Job Loss, Displacement and AI: Anticipating and Preventing Their Costs

Harry J. Holzer, February 2024

Artificial Intelligence (AI) will likely have major effects on the job market when it is more fully implemented in the workplace, and its effects will likely be mixed. On the one hand, AI will no doubt augment workers' skills in many cases, enabling them to perform jobs which had not been available to them earlier and making many more productive than they were before. On the other hand, millions of workers in many sectors of the economy may be displaced, as AI-enabled automation performs their job tasks as well or better (and more efficiently) than they were able to do before.

Regarding these losses, if we can better anticipate the occupations and industries in which job loss is likely to occur, we can perhaps prevent some of it – by training incumbent workers to perform other tasks. Alternatively, if some will be displaced, we can maybe give them a faster start at retraining for external jobs - and ameliorate displacement's worst effects. But this requires some understanding of the nature of worker displacements and job losses, as well as where and for whom the displacements are likely to occur.

Worker Displacement

What is worker displacement? This term (or worker dislocation) refers to a situation where workers with at least some minimal level of job tenure (or seniority) – like three years – permanently lose a job due to a workplace reorganization or the closure of a work establishment. The causes of such displacements tend to be automation or globalization, both of which can have large effects on the production of goods and services here in the US. (Other

institutional changes, such as the outsourcing of workers and human resource functions to other companies, can lead to displacement as well.)

In steady state, about 1 million workers per year are displaced (Farber, 2018); these numbers tend to rise during recessions. But a general technology like AI could produce higher rates of displacement over time. And worker displacement is costly, both to them and to society. Many older displaced workers never return to formal employment; and, among those who do, earnings losses of 20-30% are not uncommon (Jacobson et al., 1993).

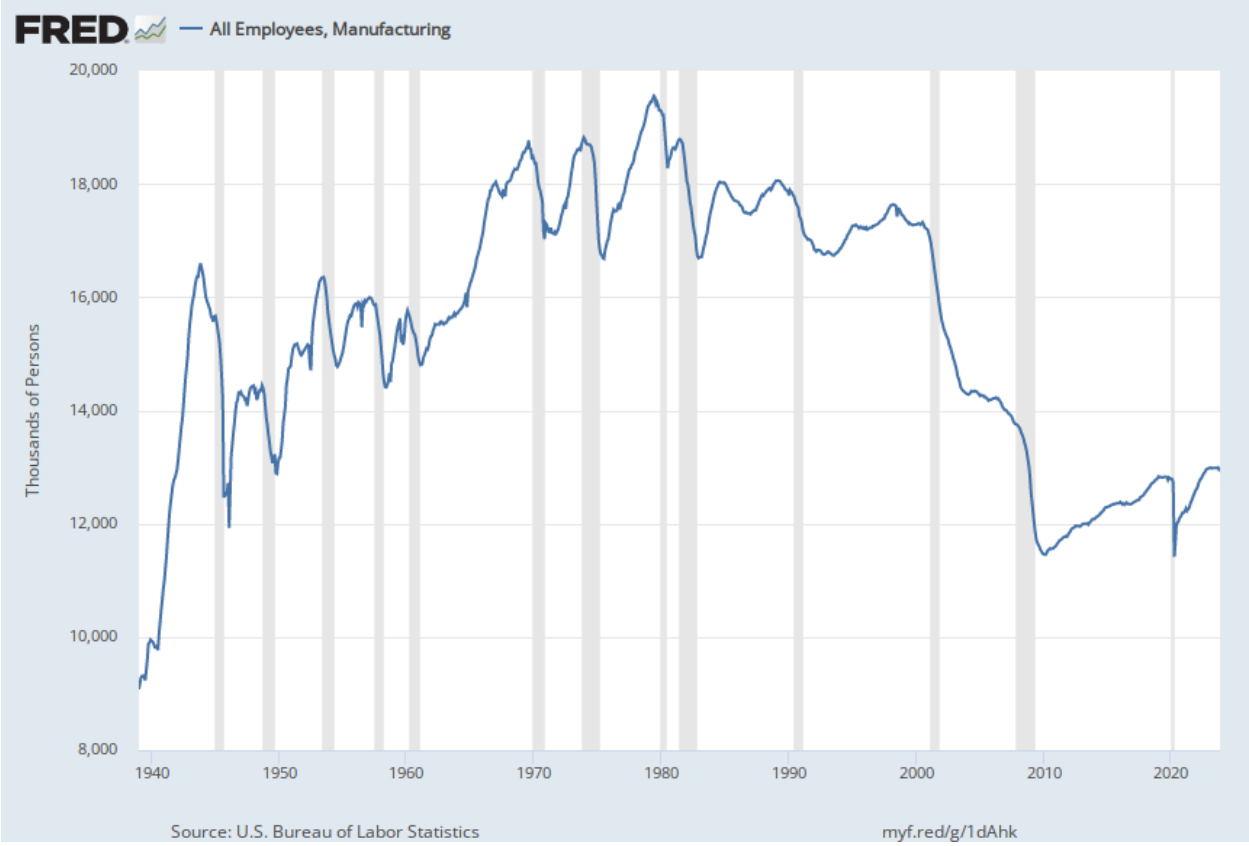
Large displacements of workers and job losses, when heavily concentrated in particular industries and regions, can hurt workers and communities even beyond those who are directly displaced. The digital automation which began in the 1980s reduced employment for production and clerical workers in a number of industries; since these were occupations where those with only high school diplomas (or less) were reasonably well compensated, these employment reductions reduced earnings for less-educated workers and increased inequality in the labor market between workers with and without college degrees. Economists have called this phenomenon skill-biased technical change (SBTC), and many view it as the primary culprit in a rising polarization of the US job market between more- and less-educated workers (Autor et al., 2007). And, when these jobs and industries are highly concentrated in particular regions of the country, the effects can be very harmful to the fiscal health of these regions and to the well-being of many communities.

The Case of Manufacturing

One example of such a phenomenon is the large decline in manufacturing employment that has occurred in the past few decades- and especially in durable manufacturing, where

wages for production workers were relatively high (Kreuger and Summers, 1986). Employment in manufacturing peaked at just under 20 million in 1980; it declined mostly during the 1980s and 1990s, before dropping quite rapidly after 2000. Indeed, manufacturing employment dropped by a remarkable 5 million between 2000 and 2010, the trough of the Great Recession, and by roughly 4 million between 2000 and 2019. Automation in the form of robotics and the admission of China to the World Trade Organization (known among economists as the "China Shock") were likely responsible for this development (Bound and Freeman, 2019; Acemoglu and Restrepo, 202X; Autor et al., 2016).

Figure 1: Manufacturing Employment in the US Since 1940



Whatever its causes, the consequences of the loss of manufacturing jobs have been severe. Not only have earnings and also labor force participation declined among less-educated men (Autor and Wasserman,2013); but communities and regions in the industrial Midwest have gone into lasting decline (Autor et al., 2016; Austin et al., 2019), and the working class more broadly have experienced a rise in disability, morbidity and mortality (that has been dubbed "deaths of despair" by Case and Deaton, 2018).

Unfortunately, the data and analysis of the effects of manufacturing job loss have all been retrospective, well after the damage has been done and too late to prevent it or help workers in a timely manner. Fortunately, we might be able to do better going forward with job changes associated with AI.

AI and Displacement: Where and Whom

Can we expect future displacements and job losses associated with AI to generate similarly negative impacts? It is not yet clear which occupations, industries, and/or regions will be affected by AI over time. It is quite possible that, given the general nature of AI, its overall impacts on employment will be larger than those associated with digital technologies and the "China Shock" but less concentrated on a particular group or region. AI might well replace particular tasks that many workers now do that do not account for most of their job tasks, which raises the likelihood that they will be retained and retrained by employers rather than displaced.

And at least some evidence (e.g., Webb, 2020) suggests that its impacts will be less biased against non-college educated workers; indeed, it might have larger effects higher up the education scale, given its abilities to do computations, writing and data analysis which to date

have been mostly performed in jobs by college graduates.[1] On the other hand, while the *incidence* of displacement might be less highly concentrated in the non-college population, *adjustments* to such potential displacement might occur more rapidly and easily among college graduates, who might be better at anticipating task performance losses and retooling themselves before they occur. Either way, a greater ability for policymakers and practitioners to predict where/for whom such task replacement will occur can likely improve the quality of our responses, helping workers to adapt in their current jobs or to move more easily to others.

More specifically, a better understanding of who is facing task replacement by AI, and in which occupations and industries, will enable a more "rapid response" to potential dislocations, in the lingo of the US Department of Labor.[2] Policymakers and practitioners might help employers retrain workers rather than displace them, overcoming a bias caused where federal tax incentives for capital investment or a lack of worker "voice" in management decisions (Acemoglu et al., 2020; Haapanala et al., 2022). Alternatively, "rapid response" for those who will be displaced helps them get Unemployment Insurance more quickly, and perhaps enroll sooner in college retraining. Educators could guide students to fields of study and task mastery that makes their skills more complementary with AI, and less vulnerable to further displacement.

To better understand the effects of AI on jobs and workers, we need the right data – and, fortunately, those are becoming more available at the state level. Using quarterly earnings

[1] Another prediction that AI will affect highly educated workers in industries like finance and technology can be found in a new report by the Burning Glass Institute (2024).

[2] https://www.dol.gov/agencies/eta/layoffs#:~:text=Rapid%20Response%20is%20a%20pro,companies%20and%20their%20affected%20workers.

records from the Unemployment Insurance (UI) system, which covers almost all workers, we can identify how specific firms and specific groups of workers are being affected by AI. Once we identify the firms affected – which we can do in a variety of ways, as Julia Lane's paper points out – we can monitor which groups of workers they are newly hiring, and which are being retained or displaced; then we can measure how each group is faring over time, in terms of employment and earnings changes. The punch-line: *available data can help us measure the employment effects of AI in nearly real time*, and enable us to respond quite rapidly to whatever we find.

And, if a range of policies are enacted (such as the provision of Lifelong Learning Accounts for workers or more expanded options for training, as well as more voice for employees in the workplace), we could strengthen the strong upsides of AI and lessen the negative effects that many workers are likely to bear.[3]

[3] For more on "lifelong learning accounts see Fitzpayne and Pollack, 2018; for evidence on retraining dislocated workers in funding from the US Department of Labor, see Andersson et al. (2022). If the kinds of funding for training and household stipends that is provided by Trade Adjustment Assistance could also be provided to workers displaced by automation, its positive effects (Hyman, 2018) could be broadened.

REFERENCES

Acemoglu, Daron and Pascual Restrepo. 2022. "Tasks, Automation and the Rise in Wage Inequality. *Econometrica*, September.

Acemoglu, Daron et al., 2022. *Does the US Tax Code Favor Automation?* Policy Brief, Brookings Institution.

Andersson, Fredrik et al. 2022. "Does Federally-Funded Job Training Work?" Journal of Human Resources.

Austin, Benjamin et al. 2018. *Saving the Heartland: Place-Based Policies for the 21st Century*. Policy Brief, Brookings Institution.

Autor, David and Melanie Wasserman. 2013. "Wayward Sons: The Emerging Gender Gap in Labor Markets and Education. NBER Working Paper."

Autor, David et al., 2007. *Revising the Revisionists*. NBER Working Paper.

Borjas, George and Richard Freeman. 2019. "From Immigrants to Robots: The Changing Locus of Substitutes for Workers. NBER Working Paper."

Burning Glass Institute. 2024. *Generative Artificial Intelligence and the Workforce*. With the Society of Human Resource Management. February 1.

Case, Anne and Angus Deaton. 2020. *Deaths of Despair and the Future of Capitalism*. Princeton University Press.

Farber, Henry. 2017. "Employment, Hours and Earnings Consequences of Job Loss: US Evidence from the Displaced Worker Survey." *Journal of Labor Economics.*

Fitzpayne, Alistair and Ethan Pollack, 2018. *Lifelong Learning and Training Accounts*. Aspen Institute.

Haapalana, Henri et al. 2022. “Robots and Unions: The Moderating Effect of Organized Labor on Technological Unemployment. *Economic and Industrial Democracy*.

Hyman, Benjamin, 2018. “Can Displaced Labor Be Retrained? Evidence from Quasi-Random Assignment to Trade Adjustment Assistance.” Federal Reserve Bank of New York.

Jacobson, Louis et al. 1993. “Earnings Losses of Displaced Workers.” *American Economic Review.* September.

Krueger, Alan and Lawrence Summers. 1986. “Reflections on the Inter-Industry Wage Structure.” NBER Working Paper.

Webb, Michael. 2020. “The Impact of Artificial Intelligence on the Labor Market.” Working Paper, Stanford University.