

Original Research Article

Artificial Intelligence and the Future of Labour Demand

Gong Hui

Institute of Information Technology of GUET, Guilin 541004, Guangxi, China

Abstract: Artificial intelligence (AI) is set to influence every aspect of our lives. As a technology platform, AI can automate tasks previously performed by labour or create new tasks and activities in which humans can be productively employed. Recent technological change has been biased towards automation, with insufficient focus on creating new tasks where labour can be productively employed. The consequences of this choice have been stagnating labour demand, declining labour share in national income, rising inequality and lowering productivity growth. The current tendency is to develop AI in the direction of further automation, with better economic and social outcomes.

Keywords: Artificial Intelligence; Innovation; Labour Demand

Artificial intelligence (AI) is one of the most promising technologies currently being developed and deployed. Broadly speaking, AI refers to the study and development of “intelligent (machine) agents”, which are machines and softwares that act intelligently by recognizing and responding to their environment. There is a lot of excitement, some hype and a fair bit of apprehension about what AI will mean for our security, society and economy. But a critical question has been largely overlooked: what the future of labour demand will be under the trendy of rapid development of AI? We do not have a definitive answer right now—nobody does. But this is the right time to ask this question while we can still shape the direction of AI research and the future of work.

1. The evolution of AI

Human (or natural) intelligence comprises several different types of mental activities. These include simple computation, data processing, pattern recognition, prediction, various types of problem solving, judgment, creativity, and communication. Early AI, pioneered in the 1950s by researchers from computer science, psychology and economics, such as Marvin Minsky, Seymour Papert, John McCarthy, Herbert Simon and Allen Newell, sought to develop machine intelligence capable of performing all of these different types of mental activities. The goal was nothing short of creating truly intelligent machines. AI came back into fashion in the 1990s, but with a different and more modest ambition: to replicate and then improve upon human intelligence in pattern recognition and prediction. Many decision problems and activities people routinely engage in can be viewed as examples of pattern recognition and prediction. These include recognizing faces (from visual data), recognizing speech (from auditory data), recognizing abstract patterns in data we are presented with, and making decisions on the basis of past experience and current information. Though there are researchers working on “Artificial General Intelligence”, much of the research and almost all commercial applications of AI are in these more modest domains referred to as “Narrow AI”—even if the relevant applications are numerous and varied. The big breakthroughs and the renewed excitement in AI are coming from advances in hardware and algorithms that enable the processing and analysis of vast amounts of unstructured data (for example, speech data that cannot be represented in the usual structured ways, such as in simple, Excel-like databases). Central to this renaissance of AI have been methods of machine learning (which are the statistical techniques that enable computers and algorithms to learn, predict and perform tasks from large amounts of data without being explicitly programmed) and what is called “deep learning”.

There are many ways AI technology can be developed as a commercial or production technology, with widely varying applications. This matters greatly because it implies that the economic and social consequences of AI technologies are not preordained but depend on how we decide to advance and build on this platform. To some degree, this is true of all clusters of technologies, but it is more emphatically so for AI. To see this, contrast it with a related but distinct new technology, robotics. Robotics often makes use of AI and other digital technologies for processing data, but is distinguished from other digital technologies by its focus on interacting with the physical world (moving around, transforming, rearranging or joining objects). Industrial robots are already widespread in many manufacturing industries and in some retail and wholesale establishments. But their economic use is quite specific, and centers on automation of narrow tasks, that is, substituting machines for certain specific activities and functions previously performed by humans.

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2. The influence of AI for labour demand

How do new technologies impact the employment and wages of different types of workers? The standard approach, both in popular discussions and in academic writings, presumes that any advance that increases productivity (value added per worker) also tends to raise the demand for labour, and thus employment and wages. Of course, technological progress might lead to job loss in some sectors. But even when that happens, the standard narrative goes, other sectors will expand and contribute to overall employment and wage growth. Moreover, even if technological progress benefits some workers more than others and increases inequality, the standard approach still predicts that it will tend to raise the labour demand for all types of workers.⁶

This view is critically underpinned by the way in which the economic impact of new technology is conceptualized--as enabling labour to become more productive in pretty much all of the activities and tasks that it performs. Yet, this not only lacks descriptive realism, but may paint an excessively rosy picture of the implications of new technologies. Indeed, in such a world Luddites' concerns about the disruptive and job displacing implications of technology would be misplaced, and they would have smashed all of those machines in vain.

The reality of technological change is rather different. Many new technologies are not intended to increase labour's productivity, but are explicitly aimed at replacing it by substituting cheaper capital (machines) in a range of tasks performed by humans. As a result, automation technologies, by displacing workers from the tasks they were previously performing, always reduce the labour's share in value added. Put differently, these technologies raise productivity by more than wages and employment. They may even reduce overall labour demand (and thus reduce wages, employment or both). Whether they reduce overall labour demand turns on the strength of the productivity effect that they create compared with their direct displacement effect. The productivity effect is simple to understand: automation technologies typically reduce costs and as costs decline, firms have an incentive to expand output, which increases the demand for labour coming from non-automated tasks. Equally, lower costs for automated products increase the demand for other complementary products, still produced with labour-intensive methods.⁸ A first conclusion from this conceptual framework is therefore that automation technologies always reduce the labour share relative to capital (and other factors), and may or may not reduce overall labour demand. A second conclusion is that whether they reduce overall labour demand depends on the strength of the productivity effect.

This last observation has important implications: contrary to popular claims that the future of labour is threatened by "brilliant" new technologies, the greater danger for labour comes from technology that is not raising productivity sufficiently. In particular, if new automation technologies are not great but just good enough to be adopted but not so much more productive than the labour they are replacing, there is a double jeopardy for labour--there is a displacement effect, taking passed away from labour, but no powerful productivity gains redressing some of the decline in labour demand generated by the displacement effects. Is this far-fetched? Not really. We have previously studied the implications of one of the most important automation technologies, industrial robots.⁹ Industrial robots are not technologies aimed at increasing labour's productivity but are designed to automate tasks that were previously performed by production workers on the factory floor. The evidence is fairly clear that industries where more industrial robots are introduced experience declines in labour demand and sizable falls in their labour share. More importantly, local labour markets more exposed to industrial robots, such as Detroit MI or Defiance OH, have significantly lower employment and wage growth. Furthermore, the declines in wages and employment fell much more heavily on workers from the lower half of the earnings distribution and those with less than a college degree, thus exacerbating inequality. All of this is despite the fact that industry-level data also suggest productivity gains from robots.¹⁰ Automation in general and robots in particular also increase inequality through two distinct channels. First, by reducing the labour share, automation increases the relative incomes of capital owners who tend to be richer than those relying on labour income. Second, currently automated tasks typically employ low-skill or medium-skill workers, and declines in their employment and wages tend to contribute to inequality. In the case of industrial robots, both of these channels appear to have contributed to greater inequality.

3. Conclusion

AI is set to influence every aspect of our lives, not least the way production is organized in modern economies. From an economic point of view, the universal of using AI technology have been stagnating labour demand, declining labour share in national income. Many new technologies are not intended to increase labour's productivity, but are explicitly aimed at replacing it by substituting cheaper capital (machines) in a range of tasks performed by humans. As a result, automation technologies, by displacing workers from the tasks they were previously performing, always reduce the labour's share in value added. The considerable promise of AI implies that the necessity to devote care and serious thought to its implications and to the question of how best to develop this promising technology to adjust labour demand planning.

References

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1. Acemoglu, D. 2002. Technical change, inequality, and the labor market, *Journal of Economic Literature*, 40 7–72.
 2. Acemoglu, D. and Autor, D. 2011 Skills, tasks and technologies: implications for employment and earnings, *Handbook of Labor Economics*, 4: 1043–1171.
 3. Acemoglu, D. and Restrepo, P. (2018a) The race between man and machine: implications of technology for growth, factor shares and employment, *American Economic Review*, 108: 1488–1542.