

in brief...

Is technology to blame for jobless recoveries?

Since the early 1990s, the United States has been plagued by weak employment growth when emerging from recessions – so-called ‘jobless recoveries’. **Georg Graetz** and **Guy Michaels** look at multiple recoveries elsewhere in the world over a 40-year period to see if the same applies – and whether modern technology is responsible.

Recoveries from recessions in the United States used to involve rapid job generation. During the 1970s and 1980s, the first two years of recoveries saw an average increase of over five percentage points in employment. But since the 1990s, the recovery engine of jobs has slowed down, and the first two years of recoveries have generated, on average, less than a one percentage point increase in employment.

This recent joblessness of recoveries exceeds what we would expect based only on the recovery of GDP, and it has caused concern among policy-makers. In our latest research, we investigate whether the jobless recovery is a wider problem that plagues developed countries outside the United States – and whether modern technologies may be an underlying cause.

The possibility that technology may be causing jobless US recoveries has been proposed in a widely cited study (Jaimovich and Siu, 2012). The authors argue that middle-skilled jobs – often involving routine tasks that are particularly susceptible to replacement by new technologies – might be permanently destroyed during recessions. The displaced workers are then forced into time-consuming transitions to different occupations and sectors, resulting in slow job growth during the recovery.

Other explanations have been proposed, emphasising not the role of technology, but that of extended unemployment benefits or the decline of unions’ ability to influence restructuring during recessions. But the possibility that

technology may be responsible for jobless recoveries is perhaps of more concern, since it is not dependent on specific institutions or policy choices, and could therefore be affecting other developed economies.

To appreciate concerns about technology’s possible effect on jobs, consider its long-run effects on employment. Following the seminal work of Autor et al (2003), recent CEP research (Goos et al, 2014; Michaels et al, 2014) demonstrates that across the developed world, new computer-based technologies are replacing routine-based tasks, including routine white collar work. So if the technology-based mechanism that Jaimovich and Siu propose is responsible for jobless recoveries, we might expect its effects to be evident throughout the developed world.

To investigate this possibility, we put together data on recession dates, employment and value added for 28 industries in 17 countries between the years 1970 and 2011. This period spans 71 recoveries, giving us ample opportunities to test whether recent ones differed from earlier ones, and whether technology is bringing about any changes.

We first examine whether recoveries that took place after 1985 differed from earlier ones – and if so, how. Across the 17 countries, we find that recent recoveries involved a slower growth of GDP, but not a significantly slower recovery of employment. In this respect, the jobless US recoveries seem to be the exception.



Second, we examine recoveries in industries that use routine tasks more intensively, including parts of the financial intermediation, retail and manufacturing sectors. These industries were more prone to technological change, including automation. Across the developed economies that we study, routine-intensive industries experienced sharper recessions and slower recoveries (compared with the periods of expansion) even before 1985, but they were not worse affected in their employment growth in more recent recoveries.

But in the United States, where recent employment recoveries have been slower, the routine-intensive industries stand out, having faced slower employment recoveries of late. We further show that our findings are not specific to routine-intensive industries but to all those that are exposed to technological change.

To do that, we focus on another indicator of new technology adoption: the use of industrial robots. Building on our previous work (Graetz and Michaels, 2015), we examine the tasks that robots are nowadays capable of performing, match these tasks to occupations and then measure the share of each industry's employment that was made up by replaceable occupations in 1980, before industrial robots became important. This gives us an indicator of industries' differential exposure to robots.

Although industries with high shares of jobs that are replaceable by robots (especially car manufacturers and the chemical and electronics industries) differ from routine-intensive industries, the patterns we find over time are quite similar in the two cases. Industries in which employment is prone to replacement by robots did not experience more jobless recoveries in recent years across the developed countries that we study.

Third, we examine whether workers from different skill groups are differentially affected by joblessness in recent recoveries. We focus mainly on middle-skilled workers: typically those with high school degrees or some post-high school education but less than a full college degree. Middle-skilled workers' jobs often involve more routine tasks, which are more prone to replacement by computer-based technologies.

We find that across the developed countries, middle-skilled workers have not suffered more employment losses in recent recoveries. In other words, there is no evidence that recoveries across the developed world are hurting middle-skilled workers who are particularly vulnerable to technological change.

Finally, we examine whether middle-skilled workers are worse affected in recoveries in routine-intensive industries, where technological replacement might be particularly pronounced. Once again, we find that across our 17 developed economies, middle-skilled employment in routine-intensive industries has not performed particularly badly in more recent recoveries.

Taken together, our results suggest that in developed countries outside the United States, modern technologies are unlikely to be causing jobless recoveries. Our results do, however, pose a puzzle as to the nature of recent jobless US recoveries.

It is possible that US technology adoption is somehow different to that in other developed countries and that this is contributing to jobless recoveries. For example, Bloom et al (2012) show that US multinationals achieved more productivity gains from using information technology than their European counterparts, so it is possible that job creation patterns in the United States also differed.

At the same time, the extension of US unemployment benefits in recent years may have played a role in explaining slow employment recoveries. Meanwhile, European labour markets have become more flexible, which may have contributed to their robust employment growth during recent recoveries. Exploring these possibilities is an important task for future research.

This article summarises 'Is Modern Technology Responsible for Jobless Recoveries?' by Georg Graetz and Guy Michaels, CEP Discussion Paper No. 1461 (<http://cep.lse.ac.uk/pubs/download/dp1461.pdf>).

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Further reading

David Autor, Frank Levy and Richard Murnane (2003) 'The Skill Content of Recent Technological Change: An Empirical Exploration', *Quarterly Journal of Economics* 118(4): 1279-1333.

Nicholas Bloom, Raffaella Sadun and John Van Reenen (2012) 'Americans Do IT Better: US Multinationals and the Productivity Miracle', *American Economic Review* 102(1): 167-201.

Maarten Goos, Alan Manning and Anna Salomons (2014) 'Explaining Job Polarization: Routine-biased Technological Change and Offshoring', *American Economic Review* 104(8): 2509-26.

Georg Graetz and Guy Michaels (2015) 'Robots at Work.' CEP Discussion Paper No. 1335 (<http://cep.lse.ac.uk/pubs/download/dp1335.pdf>).

Nir Jaimovich and Henry Siu (2012) 'The Trend is the Cycle: Job Polarization and Jobless Recoveries', NBER Working Paper No. 18334.

Guy Michaels, Ashwini Natraj and John Van Reenen (2014) 'Has ICT Polarized Skill Demand? Evidence from Eleven Countries over 25 Years', *Review of Economics and Statistics* 96(1): 60-77.