



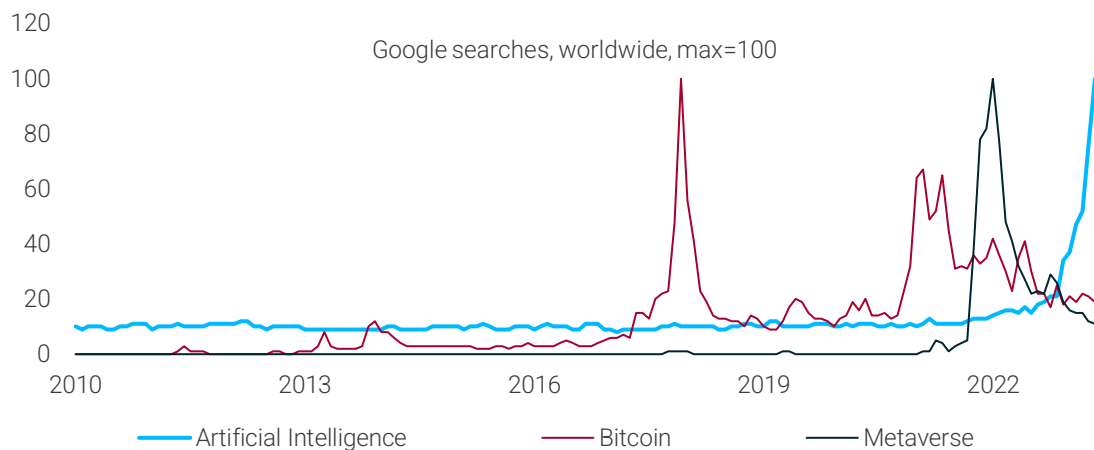
Macro Picture

# CAN AI RESTORE SECULAR DISINFLATION?

Dario Perkins

AI is creating an enormous amount of hype, both in financial markets and among the wider public. Enthusiasts say it will deliver massive improvements in productivity, generate vast wealth, and displace huge numbers of workers. While such claims are exaggerated, these technologies are our best bet for overcoming the challenges of the new macro supercycle.

Chart 1: Should investors believe the hype?



Source: Google Trends, TS Lombard

## G-ENERAL P-URPOSE T-ECHNOLOGY

ChatGPT has propelled Generative AI into the public’s consciousness, with insiders convinced these technologies will upend society and deliver vast wealth. Recent studies are already showing large efficiency gains from AI, which could be a gamechanger for a global economy that has struggled with secularly poor productivity. The wider societal impact of AI is far more uncertain.

## THIS TIME IS DIFFERENT

History of full of ill-conceived anxiety about technology creating mass unemployment. Our economies have been good at creating new roles, particularly as technology has raised living standards. While there are specific risks associated with AI – especially when combined with robotics – warnings about mass job losses and wage deflation seem wildly premature.

## MOORE’S LAW FOR EVERYTHING

The current generation of AI struggles with important limitations, particularly in terms of its reliability and trustworthiness. There is no guarantee that its capabilities will continue to improve at an exponential pace. AI-induced productivity could help the global economy overcome some of the supply problems it is facing, but the technology is unlikely to help restore secular disinflation.

## CAN AI RESTORE SECULAR DISINFLATION?

After a decade of excitement that was confined to industry insiders and science fiction fans, ChatGPT has propelled the latest generation of AI into the public spotlight. Enthusiasts claim this technology will radically transform our lives, with profound implications for the global economy. Sam Altman, the CEO of OpenAI, the company that created ChatGPT, believes we are “moving up an exponential curve” that will upend society and generate vast wealth. Sundar Pichai, chief executive of Google, claims it is the most “important thing humanity has ever worked on – more profound than electricity or fire”. Those are strong claims, verging on hyperbole; but it is already clear that AI can deliver significant improvements in productivity. A recent study showed that ChatGPT could cut journalists’ writing times by 40% and raise the quality of their output. As more workers use these technologies, AI will help them make better-informed decisions, optimize their processes and speed up the pace of technological innovation. Generative AI has already learned to code, even though it was never trained to do so, raising the (somewhat terrifying) possibility of AI coding AI, which could take the technology to new levels. This seems like a big deal for a global economy struggling with historically weak productivity and prolonged stagnation in real incomes.

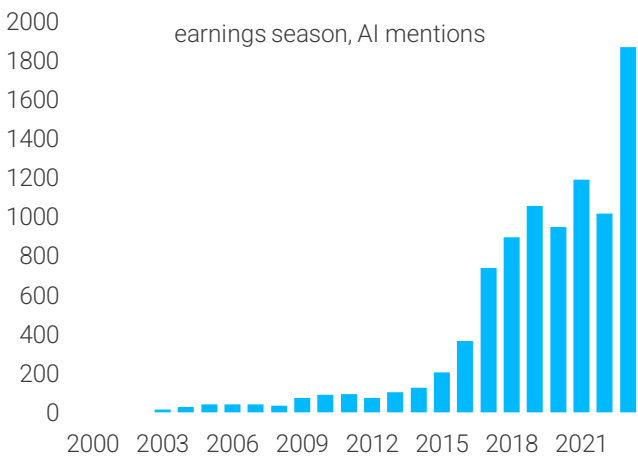
Alongside the optimism about the impact of AI on productivity, there are serious worries about what it means for labour markets and the distribution of income. On one level, this is an extremely old debate. Throughout history, technological progress has always threatened jobs. But because the “income effects” of new technologies have dominated the “substitution effects”, these worries were always misplaced – our economies created new sorts of jobs, and unemployment rates have actually trended lower. The worry with AI is that the disruption to labour markets will be wider and far more rapid, particularly when combined with new advancements in robotics. Take the comparison with computerization. Workers coped with the computerization of the economy in two ways: they either moved to sectors that were relatively sheltered, such as the low-skill services sector, or they “skilled up”, by remaining in education and seeking employment in occupations that were complementary to computers – becoming scientists, investment bankers and journalists. It was “mid-level” jobs that were destroyed, particularly in manufacturing, which caused a “hollowing out” of labour markets and polarization of wages. But the next wave of automation threatens the entire distribution of employment, as robots take low-skilled jobs and AI penetrates the (previously untouchable) high-skill “cognitive” sectors. Wage rates could plunge.

Ultimately, the employment implications (and wider societal impact) of AI will depend on the future evolution of the systems themselves, which is massively uncertain. While the current generation of AI can enhance productivity and allow high-skilled cognitive workers to automate parts of their jobs, the technology also suffers from problems that limit its threat to the human labour force. In the strictly philosophical sense of the word, the current generation of AI has a strong tendency to bull\*\*\*\*, which means it is neither reliable nor trustworthy. And despite the claims of AI enthusiasts – which at times border on mysticism – there is no guarantee that future versions of the technology will overcome these problems, or that the industry will continue along the “exponential curve” that is supposed to lead to Artificial General Intelligence (AGI) – machines that can fully replace every aspect of human competence. The broader point, however, is that it is shifting macro conditions that are likely to provide the catalyst for technological diffusion, rather than the causation running the other way. Most companies did not invest in the 2010s because low interest rates and cheap labour meant they did not need to; so, it is not surprising that productivity stagnated. But a world of labour shortages and persistent supply tensions will be more conducive to faster technological diffusion and AI will help us to overcome some of the problems associated with deglobalization and ageing demographics. The AI revolution may not restore secular disinflation, but it should help the world avoid nasty stagflationary outcomes.

# 1. GENERAL PURPOSE TECHNOLOGY

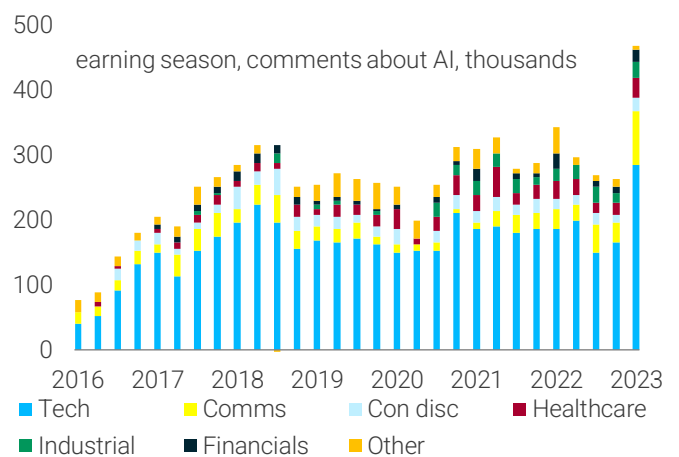
Since the launch of OpenAI’s ChatGPT in November, there has been a huge amount of hype about the socio-economic impact of Artificial Intelligence (AI) – particularly the latest vintage of “generative” AI. The hype is already having [a discernible impact on financial markets](#). As anyone who has interacted with ChatGPT knows, generative AI is “general purpose” – it can be used for a variety of tasks and is capable of self-learning – that is, it can improve itself over time. AI-enthusiasts believe this technology will totally transform the world, raising living standards for more people than ever before – and in a shorter period of time. Researchers have already documented positive effects on the efficiency of workers and companies using AI, which is a big deal for a global economy that has been stuck in a secular productivity run. But is all the excitement about generative AI justified? What does it mean for the macro environment? Could AI rescue a world that seems to be facing stubbornly high inflation and persistent supply weakness? What about its broader effects – on labour markets and the distribution of wealth?

**Chart 2: The latest corporate buzzword**



Source: Bloomberg

**Chart 3: A reason for a tech revival?**



Source: Bloomberg

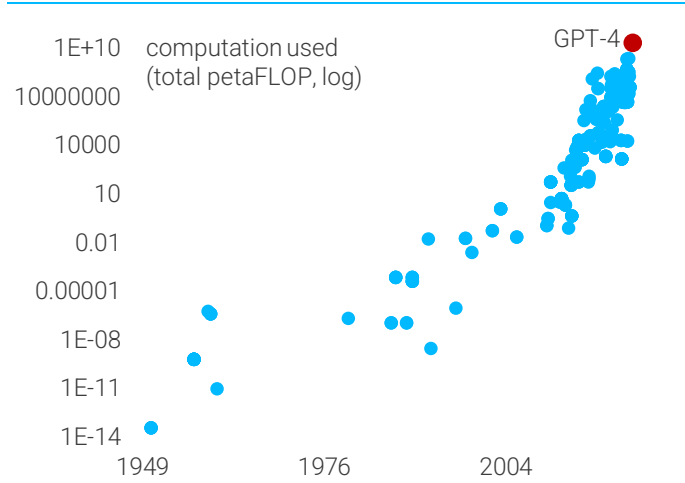
## Tech enthusiasm returns

Excitement about AI is not entirely new. Industry insiders and tech enthusiasts have been forecasting massive advancements in these technologies for much of the past decade. In an [influential book back in 2014](#), Erik Brynjolfsson and Andrew McAfee even predicted the emergence of a “Second Machine Age”. The problem, of course, was that there was no sign of the Third Industrial Revolution in any of the data; in fact, the 2010s was one of the worst decades for developed-economy productivity since the mid-1800s. While economists have given lots of plausible explanations for this IT productivity puzzle – including data mismeasurement and slower technological diffusion – true believers, such as Erik Brynjolfsson, always argued that the puzzle [was mainly the result of simple time lags](#). It takes time to build the stock of any new technology to a size sufficient to have an aggregate effect and complementary investments are usually necessary to unlock the full potential of these inventions. Given continued rapid AI advancements, maybe we have finally hit “critical mass”. Global Data estimates that the total AI market will be worth US\$383.3 billion in 2030 – a 21% compound annual growth rate over 2022. [\(By the way, Global Data – our new parent company – has considerable industry-expertise in this area – please let us know if you would like access to their reports, analysis, and data...\)](#)

### Another exponential curve

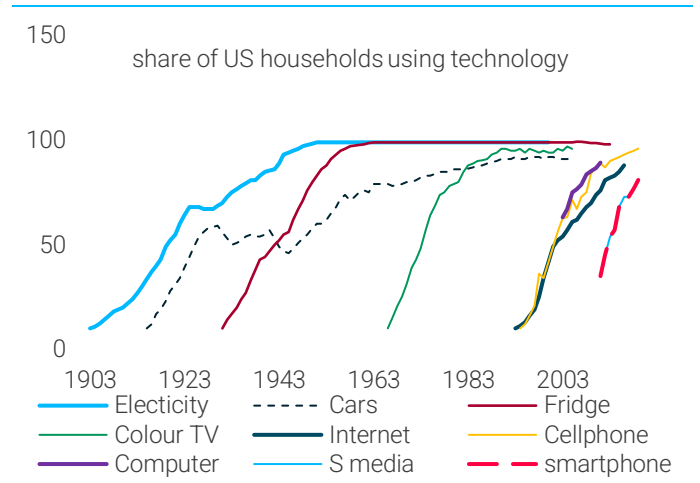
Sam Altman, CEO of OpenAI, believes the societal impact of AI will follow a steep exponential curve, one that, like the early days of the COVID pandemic, most people are underestimating because they are “thinking too linearly”. Certainly, the computational power of AI has been increasing at an exponential pace. Research by Epoch shows training compute – the computational resource used to train a large language model (LLM) – has grown by a factor of 10 billion since 2010, with a doubling rate of six months. Paul Cristiano, who left OpenAI to create the Alignment Research Center, argues that the broader intellectual world overestimated how long it will take AI systems to go from having a large impact on the world to creating a “wildly unrecognizably transformed world”. He believes this is going to be a matter of years rather than decades, and there is what he calls a real chance it could be months. Sundar Pichai, chief executive of Google, claims AI is the most important thing humanity has ever worked on, something “more profound than electricity or fire”. And, according to a survey conducted in 2022, the median AI researcher puts a 10% probability on the prospect of humans eventually losing control of these technologies, leading to human extinction or a “similarly permanent/severe disempowerment of the human species”. Ten per cent is a chillingly high probability.

**Chart 4: The exponential curve**



Source: OurWorldInData, TS Lombard

**Chart 5: Tech adoption rates speeding up**



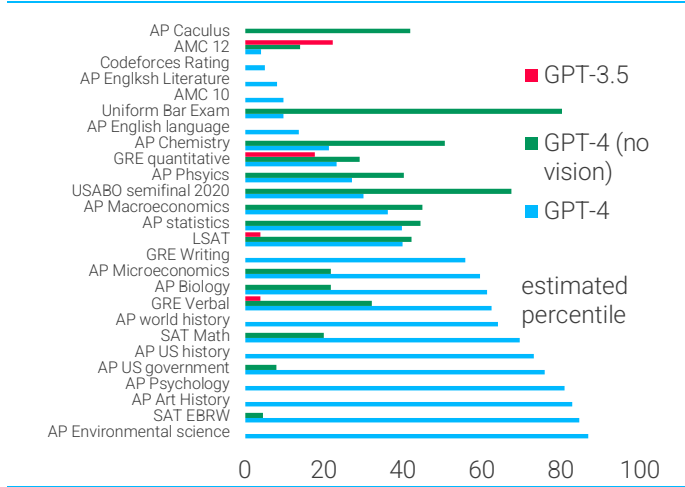
Source: OurWorldInData, TS Lombard

### How does AI work?

Hyperbole, no doubt, and the cynic would say tech investors need to find a reason to generate excitement about an industry that has struggled in the face of rapid monetary tightening. But it is certainly worth thinking through the potential macroeconomic consequences of these technologies. Let’s start, however, with a brief explanation of how generative AI works, particularly the latest vintage based on LLMs. In very crude terms, this is a system that has read a lot of stuff on the internet and is predicting the next word in the sequence. When you ask ChatGPT a question, it converts each word into a number and then tries to predict the next number in the sequence, largely based on “learning” the associations between these numbers during billions of dataruns (its “training”) on a massive dataset (a snapshot of the entire Internet – albeit with quality controls). In one sense, these models are simply trying to autocomplete our sentences, based on things humans have written down previously, but they are doing this in an extremely sophisticated way, by trying to imitate the neural networks of the human brain. And the system is learning continuously – as it processes more data, it can become better at predicting what words should come next, which allows it to generate increasingly realistic output. While ChatGPT

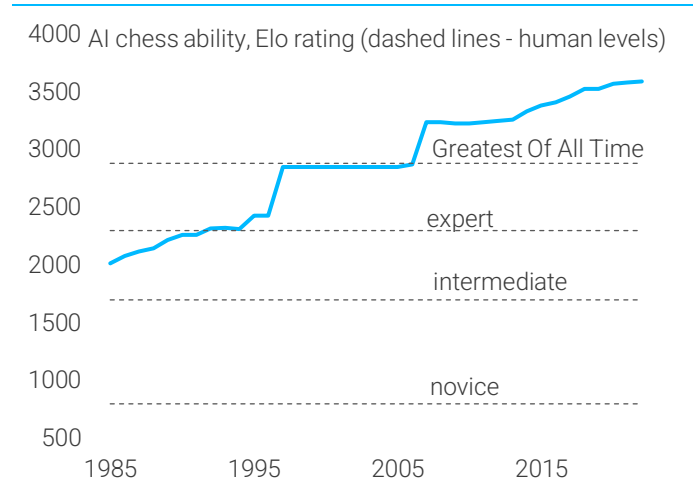
produces words, there are other LLMs that can create digital photos, drawings and animations. All the big tech companies (Alphabet, Amazon, etc.) are training their own LLMs.

**Chart 6: Impressive cognitive skills**



Source: OpenAI, TS Lombard

**Chart 7: AI beats humans**

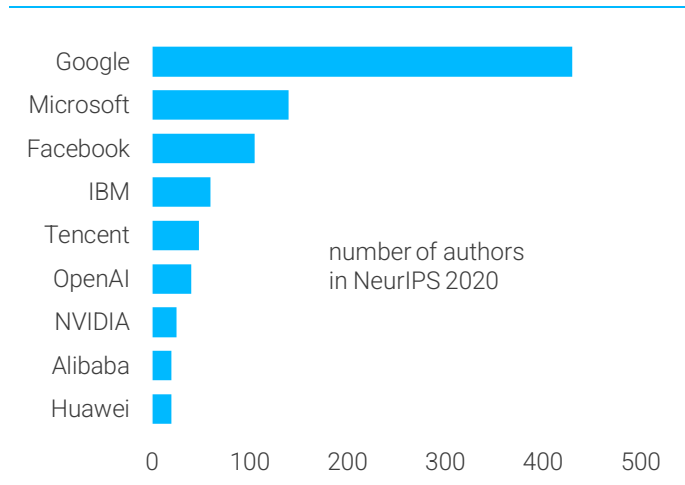


Source: OurWorldInData, TS Lombard

**Early stages of a revolution?**

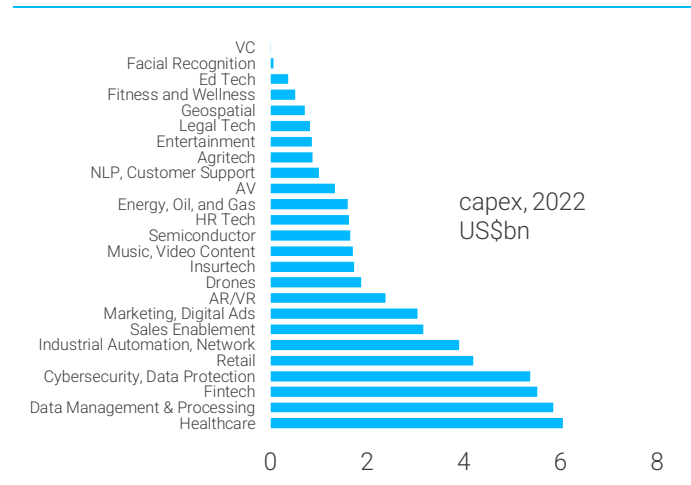
AI capabilities exploded during the 2010s thanks to deep learning software – a combination of massive datasets, algorithms that can learn, and increasingly powerful computers. LLMs have already shown they can match or beat human capabilities in a variety of areas. When ChatGPT came out in November 2022, it recorded a close to average score for the US Law School Admission Test (LSAT) and performed in the top third of SAT-takers for both reading & writing and mathematics. By March 2023, with the release of GPT-4, these abilities had been vastly superseded. GPT-4 performs in the 88th percentile on the LSAT and in the top decile for the SATs. GPT-4 can perform better than 90% of American high schoolers in a vast range of subjects, ranging from environmental science to US history. But the most surprising results have been in “emergent abilities” – skills that were not specifically trained, such as coding. This raises fascinating possibilities, such as AI coding its own AI, which on one level is rather frightening (like something from a science fiction movie). And since emergent abilities seem to increase with more and more data, tech enthusiasts believe we are only at the early stages of this revolution –

**Chart 8: The AI leaders**



Source: [The Generative AI revolution \(2023\)](#)

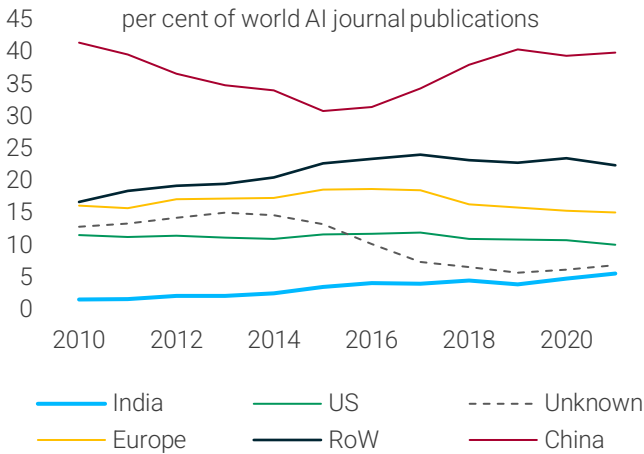
**Chart 9: AI capex by sector**



Source: 2023 AI Index Report

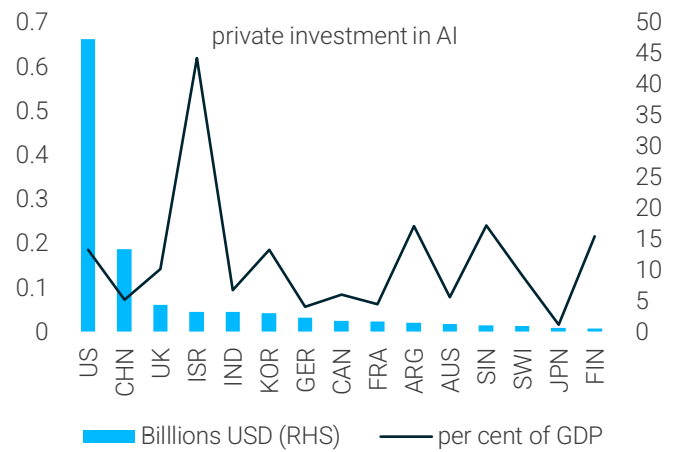
a revolution that will end with Artificial General Intelligence (AGI), fully self-aware machines that can perform any intellectual task that a human can perform.

**Chart 10: China wants to dominate AI**



Source: [The Generative AI revolution \(2023\)](#)

**Chart 11: Global AI leaders**



Source: [The Generative AI revolution \(2023\)](#), TS Lombard

### Impact on productivity

While the AI dream (or nightmare, depending on your perspective) of AGI is still largely theoretical and may never be realized (more on this in Section 3 below), the “good enough” AI technologies we currently have could still have a powerful impact on global productivity in the coming decade. We see two main mechanisms that are likely to drive this improvement:

- 1) **AI can make current processes more efficient:** It is already helping workers make better-informed decisions, optimize their processes and remove mundane tasks. This will increase the efficiency of our current workforce, which should boost overall output; and
- 2) **AI can increase the pace of new innovation:** Cognitive workers not only produce current output, but they also invent new things, make new discoveries and generate the technological progress that can raise future productivity. AI can help in all these areas.

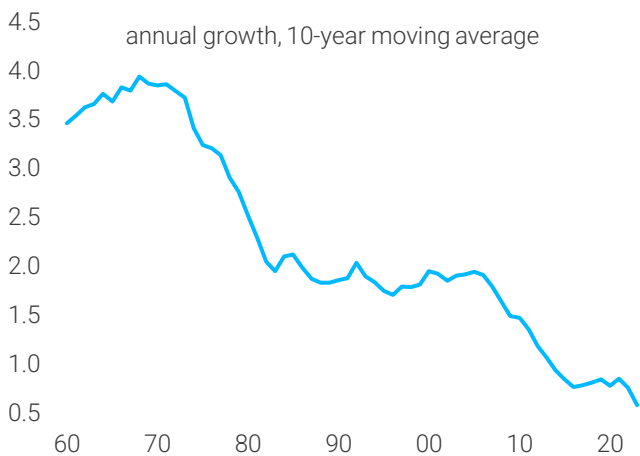
While generative AI is still relatively new, there is already compelling evidence that it will boost the efficiency of the workers and companies that use it. A [recent study by researchers at MIT](#), for example, analysed the impact of ChatGPT. It asked 444 college-educated professionals to perform two simple (occupation-relevant) writing tests, allowing half of the group to use ChatGPT on the second task (with the other half providing a control group). Their results showed a large improvement in productivity, with the average time spent on the second task dropping by 40% (Chart 14). What is interesting is that the quality of the writers’ output increased, too, with a gain of around 15%, based on (blinded) evaluations made by experienced professionals in the same occupation. And the people who benefitted most from ChatGPT were those who scored lowest on the first take, which suggests the technology caused an overall compression in the distribution of productivity. Workers who used ChatGPT also reported higher levels of job satisfaction and an improvement in their subjective self-worth.

### Real-life productivity gains

While the conditions in which the MIT study were conducted were somewhat artificial – since it used an “online laboratory” – productivity improvements have also been found in real-world settings. A yearlong study by MIT and Stanford researchers found that AI tools increased workers

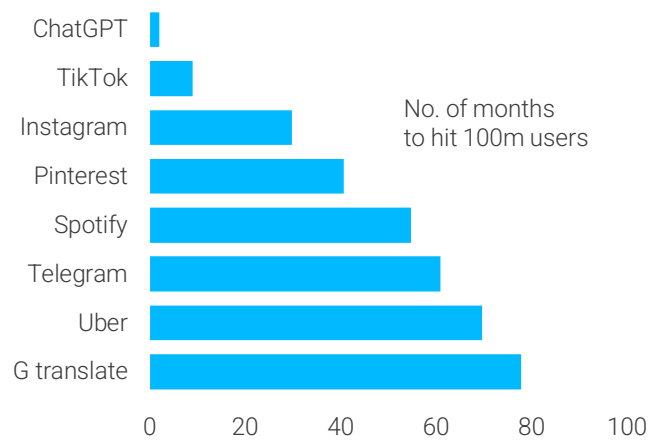
productivity at a Fortune 500 firm. [Brynjolfsson, Li, and Raymond \(2023\)](#) show that call centre operators became 14% more productive when they used the technology, with the gains of more than 30% for the least experienced workers. Customer service chat handling times declined, with an increase in chat resolutions per hour. What is more, customer satisfaction was higher when interacting with operators using generative AI as an aid; and, perhaps as a result, employee attrition was lower. It is interesting that the system appears to create value by capturing and conveying some of the tacit organizational knowledge about how to solve problems and please customers who previously learned only on the job. In any case, evidence is already starting to build that generative AI can deliver tangible efficiency improvements. Another study, by [Kalliamvakou \(2022\)](#), found that software engineers could code up to twice as fast using a LLM.

**Chart 12: Secular productivity slump**



Source: Conference Board, TS Lombard

**Chart 13: Fastest software adoption in history**



Source: [The Generative AI revolution \(2023\)](#)

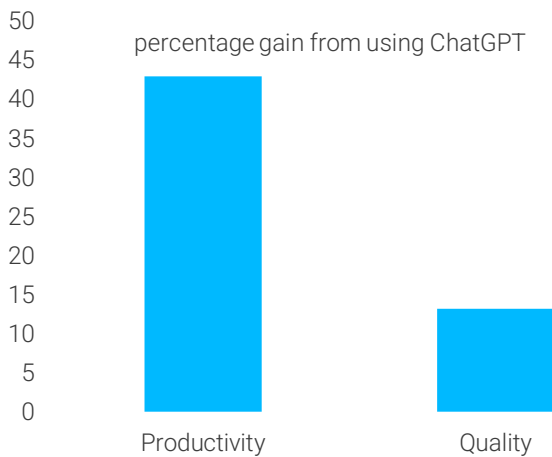
**Faster pace of innovation?**

These are large effects, and their macroeconomic impact could show up faster than economists anticipate – especially given the pace of technological adoption we are currently seeing. ChatGPT gained 100 million users faster than any other application in history, and these fast adoption rates are not confined to individual users. Major corporations, such as Bain & Company, have entered into deals with OpenAI to use generative AI in their strategy consulting business, while companies like Expedia have integrated ChatGPT through plug-ins. The more exciting impact on living standards, however, is likely to come from the second of our productivity channels – the pace of technological innovation. Generative AI can significantly expedite the R&D process by automating complex tasks, analysing vast datasets and predicting potential outcomes. It has already been useful in biological research: DeepMind’s AlphaFold predicted the 3-D structure of almost every known protein – a task that had been predicted to take decades of human labour (according to the journal *Science*, [the most important scientific breakthrough of 2021](#)). This, alongside other AI breakthroughs, has led Dr David Baker from the Institute for Protein Design to estimate that the pace of innovation in his field is now 10 times higher than it was 18 months ago. If we see rapid increases in innovation across other areas, the impact on productivity could be transformative.

## 2. THIS TIME IS DIFFERENT

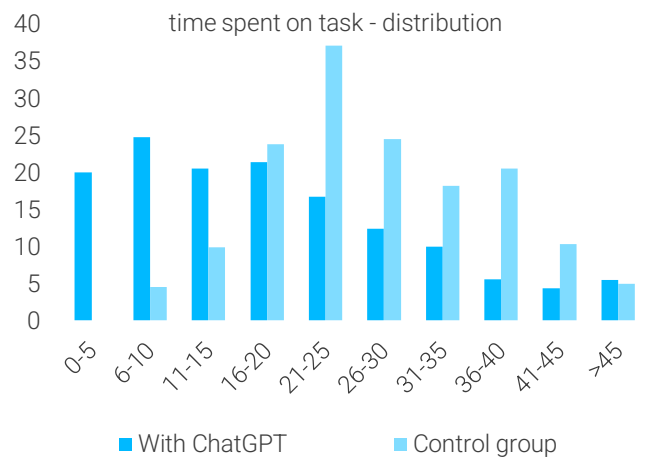
Generative AI clearly has huge potential to boost economy-wide productivity, but there is also deep concern about its broader societal impact. In a controversial open letter, some tech luminaries, [including Elon Musk, even called for a six-month pause to AI research](#) to address the risks they posed to humanity. Putting aside the Terminator-style threat to human existence, there are more immediate worries about the impact of AI on labour markets and the distribution of wealth, with the popular media full of scary predictions about the number of jobs that are likely to be lost. Are millions of people – especially those in previously untouchable “cognitive non-routine” sectors – about to find themselves unemployed? There are definitely reasons to be concerned, especially as this next wave of technological change could happen faster and affect a broader share of the jobs market than ever before. But history suggests anxiety about “technological unemployment” is usually misplaced. Ultimately, the impact of AI on the labour market is likely to depend on the nature of these technologies themselves. And by boosting real incomes, AI has the potential to create new forms of employment, perhaps in areas that are unimaginable today.

**Chart 14: ChatGPT boosts productivity**



Source: [Nov and Zhang \(2023\)](#)

**Chart 15: ChatGPT as an equalizer?**



Source: [Nov and Zhang \(2023\)](#)

### History lessons

The ultimate impact of technology on labour markets is theoretically ambiguous. This is because technological advancements have two contradictory effects: (i) a substitution or displacement effect, where labour-saving technologies can displace workers, and (ii) an income or compensation effect, where technology makes all goods and services cheaper, raising real incomes and generating new sources of demand in other sectors of the economy. Throughout history, there has always been anxiety about the substitution effect, while the income effect has often been forgotten. These worries date back at least to Ancient Greece and Rome, if not to the invention of the wheel. Some of the most influential economists have weighed in, including Adam Smith, David Ricardo, John Stuart Mill and Karl Marx. But over the very long term, anxiety about “technological unemployment” has always been misplaced. There has been no overall trend in the jobless rate and wages have typically tracked productivity. The lesson from history is that income effects typically dominate substitution effects and technology does, in fact, create jobs.

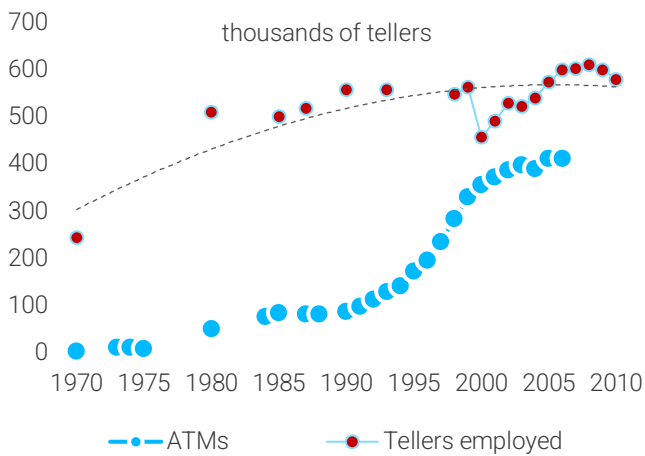
### Bank tellers and ATMs

As new technologies reduce the cost of production, they increase overall income levels, which, in turn, creates new forms of employment. [James Bessen has illustrated this dynamic with his](#)



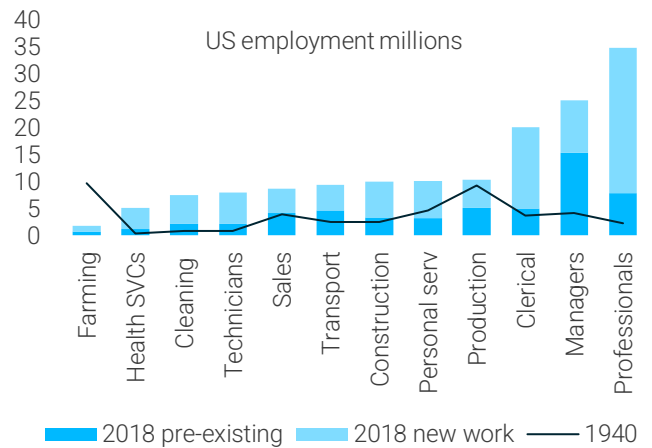
[research on bank tellers and ATMs](#). Since ATMs were first introduced in the 1970s, the number of bank tellers employed in the US has held remarkably steady. Workers moved “up the value chain” into areas like building customers relationships and solving bespoke issues, while ATM cost reductions for low-value tasks (such as withdrawing cash) raised demand for these workers. More generally, it is clear that the nature of jobs in most economies has changed dramatically over time. The MIT economist David Autor analysed new job titles in the US Census Bureau’s occupational descriptions and found that 60% of US employment is now in job titles that did not exist in 1940, a reading that rises to 75% for professional employment. Just as we did not have social media managers 15 years ago, so there will be jobs that do not exist today but will be commonplace in the 2030s (such as “prompt engineers”). Labour markets will adapt.

**Chart 16: ATMs did not displace bank tellers**



Source: [Bessen \(2015\)](#)

**Chart 17: Economies create new roles with tech**



Source: David Autor et al (2022)

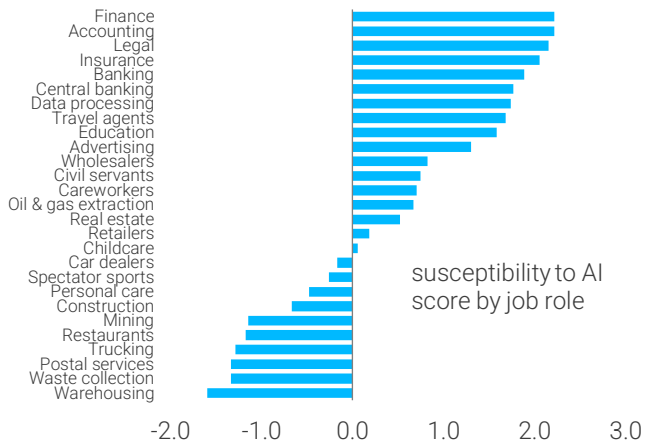
**But is AI ‘different’?**

While the historical absence of technological unemployment is encouraging, new technologies can still trigger large sectoral shifts and cause lingering adjustment problems. This was true with computerization and could be even more pronounced with AI. Since the 1970s, the secular decline in the cost of computing has encouraged employers to substitute labour for computer capital. Until recently, this technology was mainly restricted to performing “routine” cognitive and manual tasks. Routine tasks are those that follow simple rules, which can be readily expressed in computer code. Programmers set out procedures to direct the technology in every contingency. Companies automated many manufacturing jobs, plus other roles such as bookkeeping, clerical work, cashiers, telephone operators and copy-typists. But non-routine tasks – both manual and cognitive – were less exposed to technology. These roles were either not sufficiently well understood to be specified in computer code or demanded human flexibility, judgement and common sense. Now, thanks to AI, this dynamic is changing and many non-routine tasks are susceptible to automation. With Machine Learning, even complex tasks can be broken down into well-defined problems, solvable with algorithms and large data sets. This is already having an impact in areas such as fraud detection, medical diagnostics, education and financial services.

With ChatGPT, we are bound to see further encroachment into many other occupations. And just as LLMs are threatening to replace many non-routine cognitive tasks, so robots could soon automate many non-routine manual jobs as well. These roles were previously safe from technology and provided employment to displaced manufacturing workers, for example. Robot hardware is improving, thanks in part to enhanced sensors and manipulators. The number of

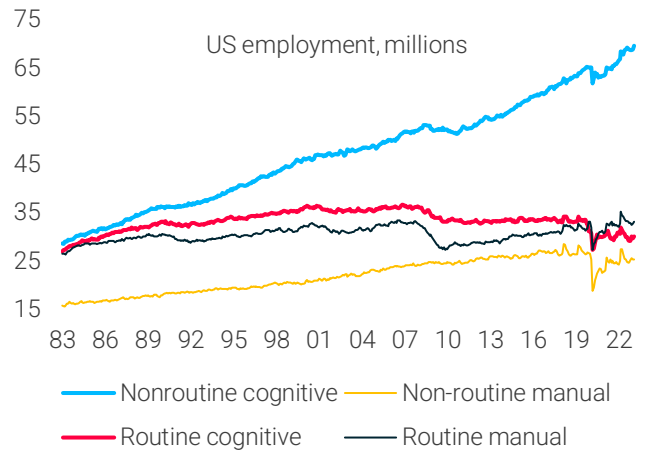
industrial robots in use is still relatively low; but with prices continuously in decline, it is set to rise rapidly. Workers adjusted to computerization in two ways: either they moved into lower-skill service industries that were relatively sheltered from automation or they “skilled up” by staying in education for longer and finding employment in jobs that were complementary to computers (finance, journalism, etc.). Even with aggregate unemployment rates that were low by historical standards, this caused a massive polarization of wages and a “hollowing out” of labour markets. But the next wave of technological progress – the combination of AI and robotics – threatens dislocation across a broader range of skills and occupations, at an unprecedented speed.

Chart 18: AI to affect cognitive tasks most



Source: Felton, Raj and Seamans database ([available online](#))

Chart 19: Labour-market adjustment to automation



Source: BLS, TS Lombard

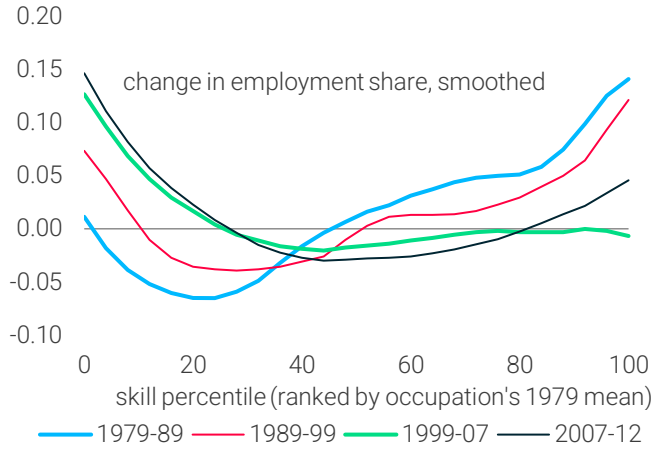
### Massive job losses?

For much of the past decade, the financial press has been full of stories citing the number of job losses that are likely to be associated with AI and other forms of automation (including robotics). Back in 2013, for example, [an extremely influential paper by Carl Benedikt Frey and Michael Osborne](#) argued that up to 50% of US jobs were at risk from automation, with similar levels of susceptibility across much of the developed world (developing countries were even more exposed). Researchers provided a breakdown of susceptibility by sector, which allowed journalists to tell their readers which jobs were most exposed. Yet, [as Noah Smith points out](#), studies that focus on the number of potential job losses tend to give an unnecessarily alarmist and unhelpful assessment of the likely impact of AI and other digital technologies. This is because “susceptibility to automation” can mean a lot of different things. If it means a worker is going to get new tools that allow them to automate the boring parts of their job, which allows them to focus on more creative activities and secure higher wages, that is very different from a situation where a machine replaces the worker altogether and their job is now obsolete. Studies that make allowance for these nuances tend to arrive at more subtle conclusions about the impact of AI on the labour market, even if they have [continued to generate scary press headlines](#).

Ultimately, the employment implications of AI are likely to depend on the nature of the AI systems themselves. While current vintages of LLM seem more likely to enhance productivity and allow high-skilled cognitive workers to automate *parts* of their roles, potentially increasing their job satisfaction and raising their real wages, the progression to more sophisticated forms of AI (such as AGI) would pose a much bigger threat to the human workforce. But, despite the claims of AI enthusiasts, there is no guarantee that we will ever make the progression to fully self-aware AI systems. Moreover, the forms of AI we have today continue to suffer from significant

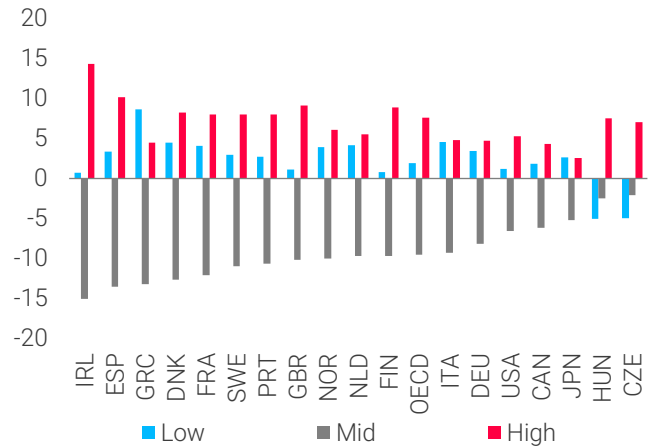
weaknesses, which are likely to limit their threat to the human labour force. Put another way, there is a good chance we can harness the productivity benefits of AI without “upending society”, that is, “driving the cost of labour to zero” or causing mass unemployment.

**Chart 20: US labour market polarization**



Source: David Autor

**Chart 21: Hollowing out of labour markets**



Source: OECD

### 3. MOORE’S LAW FOR EVERYTHING

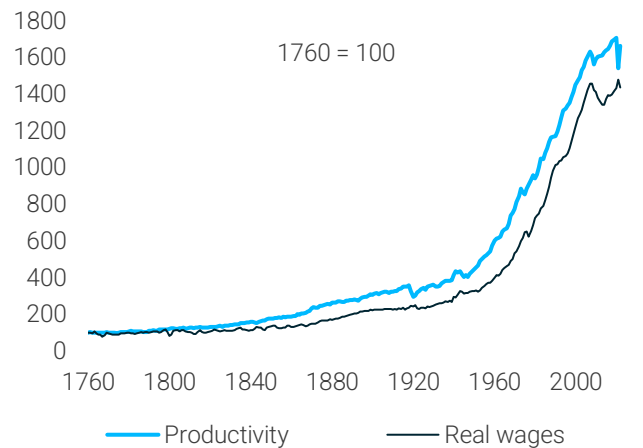
When AI enthusiasts talk about the technology’s potential to transform the global economy and upend society, they are making a *forecast* based on continuous exponential improvements in AI capability. But there is no guarantee we will continue moving up that exponential curve. Meanwhile, the models we have today continue to suffer from serious limitations, particularly in terms of their reliability and trustworthiness (they have a tendency to bull\*\*\*\*). Given their energy requirements, potential data limitations and the likely response from governments, nobody can know whether the consumption of more and more data will be sufficient for the next generation of AI to overcome these problems. The ultimate goal of AGI could remain in the realms of sci-fi rather than becoming a reality. This would dampen the socio-economic consequences of AI and curb its impact on labour markets. But businesses would still be able to harness the productivity

**Chart 22: The myth of technological unemployment**



Source: Bank of England, TS Lombard

**Chart 23: Productivity drives real wages**



Source: Bank of England, TS Lombard

benefits of AI, which could help ease some of the big supply-side problems the world appears to be facing in the 2020s – particularly from deglobalization and ageing demographics. We doubt AI can restore the secular disinflation of the past 40 years, but it should certainly help lift overall growth rates and prevent a more stagflationary outcome. In terms of [our new macro supercycle](#), we think AI will dampen its amplitude rather than halt it altogether.

### Labour costs to zero?

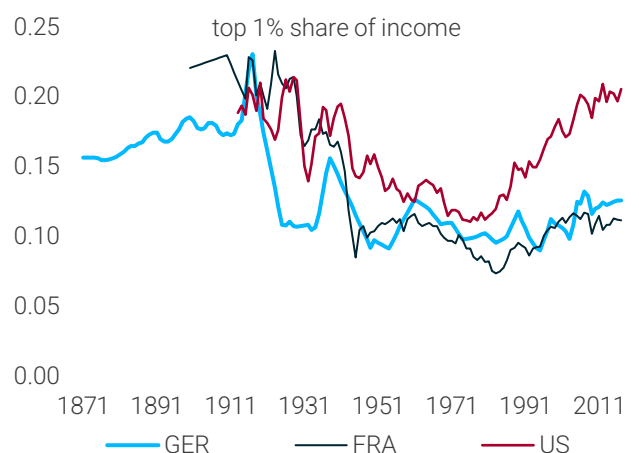
Sam Altman argues that AI will create an entirely new world by driving the cost of labour to zero. He calls his thesis “[Moore’s law for everything](#)”, which is a supposedly universal application of the original Moore’s law – the discovery that exponential growth in the number of transistors on a microchip leads to exponential growth in computing power and a corresponding collapse in the price of computers. Applied to AI, Altman argues that training LLMs such as ChatGPT on more and more data will deliver endless exponential improvements in their abilities, which will mean they can eventually do everything (and more) that a human can do – in effect, driving the cost of labour to zero. “Software that can think and learn will do more and more of the work that people now do”, which will continue to shift power away from labour towards capital, causing a collapse in wages and the concentration of a phenomenal amount of wealth among the owners of these new machines. And lower wages, in turn, will reduce the costs of all goods and services, creating a massive and unstoppable deflationary force. Altman says we need to imagine a world where the price of everything – housing, education, food, clothing, etc. – halves every two years.

Chart 24: Worst productivity in a century



Source: Bank of England, MacroHistory, TS Lombard

Chart 25: As unequal as the late 19<sup>th</sup> century



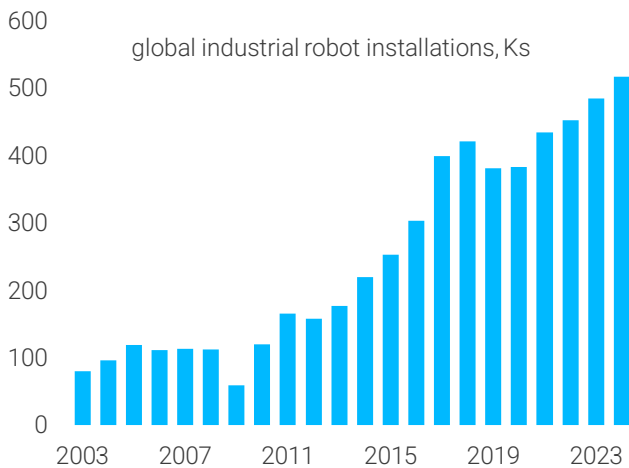
Source: World Inequality database

### Stochastic parrots

Realistically, there is no way of knowing whether Altman’s vision will be realized. Certainly, there is no guarantee that AI capabilities will continue to improve at an exponential rate. Moore’s law is not a physical law of the universe, and there is no reason to believe AI will become increasingly human-like just because its creators can increase the size of its neural networks. Some things will improve – we are seeing, for example, better approximations to the sound of language; but as [Gary Marcus \(one of the leading sceptics of AI\) recently explained on the Ezra Klein podcast](#), progress in other areas has been slower. Meanwhile, as Gary Marcus points out, the current generation of AI suffers from two serious problems: Large Language Models are not particularly reliable (they have a tendency to forget their own abilities or to solve the same problem in entirely different ways) and not trustworthy (they have a tendency to make things up or “hallucinate”). [Ethan Mollick agrees](#) and compares ChatGPT to an incredibly fast and eager intern – so eager, in fact, that it has a tendency to tell outright lies. He could ask it to research something, but he would not be comfortable publishing the results without thoroughly checking them himself.

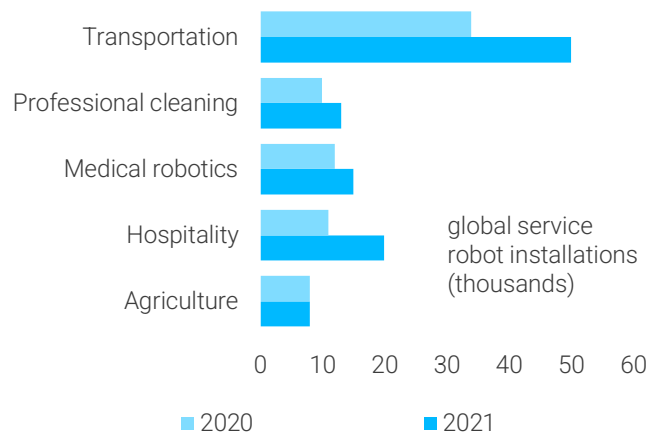
AI improves efficiency because we can delegate specific tasks to it, but the technology is most useful in areas where it can be supervised by a human expert (suggesting it will complement, not replace, that expert). Suddenly many professional workers could have at their disposal the type of staff that could provide research assistance, advice or other business services. But given their current limitations, we should expect an aggressive regulatory response. Would governments allow AI doctors with a tendency to hallucinate to give medical advice without strict supervision from a trained human expert? And, in the case of autonomous cars, for example, it surely would not be sufficient simply to match human levels of competency – we will demand near-perfection. One serious accident or human death could destabilize entire industries. The potential litigation risks for private companies would be enormous.

**Chart 26: The rise of the machine**



Source: International Federation of Robots

**Chart 27: Robots infiltrate the services sector**



Source: International Federation of Robots

**Intelligence or bull\*\*\*\*?**

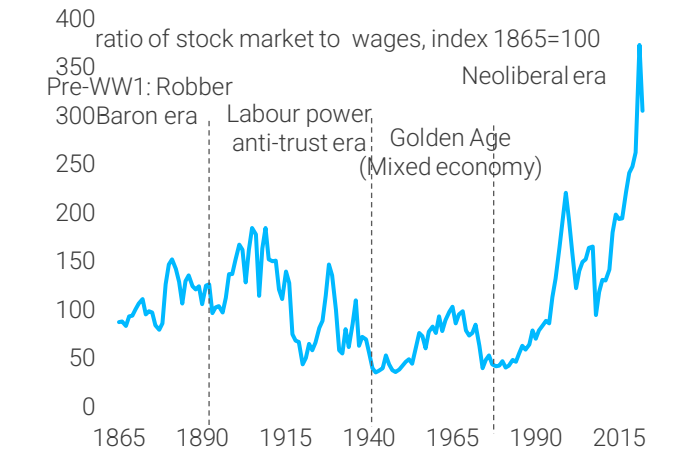
Rather than driving the cost of labour to zero, AI has – so far, at least – driven only the cost of bull\*\*\* to zero. [As Ezra Klein puts it](#), bull\*\*\*\*, in what he calls the classic philosophical sense, signifies content that has no real relationship to the truth. Today’s AI models are learning how to sound human and seem human, but they have no genuine understanding of what they are doing or saying because – unlike humans – they have no cognitive framework or mental map for understanding the world. Thus, the latest generation of AI is basically just a glorified copy and paste model, pastiching things humans have already written on the internet and imitating certain styles. And nobody knows whether the creators of AI will ever reach genuine human levels of comprehension – AGI – just by running these models on larger datasets. Ultimately, this is a question of whether human intelligence is simply energy flowing through neural networks, which is what would make it fully replicable using such machines. In the meantime, there are risks to a system that can drive the cost of bull\*\*\*\* to zero without a corresponding reduction in the cost of truthful or accurate information because it becomes impossible to distinguish between the two – especially on social media, where LLMs could [produce a torrent of misinformation](#).

**Focus on what we know**

Clearly there are massive uncertainties about where AI is ultimately headed. Even if the technology progresses in the way its enthusiasts imagine – which at times borders on mysticism – governments will be under acute pressure to regulate and control its use. There may also be hard limits on AI from the availability of data, not to forget its potential energy consumption. Training an LLM emits the equivalent of 284 tonnes of carbon dioxide (compared with 5 tonnes per year for humans), and this increases with database size and computational requirements. But in terms of assessing the overall impact of AI on the macro economy, we think it makes sense to

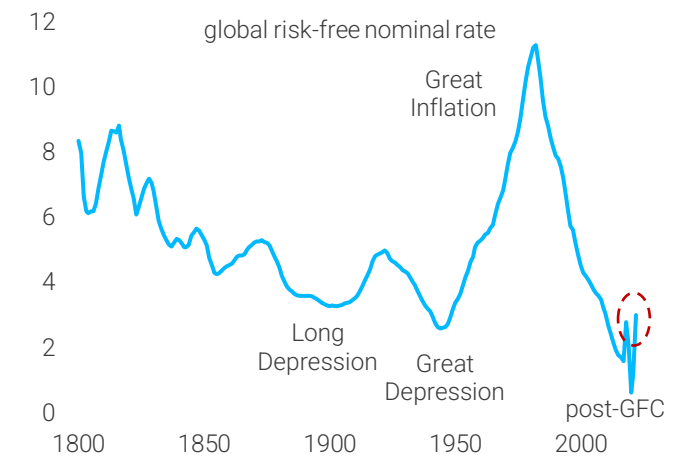
focus on the technologies that are available today rather than provide a more spurious analysis based on future innovations that may never materialize. And on this basis, we see AI mainly as a force that is likely to bring significant improvements in productivity rather than something that will destabilize society, cause mass unemployment or send wages plummeting to zero. This still makes it important, especially given some of the supply problems we face in the 2020s.

**Chart 28: Power drives the macro supercycle**



Source: The Bichler & Nitzan Archives

**Chart 29: Start of a 'real rate reversal'?**

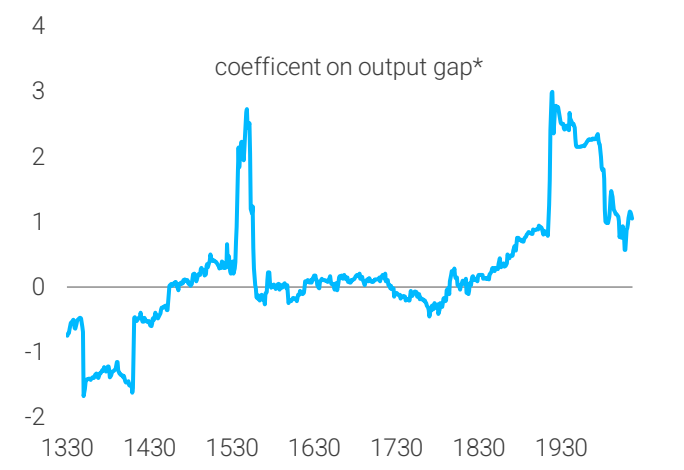


Source: Bank of England, TS Lombard

**AI and the supercycle**

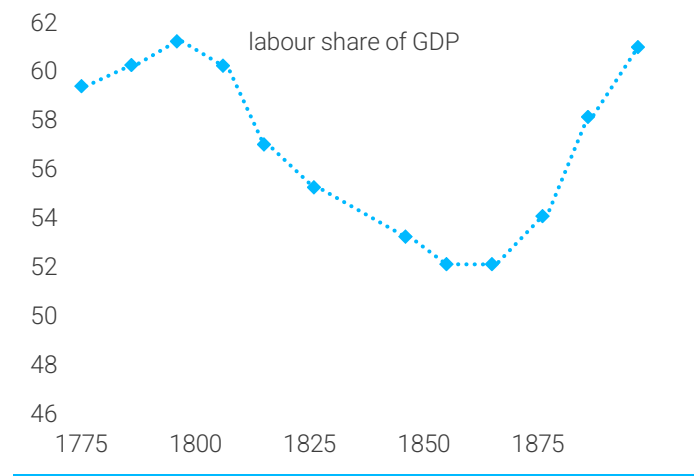
For the past two years there has been an intense debate about whether the world economy is facing secular inflation. We have sympathy [for a mild version of this thesis](#) based on the idea that important secular shifts – namely deglobalization, climate change, shifting geopolitics, activist fiscal policy and ageing demographics – are likely to deliver a “higher-pressure economy”. A big part of this thesis rests on the idea that there will be structural labour shortages, which will shift the balance of power in the economy, empowering workers for the first time since the 1980s. The Sam Altman hypothesis – that AI will ultimately swing the balance of power even further in capital’s favour – is obviously the clearest threat to our supercycle. But, based on what we know today, we see AI as more of a supercycle “dampener” than something that will halt or even reverse the supercycle. The fact is that rather than worrying about machines replacing workers, we are going to need rapid automation just to fill the large gaps that are likely to appear in the labour market over the next decade. AI can help in areas such supply-chain reconfiguration and

**Chart 30: Labour power – steeper Phillips curve**



Source: Bank of England, TS Lombard

**Chart 31: Will AI recreate the late 1800s?**

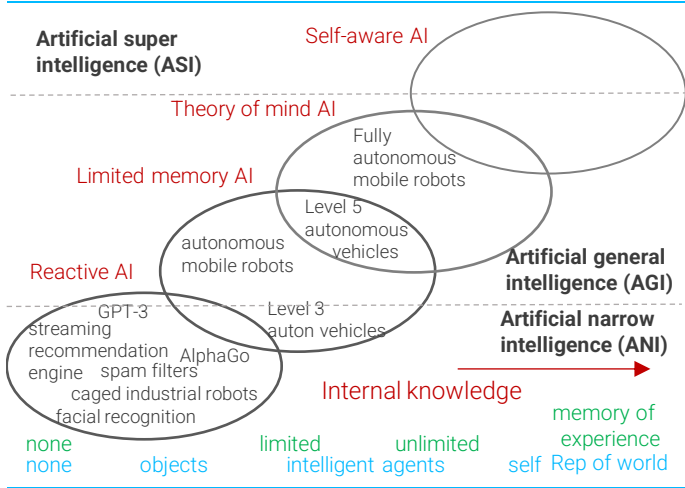


Source: Bank of England, TS Lombard

the reshoring of manufacturing. Eventually, it may even help us care for our elderly. And as the labour force stops growing, we are going to need a revival in productivity more than ever before.

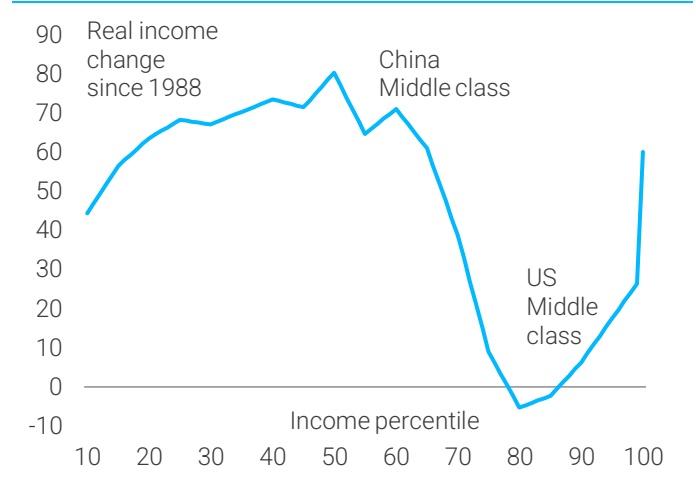
More generally, it is important to remember that the macro environment we are anticipating in the 2020s is one that is more conducive to technological diffusion and faster productivity. After all, there is no real puzzle to why productivity was so lacklustre in the 2010s. Technological diffusion slowed because, thanks to zero interest rates and an abundance of cheap labour, only the tech superstars had an incentive to invest in the latest technologies. But a world of shortages – of energy, commodities and labour – is exactly the type of environment that will force companies to work harder and generate more meaningful efficiency gains. AI is the tool that can provide this. It is a reason to be optimistic because it is the world's best opportunity for avoiding a nasty stagflationary slump. That does mean some jobs are at risk, particularly those professions where the ability to bull\*\*\* has been an advantage. Naturally, that does not apply to sellside economists or buy-side asset managers... So, our jobs are safe!

Chart 32: The stages of AI development



Source: Global Data report ("Artificial Intelligence", February 2023).

Chart 33: Globalization also drove inequality



Source: Branko Milanovic

Bottom line

There is a huge amount of hype about AI. The first public interactions with ChatGPT, a model that tries to replicate the neural networks of the human brain, have demonstrated the impressive capabilities of this technology, while industry insiders are predicting massive (exponential) improvements in its competence on an alarmingly short horizon. In terms of what we know so far, there is clear evidence that AI can deliver significant productivity improvements. Allocating cognitive tasks to these machines saves time and improves output. The pace of broad technological innovation is also likely to accelerate (though the magnitude of this acceleration is questionable). This is a big deal for a global economy that has been stuck in a long secular productivity funk. Naturally, there is also a great deal of anxiety about the wider socio-economic consequences of AI, particularly its implications for labour markets and the distribution of wealth. While history suggests fears of technological unemployment are usually misplaced, the wider social repercussions of AI will ultimately depend on the nature of these technologies themselves, which remains uncertain. But given its current weaknesses – particularly in terms of reliability and truthfulness – it is premature to think AI will “upend society” or “drive the cost of labour to zero”. This is hyperbole, verging on mysticism; and the ultimate vision of AGI may never be realized. More generally, while AI can help the world cope with the supply problems it faces in the 2020s; we are sceptical it will recreate the secular disinflationary trend of the past 40 years. Technology is a threat to our macro supercycle thesis, but it seems more likely to dampen the amplitude of the supercycle (preventing stagflation) than to permanently halt its progression.