The Economist

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Automation angst

Three new papers examine fears that machines will put humans out of work

Aug 15th 2015 | From the print edition

AS FAR back as the Industrial Revolution there have been periodic panics about the impact of automation. Handloom weavers' resistance to new machines earned them a pejorative name—Luddites—that has become a byword for all those who try in vain to stop technological progress. Such anxieties resurfaced in America in the early 1960s, thanks to the rapid automation of agriculture, even though the economy was booming. They are even more prevalent in the rich world now, as advances in information technology (IT) threaten jobs that previously seemed invulnerable to automation. Whether the anxiety is any more justified this time round is the subject of three new papers in the *Journal of Economic Perspectives*.

Angst about automation typically focuses on the substitution effect, whereby jobs once done by people are taken over by machines—the fate of the Luddites. The current fear is that ever more versatile robots will substitute for labour on a scale never seen before. However, previous experience shows that focusing on substitution shows only part of the picture. According to David Autor (https://www.aeaweb.org/articles.php?doi=10.1257/jep.29.3.3) , an economist at MIT and author of one of the papers, those with a gloomy view of automation are disregarding the many jobs that come into being thanks to the existence of whizz-bang new machines. Only that, he argues, can explain why the share of America's population in work rose during the 20th century despite dazzling technological advances, or why the drop in agricultural employment, from 40% of the workforce to 2%, did not lead to mass unemployment.

Between 1980 and 2010, Mr Autor points out, the number of bank clerks in America actually increased despite the rapid spread of the cashpoint. That was because the IT revolution not only enabled machines to dispense cash; it also allowed clerks to work out what extra financial products customers might be interested in and process applications for them. The new jobs that

technology makes possible, Mr Autor argues, more than compensate for those lost through substitution. It is just easier to identify the disappearing but familiar occupations than it is to foresee the new ones created in their stead.

Modern techno-pessimists argue that the ground is shifting because so many more jobs can now be handed over to machines. Another of the three papers (https://www.aeaweb.org/articles.php?f=s&doi=10.1257/jep.29.3.51) suggests that advances in machine intelligence may be revolutionary rather than evolutionary. Gill Pratt, an expert on robotics, highlights two techniques that could cause such a breakthrough. One is "cloud robotics", in which robots learn from one another, leading to a rapid growth in competence. The second is "deep learning", in which robots process vast amounts of data to expand their capabilities, forming associations that can be generalised. Enhancing these two approaches are some more general trends, such as the exponential growth in the availability and capacity of wireless internet access, data storage and computational power.

If this potential were to be realised, robots could march off the production lines where they carry out specific tasks and take over a far more diverse set of roles in large parts of the economy, including manual occupations. One much touted example would be driverless vehicles, which could endanger the livelihoods of legions of taxi drivers and couriers. Moreover, suggests Mr Pratt, the advances could be so rapid that unlike previous waves of automation robots might displace a much bigger share of the workforce in a much shorter time.

One way to think about the impact of technology is by categorising the tasks involved in any job between cognitive and manual on the one hand, and routine and non-routine on the other hand. It is occupations in administration and middle management, which involve cognitive but routine tasks, that have been the most vulnerable to automation so far. By contrast, employees whose work is cognitive but not routine have largely gained from technological change, since it enables them to process and present information more readily. Likewise, many forms of manual employment have proved difficult to computerise, and have thus been largely unaffected.

This explains a pattern that has become common in the labour markets of advanced economies in recent decades, whereby there has been growth in employment at both the top and the bottom of the spectrum but a hollowing-out in the middle. But Mr Pratt's work suggests that this comforting resilience may not last, as machines begin to take on both previously manual jobs (thanks to advances in automation) and non-routine ones (courtesy of improvements in artificial intelligence).

This time is the same

Mr Autor argues that many jobs still require a mixture of skills, flexibility and judgment; they

draw upon “tacit” knowledge that is a very long way from being codified or performed by robots. Moreover, automation is likely to be circumscribed, he argues, as politicians fret about wider social consequences. Most important of all, even if they do destroy as many jobs as pessimists imagine, many other as yet unimagined ones that cannot be done by robots are likely to be created.

The difficulty of foreseeing the jobs of the future is a theme of the third paper (https://www.aeaweb.org/articles.php?doi=10.1257/jep.29.3.31) , by a trio of economic historians, on the history of automation angst. In 1930, for example, John Maynard Keynes published a famous essay that predicted that the grandchildren of his generation would scarcely have to work at all. Keynes regarded that as a sign of progress, whereas many today fear such an outcome. Current predictions of the obliteration of jobs may be as far off the mark as his hopelessly rosy view.

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