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AI vs. Demographics:

Or might shrinking populations not be so bad if robots are taking jobs, anyway?

One of the key variables determining the strategic outlook is the degree to which artificial intelligence (AI) can deliver productivity gains. Past attempts to forecast productivity have been fraught with problems, so one needs to be humble in ascribing a significant increase in growth to AI. We review the latest attempt to quantify this.

Any boost from AI is not happening in a vacuum. How plausible is it that productivity gains from AI can offset the downward forces on growth from demographics and climate?

To what extent do large productivity gains from AI require mass job displacement? We suggest a preliminary model for this trade-off. This topic raises questions about the labor versus capital share and whether AI may have as large an impact on the distribution of gains as it does on total output.

Some have suggested that a shrinking workforce may not be a problem if AI is about to destroy jobs. However, this notion conflicts with the historical experience of automation. Moreover, the temporal and geographical distribution of these forces is very different.

The interaction of AI and demographics also has broader social implications: we see an evolution in the role of work and the extent to which it can give meaning. The more bullish AI forecasts imply a significant reduction in the workforce.

Our conclusions continue to support the case for US exceptionalism and an overweight to US equities, but not enough growth to shrink debt, hence we continue to believe the role of the dollar will decline.

Inigo Fraser Jenkins

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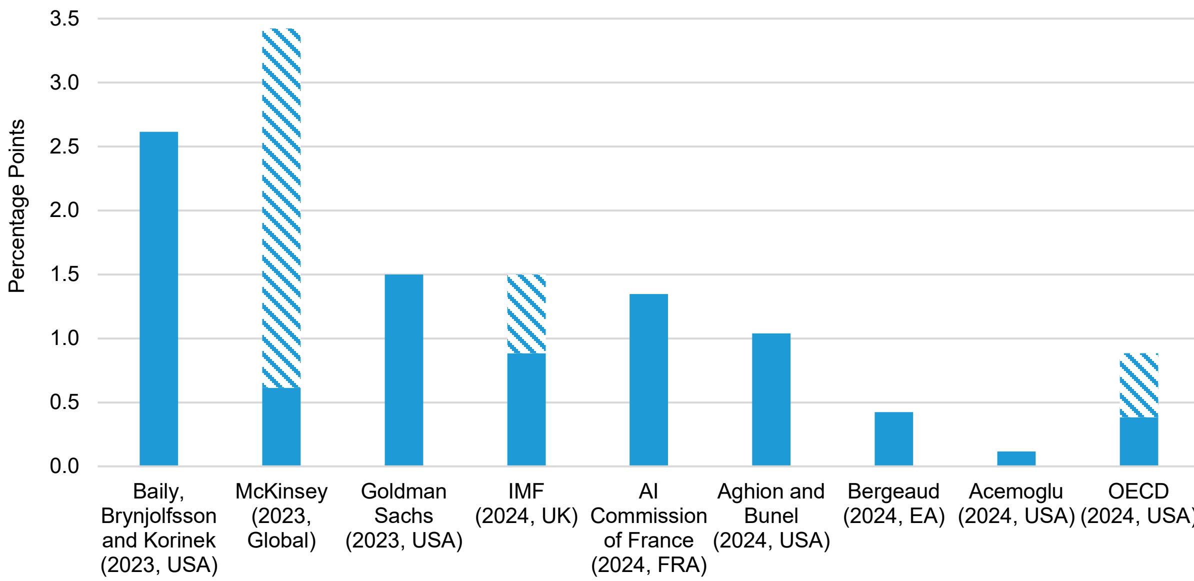
One of the key economic and social debates is what will the impact of AI be on productivity and the job market. The latest iteration of large language models (LLMs) available to the mass market are clearly remarkable in their scope and are rapidly changing how many people work, and also the hiring decisions that they make.

In this paper, we focus on some of the key macro questions that the rapid advance of LLMs prompts. Does a large step up in productivity imply mass joblessness? Or is AI similar to previous rounds of technological advance and automation that ended up creating as many jobs as were destroyed? Is the extra economic growth enough to offset other significant downward forces on growth from a smaller working-age population and an increase in global temperatures by more than two degrees? Also, is this extra growth enough to fend off the need for governments to resort to inflation to deal with the buildup of debt? With 35 to 40 million Americans set to retire over the next decade and less immigration along with an unknown number of jobs likely to be displaced by AI, what is the net impact on the balance of power between labor and capital? It is this set of questions that guides our discussion.

The pairing of AI with demographics may, at first sight, appear odd. One is fast-moving and the other the slowest of economic forces. However, we see them as intimately related in a number of ways. While the hope is that AI might raise productivity, a shrinkage of the working-age population acts to slow growth rates. One of the principal fears of AI is that it leads to mass joblessness, but what does that mean if the working-age population is shrinking anyway? In meetings with investors, some have suggested that a shrinking working-age population may be a good thing if AI is destroying jobs, but is such thinking putting hope over evidence? AI might also change the type of jobs available and the skills required—how does that interact with an aging workforce?

Before we get onto the topic of how the benefits of AI are distributed or what AI means for job enhancement versus job displacement, there is a huge disagreement about what the total productivity gain from AI is likely to be. Daron Acemoglu, winner of the 2024 Nobel prize for economics, has made a high-profile forecast that the annualized increase in US gross domestic product (GDP) from AI will be 1.2% over the next decade, or an increase of just 0.1% percentage points per annum (pppa). A raft of recent papers has come up with a range of higher estimates (*Display 1*), with most of them forecasting an annual increase in GDP growth rates of 1.0 pppa. Brynjolfsson notably forecasts more than 2.5 pppa.

DISPLAY 1: DIVERGENT VIEWS ABOUT THE AGGREGATE PRODUCTIVITY GAINS FROM AI
PREDICTED INCREASE IN ANNUAL LABOR PRODUCTIVITY GROWTH OVER A 10-YEAR HORIZON DUE TO AI



Current analysis does not guarantee future results.

Notes: When the source presents a range of estimates as the main result, the lower and upper bounds are indicated by striped areas. In cases where predictions are made for total factor productivity, predicted labor productivity gains are obtained by assuming a standard long-run multiplier of 1.5 regarding the adjustment of the capital stock (Acemoglu 2024, Aghion and Bunel 2024, Bergeaud 2024 and OECD). The estimates refer to the countries shown in brackets.

As of December 8, 2024

Source: https://cepr.org/voxeu/columns/miracle-or-myth-assessing-macroeconomic-productivity-gains-artificial-intelligence and AB

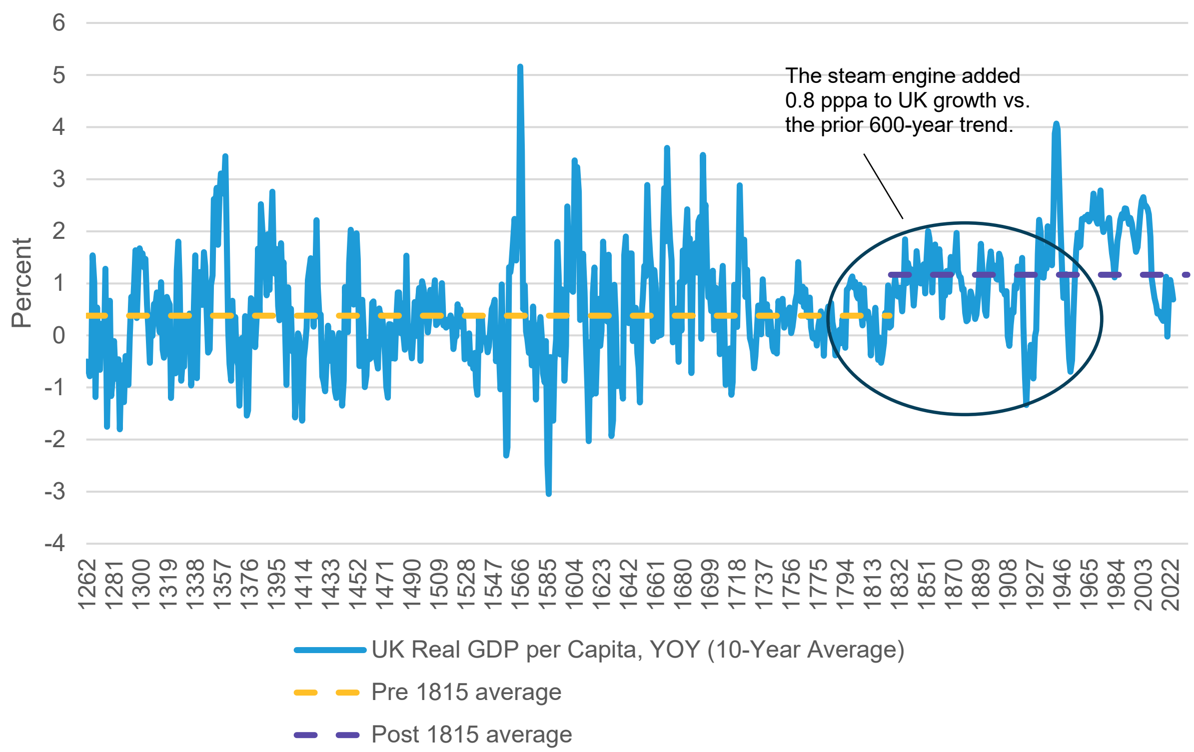
There are important methodological differences underlying the various estimates. Acemoglu's (2024) approach is calculated using a task-based aggregation framework adding up the micro-level task-based productivity gains aggregated up to broad occupation level in the economy. In this approach, the key driver of productivity growth is the automation of tasks currently performed by humans. Aghion and Bunel (2024) use the same framework but rely on different assumptions of AI adoption rates, exposure to AI by different occupation and potential cost savings, arriving at a more optimistic forecast for productivity gains.

In a report published by the Organization for Economic Cooperation and Development (OECD), Filippucci, F., P. Gal and M. Schief (2024) go on to study not only the degree of automation possible for the tasks within a given occupation and industry, but also the second-order effects and the issue of how broad AI adoption might be across the economy. If adoption is broad, then the input-output effects from the interconnectedness of sectors would have a beneficial impact. By contrast, if adoption is narrow, then this could significantly reduce productivity growth by raising costs without increasing growth (Baumol's growth disease). Finally, Baily, M., E. Brynjolfsson and A. Korinek (2023) also consider the micro-level productivity gains from AI adoption, but they crucially also assume that AI accelerates the rate of innovation through breakthroughs in research and development and improvements in new-technology adoption across the economy. The technological acceleration would compound over time, and thus lead to very substantial future productivity gains.

Evangelists for AI often equate it to the development of the steam engine—arguably the first technological development that raised per-capita growth since humans developed farming to improve on nomadic roaming. Looking at UK GDP over the past eight centuries (*Display 2*), the widespread adoption of the steam engine by 1800 marks a clear break in the series. For the six centuries prior to 1800, UK per-capita GDP growth was 0.39% annualized; after 1800, it has averaged 1.16%. Thus, very roughly, the Industrial Revolution and subsequent technological invention raised the trend per-capita growth rate by 0.8 pppa. Our view is that one would have to be very wary of any forecasts for AI that assume a sustained impact on growth greater than that of the steam engine. Nevertheless, an increase in trend per-capita growth of 0.8 pppa from today's level would be highly significant.

Some have advocated that the best way to view the aggregate economic impact of AI is indeed in the long-run context of previous rounds of automation. See, for example, Narayanan and Kapoor's recent paper exhorting one to view AI as a "normal technology."

DISPLAY 2: UK REAL GDP PER-CAPITA GROWTH SINCE 1262 (10-YEAR AVERAGE)



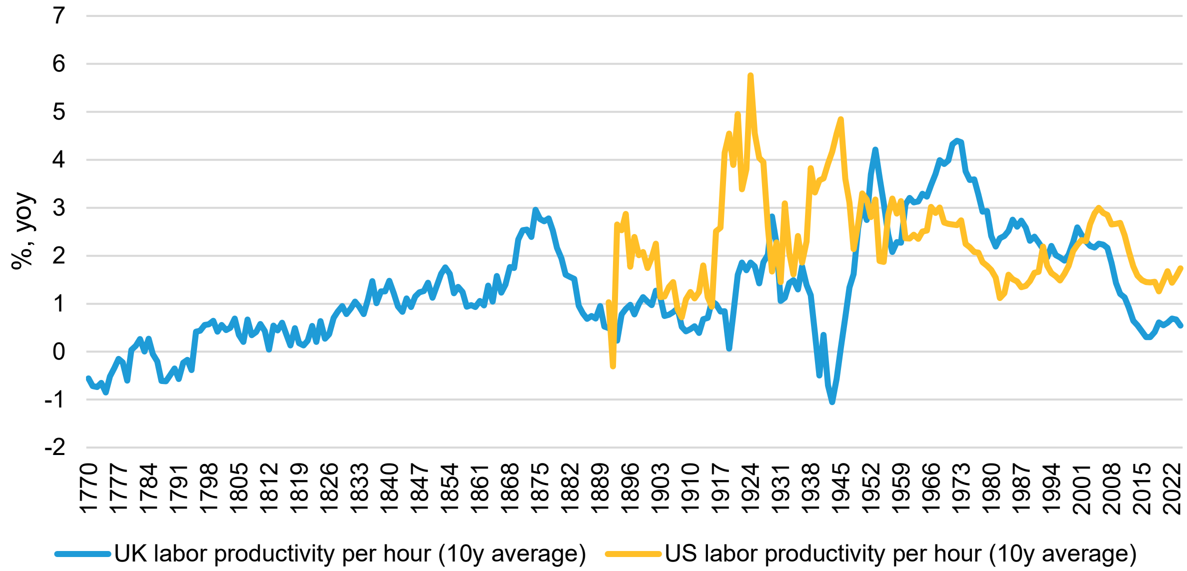
Current analysis does not guarantee future results.

As of September 4, 2025

Source: Maddison Project Database 2020, LSEG Data & Analytics and AB

The difference between these forecasts is also highly significant in the context of the evolution of productivity growth (*Display 3*). The peak-to-trough range of sustained shifts between high and low productivity periods is on the order of 1.5 pppa.

DISPLAY 3: LONG RUN LABOR-PRODUCTIVITY GROWTH TRENDS IN THE US AND UK



Current analysis does not guarantee future results.

Note: UK labor productivity data from 1770–1890 is from Bank of England, from 1890–1971 is from Bergeaud, A., Cette, G. and Lecat, R. (2016): "Productivity Trends in Advanced Countries between 1890 and 2012" and from 1971 from LSEG Data & Analytics. US labor productivity data from 1890–1971 is from Bergeaud, A., Cette, G. and Lecat, R. (2016): "Productivity Trends in Advanced Countries between 1890 and 2012" and from 1971 from LSEG Data & Analytics.

As of September 4, 2025

Source: Bergeaud, A., Cette, G. and Lecat, R. (2016): "Productivity Trends in Advanced Countries between 1890 and 2012", Bank of England, LSEG Data & Analytics

Potential growth from AI vs. constraints to growth

However, the positive growth from potential improvements in productivity needs to be set in the context of other mega forces that imply a downward pressure on growth. Some of these forces have a much higher degree of predictability (demographics) while others (climate) have a high degree of uncertainty. In *Display 4*, we try to scale the relative size of these mega forces in terms of the change that they imply for the rate of real growth in corporate earnings. The other forces that we consider are the change in the size of the working-age population, climate and aggregate shifts in labor versus capital share.

Although the core forecast for the size of the working-age population can be predicted with a high degree of accuracy, policy decisions can alter that: immigration policy and the assumed retirement age. Here, we assume the positive case is a continuation of immigration rates of recent years, which would leave the US working-age population slightly growing. A harsher policy of zero immigration would lead to a slight reduction in the working-age population, though, notably, even then the US would still have more favorable demographics than the rest of the developed world and China. For those others, demographic change is a net drain on growth, significantly so in the case of China.

A further constraint on growth is likely to be the climate prognosis. On this topic, the error bars around any forecasts are far wider than for demographics, but this nonetheless needs to be considered. Following our recent research on this topic,[1] we assume that it is highly unlikely that we meet net zero by 2050. As a result of this miss, we assume that the increase in temperature by 2050 exceeds two degrees. The implications of this for growth are widely debated. We have shown in previous research[2] that academic attempts to link a given increase in temperature to growth rates yield a broad scatter of points, i.e., a

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[1] Instability: Debt, Inflation and AI's Impact on Investing (see Chapter 2–Can the Energy Transition Happen? And if Not, What Does that Mean for Asset Allocation?)

[2] ibid

high level of heterogeneity in views. However, there is agreement that a temperature increase of two degrees would be negative for growth. A simple equal-weighted averaging of the 28 academic studies that we consider suggests that a two-degree increase in temperature is consistent with a 0.2 pppa reduction in growth rates. More recent estimates tend to be worse: taking the most recent such estimate, from the Network for Greening the Financial System suggests a starker result of a 0.6 pppa reduction in growth.

In the forecast for real corporate earnings, we also consider shifts in the profit share of GDP. In the US, there has been a large increase in this share in recent decades. One could take the view that there are social limits to how high this share could rise before it becomes unacceptable. However, if the decisions about what AI is developed and released is left in the hands of corporations, then this share could increase to even more unprecedented levels. Profit share has been more stable in the rest of the world, so we assume it would remain constant elsewhere.

Display 4 shows the required uplift in productivity from AI that would offset these other downward forces on growth. Under the most positive scenario for the US: (a) the immigration would continue at historical levels and the working-age population would continue to grow at 0.3% (versus the historical average of 0.9%); and (b) the rise in temperatures would have no impact on GDP. However, even under this rosy scenario, if we compare the change in average growth rates to the average since 1980, AI would still need to raise the rate of productivity growth by 0.5 pppa in order to reflect that, despite an increase in the working-age population, the growth rate of the work force would still be 0.6 pppa slower than it has been. However, the average of recent academic studies implies that AI could deliver growth above this amount.

Under the more negative path where a harsh immigration policy and climate impact on growth is in line with the latest studies, then the drag to GDP growth would be –0.9% + (–0.6%) + (–0.1%) = –1.6%. This does not include the effect of additional healthcare workers needed to support an increasingly larger population of very old people with increasing prevalence of dementia and other chronic illnesses, which would make the demographic headwind to growth even larger, nor the possible drags on growth from deglobalization. Thus, the productivity growth rate from AI would have to be much greater just to keep growth in line with recent experience. It would take the very techno-optimist view for AI to make up for lost growth in those circumstances, and a sustained boost to productivity from AI greater than that provided by the steam engine.

We will discuss potential regional differences for any productivity boost from AI in more detail later in this note. However, there is a case that the uplift to growth outside the US will be lower. Using OECD forecasts, the GDP-weighted expected productivity increase for Germany, Italy, the UK, France and Japan is likely to be on the order of 0.3 pppa, and yet the demographic headwinds are harsher.

We note that in *Display 4*, the changes in the size of the working-age population may look similar, but the absolute levels are very different, i.e. population growth in the US and decline elsewhere.

DISPLAY 4: CAN A PRODUCTIVITY BOOST FROM AI OFFSET OTHER LIKELY DOWNWARD FORCES ON GROWTH? NET *CHANGES* IN IMPETUS TO GROWTH FROM MACRO FORCES (PERCENTAGE POINTS PER ANNUM OVER 10 YEARS)

	REGION	POSITIVE OUTCOME	MIDDLE GROUND	NEGATIVE OUTCOME	NOTES
US					
Demographics	Immigration continues at recent pace	–0.6			The effect is compared to historical average growth
	Middle ground		–0.8		US likely to have stable working-age population…
	Harsh immigration policy			–0.9	… ie a decline in growth compared to recently
Climate	No impact on growth	0			Assuming zero impact (seems highly unlikely)
	Academic Research Average		–0.2		
	NGFS			–0.6	
Labor-capital share	Corporations take more share.	0.1			Recent policy and AI development as enablers
	Constant share		0		
	Labor claws back share			–0.1	Assumes there are social limits to capital share
AI	Required boost from AI	0.5	1	1.6	
	Techno-optimist	2.5			Assume that fast AI adoption yields scientific breakthroughs
	Average of recent academic studies		1		Assumes fast adoption
	Acemoglu (2024)			0.1	
Developed World ex US					
Demographics	Immigration continues at recent pace	–0.6			The effect is compared to historical average growth
	Middle ground		–0.8		Developed World working age population shrinks regardless of immigration policy
	Harsh immigration policy			–0.9	
Climate	Climate change has no impact on growth	0.0			Assuming zero impact (seems highly unlikely)
	Academic Research Average		–0.2		
	NGFS			–0.6	
Labor-capital share	Assume constant	0.0	0.0	0.0	Less tolerance of high capital share
AI	Required boost from AI	0.6	1.0	1.5	
	Techno-optimist	0.8			Apply same ratio as in US
	OECD average		0.3		GDP-weighted average of Germany, Italy, UK, France and Japan
	Slow adoption			0.0	Assume zero productivity uplift
Developed World					
Demographics	Immigration continues at recent pace	–0.7			
	Middle ground		–0.9		
	Harsh immigration policy			–1.0	
Climate	No impact on growth	0.0			Assuming zero impact (seems highly unlikely)
	Academic Research Average		–0.2		
	NGFS			–0.6	
Labor-capital share	Assume constant	0.0	0.0	0.0	
AI	Required boost from AI	0.7	1.1	1.6	Use GDP weighted share to apply globally
	Techno-optimist	1.2			-
	Average of recent studies		0.5		-
	Acemoglu (2024)			0.0	-

Current analysis does not guarantee future results.

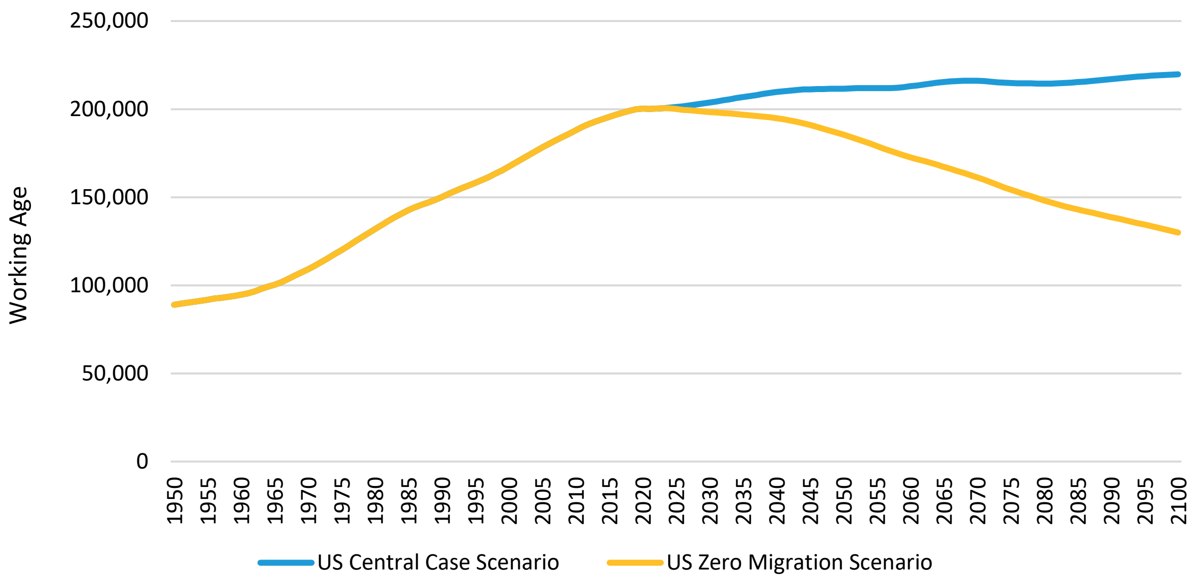
As of September 10, 2025

Source: Acemoglu, Daron (2024) *The Simple Macroeconomics of AI*, United Nations, NGFS, OECD, LSEG Data & Analytics and AB

We note that one important assumption of the central United Nations (UN) demographics projection is that it assumes migration rates in line with historical averages. However, the experience over the last five years in the US and a number of European countries shows that there can be dramatic shifts in migration numbers in a relatively short period of time. For example, in Spain during 2021 through 2023, there were three million immigrants born outside of the European Union (EU).[3] That equates to nearly 6% of the region's total population and nearly 10% of the working-age population. In the US, the 1.6 million new immigrants in 2023 marked the largest increase in more than 20 years.[4]

Recent US migrant flows are now running at levels significantly below the average of recent years, and the migration policy is expected to tighten further. The UN provides an alternative demographic forecast under a scenario where all migration flows drop to zero from 2025. *Display 5* shows a comparison of this scenario with the baseline projection. In this scenario, the US working-age population growth would drop to –0.16% pppa. While this is an extreme scenario that's unlikely to materialize, it does serve as a useful illustration of how a shift in policy can significantly affect the structural growth rate.

DISPLAY 5: US WORKING-AGE POPULATION GROWTH RATE UNDER DIFFERENT SCENARIOS



Current analysis does not guarantee future results.

As of September 4, 2025

Source: United Nations and AB

This exercise allows for a humbler approach to estimating the impact of a productivity gain from AI. Given the poor track record in the industry, and the economics profession more broadly, at making forecasts of productivity, it allows us to "reverse engineer" the problem and ask how large any aggregate productivity gain must be to offset the downward force on growth from these other mega forces. The implication from the above analysis is that for the total developed world, we should expect a decline of 1.1 pppa in the growth rate of real earnings and GDP over the next decade.

How plausible is such a compensating increase in growth due to AI? The amplitude of changes in productivity in the US between low- and high-productivity periods since World War II has been about the same order of magnitude (*Display 6*). Therefore, there is a case to be made that an AI productivity gain can indeed offset downward forces on growth. However, this case requires one to assume that the maximum historical range of productivity increases as a base case, a forecast that we do not think is prudent.

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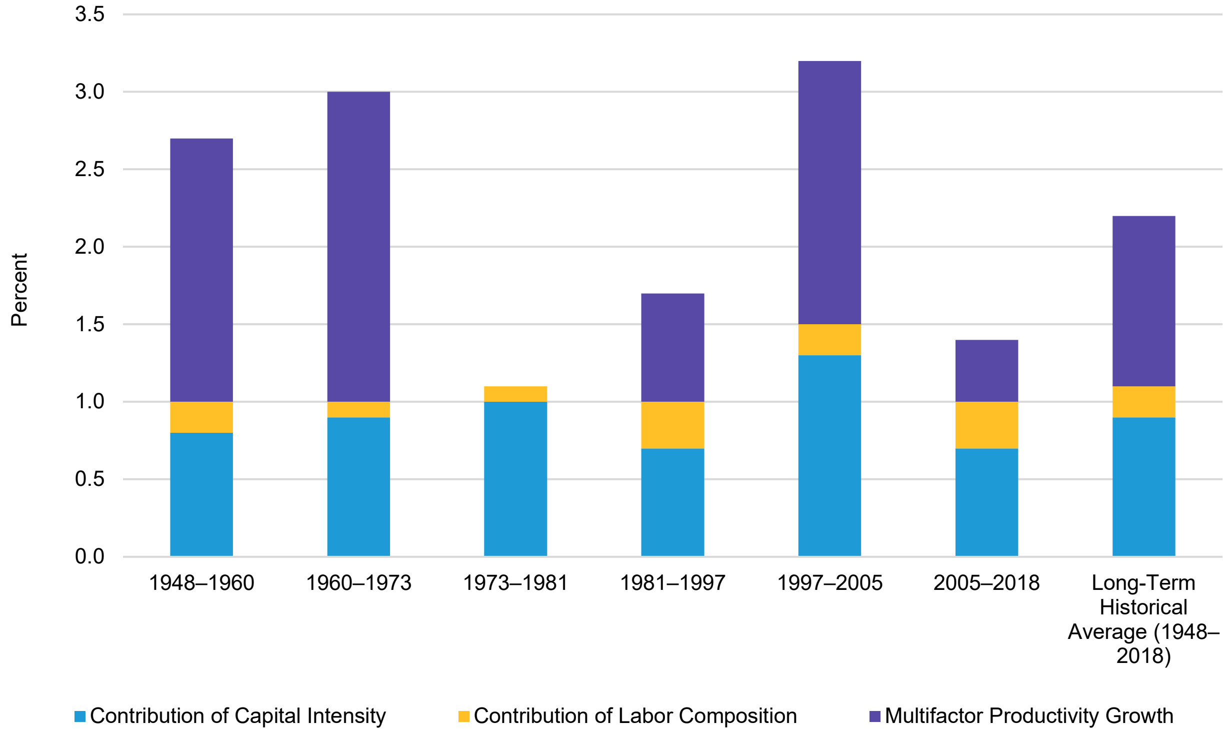
[3] https://www.nytimes.com/2025/08/11/opinion/spain-immigration-sanchez-amnesty.html

[4] https://www.pewresearch.org/short-reads/2024/09/27/u-s-immigrant-population-in-2023-saw-largest-increase-in-more-than-20-years/

DISPLAY 6: RANGE OF HISTORICAL PRODUCTVITY GROWTH



Current analysis does not guarantee future results.

As of June 30, 2023

Source: BLS, LSEG Data & Analytics and AB

The AI/demographics balance and how it interacts with other macro forces also has implications for the ongoing debate about US exceptionalism. We made the case recently[5] that exceptionalism for US growth (and hence equity returns) can be robustly defended, and this analysis agrees with that case. The range of outcomes across a range of AI and demographics assumptions (the two recurring big themes in this note) show a range that favors the US relative to other regions.

For the world ex US, a rapid AI adoption would offset a "good" (well, less bad) possible climate outcome and demographic change, perhaps pointing to no change in real growth rates. This is a very optimistic outcome, though, as it assumes that the same AI growth benefits that can be achieved in the US under a good scenario can also be achieved elsewhere. This is probably not quite right given: (a) smaller tech sectors in other countries; (b) a history of non-US firms not being as effective as their US peers in harnessing technology;[6] and (c) other major economies not having the same degree of security of energy supply.

While the balance of forces on growth show an advantage for the US from an equity-allocation perspective, the US also has a more rapidly deteriorating fiscal balance. Our view is that the appeal of the dollar as a reserve currency is waning,[7] so the topic of fiscal sustainability is becoming more pressing. This begs the question: What level of extra growth is needed to shrink US debt? Without a plausible mechanism to grow out of the debt, the challenge raises the risk of inflation or financial repression as more likely paths out.

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[5] The End of US Exceptionalism?

[6] Bloom, Nick, Raffaella Sadun and John van Reenen (2012). Americans Do IT Better: US Multinationals and the Productivity Miracle. American Economic Review 2012, 102(1): 167–201

[7] The Dollar: Half Awake in a Fake Empire?

The current level of federal US debt is 100% of GDP. Based on the Congressional Budget Office (CBO) baseline projection, it is expected to reach nearly 120% in the next decade, and would then continue to grow to 156% of GDP by 2050.[8] In this projection, total factor productivity (TFP) is assumed to grow at an average annual rate of 1% pppa in coming years, and the rate of population growth is expected to decline from an average of 0.4% a year from 2025 through 2035 to an average of 0.1% thereafter.

Could an AI-driven rise in productivity help to keep the growth of debt under control? In one of the recent alternative scenarios produced by the CBO,[9] if TFP in the nonfarm business sector achieved sustained growth of 0.5% per year above the baseline, the debt-to-GDP ratio would be stabilized at 113%. However, while the CBO projections include the effect of slowing population growth, they do not consider the potential for a negative impetus to growth from adverse climate change, nor the potential for an even harsher immigration policy to reduce the working-age population.

Thus, taking these into account, the change in the growth rate required to stabilize the growth of debt is likely to be higher. So, we conclude that the mid-range forecast for AI-led productivity gains is probably not sufficient to stabilize debt; estimates for productivity gains at the more bullish end of the range are required.

As we pointed out in recent research,[10] the level of debt/GDP does not represent a hard limit. It is exceptionally hard to forecast what level triggers concerns about debt sustainability to a degree that sovereign risk is priced in. Instead, the interest expense as a share of expenditure might represent a harder limit. On this basis, we think it is significant that the US servicing cost on debt exceeded the defense budget for the first time in 2024. A very generous assumption of AI productivity gain will be required to correct this.

Do significant productivity gains from AI entail mass job losses?

An intriguing question has come up in various guises during recent meetings with clients. This is the question of whether a shrinking working-age population may, contrary to first appearances, be a good thing. The premise is that perhaps AI is about to displace jobs on an unprecedented scale in which case fewer workers may be required. This line of reasoning goes on to suggest that a growing working-age population (which, in the developed world, is still the prospect only in the US) might create social problems if there is a large number of people looking for work but no longer able to find employment. Some investors have suggested to us that, given this potential outcome, maybe the prospect of shrinking working-age populations in Europe, Japan and China might not be a problem from an economic growth perspective (this point is distinct from the positive planetary impact of declining populations). We think there is likely an element of wishful thinking in this line of argument, but the interaction between a productivity improvement from AI and declining working-age populations is critical from an economic and social point of view, so it is worth analyzing.

This harks back to a theme as old as the Industrial Revolution. In *Two Memorials on behalf of the working classes* (styled as a presentation to the governments of Europe and America), Robert Owen suggested that that scientific advances would "soon render human labor of little avail in the creation of wealth." His vision was that increased automation could lessen the demand for adult and child labor, ending misery for large swaths of the population. Making sure that automation was subservient to labor was an important step, according to Owen, to ensure that the benefits of automation were evenly spread. He made this suggestion when writing in 1818, and thus prefigured by a century Keynes' famous suggestion in *Economic Possibilities for Our Grandchildren* that the working week could be cut to 15 hours because the economy was becoming more productive. Keynes made this suggestion in 1930, looking 100 years into the future. We are nearly at the point in time that Keynes was speculating about, but the prospect of a 15-hour week seems laughable. We discussed the reasons why this was a mistaken forecast in Instability: Debt, Inflation and AI's Impact on Investing (see Chapter 3, –Machines, Democracy, Capitalism and Feudalism: Five Books for a Different Age, and What It Means for Investing).

The idea of productivity gains obviating the need to work has been echoed more recently in the contemporary left accelerationist movement, which starts by rejecting the need to work and then calls for rapid automation to free up people's time, with this being achieved by a democratization of productive technologies.[11]

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8 For more details please see: https://www.cbo.gov/publication/61187

9 https://www.cbo.gov/publication/61429

10 The Dollar: Half Awake in a Fake Empire?

11 See Srnicek, Nick and Alex Williams (2015) Inventing the Future: Post capitalism and a World Without Work. Verso Books

One of the key reasons why Keynes' forecast was wrong and why Owen's utopian hope has yet to come to pass was that the gains of productivity improvements were not shared equally. Owens' own suggested solution to the problem of distributing these benefits was cooperatives and the commons, which is very far from the dominant model of late-stage capitalism. Indeed, the dominance of platform companies and increasing rent-seeking behavior of mega-caps point in the opposite direction. Corporations are clearly in the driving seat of AI development in capitalist societies, with the power to decide what kind of AI is developed and released.

The point Owen raised at the dawn of the Industrial Revolution is highly relevant today with the rise of AI. The dominant fear with AI is that the automation will destroy jobs in a semi-permanent way, especially for a range of white-collar jobs that supported a mass-affluent cohort in society. The counterargument to this is that the fears about mass job displacement might turn out to be empty fears as AI creates demand for new jobs. This, after all, is the net result of all the previous rounds of automation since the beginning of the Industrial Revolution.[12] Hotte et al conducted a systematic literature review of the impact of technology on jobs.[13] They concluded that the labor displacing effect of technology has, in the past, been more than offset by labor creation.

There has been no upward trend in structural unemployment rates over the long run. Why should one think that AI is different from previous breakthroughs in technology? Despite the lack of evidence of prior rounds of automation leading to structural unemployment, there is evidence that previous rounds of automation have led to a collapse in real wages in affected sectors.[14] We discuss, later in this paper, the broader aspect of this, focused less narrowly on economics.

We started this paper by noting that there is significant dispersion in forecasts of the impact of AI on productivity. Aside from trying to forecast this aggregate impact on growth, the question that interests us is: Does a very positive view on the productivity improvement of AI necessarily entail a view that jobs are displaced *en masse*? The extent to which productivity gains from AI rely on simply displacing labor versus making existing labor more productive is clearly a key question for the future of the labor market and the prognosis for individual sectors. It also matters in allowing us to get a sense of the social impact of AI and cast some light on the key economic question of the level of productivity gain that is plausible.

Any near-term improvement in productivity due to AI could come about from two possible channels: either from substituting labor and saving the cost of the roles that are displaced while keeping output constant, or by complementing labor by making a given role more productive. In time, there are also other channels: for example, AI could also create new roles.

In order to gauge the impact of these effects, one needs to distinguish between tasks and jobs. A given job requires a selection of different tasks to be completed. We won't go into detail on how to distinguish between tasks and jobs, as it feels like this has been discussed a lot in recent commentary on the economic consequences of AI. For people who are interested in doing so, we recommend reading Eloundou (2024) and Acemoglu (2024).

One of the most comprehensive attempts to measure the degree to which individual tasks are exposed to automation by LLMs is the work of Eloundou,[15] who uses both a ChatGPT and human-based approach to assess the degree to which LLMs can undertake the individual tasks that make up each occupation within the economy. Aggregating across all the tasks that are required for a particular occupation yields an exposure score for how much of that task could be performed by a LLM. Eloundou concludes that 80% of workers have an occupation with at least 10% of its tasks exposed to LLMs, while 19% of workers are in an occupation where over half of its tasks are exposed. A recent paper from the Brookings Institute suggests that 30% of workers could see at least 50% of their occupation' tasks disrupted (Kinder 2024).

Display 7 shows the percentage exposure to LLM automation tasks (using estimates by Eloundou), aggregated in major occupation groups. At the high end, more than 70% of computer and mathematical tasks as well as office and administrative tasks are exposed to LLM automation. At the low end, construction, building and maintenance, and protective services have exposure levels of only around 20%.

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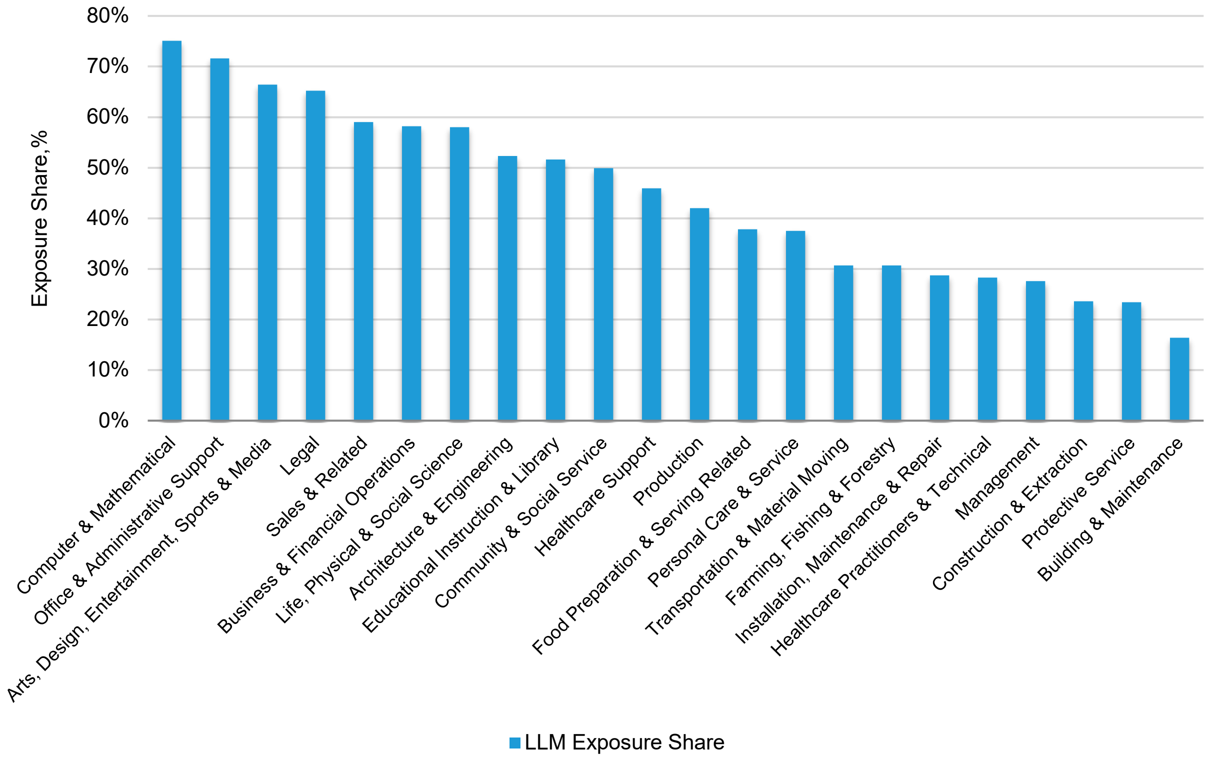
[12] See Autor, D, Why Are There Still So Many Jobs? The History and Future of Workplace Automation, Journal of Economic Perspective, 29, 3-30 (2015) https://doi.org/10.1257/jep.29.3.3

[13] Kerstin Hötte, Melline Somers, Angelos Theodorakopoulos, Technology on jobs: A systematic literature review: https://www.sciencedirect.com/science/article/pii/S0040162523004353

[14] See Cassidy (2025) and his discussion of weavers' wages 1800-1820.

[15] Eloundou, Tyna, Sam Manning, Pamela Mishkin and Daniel Rock (2024) GPTs are GPTs: Labor market impact potential of LLMs. Science: Vol 384, Issue 6702. June 2024

DISPLAY 7: LLM TASK EXPOSURE LEVELS FOR MAJOR OCCUPATION GROUPS



Current analysis does not guarantee future results.

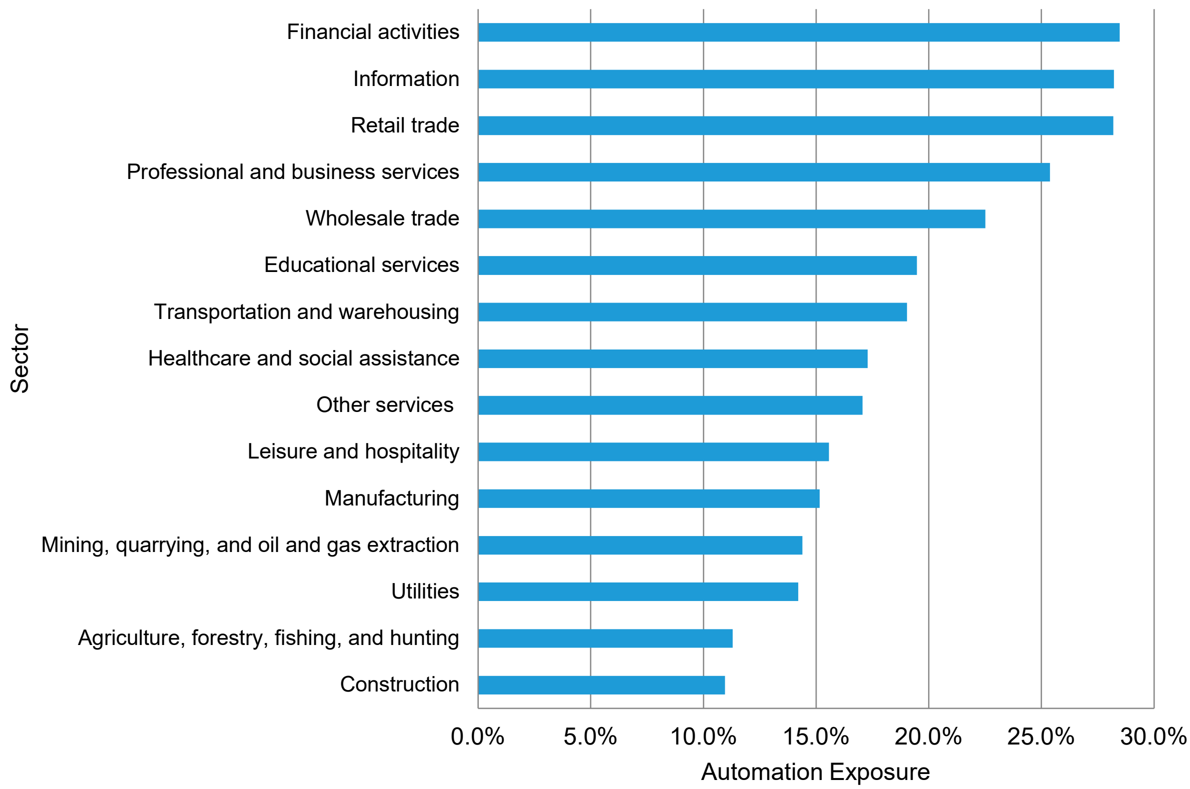
Note: Task exposure data is provided by OpenAI.

As of October10, 2024

Source: Brookings Institute and AB

Each industry in the economy consists of a range of individual occupations. By summing the AI exposure of individual occupations that make up a sector, we can arrive at an AI exposure for major sector in the economy (*Display 8*). On this basis, for broad sectors, financial services is the most exposed to AI, while construction and agriculture are least exposed. This seems reasonable.

DISPLAY 8: LLM AUTOMATION EXPOSURE BY SECTOR
WEIGHTED BY INDUSTRY VALUE-ADDED SHARE



Current analysis does not guarantee future results.

Note: Occupation level automation data provided by Acemoglu. Value Added data comes from BEA Input-Output tables
As of May 12, 2024
Source: Daron Acemoglu, BEA and AB

How much of a productivity gain can be expected for a given task that is exposed to AI? This question can be thought about as the product of the micro-level productivity gain in any specific task, the exposure of the task to AI and the adoption rate (we discuss the latter below).

Filippucci, F., P. Gal and M. Schief (2024) provide a detailed review of academic literature estimating the micro-level gains in productivity from AI adoption. The estimates for different tasks range from a 14% to 56% improvement, with varying degrees of precision and confidence intervals. However, most studies tend to converge to a 30% baseline effect on productivity over a 10-year horizon. In our analysis, we take a slightly more conservative approach and assume a 15% productivity gain.

But the literature on productivity gains from AI tends to skirt over the topic of how much of that gain comes from allowing workers to produce more versus displacing workers while maintaining the same output. This approach is understandable. After all, it is hard enough to forecast productivity alone, let alone untangle its component parts. Ideally, one would estimate the proportion of workers that is displaced and the cost, then also estimate the proportion of workers that remains and those workers' increase in productivity.

However, in practice it is very hard to come up with hard estimates for the proportion displaced versus remaining. In a sense, this difficulty goes to the heart of the current debate about how the productivity gains from AI evolve. This split may be something that is more amenable to a forecast in the next one to two years, as we have more live use cases of how AI is being adopted in corporations.

Just because a job is exposed to AI does not mean it will be eliminated. Indeed, there are jobs with mundane elements that are exposed to AI, and AI might enable a worker to become more productive (and for the work to become more interesting). See Autor[16] for a good discussion on this point, which highlights the crucial distinction that it is not jobs that will be displaced per se, but tasks, with each job involving many tasks. A similar argument is made by Freund and Mann (2025), who argue that the primary effect of AI on the labor market is through job transformation rather than an outright job loss. They note three main effects resulting from the automation of tasks. First, workers that are highly specialized in tasks that become automated are forced to leave their transformed jobs, suffer wage losses and are at risk of structural unemployment.

However, automation also creates two groups of winners. The first group is incumbent workers that remain in highly automation-exposed occupations, who are freed to spend more time on tasks that are less easily automated, such as customer-facing and coordination tasks in which they excel. The second group is workers who previously were discouraged from taking roles in automation-exposed sectors due to a lack of necessary skills in data processing and analysis, for example. These workers are now able to switch into these new jobs and potentially earn a wage premium. Thus, as the authors suggest, the automation-exposure measures of occupations are best viewed as potential for change, rather than an outright job displacement. However, AI-based automation will still have major labor-market effects by transforming how workers spend their time and through reallocation between different sectors of the economy.

One attempt to observe the split between displacement and complementing tasks was made by Handa et al,[17] which assessed millions of Claude conversations to determine what this LLM was used for. Over half of the instances were to complete coding or writing tasks. Importantly, though, 57% of Claude usage was to complement a human activity and 43% was used to automate and displace a human activity.

Because of these difficulties, our analysis assumes a range of scaling factors for converting the degree to which a job is exposed and the number of such jobs that may be eliminated. Any such approach will be open to counterarguments, but we feel that doing so is important to give us some form of quantitative basis to assess the interaction of productivity and job losses. We make this link fully expecting the need to revise these numbers in coming years, but it is a start, nonetheless.

The aggregation of AI exposure across industries outlined above suggests three broad tiers of AI exposure: less than 15%, 15–25% and greater that 25%. Because there is so much uncertainty about the degree to which efficiency gains are linked to a displacement of jobs, we then assume a range of scenarios for the extent to which exposure to AI translates into job displacement. In all cases, we assume that jobs with less than 15% exposure do not see job displacement. We then assume three tiers of displacement (low, medium and high) for other sectors. In the high case, we assume there is a 1:1 conversion between AI exposure and job displacement for the sectors where more than 25% of tasks are exposed to AI. In interpreting this, in the high-displacement scenario, all the productivity gain from AI in those sectors is driven by a lower need for employment.

DISPLAY 9: ASSUMED SCENARIOS OF LOW/MEDIUM/HIGH DISPLACEMENT FOR DIFFERENT AUTOMATION EXPOSURE BANDS

	Displacement Scenario		
Exposure Band	**Low Scenario**	**Medium Scenario**	**High Scenario**
<15%	0%	0%	0%
15–25%	10%	15%	20%
>25%	20%	25%	Proportional to exposure

Current analysis does not guarantee future results.

As of August 21, 2025

Source: AB

[16] Autor, David H and Neil Thompson: Expertise. NBER Working Paper 33941. June 2025

[17] Handa et al. *Which Economic Tasks are Performed with AI? Evidence from Millions of Claude Conversations*

We also need to make assumptions about adoption rates. Filippucci, F., P. Gal and M. Schief (2024) compare the early adoption of AI (since the launch of ChatGPT) and that of previous widespread general-purpose technologies such as electricity, computers and the internet. A decade after electricity's first introduction, the adoption rate of firms reached 20%. The trajectory of internet adoption was much quicker, reaching more than 40% in the first 10 years. So far, the adoption of AI appears to be happening at an even faster pace—it took only five days after launch for ChatGPT to reach one million users. It currently has more than 800 million active weekly users and is on track to reach one billion by the end of the year.[18] Thus, we expect AI adoption to be fast, especially in the US, and to surpass the pace of previous technological innovations. In our high-adoption case, we expect 60% adoption, and in our medium case 40% adoption, over the next decade. For simplicity, we are assuming the same adoption rates across sectors, though of course this could be adapted to sector-specific adoption.

We bring all this together in *Display 10* on the following page, which is an attempt to cast light on the trade-off between growth and job displacement. We show results for several different scenarios, representing fast or slow AI adoption by corporates and also high, medium and low linkages between AI exposure and job displacement. Generally speaking, a greater productivity improvement of AI implied a higher degree of job losses, but the scale of this link has a large range.

A caveat is that this methodology does not allow us to account for new roles that are potentially created. Previous rounds of automation have created new tasks. So, the net number of displaced jobs could well be overstated. However, the other theme in this note is demographics and the aging of populations in advanced economies and China. Seen in this light, there are questions around how appropriate any new roles might be for the individuals displaced and a risk of a drag on growth from a structural increase in unemployment.

The total displacement of labor is calculated as:

$$Total\ displacement\ = adoption\ rate * \sum_{industries} displacement\ rate\ based\ on\ AI\ exposure\ *\ share\ of\ employment$$

In order to link this to corporate earnings growth, we calculate total gain in productivity:

$$Gain\ in\ productvity\ = adoption\ rate * productivity\ gain\ factor * \sum_{industries} AI\ exposure\ *\ share\ of\ profit$$

The total productivity gain is then divided by the remaining number of workers, which accounts for the displacement calculated earlier. To avoid double-counting the part of a productivity gain that comes from a decline in the number of workers, we halve the productivity gain factor assumed in recent literature to account approximately for the labor versus capital share. Finally, both the productivity gain and displacement are compared to the 2023 baseline and annualized over 10 years.

In the medium-adoption and medium-displacement scenario, the annual gain in productivity is 1% (close to the OECD forecast for productivity growth and the mean of the studies considered earlier in this paper), resulting in 0.7% of displaced workforce per year. In the most extreme case of high adoption and high displacement, the annual productivity gain is 1.75% (at the bullish end of the AI forecasts considered earlier), implying that 1.4% of the workforce is displaced annually.

To put the displacement numbers in perspective, the Bureau of Labor Statistics puts the annual rate of labor turnover in the US private sector in the region of 3%–4%.[19] Thus, in the case of high adoption and high displacement, the annual labor churn would increase by nearly 50%, but the resulting gain in productivity would also be very high by historical standards.

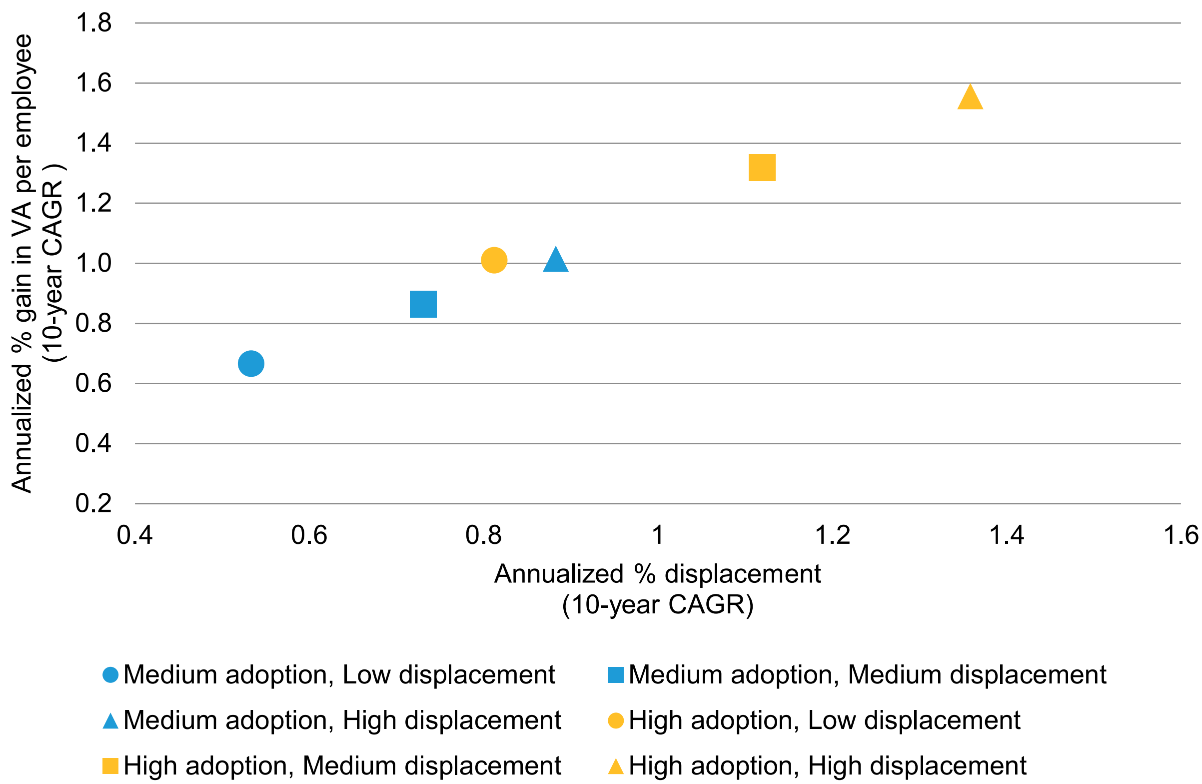
If the displaced workers are able to re-train and find employment in other industries relatively quickly, this shock to the labor market might be an acceptable trade-off for the productivity gains. However, a more negative interpretation would be to assume that the automated jobs are lost permanently and that most or all of the displaced workers become structurally unemployed. In the worst interpretation of this case, the structural unemployment rate would rise by more than 14% over a

[18] https://www.demandsage.com/chatgpt-statistics/

[19] https://www.bls.gov/news.release/jolts.t20.htm

decade in the high-adoption and high-displacement scenario. That would presumably require government intervention in the form of universal basic income or other social guarantees.

DISPLAY 10: A FIRST ATTEMPT AT THE TRADE-OFF BETWEEN PRODUCTIVITY GROWTH AND JOB DISPLACEMENT OVER A 10-YEAR HORIZON



Current analysis does not guarantee future results.

The high adoption rate assumes a 60% adoption rate in the first decade and the mid adoption rate assumes 40% adoption (in line with the growth of internet adoption).

As of September 3, 2025

Source: Acemoglu (2024), Bureau of Labor Statistics and AB

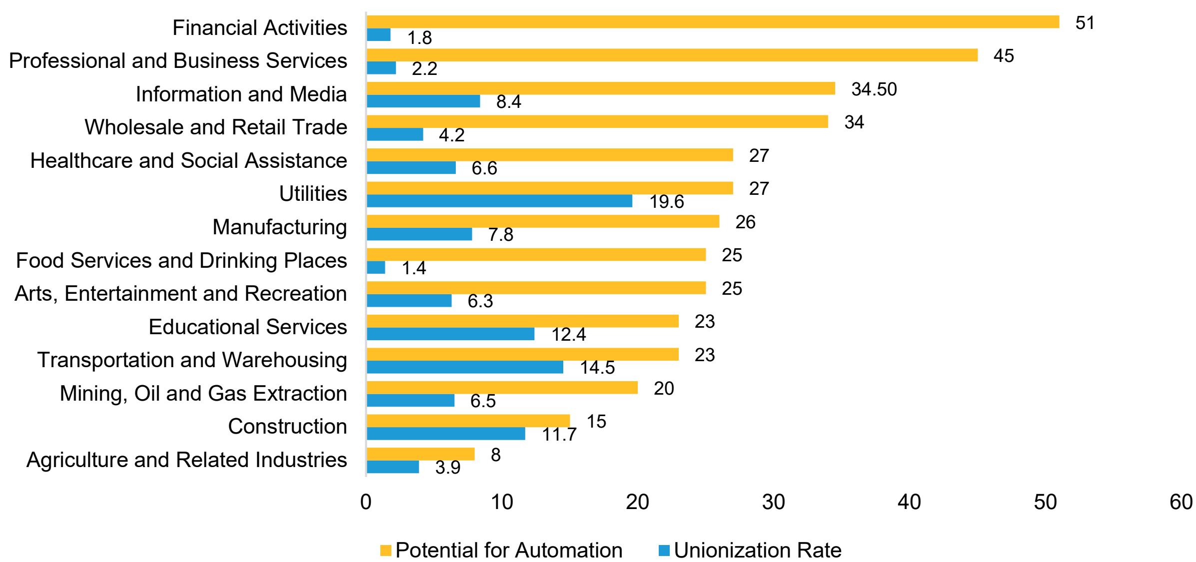
Questions of Distribution

It would be naïve in the extreme to assume that the impact on aggregate productivity was the only question of economic relevance with regard to AI. An analysis of AI inevitably raises questions of cross-sectional distributions of gains. AI could plausibly raise aggregate productivity while forcing a broader dispersion of outcomes across society, e.g., the potential for some people to become much more productive while others are simply displaced.

In *Power and Progress*, Acemoglu and Johnson make the case that the distribution of benefits from a technology is not determined by the technology itself, but rather by social and political decisions made when the technology emerges. There are two ways for a new technology to alter the wealth distribution. It could impact the wage distribution across society (the more uneven distribution of wages has been the new development in recent decades, as pointed out by Piketty). A technology can also affect the split between labor and capital, for example by automating jobs that previously were not automated.

The debate about how many jobs are put at risk by automation is as old as the Industrial Revolution, and so far there has been no trend increase in unemployment despite all the rounds of automation. Nevertheless, one aspect of AI sets it apart from the rounds of automation since World War II: non-unionized roles seem particularly exposed (*Display 11*). This has potentially significant implications for the bargaining power of labor versus capital, which we discuss below. Its impact on the cross-sectional distribution of wealth is complex, though, as many of the non-unionized jobs most at risk are higher-paid white-collar jobs. Such a shift could undo part of the growth in income inequality in recent years (though wealth inequality could well rise, as the owners of capital take a larger share of gains).

DISPLAY 11: NON-UNIONIZED LABOR IS MOST AT RISK FROM AI DISRUPTION



Current analysis does not guarantee future results.

As of June 29, 2023

Source: Accenture Research analysis of Occupational Information Network, Bureau of Labor Statistics, Department of Labor and AB

There have been examples of AI safeguards being put in place through collective bargaining.[20] But, for the most part, in the West it seems to be corporations that are firmly in the driving seat in determining which AI is developed and released. Thus, the direction of travel seems to be set for gains for capital at the expense of labor (and perhaps at the expense of governments too). If the path to greater automation does indeed imply mass job displacement, will states allow the scenario of mass joblessness? It will possibly become a key policy question with potential different answers, e.g., between the EU and US.

The other question of distribution is one of a cohort effect. Early evidence from Brynjolfsson (2025) shows that in sectors with a high exposure to AI, the relative impact on job creation is much more pronounced in the cohort under age 30 than for older workers. We would link this to our view that greater longevity, a higher prospect of inflation, a curtailment of defined benefit pension provision, and questions over the degree to which state support can be maintained given fiscal pressure all imply that this age cohort has to save at a faster rate than older groups. The prospect of high job displacement within this cohort is therefore doubly problematic.

Country differences: Furthering US exceptionalism

Most of this paper is concerned with sectoral differences in AI exposure, but there are country implications, too. Differences in the benefits of AI by country will depend on:

- Adoption rates (partly determined by policy and partly by corporate readiness)

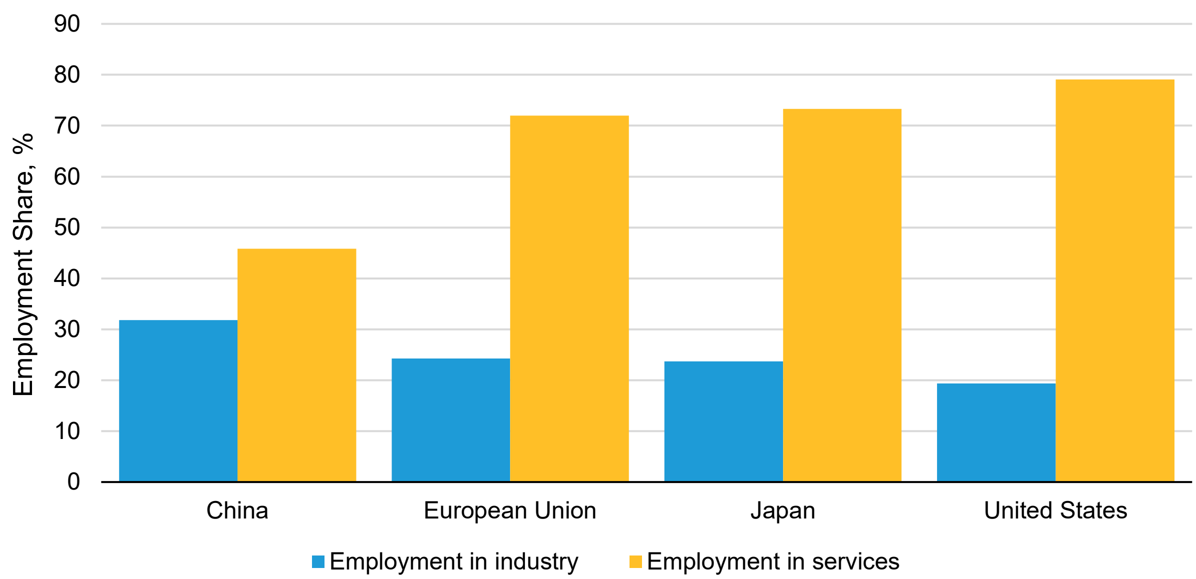
[20] https://www.brookings.edu/articles/hollywood-writerswent-on-strike-to-protect-their-livelihoods-from-generative-ai-their-remarkablevictory-matters-for-all-workers/

- The share of tasks that are exposed to AI, itself a function of the proportion of jobs in services versus manufacturing
- The ability to meet the power demand of AI and the security of that energy supply
- The degree to which productivity gains come from displacing workers versus increasing the productivity of individual workers. Some regions may be more averse to allowing mass job displacement.

Seen in this light, we think that there is a strong case to be made that the US will be a *relative* beneficiary among developed markets, no matter what the absolute level of productivity gain. Note that this is distinct from the question about whether current mega caps are the specific companies to benefit from AI or whether the beneficiaries are spread across the economy more broadly. On all aspects of readiness, from composition of the labor market to energy supply, there is a case that an effective role of AI further supports the case for US exceptionalism. There has been evidence that US firms have long been more effective at deploying IT,[21] and this could be a larger example of that advantage.

As we have discussed earlier, knowledge- and service-oriented sectors are most exposed to AI automation. In *Display 12*, we show the employment composition in major economies based on service and industry sectors. The US has the largest share of service employment that is close to 80%. Europe's share is considerably lower at around 70%, and in China service-oriented employment constitutes only 46% of the economy. This reinforces our view that US is likely to be the biggest beneficiary of AI adoption. On the other hand, if in the end most of the benefit comes from displacing workers, then this would put the US at a disadvantage on this basis. However, this is not our central assumption.

DISPLAY 12: SHARE OF EMPLOYMENT IN SERVICES VS. MANUFACTURING



Current analysis does not guarantee future results.

As of December 2023

Source: World Bank and AB

Filippucci, F. et al. (2025) estimated the potential impact on productivity of AI adoption across the G7 economies (*Display 13*). In the baseline scenario, they predict much lower benefits from AI for France, Italy and Japan. Meanwhile, the UK, Germany and Canada are expected to see productivity gains close to those in the US. This projected difference in part reflects observed adoption rates, but also owes to sectoral differences. The distinction also mirrors the gain in productivity from IT adoption from 1995–2005, which was larger in the US than in Europe.

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[21] Bloom, Nick, Raffaella Sadun and John van Reenen (2012). *Americans Do IT Better: US Multinationals and the Productivity Miracle*. American Economic Review 2012, 102(1): 167–201

DISPLAY 13: EXPECTED AGGREGATE PRODUCTIVITY GAINS FROM AI ACROSS G7 ECONOMIES

Scenario	Exposure given AI Capabilities*	AI Adoption Pace	AI's Predicted Contribution to Annual Labor Productivity Growth over the Next Decade (in p.p.)						
			US	UK	Germany	Canada	France	Italy	Japan
Slow Adoption	Baseline	Slow (as electricity)	0.41	0.39	0.34	0.35	0.26	0.19	0.16
Medium Adoption and Expanded AI Capabilities	Expanded	Medium (as computers & internet)	0.99	0.97	0.86	0.86	0.72	0.57	0.51
Rapid Adoption and Expanded AI Capabilities	Expanded	Rapid (as mobile phones)	1.28	1.27	1.16	1.13	1.05	0.89	0.82

Current analysis does not guarantee future results.

*Exposure to AI is measured as the weighted share of tasks in which AI can substantially reduce the time required for their completion. Baseline exposure refers to the median estimate of task-level exposure in Eloundou et al. (2024). High exposure refers to the upper-end estimate of task-level exposure in Eloundou et al. (2024), which makes a more optimistic assumption about the integration of AI via the development of complementary software. AI exposure can vary across countries due to differences in the occupational structure within sectors and the sectoral composition of the economy

As of June 2025

Source: Filippucci, F. et al. (2025) and AB

Moreover, London School of Economics public-policy professor Luis Garicano notes that European employment protection laws and other exit and entry barriers pose a significant headwind to any technological change. For example, he notes that German codetermination law forces large companies to run every major capital-expenditure and automation decision through a parity-supervisory board and cannot act without worker consent.[22] Similar lengthy and costly negotiations with affected workers are also deeply embedded into French law. Italian and Spanish labor law and Nordic collective-bargaining practices make large-scale headcount reductions extremely costly. Professor Garicano also notes that the US younger demographic is an advantage in terms of AI adoption, as the increasingly aging European society is less able to switch and adapt to new technologies.

The economics view of jobs and productivity is too narrow

We think the debate about productivity improvement versus job displacement is ultimately too narrow. We don't want to dismiss it, as it is one of the key economic debates of our age. However, this debate assumes that paid employment performs only a task of economic distribution. Work does much more than that, and for many people it gives meaning as well. Skidelsky offered a good discussion of this point in his book *The Machine Age.*[23] In the extreme case of mass joblessness, if that occurs, his work implies that a program of universal basic income wouldn't be sufficient to make up for what is lost.

The more positive view of this path would be to adopt the view of Srnick and the Left-Accelerationist movement that calls for automation explicitly to end the need for work. The difference between these two views lies less in the nature of AI as a technology and more in the social and political power structures that guide it. From a technological point of view, the advent of AI makes that socialist utopia seem not quite so far-fetched, perhaps. However, the entirely corporate-led approach to AI makes that end point seem highly unlikely.

There are broader epistemological implications, too. We think that AI is likely to change the role of explanation, and hence the path to meaning. AI models can be powerful as a route to making predictions, and as such can strongly outperform alternative approaches. Fundamentally, one of the ways that AI models can achieve this is to use an approach to pattern recognition that goes far beyond what humans are capable of. Indeed, it is part of the whole power of machine-learning approaches that they can use highly complex and non-linear approaches to categorizing data. But this power creates a potential gulf between

[22] Please see: https://www.siliconcontinent.com/p/can-ai-solve-europes-problems

[23] See our book review in Instability: Debt, Inflation and AI's Impact on Investing (Chapter 3–Machines, Democracy, Capitalism and Feudalism: Five Books for a Different Age, and What It Means for Investing)

prediction and explanation. The latter is usually taken to mean linking a specific case to a generalized example or accepted theory, but no such thing exists in the case of AI. It's not clear where this leaves explanation as a concept. The techno-optimists no doubt will tell us that the desire for explanation is too anthropocentric and should be abandoned, but we are not so sure.

If this notion seems too abstract, one can apply the evolution in how knowledge is attained to financial analysis. We think that AI will herald a profound change in model structure—that is to say, the structural underpinning of the approach used for financial analysis. A mini history of the financial model for a company can serve as an example. In theory, a revolution in financial analysis took place in the early 1990s with the transition from paper-based spreadsheets to Excel. However, we would argue that, from a model structure point of view, this was not, in fact, a profound change at all. Models became far easier to update, as there was no longer a need to rub out a number and pencil in a new one. As a result, models had more lines added to them, but the structure of the model didn't change in the progression from paper spreadsheets to digital ones.

Much later, it seemed plausible that the ubiquitous use of Python would bring about a change in model structure, and we argued as such a decade ago,[24] but it never really happened. The practical change was that the inputs to the model could change to become a function of mass web-scraping, with an order of magnitude increase in input data. However, the structure of models used to value companies did not really change—it was merely able to have a broader range of inputs. It turned out that despite the ability of technology to revolutionize the approach to modelling, a host of other factors slowed innovation (organizational inertia, lack of demand, and regulation in terms of formal dissemination requirements for sell-side analysts).

The ease of access to AI seems set to offer a new approach that could lead to the largest change in financial-model structure since paper spreadsheets. If this happens, it is entirely possible that predictive efficacy increases, but possibly not the ability to explain. Of course, many people may shrug their shoulders and be perfectly content with explanation-free prediction if it leads to outperformance. In finance that may be good enough most of the time, though not, we would argue, when the model goes wrong. When that happens, an explanation is actually needed.

Even more broadly, what does AI mean for human interaction? This, in turn, arguably has a huge indirect influence on any attempt to make a macro forecast over strategic horizons. Berardi argues that technology is changing the nature of personal interaction in what he calls the de-sexualization of desire.[25] The de-materialization of communicative exchange has been in progress for some time, driven for example by social media, and plausibly boosted by the pandemic. Once communication is dematerialized, AI has a significant ability to take a greater role in deciding what is actually said either via text prompts, by giving personal advice, or even by entirely populating the chat, as happens on dating platforms. This shift suggests that an even wider gulf within society beckons.

Conclusions and investment implications

The role of AI permeates many strategic discussions about the outlook for investing. For the purposes of making macro pronouncements, the key factors within this topic are the likely range of AI-driven productivity improvement and to what extent it results from a net displacement of labor versus an increase of the productivity of a unit of labor. In conjunction with this, we think that the discussion of AI in the investment industry is focused too much on what the absolute improvement in productivity might be, whereas we think a more relevant issue is the net effect of AI productivity improvements in conjunction with other contemporaneous forces such as a shrinking working-age population and the likelihood of worse climate outcomes that act to depress growth.

For the US, the more optimistic scenarios for AI productivity improvements are enough to significantly offset these other downward forces. However, our base case is that this extra growth is not likely to be sufficient to force a shrinkage in net debt/GDP.

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[24] Fraser Jenkins et al., Global Quantitative Strategy: Why company models need to move out of Excel and into Python, Bernstein Research, October 4, 2018

[25] Berardi, Franco. Hyper-Semiotization and De-Sexualization of Desire https://www.e-flux.com/journal/133/514287/hyper-semiotization-and-de-sexualization-of-desire-on-felix-guattari/

Thus, this conclusion reinforces our view that US exceptionalism still stands and that investors should strategically overweight the US within equity portfolios. However, concerns about fiscal sustainability remain, so our view is still that the dollar's status will continue to be eroded.

For the world beyond the US, even optimistic forecasts for AI productivity improvements seem unlikely to be sufficient to offset downward forces on growth, principally because the decline in working-age populations is more acute in Europe and Japan. It also seems likely that achieving the same degree of AI-led productivity uplift will be harder in those regions.

This brings us to the question of the interaction of declining populations and the possible displacement of labor, the linking of the AI and demographics themes that is at the heart of this paper. We do not think it is likely that these two huge changes will happen to balance out—there is no reason why they should. Moreover, forecasts for these issues have a very different status. Demographics is one of the few things in economics that can be forecast with a high degree of certainty. Productivity growth, by contrast, has been one of the things that has shown itself to be least tractable for forecasting purposes.

There seems to be a likely geographical mismatch in where these forces are strongest. Among capitalist economies, it seems likely that AI adoption will be fastest in the US, but the US working-age population is still likely to grow over the next decade (or under a very harsh immigration policy, potentially remain static or shrink slightly). In the EU and Japan, by contrast, AI adoption is likely to be slower, but the working age population is shrinking.

In China, the working-age population is set to decline at the shocking rate of 1% annualized from now until 2050, and AI adoption has the potential to be rapid in some areas. However, the office-based service-economy jobs where the change in automation potential is arguably the strongest constitute only 45% of the workforce, as opposed to 80% in the US. Thus, it is not clear what the scale of the aggregate economy-wide improvement in productivity from AI is likely to be at this stage.

Demographics and AI also overlap when it comes to considering the climate impact on growth. We take the view that a declining human population would be good from a planetary point of view, but also that the change is happening too slowly to have a material effect on the ability to curtail temperature increases to less than two degrees. The extra power demand of AI (with total data-center power demand forecast to be three times the total power consumption of Japan by 2030) will likely have a more immediate impact.

The more bullish forecasts for AI-led productivity gains do seem to imply a need for significant labor disruption. While past rounds of automation have not led to a structural increase in unemployment, it does seem that AI is different, not least in the way that non-unionized jobs are those most at risk. AI is the best hope, economically speaking, for a counterbalance to the significant downward forces on growth. However, at the same time, it implies a risk for social dislocation both via the jobs market and in the distribution of wealth. It does not seem likely that a shrinking workforce will naturally balance this in a harmonious way, not least because of the significant temporal and geographical differences in these forces.

We are still at an early stage of the adoption of AI, and evidence is simply not available to determine whether this is a "normal" technological development that, while disrupting jobs, creates new ones, or whether "this time its different," and jobs are displaced and not replaced. The mid-range of the latest productivity-growth forecasts are in the same range as the expected decline of growth due to other forces. While this is encouraging, it is not enough to talk about an absolute increase in growth rates or a route to grow out of government debt burdens. The higher range of productivity forecasts would indeed lead to a net increase in growth rates for the economy, but those high levels of productivity gains are probably the ones that are most detrimental for the future of jobs.

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