



## History suggests AI will ultimately create not destroy jobs

The release of ChatGPT took the world by storm late last year. Within just five days, it had already reached 1m subscribers, which vastly outpaced the ten months it took Facebook to reach the same milestone. Suddenly, professions such as lawyers or journalists that had once looked fairly safe from automation faced a competitive threat.

Then in March, the release of GPT-4 turbocharged these fears. The new model underpinning ChatGPT was able to score in the top decile of a simulated bar exam, in contrast to GPT-3.5 that was around the bottom decile. It was even able to analyse images, rather than just text.

The new capabilities offered by large language models have stimulated a backlash on various grounds. Concerns about academic cheating soon led New York City public schools to ban the use of ChatGPT. Subsequently, Italy banned it altogether due to privacy concerns.

Given how rapidly the use of AI could spread, it is true that it could cause short-term dislocations in labour markets, in which case we can expect governments to intervene. In today's society the tolerance for dramatic changes to people's employment prospects is low. So if the impact were transformative, then we could expect new laws, regulation and financial support to reduce the near-term impact.

But if this occurs, it should not come as too much of a surprise. Throughout history, new waves of technology have regularly been met by resistance, not least because of fears about the employment effects. To date, those fears have consistently proven unfounded over the long term, since new technologies don't just substitute labour, but complement it as well.

Happily, we now look back on previous productivity-enhancing technologies as incredibly positive developments. After all, long-term gains in real wages have historically rested on our ability to be more productive. If anything, the bigger risk would come from failing to embrace new technologies, since the centuries prior to the industrial revolution demonstrate how stagnant productivity meant that real wages and living standards saw little change from generation to generation.

This piece takes a whistle-stop tour of the impact of new technology on employment over the last few centuries. Whilst there were regular waves of concern at the time, thankfully the reality was much more positive.

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## Historic Fears About Technology: Some Case Studies

There is a long history of resistance to technology. As far back as 1589, Queen Elizabeth I of England refused to grant the inventor of a mechanical knitting machine a patent lest it put manual knitters out of work.

Such concerns were accelerated by the arrival of the Industrial Revolution. In 1772, Thomas Mortimer wrote how machines would “exclude the labour of thousands of the human race, who are usefully employed”. And the workers themselves were certainly alive to the prospect that they could be made unemployed by new technologies. Most famously, in the early 19th century a group of English textile workers called the Luddites destroyed machinery, in part because of fears it would take their jobs away. To this day, the term ‘Luddite’ is still used to refer to those resistant to new approaches and methods of working.

Whilst the industrial revolution did not lead to the mass unemployment of workers (see [Figure 1](#) below), resistance to new technologies showed no sign of abating more broadly. For instance, in 1862 a group of shovelers in New York City formed a union after grain elevators were able to do their work much faster. They also refused to work for anyone who used the elevators. At the time, a New York Times article said that speakers at a meeting on the issue “denounced the owners of the elevators as capitalists and speculators, who were robbing the honest laborer of his due.”

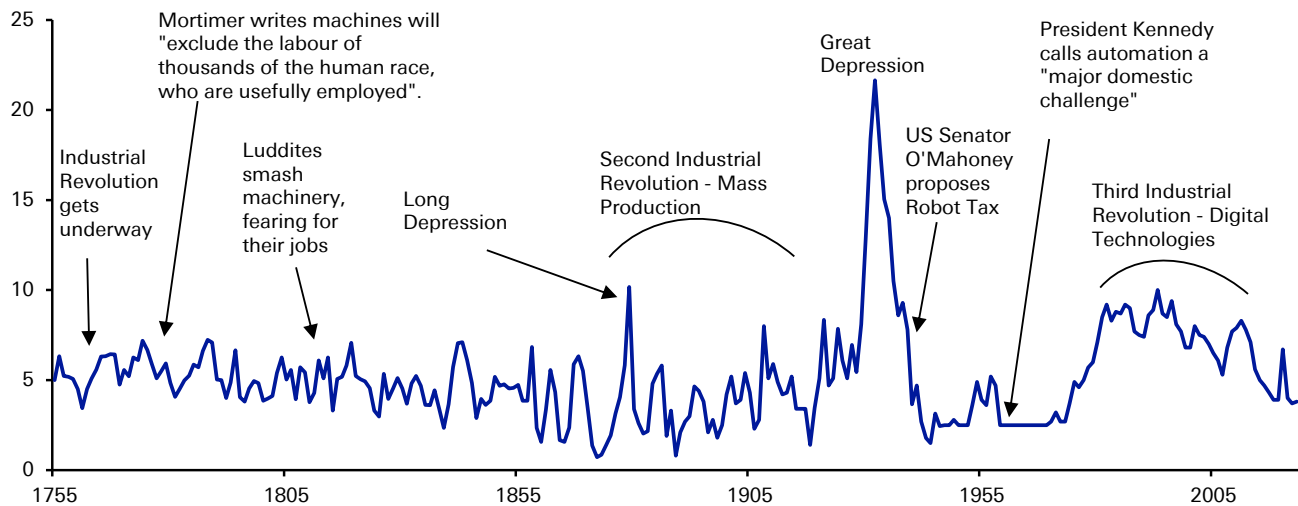
Another wave of fears about technological unemployment surfaced around the Great Depression. This was hardly surprising given there was mass unemployment anyway, peaking at 25% in the United States. One report to President Hoover on recent social trends suggested it would be a problem for some time, saying that “At best, the problem of technological unemployment promises to remain grave in the years to come.” Not long after, in 1940, US Senator Joseph O’Mahoney proposed an early version of a Robot Tax. He suggested that machines should be taxed in proportion to the number of jobs they took away from humans, whilst tax credits should be offered to employers using more humans and fewer machines.

Even as unemployment fell back again around WWII and in the years that followed, this failed to stop a renewed bout of concern about technology in the 1960s. One example can be seen from a TIME magazine story in 1961, which pointed out how “In the past, new industries hired far more people than those they put out of business. But this is not true of many of today’s new industries.” In 1962, President Kennedy was asked about the issue, and said he regarded automation “as the major domestic challenge, really, of the ‘60s, to maintain full employment at a time when automation, of course, is replacing men.” Those concerns led Kennedy’s successor, President Lyndon Johnson, to establish a National Commission examining the question of technology’s effect on employment.

So contrary to the rolling fears of the last several hundred years, history tells us that technology does not create unemployment. We can illustrate this by looking at long-term unemployment data, using the median of the G7 countries. At first there’s just data for the UK, but the others are gradually included as they become available. It clearly shows that unemployment has oscillated based on economic cycles, rather than any technological waves. In fact, today’s median G7 unemployment rate of 3.8% is beneath the 5% UK rate at the start of the series in 1755. So even though most of the jobs of 1755 no longer exist, the automation of different tasks did not lead to an ever-increasing spiral of unemployment.



Figure 1: Median G7 Unemployment (%) with annotations around technological breakthroughs, fear stories about its impact, and the actual economic-led reasons for job losses



Source: GFD, Deutsche Bank

## So why hasn't there been a wave of mass unemployment?

As the above examples demonstrate, there has been a general tendency through history to overestimate how replaceable humans are. But fortunately, new technologies don't just substitute labour, they also complement it in several ways.

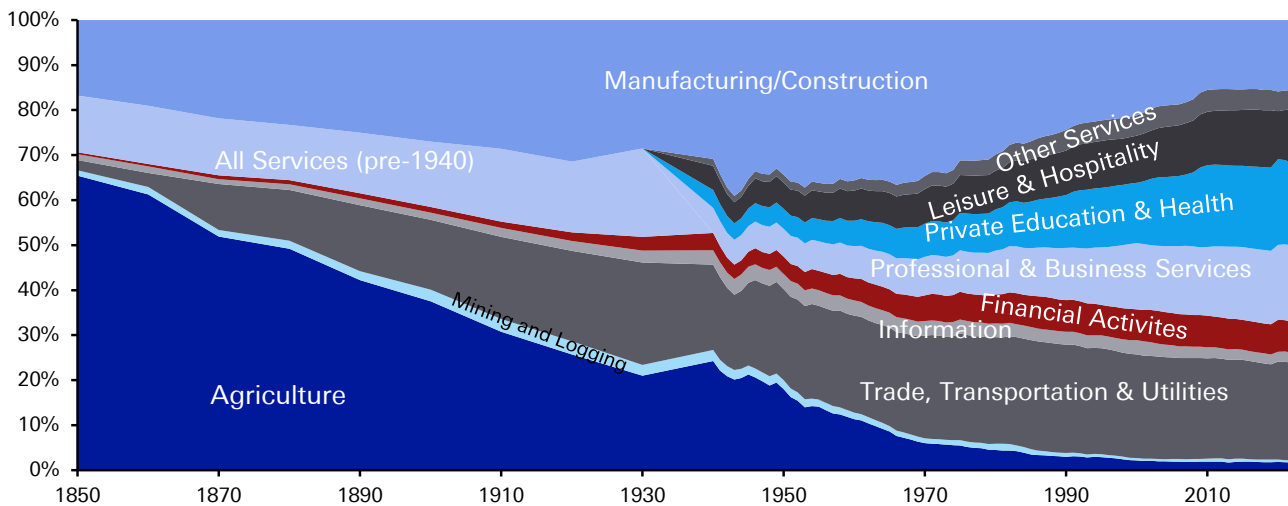
First, new jobs are created directly as a result of new technologies. In centuries past there were no cloud engineers or YouTubers, yet there are plenty today. Second, existing jobs change in nature because of new technologies. For example, there used to be a premium on lawyers who were able to recall amazing quantities of legal rules, but electronic databases nowadays have reduced the benefits of that skill. As a result, tasks that AI cannot do, such as persuasive argumentation, or grappling with complex problems, have increased in importance. And third, as technologies have increased our productivity and wealth, that has freed up time and resources for people to demand other services, like personal fitness trainers.

The record of recent centuries show this process playing out as described. In [Figure 2](#), data for the US over time shows that in the mid-19th century, most of the private-sector workforce was employed in agriculture. As recently as 150 years ago, the majority of all workers were simply employed to feed the full population, so still relatively close to subsistence farming with limited free resources to drive growth.

But as time went on, and technology replaced humans in agriculture, this freed up labour and money to be redeployed to other new ventures and ultimately new industries. Initially manufacturing type activities grew rapidly, reaching a peak around WWII. Subsequently, increasing numbers came to be employed in services industries, such as leisure and hospitality. Who knows what industries future generations might be working in?



Figure 2: Proportion of Private Sector US Employment by Sector - Technological innovation in Agriculture allowed the world to move from subsistence farming to productivity-enhancing new sectors.



Source : Haver Analytics, US Census, Deutsche Bank

A more specific example of technology creating new jobs can be seen through the Ford assembly line, which the company brought in to mass produce cars on a bigger scale. By using a conveyor system and assigning workers specific tasks, there was a massive boost in productivity, reducing the time to produce a car from just over 12 hours to around an hour and a half. At the time, some might have assumed that those workers would find themselves underemployed given the new technology. But as the price of a car fell from \$950 in 1909 to just \$290 by 1926, there was a tipping point in demand and the number of cars sold massively increased, which meant employment at Ford actually rose rather than fell.

That was not the end of the story either, since the productivity boost at Ford and the widespread use of motor vehicles created positive externalities elsewhere. Even more jobs were created, with growth in auto dealerships, repair garages and fuel stations. Later on, mass car ownership led to the building of new highways and facilitated the growth of out-of-town shopping malls. It enabled the growth of suburbia as people were able to travel further independently. And even holidays changed in nature, since families could access previously inaccessible locations. Whilst this is just one example, it demonstrates how new technologies do much more than simply substitute human labour, and can lead to widespread societal advances to the benefit of all.

Another factor preventing widespread unemployment is that societies are adaptable to changing workplace demands and the need for different skills. Indeed, a large driver behind the move to more advanced schooling from the late-19th century was the recognition that new industrial jobs required more skills. Hence in the UK, the school-leaving age was progressively increased from that time, moving from 10 in the 1880 Elementary Education Act, to 15 by the time of the Education Act 1944. And today, a young person has to remain in some education or training until they are 18.

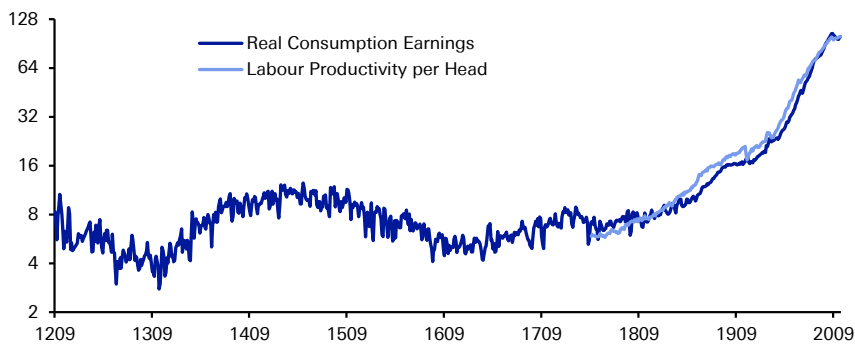


## History suggests the far bigger risk would come from not embracing technologies

Most of us alive today are substantially better off than our ancestors. But this didn't happen by accident. In large part, it came because new technologies enabled workers to produce a higher quantity of output, thus enabling the process of economic growth that's allowed us to enjoy higher standards of living.

We can see this over the very long run by looking at the UK. As [Figure 3](#) shows, there is an incredibly strong correlation between productivity and real wages, which is no surprise given that one drives the other. And by looking further back, we can see that real wages were broadly flat from generation to generation before the Industrial Revolution. In fact, real wages in 1209 were above their levels in 1709, a full 5 centuries later!

Figure 3: UK real wages and labour productivity (2016 = 100)



Source: Bank of England: Millennium of Macroeconomic Data, Deutsche Bank

This era before widespread technological progress and economic growth was not a happy time. The vast majority were illiterate and lived in dire poverty by today's standards. Around half of children would die before reaching adulthood. It was not a peaceful existence either. Estimates suggest the murder rate in Western Europe was at least 10 times current levels, and famines were far more common.

By contrast, economic growth has enabled us to lead healthier and happier lives. Today we have decent sanitation and central heating in our homes. Modern communication means we can instantly contact friends and family. Technology and specialisation mean we do not need to farm our own food. Better health means we are around seven inches taller than our pre-industrial ancestors, and live decades longer. In the 19th century, only a minority could expect to live to the age of 70.

As another example, imagine a world where we harness natural renewable resources (solar and wind) to fuel all our energy needs. The huge fossil fuel industry and associated jobs would slowly cease to exist. However, the likely far cheaper energy and new industries it would support would drive productivity and support alternative employment opportunities. Economic growth also means there is a positive-sum game for resources. It is possible for everyone to simultaneously become richer.

This is unlike a zero-growth world, in which someone becoming richer would require someone else's income to decline. A zero-growth world also means



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governments cannot increase public spending without offsetting spending cuts or tax rises elsewhere, at least in the long term.

In recent years, plenty has been written on how we are currently experiencing an era of slower growth, particularly since the GFC in 2008. The consequences of that are profound, and the result is that living standards are not rising as rapidly as they used to. Indeed, data shows the proportion of children out-earning their parents at the same age has noticeably declined in the United States.

So when new technologies come along that offer scope for substantial productivity improvements, the lessons of history strongly suggest that this should be welcomed. Being able to produce goods and services more efficiently frees up resources for other tasks, enabling us to earn more and improving living standards more broadly. If the Ford Assembly line had been stopped in its early days, then we would never have benefited from the array of additional benefits of widespread car usage, or at the very least we'd have got there much slower. Today we could well be at a similar point: the widespread adoption of AI might have benefits that we struggle to imagine today, but which enable us to lead better and happier lives.

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## But could AI finally be the technology where this pattern stops and there are widespread job losses?

Whilst there are legitimate fears about what AI means for society, we are sceptical that this time is different and it will lead to widespread job losses.

First, recent experience demonstrates that humans are harder to substitute than is generally thought. For example, despite long-standing predictions that truck drivers will soon find themselves out of work thanks to driverless vehicles, there is still a shortage of drivers. In fact, as of April 2023, the number of US nonfarm payrolls in the "Truck Transportation" category hit a record high. In part, this is because people still want certain tasks to be completed by humans, and aren't ready to fully move over to machines yet, whether that's driverless vehicles or having their hair cut.

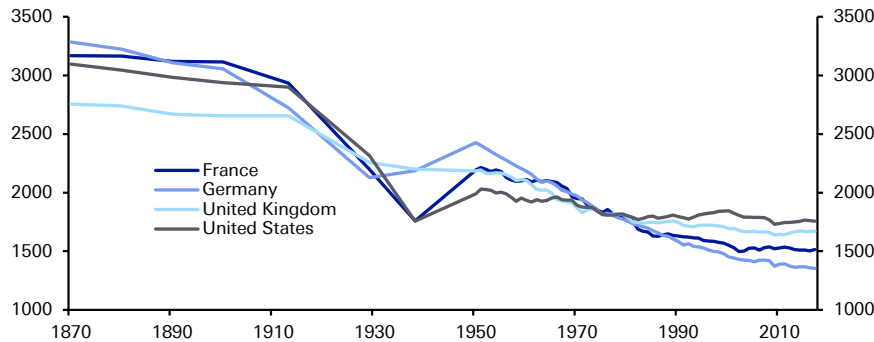
Even the most eminent economists have over-estimated the extent to which humans would find themselves underemployed as a result of economic progress. Back in 1930, John Maynard Keynes wrote an essay called "Economic Possibilities for our Grandchildren". He predicted that living standards in a century would be 4-8 times higher, which in the UK has proven correct with 7 years to go. But as a result, he speculated that there might be 15-hour workweeks, and said "for the first time since his creation man will be faced with his real, his permanent problem – how to use his freedom from pressing economic cares, how to occupy the leisure, which science and compound interest will have won for him, to live wisely and agreeably and well". But even though living standards have advanced by several times over, we are not yet faced with an abundance of leisure time just yet, and working hours have only seen a gradual decline since the 1930s ([Figure 4](#)).

Several reasons lie behind this. One is that work does not just have financial benefits, but can also provide a sense of purpose and fulfilment. It is no coincidence that unemployment is associated with various negative health outcomes. Another reason is that people care about their relative income as well as their absolute



income. Humans are inherently ambitious and will always seek out ways to progress themselves. So even if we all become richer in future, individuals are unlikely to just accept a good standard of living as defined in 2023. Instead, they will strive to keep up with others, which will likely involve remaining in work to earn more money. As a result, even if some of our newfound wealth in the future is used to enjoy more leisure time, it is highly unlikely we see a complete one-for-one substitution.

Figure 4: Annual Working Hours per Worker



Source : Our World in Data, Deutsche Bank

## Conclusion

History suggests we should embrace potentially game-changing technologies such as AI, especially in the world of low productivity we find ourselves in today. That doesn't mean there won't be major disruption to how we work, especially in white-collar jobs. But if harnessed correctly, AI should help enhance productivity, and ultimately free up resources for new ventures and industries that we currently don't know we need or desire.

If AI does prove disruptive, then it is to be expected that policymakers will protect workers against any short-term employment disruption, whether that's via by laws, regulation or the redistribution of income. The challenge will be to ensure that this doesn't slow the productive potential of the technology, not least since we need productivity growth as we grapple with high debts, weakening demographics, and sluggish economic growth.



# Appendix 1

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