Cobots as Workforce Partners: Overcoming Barriers Through Policy Opportunities

Lindsay Jacobs[a], Bilge Mutlu[b], Robert Radwin[c], and Timothy Smeeding[a]

[a]La Follette School of Public Affairs
[b]Department of Computer Sciences
[c]Department of Industrial & Systems Engineering

University of Wisconsin–Madison

September 17, 2025

Abstract

Substitution of capital in the form of automation and robotics has displaced many American manufacturing workers, especially those without college degrees. However, this need not be the path forward. We argue that now is an opportune time for greater policy emphasis on collaborative robots, or "cobots," which are designed to complement rather than replace manual labor while raising productivity. To realize this potential, policies must properly align incentives, support training, and address often overlooked issues such as monitoring and privacy. From an interdisciplinary vantage point, we examine the current state of cobot deployment and demonstrate how well-designed job tasks, paired with carefully integrated cobots, can preserve employment opportunities while enhancing productivity. Strategic policy measures aimed at redirecting investments can balance manufacturers' needs while ensuring stable employment, higher wages, and safer workplaces. With informed policy regarding cobots, we can avoid the harms of past automation and offshoring.

Keywords: Labor policy, trade and automation, tariffs, collaborative robots (cobots), worker displacement, labor augmentation.

1. Introduction

Manufacturers have increasingly turned to automation and robotics under pressure to boost productivity. The recent trajectory of technological change reflects what Schumpeter termed "creative destruction": Technology has raised productivity but also led to widespread layoffs, plant closings, and the loss of stable jobs for many blue-collar, non-college workers [8, 10, 3, 4, 14, 51]. While discourse around emerging technologies often emphasizes further worker displacement through robotics and artificial intelligence (AI) [37], some remain skeptical and sudden displacement is not inevitable [44, 15, 46]. With new tariffs, potentially more manufacturing in the U.S., and labor costs remaining high, robotics may play an increasingly larger role.

In this paper, we argue that *collaborative* robotic technologies, or "cobots," offer a different path. Cobots already account for a growing share of industrial robots, and can raise productivity by augmenting manual labor rather than replacing it. Their deployment has increased rapidly, and the current state of the technology makes this an opportune time for forward-looking, human-complementary policy. Such policy requires both a clear understanding of cobot capabilities and an alignment of incentives so that the gains from new technology are broadly shared.

Unlike traditional industrial robots, which operate in isolation for worker safety, cobots are in fact designed and engineered to work safely alongside people, can be flexible across settings, and relatively low in cost. They take on repetitive or physically straining tasks, allowing workers to focus on dexterous or decision-based tasks. Figure 1 illustrates such complementarity in an application at a Ford automotive assembly plant, where a cobot carries a heavy tool while the worker positions and supervises its use during shock absorber installation—reducing physical strain while raising productivity. Across many applications, specific manufacturing tasks, rather than entire jobs, can be automated and combined with human work in ways that are both safer and more efficient.

Technological advances in robotics, assisted by artificial intelligence, extend this potential by enhancing productivity without necessarily displacing jobs. As Autor [9] and others have shown, productivity gains from automation can also increase the value of human labor. By automating undesirable tasks while preserving those requiring human expertise, the integration of cobots can reduce workplace injuries, extend career longevity, and increase overall labor productivity as workers adapt to new technologies [46].

What policies would best support a "human-centered" transformation that averts the most disruptive consequences of automation we have seen in the past? A shift toward cobotics that improves worker and societal well-being will require policies based on an understanding of the current state of the technology, its challenges, and its design potential. Motivating these policies from an interdisciplinary perspective, we describe promising advancements and barriers in cobot deployment, then, considering the role of existing institutions and incentives, we propose forward-looking policy areas to align productivity growth with more stable and desirable jobs.

2. The State of Cobots: Promise and Challenges

Cobots hold substantial promise for reshaping work, but realizing these gains depends on how they are designed and integrated. Advances in human–robot interaction have created opportunities for safer and more productive collaboration, yet challenges remain around worker safety, satisfaction, and distributional impact that policy must account for and can in some cases address.

2.1. Design Advances and Worker Reception

Much of the recent progress in cobotics has focused on enabling productive interaction between humans and robots [6, 35, 48, 49]. New approaches to task allocation allow repetitive or physically straining tasks to be shifted to cobots while workers maintain oversight and decision-making roles. Studies demonstrate that "hybrid" human–robot teams improve both productivity and ergonomics, particularly for tasks that are parallelizable, repetitive, or physically awkward.

Other advances involve end-user programming and teleoperation. End-user programming allows workers to plan automated tasks for cobots while stepping in to make corrections when automation falls short, and allows for cobots to be more widely suitable across firms [27]. Field tests, such as sanding applications, show that this reduces fatigue, improves quality, and allows workers to supervise multiple cobots simultaneously [38]. Teleoperation, meanwhile, makes it possible to coordinate human and robot workers across distributed—and sometimes hazardous—worksites [36].

Worker acceptance of robots and cobots is an essential design and training barrier to overcome. Concerns about safety, job loss, and mistrust can hinder adoption, yet evidence shows that it is possible for carefully integrated cobots to *improve* worker satisfaction [6, 35, 25]. Acceptance grows when workers perceive ergonomic benefits, gain some ownership by programming or configuring cobots, or interact with cobots that provide social cues [57]. In some field studies, workers even attribute human-like qualities to cobots, suggesting that design features influence not only productivity but also the social environment of a workplace.

These advances show that cobots can be more than just tools, becoming reliable partners in production when design emphasizes complementarity and worker experience.

2.2. Worker Safety, Workload, and Satisfaction

The effects of technology on workers are not just limited to wages and employment, but also job content, job quality, and economic stability [1, 45]. Through taking on repetitive or physically demanding tasks, they reduce injuries and improve ergonomics. Indeed, research from the U.S. and Germany shows that robots already lower injury rates, and cobots are especially well suited to the many jobs where strain is high but full automation is not feasible [22, 42]. By reducing ergonomic risks, cobots could even indirectly mitigate opioid use disorder, which is closely linked to work-related pain and injury [54, 7]. Hence, meaningful improvements in workplace conditions can save lives.

At the same time, cobots are not a guaranteed improvement. Poorly designed integration can intensify workloads, accelerate the pace of work, and reduce autonomy [26, 40, 60], introducing what some call "digital Taylorism" [29]. These conditions raise stress, injury risk, and turnover. But the situation is not hopeless, as analyses reveal that for some jobs, physical and mental workloads decrease, while for others they increase after cobots are reassigned tasks for optimal productivity [49, 43].

Monitoring technologies are often part of cobot systems, which adds another layer of complexity. Smart systems that track worker and cobot activity can enhance safety and coordination, but also raise concerns about surveillance and productivity pressure. Many workers dislike monitoring due to privacy risks and mistrust, especially if data could be used for discipline or discrimination [11, 58, 59]. Yet in other industries, such as trucking, driver monitoring is sometimes welcomed when it clearly improves safety and reduces accidents [21, 30]. This suggests that design and regulation will determine whether monitoring strengthens or undermines worker trust.

Finally, cobot impacts will be uneven. Work by [42] shows a wide potential impact of cobots across industries, demographics, and geography. The intensity of geographic impact is reproduced in Figure 3, and shows an uneven distribution across states nationally. The occupations most likely to see cobot integration are often physically demanding and employ younger, lower-income workers (lower panel of Figure 3). At the same time, cobots certainly have the potential to expand opportunities for older or physically limited workers by shifting jobs away from many strenuous tasks. Given our aging demographics, this would be a welcome development.

3. Policy Priorities for Human-Centered Cobotics

Cobot deployment need not follow the path of past automation, and deliberate, human-centered technology policy can steer adoption away from displacement and toward realizing cobots' broader promise. The current combination of advancing technology, high labor costs, and shifting trade conditions makes this the right time to act. Institutional arrangements, corporate incentives, and trade policy all shape how new technologies are adopted, often in ways that prioritize short-term profit over long-term job quality. Without intervention, firms may deploy cobots in ways that intensify workloads or displace workers rather than complement them.

Institutional and policy context. Several institutions and policy structures already influence cobot adoption. Unions have historically been instrumental in improving wages and working conditions [13], and could continue to play a role in ensuring that new technology enhances rather than undermines such gains. While anticipated automation has been shown to weaken bargaining power [41], renewed organizing in industries like automotive demonstrates that unions can play a constructive role in promoting complementary approaches to technology. Worker voice more broadly is gaining momentum, reflecting demand for a say in how new technologies are integrated.

Corporate tax structures also matter. Current U.S. policy taxes capital income at lower rates than labor, incentivizing automation even when human-complementary technologies might be more socially beneficial [56, 55]. If estimates of capital's responsiveness to taxation are overstated, the preferential treatment of automating capital cannot be justified [2]. Shifting tax incentives toward worker-augmenting technologies like cobots would help correct this imbalance.

Trade and tariff policy additionally shape the context for cobot deployment. Free trade agreements delivered broad consumer benefits but left concentrated costs in manufacturing communities. Most Americans favor free trade agreements but also think that more has been lost than gained through increased trade [16] and consider tariffs acceptable under certain circumstances [50]. Recent industrial policy, including the CHIPS and Infrastructure Acts, has encouraged new domestic manufacturing investment [17, 52]. With higher costs leading to decreases in imports from China, there has been a significant increase in domestic manufacturing structure investment (Figure 4; [18]). In this environment, cobots are especially appealing, as they can help offset high labor costs while preserving and upgrading employment opportunities.

Against this backdrop, we propose five policy priorities that would move ongoing cobot adoption in alignment with broader economic and social goals.

3.1. Strategic Investments in Human Capital

Strategic investments in formal post-secondary training and education, coupled with clear pathways to employment, would minimize displacement and promote recovery. U.S. labor markets are very flexible but do not often facilitate connections that both help prepare people for jobs and then link them to these jobs. Sectoral technical training, or "career and technical education" (CTE), can be accomplished through existing and expanded collaborations between community colleges and employers to provide the necessary skills. Additionally, apprenticeships and on-the-job learning can also contribute [34] and be encouraged through tax incentives for firms that provide training in working with cobots and other technologies that enhance human labor. By adopting these strategies, such technologies would be more attractive relative to those designed to displace human labor, ensuring a swifter recovery for and minimization of displaced workers [20]. The U.S.

Trade Adjustment Assistance (TAA) program, which has helped provide wage insurance for workers adversely affected by trade, could be used also to compensate workers displaced by technology [31]. While the effectiveness of TAA has been mixed [53], lessons from it can inform the design of programs that anticipate—rather than respond to—potential disruptions, relying on estimates of robotics exposure [19, 42]. Such programs and policies are widely practiced in Europe and offer models that could be adopted [39].

3.2. Supporting Human-Centered Cobot Research

Tasks where cobots are carefully integrated to augment worker capabilities have the potential to mitigate physically straining work by performing repetitive and physically straining tasks and reduce direct costs associated with worker injuries and lost time, as well as reducing indirect costs associated with reassignments, insurance, and work dissatisfaction. While this is clearly valuable for workers, employers, and society broadly, costs are concentrated, and so many technologies come from research focused on more narrowly defined objectives. Increased public funding for human-complementary technology research, recognizing that this is not currently a private sector priority, should be better supported to optimize robotics for all [36]. Without such support, we risk underinvesting in cobot designs that yield broad benefits. Innovation in cobotics is currently driven by internal research and development divisions within and investments by large companies [5], and in addition to technological advantage, tax incentives for companies, in exchange with public sharing of advancements, can facilitate industry-driven innovation. As it is now, because not all benefits are internalized, even negligible costs lead to missed opportunities and design approaches that society overall would benefit from. Human-centered design and research that takes an integrated, cross-disciplinary perspective on workplace technologies like cobots should be advanced within existing research and funding structures.

3.3. Place-Based Investment Strategies

Policies promoting the integration of human-centered technology should expand on or redirect recent targeted programs, such as the 2022 CHIPS and Science Act's regional tech hubs program and the 2017 Tax Cuts and Jobs Act's Opportunity Zones. As larger companies seek to reduce supply chain risks by investing closer to their customers, these programs have further encouraged revitalization in areas affected by disinvestment due to trade and technological changes [47]. Much of this new investment targets communities that suffered the worst impacts of plant closures in recent decades, some of which are gaining a disproportionate share of new investment and job creation [32], with both notable successes and failures [24, 23, 12]. By aligning place-based investment with training and cobot integration, communities can capture the benefits of reshoring while avoiding a repeat of past displacements.

3.4. Worker Input, Safety, and Privacy

Policies that facilitate the integration of cobots in the workplace should seek to promote worker input, safety, and privacy, while at the same time avoiding unsustainable cost increases or encouraging full automation. This can be achieved by encouraging collaboration on productivity-linked agreements. A collaborative approach, as demonstrated by Germany's industrial unions, enables companies to embrace and adapt to technological advancements while maintaining competitiveness by improving both productivity and wages. Actively promoting collaborative investment, however, also requires policies that would align the training needs of people and employers. This should include more tangible incentives for investment in human capital to complement human-centered cobot technologies. While unions can advocate for training and upskilling programs that enhance labor value and reduce the risk of automation-driven displacement, such initiatives are not always in employers' immediate interests or financially viable. Firms could be incentivized to provide these programs through tax deductions, alongside training initiatives coordinated through the Workforce Innovation and Opportunity Act (WIOA). Additionally, changes to Occupational Safety and Health Administration (OSHA) rules with input from National Institute for Occupational Safety and Health (NIOSH) should have monitoring guidelines and facilitate reporting of hazards by employees and employers. These updates could incorporate incentives to reduce injuries, by means of increasing employer penalties for injuries and rewarding employers for reducing injuries on the job. Proactive surveillance for occupational health and safety hazards can not only prevent injuries but reduce the costs associated with lost work time and reassignments. Ergonomics tools for hazard surveillance utilizing AI, computer vision, and sensor technologies offer a means for detecting hazards that are more vigilant and less demanding of employer resources. Policies for monitoring physical stress and strain should be updated to accommodate smart devices.

3.5. Tax Policy Reform

Capital income is almost always taxed at lower rates than earned labor income in the U.S. and in other advanced economies [28], distorting the relative prices such that there is a bias toward labor-replacing capital [33]. Along with [15], we would argue for equalizing the effective marginal tax rates between labor and capital and incentivizing worker-augmenting technologies. In doing so the existing price distortions would diminish, and more investment would be directed towards enhancing human labor—including technologies such as cobots—and away from technologies that displace or automate human labor.

4. Conclusion

Cobots hold significant promise for enhancing productivity through collaboration with human workers rather than displacement. This is an opportune moment for policy to guide deployment, drawing lessons from past experiences with automation and offshoring. Understanding and anticipating barriers—ranging from safety and monitoring to uneven workforce impacts—is essential to ensure cobots enhance job quality as well as wages and employment.

Cobot adoption hinges not only on engineering capabilities and design, but also on institutional and policy choices. Ergonomic task assignment, end-user programming, and teleoperation show how cobots can reduce strain, extend careers, and raise productivity. Yet, ultimately, successful cobot integration requires creating an environment in which the interests of workers and employers are more aligned to balance immediate cost savings with labor-augmenting, long-term benefits.

The United States has an opportunity to shift the trajectory of technological change away from labor replacement and toward labor enhancement. By making proactive investments and policy adjustments now, human-centered cobotics can deliver productivity growth that strengthens, rather than undermines, the social and economic foundations of work.

Acknowledgments

The authors are grateful to Shiyu Zhou for comments and Indu Kilaru for research assistance.

Funding

This work received funding from the National Science Foundation, awards CMMI-2026478, titled "FW-HTF-RM: Human-Robot Collaboration for Manual Work," and DGE-2152163, titled "Integrating Robots into the Future of Work."

References

[1] AAAS. Advancing a people-first economy, 2023. (page 3)

[2] D. Acemoğlu, A. Manera, and P. Restrepo. Does the us tax code favor automation? Technical report, 2020. (page 4)

[3] D. Acemoğlu and P. Restrepo. Tasks, automation, and the rise in us wage inequality. *Econometrica*, 90(5):1973–2016, 2022. (page 1)

[4] D. Acemoğlu and P. Restrepo. Automation and rent dissipation: Implications for wages, inequality, and productivity. Technical Report w32536, National Bureau of Economic Research, 2024. (page 1)

[5] R. Allgor, T. Cezik, and D. Chen. Algorithm for robotic picking in amazon fulfillment centers enables humans and robots to work together effectively. *INFORMS Journal on Applied Analytics*, 53(4):266–282, 2023. (page 5)

[6] A. S. Arora, M. Fleming, A. Arora, V. Taras, and J. Xu. Finding "h" in hri: Examining human personality traits, robotic anthropomorphism, and robot likeability in human-robot interaction. *International Journal of Intelligent Information Technologies (IJIIT)*, 17(1):1–20, 2021. (pages 2, 3)

[7] A. Asfaw and L. I. Boden. Impact of workplace injury on opioid dependence, abuse, illicit use and overdose: A 36-month retrospective study of insurance claims. *Occupational and Environmental Medicine*, 77(9):648–653, 2020. (page 3)

[8] D. Autor. Work of the past, work of the future. In *AEA Papers and Proceedings*, volume 109, pages 1–32, 2014 Broadway, Suite 305, Nashville, TN 37203, May 2019. American Economic Association. (page 1)

[9] D. Autor. Applying AI to rebuild middle class jobs. Technical Report w32140, National Bureau of Economic Research, 2024. (page 2)

[10] D. Autor, C. Chin, A. Salomons, and B. Seegmiller. New frontiers: The origins and content of new work, 1940–2018. *The Quarterly Journal of Economics*, 2024. (page 1)

[11] Kirstie Ball et al. Electronic monitoring and surveillance in the workplace. *European Commission Joint Research Centre*, 2021. (page 3)

[12] A. Benzow and C. O'Brien. Manufacturing jobs have recovered, but not everywhere. Technical report, Economic Innovation Group, October 8 2024. (page 5)

[13] D. G. Blanchflower and A. Bryson. Unions, wages and hours. *SSRN Electronic Journal*, 2024. (page 4)

[14] L. P. Boustan, J. Choi, and D. Clingingsmith. Automation after the assembly line: Computerized machine tools, employment and productivity in the united states. Technical report, National Bureau of Economic Research, 2022. (page 1)

[15] V. Capraro, A. Lentsch, D. Acemoğlu, S. Akgun, A. Akhmedova, E. Bilancini, and R. Viale. The impact of generative artificial intelligence on socioeconomic inequalities and policy making. *PNAS Nexus*, 3(6), 2024. (pages 1, 6)

[16] Pew Research Center. Majority of americans take a dim view of increased trade with other countries, 2024. (page 4)

[17] Joint Economic Committee. Fact sheet: The manufacturing renaissance that will drive the economy of the future, April 24 2024. (pages 4, 13)

[18] J. Dunn and F. Leibovici. Has us-china decoupling energized american manufacturing?, March 2024. (page 4)

[19] E. Felten, M. Raj, and R. Seamans. Occupational, industry, and geographic exposure to artificial intelligence: A novel dataset and its potential uses. *Strategic Management Journal*, 42(12):2195–2217, 2021. (page 5)

[20] J. Furman. Policies for the future of work should be based on its past and present. Technical report, Economic Innovation Group, 2024. (page 4)

[21] Mahtab Ghazizadeh, Yiyun Peng, John D. Lee, and Linda Ng Boyle. Augmenting the technology acceptance model with trust: Commercial drivers' attitudes towards monitoring and feedback. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, 56(1):2286–2290, 2012. (page 3)

[22] R. Gihleb, O. Giuntella, L. Stella, and T. Wang. Industrial robots, workers' safety, and health. *Labour Economics*, 78:102205, 2022. (page 3)

[23] A. Goldstein. Back to janesville, 2024. (page 5)

[24] P. Goodman. Communities that suffered the worst of plant closings in recent decades are now gaining an outsize share of fresh investment and new jobs, November 1 2024. (page 5)

[25] Jacob F. E. H. Grosse, S. Morana, and C. J. König. Picking with a robot colleague: A systematic literature review and evaluation of technology acceptance in human–robot collaborative warehouses. *Computers & Industrial Engineering*, 180:109262, 2023. (page 3)

[26] B. Gutelius and N. Theodore. The future of warehouse work: Technological change in the us logistics industry. Technical report, UC Berkeley Center for Labor Research and Education and Working Partnerships USA, 2019. (page 3)

[27] M. Hagenow, E. Senft, R. Radwin, M. Gleicher, M. Zinn, and B. Mutlu. A system for human-robot teaming through end-user programming and shared autonomy. In *Proceedings of the 2024 ACM/IEEE International Conference on Human-Robot Interaction*, pages 231–239, March 2024. (page 2)

[28] D. Hourani, B. Millar-Powell, S. Perret, and A. Ramm. The taxation of labour vs. capital income: A focus on high earners. Technical report, OECD Taxation Working Papers, No. 65, OECD Publishing, Paris, 2023. (page 6)

[29] J. Howard. Algorithms and the future of work. *American Journal of Industrial Medicine*, 65(12):943–952, 2022. (page 3)

[30] Yueng-Hsiang Huang, Matthias Roetting, Jamie R McDevitt, David Melton, and Gordon S Smith. Feedback by technology: Attitudes and opinions of truck drivers. *Transportation Research Part F: Traffic Psychology and Behaviour*, 8(4-5):277–297, 2005. (page 3)

[31] B. G. Hyman, B. K. Kovak, and A. Leive. Wage insurance for displaced workers. Technical Report w32464, National Bureau of Economic Research, 2024. (page 5)

[32] Réka Juhász, Nathan Lane, and Dani Rodrik. The new economics of industrial policy. *Annual Review of Economics*, 16:213–242, August 2024. (page 5)

[33] L. Karabarbounis. Perspectives on the labor share. *Journal of Economic Perspectives*, 38(2):107–136, 2024. (pages 6, 12)

[34] L. F. Katz, J. Roth, R. Hendra, and K. Schaberg. Why do sectoral employment programs work? lessons from workadvance. *Journal of Labor Economics*, 40(S1):S249–S291, 2022. (page 4)

[35] J. Kildal, A. Tellaeche, I. Fernández, and I. Maurtua. Potential users' key concerns and expectations for the adoption of cobots. *Procedia CIRP*, 72:21–26, 2018. (pages 2, 3)

[36] S. Kim, I. Hernandez, M. A. Nussbaum, and S. Lim. Teleoperator-robot-human interaction in manufacturing: Perspectives from industry, robot manufacturers, and researchers. *IISE Transactions on Occupational Ergonomics and Human Factors*, 12(1-2):28–40, 2024. (pages 3, 5)

[37] J. A. Kingson. AI and robots fuel new job displacement fears, April 2 2023. (page 1)

[38] A. Konstant, N. Orr, M. Hagenow, I. Gundrum, Y. H. Hu, B. Mutlu, and R. G. Radwin. Human–robot collaboration with a corrective shared controlled robot in a sanding task. *Human Factors*, 2024. (page 3)

[39] I. Kuziemko, N. Longuet-Marx, and S. Naidu. "compensate the losers?" economic policy and partisan realignment in the us. Technical Report w31794, National Bureau of Economic Research, 2023. (page 5)

[40] H. Lager, A. Virgillito, and T. P. Buchberger. Digitalization of logistics work: Ergonomic improvements versus work intensification. In *Digital Supply Chains and the Human Factor*, pages 33–53. 2021. (page 3)

[41] S. Leduc and Z. Liu. Automation, bargaining power, and labor market fluctuations. *American Economic Journal: Macroeconomics*, 16(4):311–349, 2024. (page 4)

[42] Q. Lin, L. Jacobs, and N. Duncombe. Collaborative robots in the workplace: Occupational, geographic, and demographic opportunities for technology adoption. Technical report, 2024. Working Paper. (pages 3, 3, 5, 12)

[43] L. Liu, A. J. Schoen, C. Henrichs, J. Li, B. Mutlu, Y. Zhang, and R. G. Radwin. Human robot collaboration for enhancing work activities. *Human Factors*, 66(1):158–179, 2024. (page 3)

[44] F. Manjoo. In the battle with robots, human workers are winning, October 7 2022. (page 1)

[45] D. Matthews, A. Spielberg, D. Rus, S. Kriegman, and J. Bongard. Efficient automatic design of robots. *Proceedings of the National Academy of Sciences*, 120(41):e2305180120, 2023. (page 3)

[46] L. Moe and W. M. Rodgers III. Robots: Helpers or substitutes for workers?, September 25 2024. (pages 1, 2)

[47] M. Muro, R. Maxim, J. Parilla, and X. de Souza Briggs. Breaking down an $80 billion surge in place-based industrial policy, Brookings Institution, December 2022. (page 5)

[48] B. Mutlu and J. Forlizzi. Robots in organizations: The role of workflow, social, and environmental factors in human-robot interaction. In *Proceedings of the 3rd ACM/IEEE International Conference on Human Robot Interaction*, pages 287–294, March 2008. (page 2)

[49] M. Pearce, B. Mutlu, J. Shah, and R. Radwin. Optimizing makespan and ergonomics in integrating collaborative robots into manufacturing processes. *IEEE Transactions on Automation Science and Engineering*, 15(4):1772–1784, 2018. (pages 2, 3)

[50] Harvard CAPS/Harris Poll. January Harvard CAPS/Harris Poll: Trump to enter office with approval rating 14 points higher than biden, with voters prioritizing inflation and immigration, 2025. (page 4)

[51] P. Restrepo. Automation: Theory, evidence, and outlook. *Annual Review of Economics*, 16, 2023. (page 1)

[52] Martha Ross and Mark Muro. How federal, state, and local leaders can leverage the CHIPS and Science Act as a landmark workforce opportunity, Brookings Institution, January 2024. (page 4)

[53] P. Z. Schochet, R. D'Amico, J. Berk, S. Dolfin, and N. Wozny. Estimated impacts for participants in the trade adjustment assistance (taa) program under the 2002 amendments. Technical Report 582d8723f6884d4eb7a3f95a4d5ef086, Mathematica Policy Research, 2012. (page 5)

[54] W. S. Shaw, C. Roelofs, and L. Punnett. Work environment factors and prevention of opioid-related deaths. *American Journal of Public Health*, 110(8):1235–1241, 2020. (page 3)

[55] D. J. Skinner. The evolving relation between earnings, dividends, and stock repurchases. *Journal of Financial Economics*, 87(3):582–609, 2008. (page 4)

[56] J. C. Suarez-Surrato. Targeting business tax incentives to realize wage growth. Technical report, WCEG, Washington, 2021. (page 4)

[57] A. Tausch, C. Peifer, B. M. Kirchhoff, and A. Kluge. Human–robot interaction: How worker influence in task allocation improves autonomy. *Ergonomics*, 65(9):1230–1244, 2022. (page 3)

[58] U.S. Government Accountability Office. Digital surveillance of workers: Tools, uses, and stakeholder perspectives. Technical Report GAO-24-107639, U.S. Government Accountability Office, 2024. (page 3)

[59] Darrell M. West. How employers use technology to surveil employees, Brookings Institution, January 2021. (page 3)

[60] Y. Q. Zhu and K. Kanjanamekanant. Human–bot co-working: Job outcomes and employee responses. *Industrial Management & Data Systems*, 123(2):515–533, 2023. (page 3)

5. Supplementary Figures

FIGURE 1: A cobot application at a Ford Motor Company's assembly plant in Cologne, Germany. In the application, the cobot carries a heavy, air-powered tool, which the worker positions during the installation of shock absorbers in Ford Fiesta model cars. (Copyright: Ford Media Center, permission pending.)

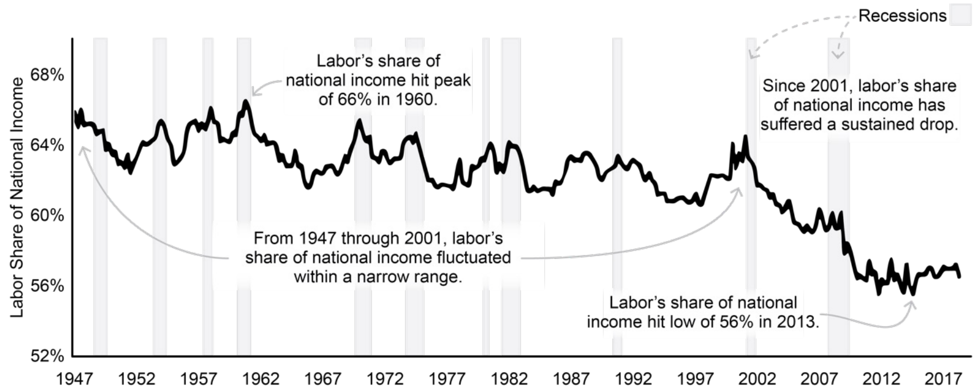
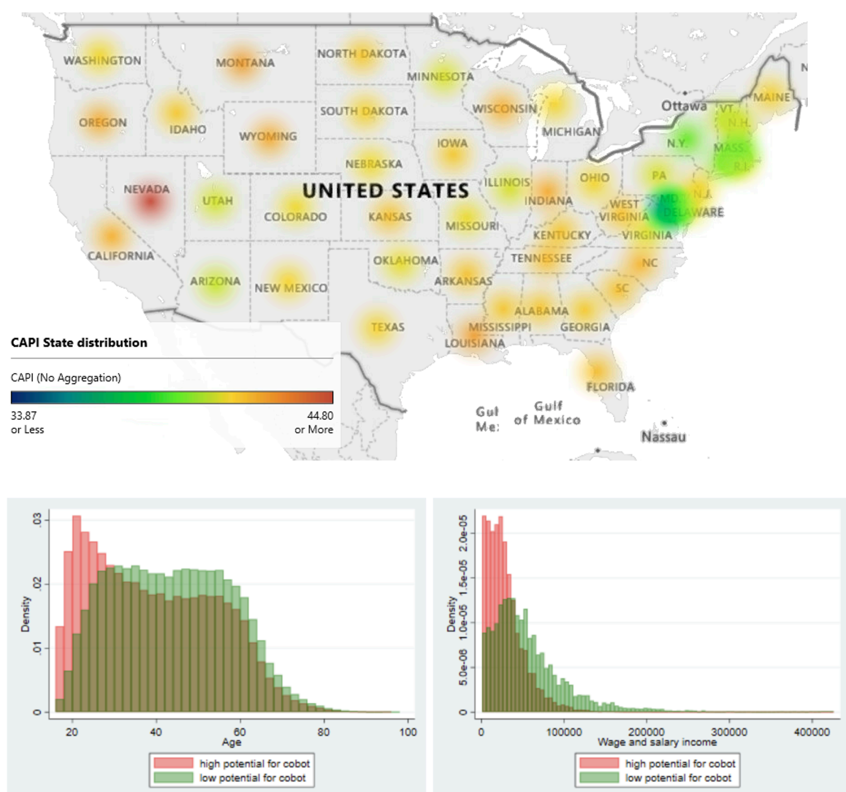


FIGURE 2: Labor share of national income. (Adapted from [33]; data source: Bureau of Labor Statistics.)



(a) age

(b) income

FIGURE 3: *Top:* geographic distribution of cobot-exposed work. *Bottom:* age (a) and income distribution (b) for people in jobs with high- and low-cobot exposure. (Source: [42]).

Figure 4: Surge in real total manufacturing construction investment after the passage of the CHIPS Act and IRA. (Adapted from [17]; data source: FRED Total Manufacturing Construction Spending, monthly at a seasonally adjusted, annualized rate using FRED Price Index of Materials and Components for Construction).