robots into internal redeployment, whereas adversarial workplace relations in South Korea and the absence of independent representation in China make automation an instrument for engineering labor out of contested production processes.

Several important questions remain for future research. The long-term effects of AI on labor relations are only beginning to be understood, since the existing evidence rests largely on short-run experiments in a small number of settings. It remains unclear whether the compression of within-occupation productivity differences persists once firms reorganize work around the technology, and whether representation can secure an equitable access to it. The effectiveness of the EU Platform Work Directive and of emerging collective bargaining initiatives in the platform economy requires an ongoing evaluation, particularly given the evidence from Spain that statutory rights may be hollowed out by organizational restructuring and algorithmic opacity where enforcement capacity and workplace organization are weak. The interaction between the green transition and labor-management institutions is a further frontier area, and so are the conditions under which “just transition” commitments translate into practice. Finally, the role of alternative and voluntary forms of representation in the new economy deserves further attention, particularly with regard to the question whether these institutions provide a genuine worker voice or whether they primarily serve to co-opt worker concerns in the absence of statutory protections.

Overall, labor-management relations are by no means a relic of the industrial age. In a period of rapid technological change the design and the strength of labor market institutions remain decisive for the question whether the gains from automation, AI and digitalization are shared broadly or concentrated among a narrow group of beneficiaries. The evidence strongly suggests that strengthening and adapting worker voice institutions is compatible with technological progress and may well be a precondition for progress which serves the interests of workers and of society as a whole.

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