

# DID THE LUDDITES GET IT RIGHT? AUTOMATION AND THE LABOUR MARKET

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*Discontent about disappearing jobs has fuelled the polarised politics of recent elections; never have jobs lost to technology mattered more. Peter Wilson, however, examines the history of automation and its changes in the labour market in this essay, highlighting how other eras have also displayed a preoccupation with the fear of losing livelihoods to technology. This discussion of past trends sheds light on a highly relevant topic for both citizens and policy makers today.*

## Introduction

In 1930, John Maynard Keynes prophesied a “startling” future for economics:

*“...Assuming no important wars and no important increase in population, the economic problem may be solved, or at least within sight of solution, within a hundred years. This means that the economic problem is not the permanent problem of the human race.”*

*(Keynes, 1930)*

This utopian society Keynes imagined in his essay “Economic Possibilities for our Children”, rested on the power of technology as a driver of growth, relieving workers from the necessity of work. Technology would complement, empower and raise the worker of tomorrow to at-most a “fifteen-hour workweek”. Yet almost one hundred years later, this has not been the case. Technology has had ambiguous effects on the labour market, ranging from vehement opposition and fears of automated job-loss, in the form of the Luddite Movement in the 19th century, to an uncertainty as to the extent modern technologies will render humans unemployed in the future. Estimations of “technological unemployment”, a term originally coined by Keynes in the same essay, are as high as 47% of occupational categories within the next twenty years in some studies (Frey and Osborne, 2013).

This paper will assess the impact of automation on the future of the labour market from a historical context. The effect of technology on unemployment in the long-run will first be assessed, followed by an examination of the potential for automation to exacerbate economic inequalities. Policy measures that could be implemented in response will then be proposed.

## The Origins of Technological Anxiety

### Technological Unemployment

It is first poignant to clarify exactly what Keynes was referring to when he mentioned 'technological unemployment'. In his own words, "this means unemployment due to our discovery of means of economising the use of labour outrunning the pace at which we can find new uses for labour" (Keynes, 1933). In modern terminology, he is referring to the effective substitution of capital for labour. Hence, when machinery and other forms of technology become more efficient than labour in terms of productivity, firms will increase capital and decrease labour thus raising unemployment. Those displaced by this process will be unemployed in the short to medium term, but this is simply a "temporary phase of maladjustment", according to Keynes. As *The Economist* (2014) clarifies - by raising productivity, automation that 'economises' on the use of labour increases income level, which in turn, will create demand for products and services, thus creating jobs for those displaced workers. However, this short-term period of displacement has historically caused some backlash from labourers.

### A History of Automation and Unease

Beginning in the early 19th century, concerns of workers being replaced by machines began to increase. As Mokyr et al (2015) note, the Luddite Movement (1811-16) in Nottingham, England became a popular example of workers revolting against automation, destroying factory machines out of fear of job losses. However, it should be noted that these claims are often exaggerated and subject to misinterpretation. It would appear that the Luddites were, in fact, "more concerned with low wages and work practices", rather than just automation (Mokyr et al, 2015). The machines appear to have been a scapegoat for their frustrations, rather than the actual cause.

Their concerns about automation proved to be unfounded, as while automation saw some workers displaced, it equally created demand for other types of labour. Mechanics were necessary to maintain new machines, which created more demand for supervisors to manage the mechanics (Mokyr et al, 2015). In essence, technological change involves a process of job destruction in older occupations and industries, which is then followed by a period of job creation and higher standards of living. In Britain, these higher standards of living were apparent as real wages tripled between 1570-1875, then tripled again from 1875-1975 (*The Economist*, 2014). In summary, the effects of automation on the labour market during this period of industrialisation are succinctly captured by Knut Wicksell (1901 [1934]: 164), who wrote, '*The great inventions by which industry has from time-to-time been revolutionised at first reduced a number of workers to beggary... (but then) as accumulation continues, these evils must disappear... and wages will rise*'.

## A Painful Transition

It is important not to understate the enormous undertaking that this transition can have on workers and the labour force, however. In the long-run, we have seen that economies, as a whole, will benefit from greater technology integration through improved productivity and thus growth. This simplified view of economic models neatly adds technology to capital and labour to increase output, but in reality, technological changes do not affect all workers in the same way (The Economist, 2014). While some workers will find that their skills complement new technologies, others will not. For the latter, the transition to acquire new skills often not immediate. In the case of the Industrial Revolution, as stated by Mokyr et al(2015), 'by many estimates it took longer than an average working lifetime to do so, and in the long run, we are all dead'.

## Automation and Mass-Unemployment?

The scale and circumstances for a large disruption to the labour market are different in this 'second machine age' we are in (OECD, 2016). One argument is that mechanical technological improvements during the 19th century were limited to acting as a substitute to human strength and dexterity, but ultimately, the machines increased productivity in very simple, one-dimensional tasks such as assembly lines (Mokyr et al, 2015). Now, with the rapid increase in technological capabilities, encompassed by Artificial Intelligence (AI), increasing computer power and Big Data it is more feasible that future automation will be able to carry-out more complex tasks and thus create more ubiquitous unemployment in the labour market (OECD, 2016).

One of the clearest examples of this potential disruption to the labour force is in the trend for automation in self-driving cars. As Nicolas Yan (2016) explains, "Google's fleet of self-driving cars, for example, has collectively logged more than 1.5 million autonomous miles on the road". If we take the potential of this automation to disrupt, say, the truck driving market, which currently is related to 8.7 million jobs in the United States economy, as well as 'being the most common job in 29 of the 50 US states', the potential for unemployment loss in the short to medium term could be catastrophic (Yan, 2016).

To revert back to the opening quote from John Maynard Keynes in this paper, it would appear that automation will impact the labour market by increasing leisure, as he predicted, if this technology were to come to fruition. Yet, of course, it would do so at the cost of higher short-term unemployment. One might ask, is this trade-off adequate? It is true that, in this scenario, many workers would be displaced from their jobs and thus may have to accept lower-paying work. However, as Martin Ford states in his book 'The Rise of the Robots' (2015, pg 198), automation 'might indeed drive down wages or cause unemployment but more efficient production would also make everything cheaper. So even if your income fell, you'd still be able to continue consuming since prices for

the things you wanted would be lower'. In essence, if the truck driving industry were to become fully autonomous, the cost of providing the service would fall, thus the cost of the products delivered would fall, allowing purchasing power to be aligned with the decrease in nominal incomes.

At this point in the paper, a pattern has emerged. The parts of the labour market most exposed to automation have the characteristic of being highly routine, such as truck driving in modern society, or a factory worker in the Industrial Age. It should come as no surprise so, that since 1950 in the United States, employment in manufacturing has decreased from 30% to 10%, while the service industry has increased from 50% of total employment to 70% (The Economist, 2014). Thus, it is evident that the shift from low-skilled, low-wage jobs to high-skilled, high-wage jobs is increasing. Furthermore, some studies have found that in high-tech industries, every job created equates to another five complementary jobs conceived (OECD, 2016). As Mokyr et al. (2015) conclude on this matter, 'the future will surely bring new products that are currently barely imagined, but will be viewed as necessary goods by the citizens of 2050 or 2080. These product innovations will combine with new occupations and services that are currently not even imagined'.

## Automation Exacerbating Inequalities

The first part of this paper has shown that automation will most likely result in job displacement and job reorientation, as was the case in the Industrial Age. We have also adequately dismissed the claim of long-term or permanent unemployment at the hands of automation. Yet, that does not mean the effects of automation on the labour market are negated. Surmounting evidence would suggest that, although long-term substitution of capital for labour is unlikely in the near-future, it is far more plausible that automation could widen the inequality gap in many economies (OECD, 2016).

Firstly, the level of education a worker holds is strongly correlated with their risk of displacement. According to Berger and Frey et al. (2016), '40% of workers with a secondary education degree are in jobs with a high risk of job automation, while less than 5% of workers with a tertiary degree are'. Thus, automation could reinforce existing disadvantages faced by some workers. Polarisation of the labour market means that workers who are unable to adapt their skills to become complements to new capital face further separation into low-paying jobs, whilst highly skilled workers face further demand for their skills. If this trend were to widen, without government interference, a "plutonomy" may eventually arise i.e. 'a top heavy economic system where growth is driven primarily by a tiny, prosperous elite' (Ford, 2015). In this scenario, the middle class would begin to dissipate into the lower class, competing for lower skill jobs after being displaced, or the upper class, acquiring capital and hence wealth, creating greater inequality.

When Keynes wrote the 'Economic Possibilities for Our Grandchildren', he could not have predicted such a trend. His vision was one of shared equality, such that, all of society would need less labour as machines would be so productive, with the reward being increased leisure - evenly distributed (Rosen, 2016). He wrote that the standard of living may be between "four to eight times" higher today, than in 1930 (Keynes, 1933). If we look at 1930, the average workweek was 47 hours, compared to 39 hours in 1970 (Rosen, 2016). Keynes' prediction thus looked to be on track. Yet, since 1970, the working week has stagnated at 40 hours per week. If labour inequality is, in fact, growing, as this paper has so far suggested, then this would mean productivity is not being shared evenly which would explain this outcome.

A possible result of this finding is the appearance of "regional inequalities", where new jobs are created in cities with clusters of highly-skilled workers, while rural towns with low skilled workers accumulate those experiencing displacement or unemployment; dividing the standard of living (Berger and Frey, 2016). When it comes to the effects of automation on the labour market, it is worth remembering: 'there's no economic law ensuring that as technological progress makes the pie bigger, it benefits everyone equally' (Yan, 2016).

The effects of automation on the labour market, stated in this paper, imply a need for government action to combat market failures. One of the profound future challenges of modern economies will be the measures that policy makers must take to ensure an equitable distribution of the benefits of productivity. Historically, as The Economist (2014) notes, this would have placed a greater emphasis on distribution of funds to education. Linking back to the Industrial Revolution, increasing the skills of children in the 19th century would have merely required providing schools where many illiterate children could learn to read and write (The Economist, 2014). In modern society, this is not so easy. Raising the standard of secondary and tertiary level education would be more costly and difficult to achieve. Online education provides a cheaper alternative, and together with labour market training, acts as a resource for workers to adapt their skills to the continuously changing nature of work, which was not necessary in the past when jobs were more permanent and stable (O'Hagan, Newman, 2014).

However, policy implications can become convoluted when it comes to unemployment benefits. Unemployment benefits act to financially relieve those who have lost a job through no fault of their own, allowing for effective job search (O'Hagan and Newman, 2014). But what if there are no jobs to search for? In the case mentioned previously, regarding automated cars, the potential for mass unemployment in the short-term for truck drivers is 8.3 million people in the United States alone. If these workers were to become unemployed, their skills may not be compatible with other sectors and industries, especially if more than one car-related sector becomes automated. In this case, unemployment benefits may become the sole income these workers have. This reduces the cost of unemployment and, raises their 'reservation wage' i.e. the price that workers

will not work below (O'Hagan, Newman, 2014). Hence, this puts a strain on the welfare state.

A solution posed by many economists is a Universal Basic Income (UBI). As Martin Ford (2015) describes, universal basic income 'is a certain minimum income for everyone, or a sort of floor below which nobody need fall even when he is unable to provide for himself'. The main difference between UBI and unemployment benefits are that all those in the labour market, not just those temporarily unemployed, would receive this benefit. And if, as previously derived, inequality rises, plutonomies form, and capital remains in the hands of those who are wealthy, this is a real problem. The data for would agree with this statement. Firstly, between 1992 and 2012 in the US, the top 5% of households in terms of income, rose from 27% of total spending to 38%, while the bottom 80% of household income decreased from 47% to 39% (Ford, 2015). Secondly, the marginal propensity to save is higher for these wealthy classes than it is for the middle and lower classes. The lower classes in particular have no choice but to spend their income in order to maintain their standard of living (Ford, 2015). Therefore, to aid those in lower positions, and keep aggregate consumption from falling significantly, a stipend such as UBI seems logical. Nevertheless, the cost of such a policy in practice has been estimated to be as high as \$1-2 trillion for the US economy, for example, which is clearly not feasible (Ford, 2015).

## Conclusion

The purpose of this paper was to provide a detailed historical analysis of the effects of automation on the labour market with consideration of future policy implications. Deriving from the Luddites and spanning throughout modern history, a preconception that technology holds as much potential for destruction as it does for creation has been widely accepted, but this might not necessarily be the case. The long-term effects of automation on the labour market and productivity are clearly beneficial. The potential automation bears for inequality should not be disregarded, however, and the outlined policy measures must be considered in response to disparities in incomes and wealth. To conclude, almost 100 years after Keynes wrote his infamous essay, we see that 'the economic problem is (still) the permanent problem of the human race'. How we perceive automation and its effect on the labour market, may very well decide if this remains true.

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