

Robots, Artificial Intelligence and the Future of Jobs

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Macquarie University, as part of its Lighthouse Lecture Series, recently hosted a discussion by world renowned labour economist, Professor Richard Freeman from Harvard University on "Employment and Income in the Age of Robots".

Professor Freeman highlighted the game changing impact that Robots and Artificial Intelligence (AI) will have on work automation, wages and employment in the future.



What jobs will robots do

There has been an explosion in recent times in the use of robots for everyday tasks, including a robot noodle chef in Japan and robot pizza delivery here in Australia. There are of course more sophisticated developments, such as IBM's Watson which can autonomously answer customer questions, convert speech to text, translate languages and find meaningful insights from unstructured data. With robots and AI getting better and better at these specific tasks it seems natural to ask, when will they replace human workers? According to 352 AI experts there could be a significant change in many areas, with AI outperforming humans in coming decades, but the possibility of AI replacing human workers entirely is still a very distant possibility.

When will AI outperform humans at work?

How many years until a machine can do our jobs better than us?



Source: When will AI exceed human performance? Evidence from AI Experts. A research paper by Katja Grace, John Salvatier, Allan Dafoe, Baobao Zhang and Owain Evans. BBC Capital and Nigel Hawtin.

However, automation in the workplace and the replacement of labour with capital is not new. Throughout the past 200 years, from the agriculture sector in the 18th and 19th centuries to the industrial revolution and the division of labour, use of electricity and mass production in the late 19th and early 20th centuries, jobs have been destroyed but also created.

The use of electronics and developments in technology and computer science over the past 50 years has now pivoted to the rise of robots. AI could now be viewed as the next step in the automation process.

Previous theories to analyse the impact of automation, largely derived in the 1960s, centred on the elasticity of supply of capital and labour. Labour is less elastic than machines and therefore the labour market clears through lower price of wages, but real wages rise with the productivity gains through automation.

This time is different....

Professor Freeman though says this time is different. The rise of AI and Robots is not the same as historical periods of automation. Historically, machines have replaced the (generally dangerous) work of the human body, allowing us more time to think, in contrast AI could replace the judgement and decisions making of our minds. This means AI can beat humans at tasks that are innately human, such as Google AlphaGo's defeat of Ke Jie (the world's number one Go player) earlier this year, a feat previously thought impossible. This is only becoming more and more true as our lives and work move increasingly into the digital world. As historical comparisons are not appropriate Professor Freeman believes in using a well-known economic theory, the law of Comparative Advantage, to analyse the impact.

Robots / AI could eventually outperform humans at most jobs as the chart shows, but Comparative Advantage tells us that there will still be jobs for humans, since Robots and AI will stick to the jobs they are best at.

Currently humans have advantages in many areas, most importantly in intuition and perception of patterns, in our level of general intelligence and in our touch and flexibility. But technology is catching up. Deep learning and neural networks have now shown that computers can even beat humans at poker!

This of course raises a myriad of ethical and economic questions. The critical juncture will be when the current system of single task AI algorithms move towards an ensemble of programs that can mimic the general intelligence of humans. When this happens along with improvements in dexterity and the ability of Robots and AI to operate better offline, jobs and incomes for humans will be impacted.

Professor Freeman notes that effectively there will be a higher elasticity of substitution between machines and humans. Add to this the technological developments that reduce the cost of robots / machines and human wages will effectively be bound below the cost of a robot substitute.

Who owns the robots will be critical for the economic outcome

Essentially the effect on incomes will come down to who owns the robots. If it is the employee then great, this will boost your income, and your robot can work for you and earn you an income! If the robot is owned by the employer, then watch out for the consequences.

From an economic sense, the capital share of income will rise and the labour share of income will fall, accelerating the trend witnessed in recent years. This would increase income inequality, lead to lower wages and continue the trend we have witnessed in political uncertainty given the policy responses are challenging.

Professor Freeman suggests that solutions to this would likely include forms of income redistribution through a tax on capital, or a Universal Basic Income with more public goods available such as healthcare, food and leisure. Alternatively, humans should own more of the capital (i.e. robots) or, the most dramatic response, move towards human enhancement technology, if you can't beat them join them.

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