

The great artificial intelligence challenge

Since Robert Solow, economists know that technical change is the most important force to have driven economic growth in advanced economies. One could argue that this should settle the debate about the effects of artificial intelligence (AI)—it should already be crowned the best invention since electricity. Sadly, access to electricity killed millions of jobs and the fear that AI will do the same has crippled the enthusiasm for it.

AI is going to radically improve productivity and welfare in ways such as accelerating vaccine development, improving medical diagnostics, increasing highway safety and reducing traffic congestion. But much of the public debate around it has focussed on the labour market effects of increasing automation. While tech leaders like Jack Ma, Bill Gates and Mark Zuckerberg are concerned about mass unemployment, economists are generally more optimistic.

A research paper titled *The Impact of Artificial Intelligence on Innovation* by Cockburn, Henderson and Stern of Boston University, Harvard University and Massachusetts Institute of Technology respectively, posits that AI is a remarkable development in that, just like the electric motor and microprocessor, it has widespread direct applications, making it a general purpose technology (GPT). But it is also an “invention for making other inventions” (IMI) in that it is a research tool that introduces hitherto unimaginable ways of solving problems. Take lenses, for example. They not only aid people with poor eyesight, but also allow scientists to observe things under a microscope or through a telescope. Just like lenses, machine learning not only has direct application in a wide range of industries, it will also radically alter the “ideas production function”, making it a vastly more potent tool than mere routine technological progress. The labour market effects of AI will have to be seen in light of this fact.

The doomsayers argue that if capital is sufficiently cheap or productive, automation will lead to the substitution of labour in those tasks. This is a correct, albeit incomplete, analysis because structural unemployment in world economy has not increased significantly since the Industrial Revolution, even as women have entered the workforce, because there are forces that offset this substitution: first, automation is likely to increase labour employment in the automated industry if it serves an unmet need (demand is elastic). For example, when automation made cars more affordable, it directly increased employment in the industry by increasing the demand for cars. Second, automation doesn't lead to further displacement if it increases productivity in jobs that have already displaced labour in the past. In fact, rising productivity increases labour demand. This is called deepening of automation.

But the most important source of jobs is the creation of new tasks. Economists Daron Acemoglu and Pascual Restrepo show that the introduction of new jobs and job titles accounted for 50% of the employment growth in the US between 1980 and 2010. AI, by virtue of being not only a general purpose technology, but also a novel method of innovation, will only accelerate the process by dramatically increasing the capabilities of manufacturers and researchers to envision new products. In pursuit of solving new problems and meeting the new demands, entrepreneurs and businesses will create jobs. Therefore, there is a powerful reinstatement effect working opposite the displacement effect in labour markets—if automation runs too far ahead, it reduces the share of labour and wages, making further automation less profitable.

Most people today are acquiring skills that will be far less valuable in an AI-first economy, and the process of retraining and finding suitable jobs could be slow and painful. Two key factors will determine how a worker will be affected by AI: first, workers who complement AI (instead of being substitutes) will benefit. So a bank cashier who can use their relationship with customers to sell other banking products will benefit. Second, jobs where wage increases can be chipped away by a

sudden increase in labour supply will not benefit much. Therefore, the increase in demand for highway restaurants would not have significantly increased the wages of waiters, but productivity gains for chartered accountants will be largely captured by those who are presently working as CAs.

The AI-first economy will create new tasks and demand new skills, and investments in human capital will be at the heart of any long-term strategy for producing skills that are complemented, rather than substituted, by AI. In light of this challenge, our present education system is grossly inept. Instead of allowing entrepreneurs to create a variety of schools to cater to different needs, we have a top-down, one-size-fits-all approach. Tough questions need to be asked about the “factory model” of K-12 education, government controlled curricula in schools and universities, the restrictions on foreign investment in universities and the limited engagement with the industry. The overall approach to education needs to shift from knowledge dissemination to skills training, with students having the option to drop out after high school to pursue formal vocational training.

To sum it up, the real threat of jobs will come not from AI, but from technologies that are just productive enough to be adopted and cause displacement, but not enough to increase productivity and create new jobs. AI is a unique development—a general purpose IMI—and its key challenge seems to not be unemployment, but reducing friction in the labour market and acquiring skills that can capitalize on or complement it.

How should the formal education system respond to the challenge posed by artificial intelligence? Tell us at views@livemint.com

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