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## Economic Bulletin

# WHY BRITAIN NEEDS MORE ROBOTS



- Worries over the impact of automation on jobs are increasingly widespread, with the Labour Party floating measures that would impede mechanisation.
- If anything, the UK's problem is having too few robots, not too many. There are only 71 for every 10,000 employees in manufacturing, compared to more than 300 in Germany.
- It is unlikely that net employment will fall as a result of mechanisation – and the UK is at lower risk than other developed nations.
- Taxing robots would not protect jobs. On the contrary, impeding mechanisation would further suppress productivity growth, depress wage growth and encourage economic activity to locate elsewhere – thereby reducing the tax base to pay for public services.
- Calls for a Universal Basic Income are premature. It would be costly, distort the labour market and, in any case, income inequality has been falling.
- Nevertheless, the potential for automation to lead to growing income inequality is a concern. The best way to counter this, however, is not by nationalising the robots, but by reforming skills and training.





## 1. INTRODUCTION

According to media reports, Jeremy Corbyn has suggested that profit from replacing humans with robots to pay more tax, believing that mechanisation presents a threat to workers. He has also floated the idea of putting the ownership of robots in the hands of employees. His colleague John McDonnell warned that “by the middle of this century, it is possible that up to half of all the jobs we do now could be automated away” and that automation is “being used to vastly enrich a tiny elite, whilst creating a life for many workers of long hours, low pay, and insecure employment”. But what is actually happening?

Paranoia about the impact of automation on the labour market is nothing new. For at least two centuries, there have been periodic warnings that automation and new technology are going to wipe out large numbers of jobs. The [best known early example](#) is the Luddite movement of the early 19<sup>th</sup> century, where a group of English artisans protested against the automation of textile production by seeking to destroy some of the machines.

Historically, concerns about the impact of mechanisation have been unfounded. The creative destruction brought about by new technology has boosted productivity, raised living standards and created new job opportunities. This has held true into the 21<sup>st</sup> century: a recent [study](#) by Deloitte found that technology is likely to have displaced over 800,000 jobs in the UK between 2001 and 2015, but created nearly 3.5 million new ones over the same period.

Of course, it is not safe to simply assume that the next stage of mechanisation will play out in the same way. Even entrepreneurs such as Bill Gates are [sounding the alarm](#) about automation’s potential to destroy jobs, or to cause such rapid changes in the economy that humans struggle to cope with the dislocation.

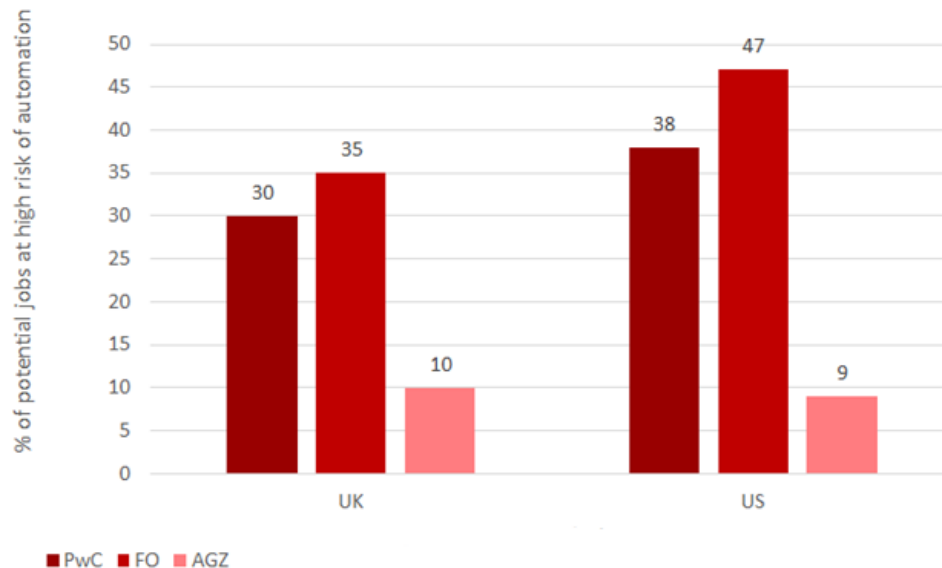
So, what are the opportunities and challenges that arise from the new machine age? And how should policy-makers respond?





## 2. THE IMPACT ON EMPLOYMENT

Figure 1: Estimates of jobs at high risk of automation



Source: [Pricewaterhouse Coopers](#)

Increasing mechanisation – the development of more sophisticated robots that can perform the same physical tasks as humans for a lower cost, and of machine learning algorithms that can similarly outperform human workers in the fields of cognition and data-processing – will undoubtedly have an impact on the labour market. In 2013, a much-publicised study by Carl Benedikt Frey and Michael Osborne of Oxford University estimated that 35% of jobs in the UK are at high risk of automation, which is roughly the estimate produced by [PriceWaterhouse Coopers](#). The Bank of England, using the same methodology as Frey and Osborne, [estimated](#) that up to 15 million UK jobs could be automated over time.

Yet it is important to put these figures in perspective. The figures for “jobs at risk” are likely to be overestimates, as they only consider whether a task can potentially be automated, not whether it is economically sensible for that to happen.

It also, some critics argue, rests on an overly simplistic interpretation of what the jobs in question involve. A separate [OECD study](#) used a “task based” approach instead, working on the assumption that it will be specific tasks that are mechanised rather than entire occupations. It found that only 9% of jobs across the OECD are at high risk of automation (the figure for the UK was 10%).





Hair-raising figures about “jobs at risk” also ignore the existing scale of creative destruction in the labour market. Every year in the UK, [roughly](#) 10 per cent of jobs are lost – but another 10 per cent are created. (Or in recent years, given the country’s impressive employment record, considerably more). Jobs today are in fact more secure than they used to be: in the US today, [gross job losses per year](#) as a % of overall employment have fallen from 12.1% in 1994 to just 9.1% in 2016 (see Table 2-A-E at the following [link](#)).

[Pricewaterhouse Coopers](#) therefore concludes that the overall net impact of automation on employment will likely be neutral. It is true that the tech sector tends to create fewer jobs than the industries of the past, for the same amount of economic value created. But while the sector may not fully compensate for the jobs displaced elsewhere, new jobs are likely to appear as technological applications develop and other sectors expand – even if the latter may take some time to materialise. Indeed, [some estimates](#) suggest that for each job created by the high-tech industry, around five complementary jobs are created.

Furthermore, UK workers may be less at risk from automation than those of other developed nations. [According to PWC](#), Germany is more prone to automation due to its dependence on manufacturing. The same study argues that the City of London’s focus on international markets makes the UK’s finance industry less prone to automation than the US finance industry. This reflects the US finance industry’s focus on the domestic retail market, where workers do not require the levels of education that those working in international finance do.

The automation scaremongering also ignores the fact that, rather than simply replacing jobs, [the adoption](#) of new technologies seems to lead to a new division of labour: workers increasingly perform new and more complex tasks, with machines complementing rather than replacing them.

A [recent paper](#) published by the Massachusetts Institute of Technology argues that expert commentators tend to overstate the extent of machine substitution for human labour and ignore the strong complementarities between them. Examples of this occurring in practice [include](#):

- a) Amelia – an AI platform by IPsoft with natural language processing capabilities – has supported maintenance engineers in remote locations.
- b) Robots using 3D sensors that can now navigate safely and work alongside warehouse workers, removing the need for employees to navigate crowded spaces and avoid moving obstacles.
- c) Automated porters in hotels which free staff from having to spend much of their time making routine room deliveries.

In the UK, technology and jobs have often “marched together” in areas including medicine, education and professional services, employment and technology. The growth in these areas has led to an exponential increase in demand for accountants. [According to Deloitte](#), the number of accountants in England and Wales has risen twenty-fold from 9,832 in 1871 to 215,678 currently.





### 3. THE OPPORTUNITIES OF MECHANISATION

Much of the commentary on automation, as mentioned above, has focused on the spectre of job losses. Yet this ignores the fact that it could bring significant benefits. For example:

#### A. *Boosting lagging labour productivity*

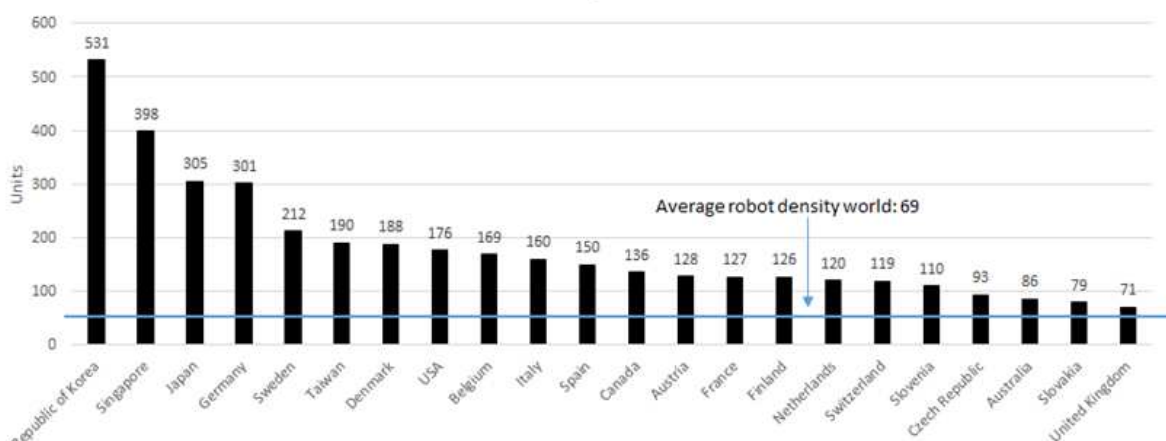
It is well known that productivity in the UK has lagged behind its rivals for some time now. GDP per hour worked is [around 20% lower](#) than the G7 average.

Economists disagree about the main determinants of this trend. But a key factor is undoubtedly the low capital-labour ratio in the UK economy – the fact that we have an abundance of relatively low-paid workers and relatively little corporate investment.

This has come about largely because of a lower take-up of automation compared to our competitors. This is particularly notable when it comes to industrial robots. In 2016, according to the [International Federation of Robotics](#), around 1,800 of these were sold in the UK, compared to 6,500 in Italy and more than 20,000 in Germany.

Yes, the UK has a smaller manufacturing base than Germany's. But we have only 71 robots per 10,000 employees in the sector, compared to 301 in Germany (see Figure 2). Rather than being at risk of excessive reliance on robots, the UK doesn't have enough of them – meaning that its economy is under-capitalised.

Figure 2: Robot density in UK vs OECD (per 10,000 employees in the manufacturing industry) – 2015



Source: International Federation of Robotics

The boost in productivity from further mechanisation could [help](#) to offset the economy's other problems, such as high industrial electricity prices and major skills shortages in many areas. There is also evidence that increased competitiveness due to investment in new technology [can lead](#) to lower-priced products, higher demand and therefore a growth in the demand for labour. This could in turn feed through into higher wages or higher employment.

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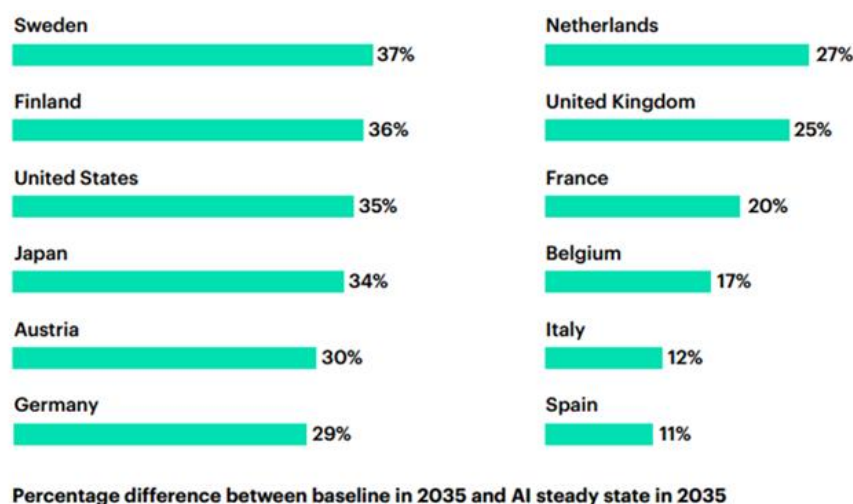




## B. Increasing growth rates

In 2015, a [study](#) by the Bank of Canada posed the question “Is Slower Growth the New Normal in Advanced Economies”? Mechanisation could mean that there is no need to pose such a question. According to a [report by Accenture](#), Artificial Intelligence (AI) has the potential to double growth rates in the Western world by 2035. The report argues that AI should be viewed as a new factor of production along with labour and capital. That is because it has the potential to help humans focus on tasks that add most value, boost the efficiency of capital stock and help promote innovation in industry.

Figure 3: Increase in labour productivity from AI



Source: [Accenture](#)

## 4. BUT WHAT ABOUT INEQUALITY?

While the literature does not anticipate large scale unemployment from growing mechanisation, there are widespread concerns that it could lead to increased income inequality.

Most studies do indeed find that automobility of jobs is lower in jobs with higher educational requirements. For instance, [PWC estimates](#) that for those in the UK with GCSE-level education or lower, the estimated potential risk of automation is as high as 46%. This falls to only around 12% for those with undergraduate degrees or higher. This could lead to an ever-increasing wage premium for those occupying skilled positions – a concern [raised](#) by the Bank of England.

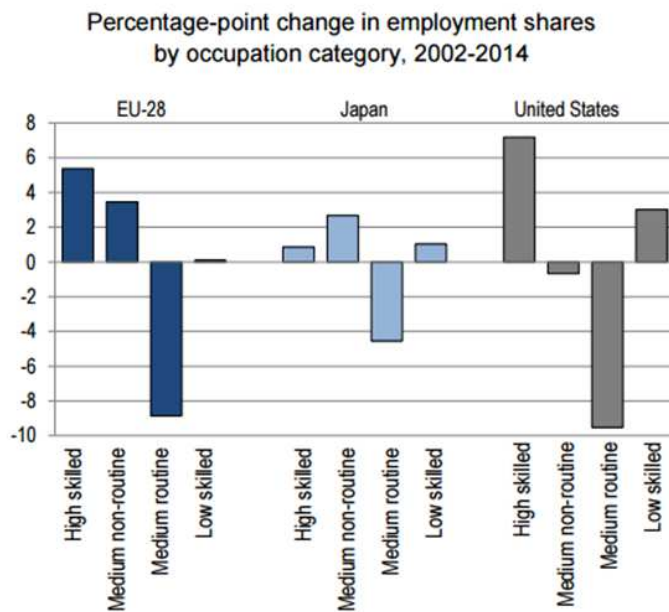
Accordingly, there has already been a hollowing out of mid-level skills across Western economies (see Figures 4 and 5). Automation has led to the substitution of machines for a substantial part of routine jobs, irrespective of the skill level. At the same time, the demand for workers in high-skilled, non-routine jobs has increased considerably in most advanced economies.





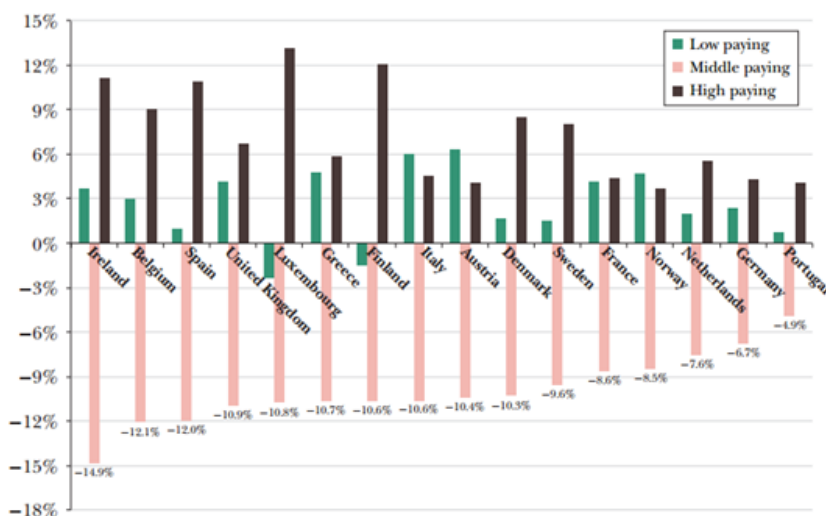
However, this trend is not universal – in particular, it has been observed far more strongly in the US than in Europe, where there has been a substantial growth in “medium non-routine” jobs. According to the official [Taylor Review](#) earlier this year, the so-called “hollowing out of the middle” has not yet had an effect on wage distribution in the UK. Indeed, income inequality has been shrinking over the past few years, rather than rising, with the UK’s Gini coefficient falling from 33.7 in 2010/11 to 31.6 in 2015/16.

Figure 4: Job polarisation in the European Union, Japan and the United States



Source: [OECD](#)

Figure 5: Change in occupational employment shares in low, middle and high wage occupations



Source: Study by Massachusetts Institute of Technology, Cambridge, Massachusetts





Even if automation does not yet appear to be fostering the kind of inequality that John McDonnell so luridly describes, it is certainly an issue that needs to be addressed. In the coming years, it is likely that the wider UK workforce will need to adapt to the new labour market, and that this process will be painful for some in areas that are highly prone to automation, for example jobs involving driving and delivery.

One potential solution suggested by economists is to focus the education system, and professional training, on areas where humans are likely to retain an advantage over AI. The UK Commission for Employment and Skills has [suggested](#) that continuous learning and adaptation will be an essential part of successful participation in the labour market, due to the increasing rate of technological change. They argue that careers may become more varied, as jobs change rapidly, increasing the need for employees to upskill or reskill.

As for income inequality itself, one popular suggestion for tackling it is the idea of a universal basic income. This concept has been around for a long time: back in 1966, [it was touted](#) in the US “as a guaranteed minimum income for each family; using the government as the employer of last resort for the hard core jobless; two years of free education in either community or vocational colleges; a fully administered federal employment service, and individual Federal Reserve Bank sponsorship in area economic development free from the Fed’s national headquarters”.

Arguments for a universal basic income (UBI) would, however, seem premature. The UK’s fiscal position does not allow for such a scheme at the current time – indeed, a basic income at anything but the most meagre rate [would involve](#) large-scale increases in taxation, and far more extensive redistribution of wealth (which may be why McDonnell has expressed such interest in the idea). Moreover, there are real questions as to whether a UBI would create distortionary labour market incentives, for example by driving a coach and horses through the conditionality which has been at the heart of Britain’s successful welfare reforms. Moreover, there seems to be little case for implementing a UBI at the current time, given that income inequality has actually been falling.

## 5. CONCLUSION

The UK is already behind the curve on mechanisation. Deliberately impeding the growth of automation with the explicit purpose of “protecting jobs”, as Labour suggests, would be detrimental to the UK economy’s progress – and entrench our labour productivity problems, as well as the muted wage growth that has been the hallmark of our economy over the past decade. Similarly, taxing robots or legislating for them to be owned by employees would discourage investment in capital, exacerbating all of these problems.

While we do not yet know whether the new machine age will create or destroy jobs, and on what scale, hindering mechanisation will do little to “protect jobs”. All it will do is encourage these new technologies - and the jobs associated with them – to be developed overseas. That would mean lower wages, fewer jobs and a smaller tax base to pay for the public services.





There are legitimate questions regarding the “hollowing out” of middle-income jobs. This is a challenge that policy makers will need to tackle by promoting an education and skills system that can assist workers in upskilling and, in some cases, reskilling in different areas. But at this stage, automation looks far more like a blessing for Britain than a curse.

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