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Revisiting the Extent and Timing of AI Labor Displacement

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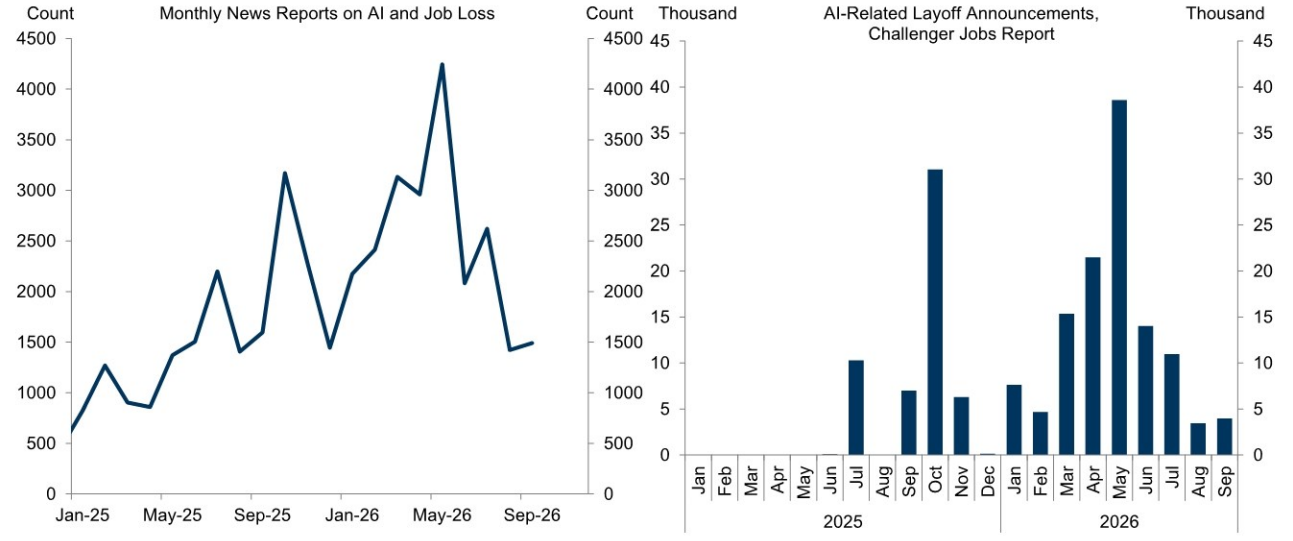
- Concerns of imminent AI-related job losses have cooled. But recent labor market data show some signs of AI-related hiring headwinds, and market participants are increasingly focused on whether AI labor cost savings will be sufficient to justify investment. In this *Global Economics Analyst*, we consider three empirical approaches to quantify how technology has historically displaced labor and the implications for AI labor disruption.
- First, aggregate shocks imply that each 1% increase in labor productivity due to technological innovation leads to a temporary 0.3-0.4pp peak boost to the unemployment rate that fades after two years. This rise is driven by a 0.5-0.6% cumulative increase in gross job losses and a smaller 0.2% drag on gross hiring.
- Second, industry-level productivity shocks imply very similar effects on unemployment and gross job gains and losses, but larger impacts on job losses in the late 1990s and following larger productivity shocks.
- Third, examining 25 occupations that were exposed to significant technological disruption (e.g., photo processors, proofreaders, file clerks) implies larger job losses (25% on average after five years) when technology makes labor redundant. We again find that headcount reductions were driven more by an increase in job separations than a decrease in hiring for these occupations.
- We draw three conclusions from our results. First, under our forecast for a 15% productivity increase from AI, around 9% of workers could be temporarily displaced during the AI transition. Second, employment reductions are on average more driven by job losses than slower hiring, suggesting that AI-related layoffs should provide a good real-time guide. Third, our industry-level and occupation-level analyses suggest upside risks to labor disruption.
- Narrow labor impacts so far reflect the fact that the AI transition is still in early stages, but also that the overall economy has remained resilient. All three of our empirical approaches imply that automation-related labor disruption is limited when the overall economy is healthy but accelerates during cyclical slowdowns. We therefore expect that the AI labor market transition will be manageable under our baseline forecast where activity remains healthy, but that AI-related labor disruptions could well amplify the broader business cycle.

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Revisiting the Extent and Timing of AI Labor Displacement

Concerns of imminent AI-related labor displacement have cooled in recent months after hitting a fever pitch this spring. As shown in Exhibit 1, the number of layoffs attributed to AI has pulled back sharply from its peak this spring. On a similar note, the number of news reports on AI-related job losses surged through May but has since fallen back to levels seen at the start of 2026.

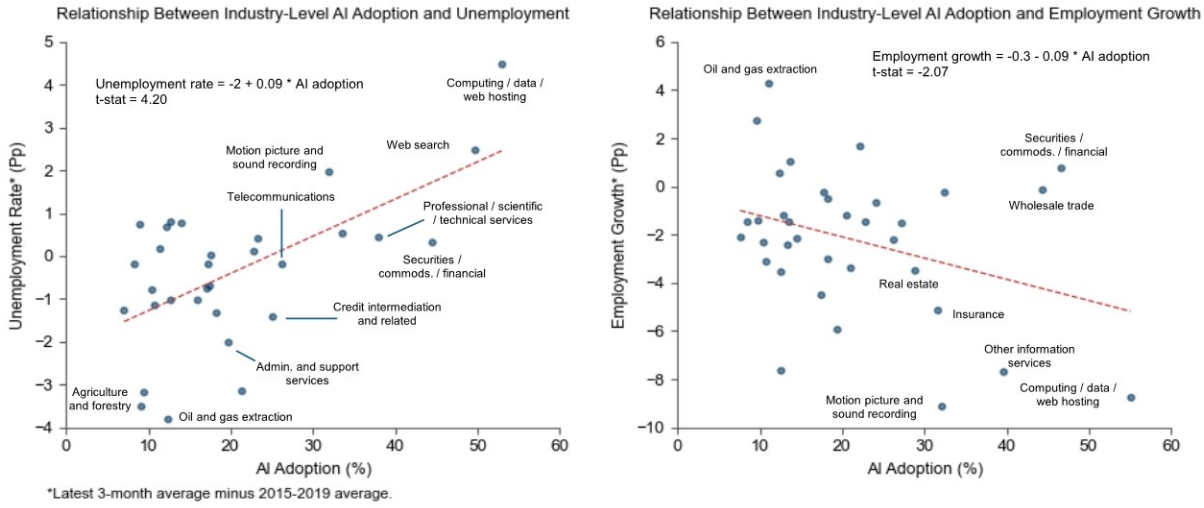
Exhibit 1: Concerns Around AI-Related Job Losses and Layoff Announcements Have Cooled in Recent Months...



Source: Bloomberg, Haver Analytics, Challenger, Goldman Sachs Global Investment Research

As we noted in our most recent AI adoption tracker, the labor market impacts from AI remain visible but narrow. Job growth in the most AI-exposed industries continues to underperform by around 10k relative to its long-run trend over the last 3 months (consistent with the underperformance over the last several years), although this has been roughly offset by increased hiring in AI-related construction jobs. Cross-sectional industry-level patterns are starting to show some signs of AI-related hiring headwinds from AI adoption, however. As shown in Exhibit 2, the correlation between adoption and unemployment has turned positive (and statistically significant) in the service sector, while the correlation between AI adoption and job growth has turned slightly negative (albeit not statistically significant). While these patterns suggest that a modest labor market headwind is emerging, the near-term headwinds remain smaller than feared earlier this year.

Exhibit 2: ... But the Most Recent US Services Industry Cross-Section Shows Some Signs of Labor Headwinds from AI Adoption



Source: US Bureau of Labor Statistics, IPUMS, Goldman Sachs Global Investment Research

As a result, the AI-labor market discussion has started to shift from whether large job losses are imminent to whether AI labor cost savings will be sufficient to justify rising AI investment. As noted by our US portfolio strategy team, current capex projections imply that AI users will need to spend roughly $1 trillion annually on AI applications for hyperscalers and application providers to generate the profits which markets appear to be discounting.

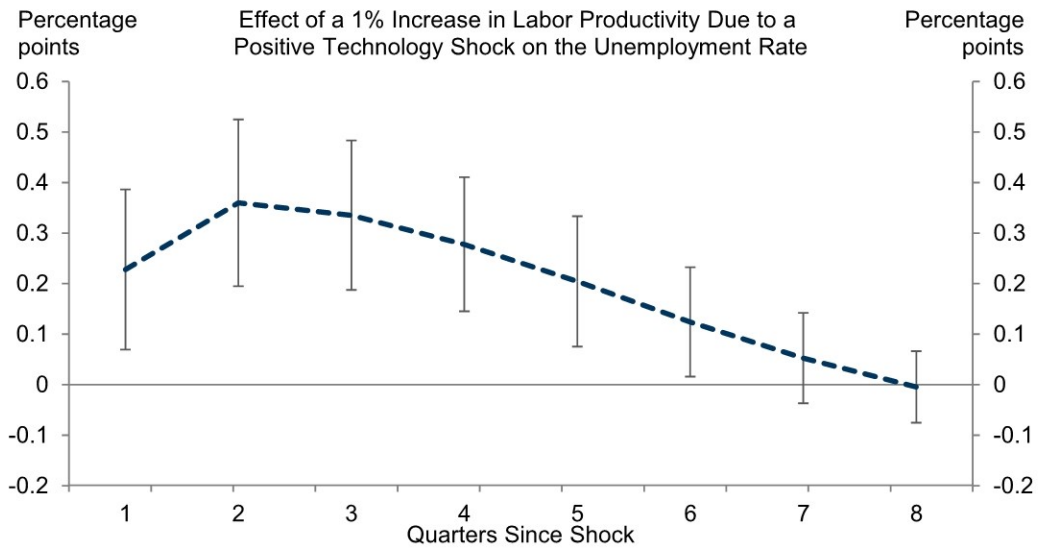
Against this backdrop, in this *Global Economics Analyst*, we use three different empirical approaches to revisit how technology has historically displaced labor. Our results continue to suggest that AI automation will deliver significant time and labor cost savings, but that the timing and extent of automation and labor disruption will likely track the overall economic cycle.

Historical Data Still Suggests Meaningful Headwinds to Job Growth

Aggregate Evidence

Our first approach builds upon our work from last year which considered how the impact of a technology-driven increase in productivity impacts the unemployment rate. Using technology shocks identified via long-run sign restrictions (based on an assumption that technology shocks lead to permanent increases in labor productivity while demand shocks do not), we estimated that each 1pp boost in labor productivity due to technological innovation leads to a temporary 0.3-0.4pp peak boost to the unemployment rate that fades to zero after two years.

Exhibit 3: Our Standing Estimates Based on Aggregate Data Imply a 1% Increase in Technology-Driven Productivity Causes a 0.3-0.4pp Uplift to the Unemployment Rate



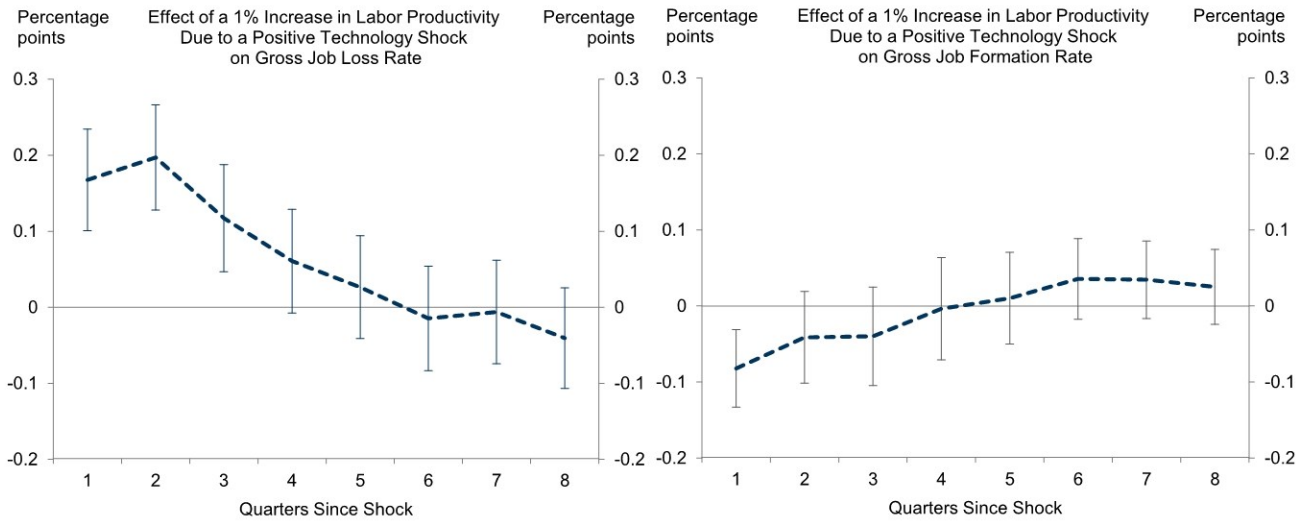
Source: Goldman Sachs Global Investment Research

The rise in the unemployment rate due to a technology shock understates the total amount of labor displacement, however. Some workers that are displaced may find jobs relatively quickly (thereby limiting the increase in the stock of unemployed workers), while others may decide to exit the labor force (thereby limiting the rise in the unemployment rate via a reduction in the denominator). A better measure of technology-related labor displacement is therefore the impact on gross job losses (and gains).

In Exhibit 4, we therefore extend our analysis to examine how a 1pp increase in productivity due to a positive technology shock (identified the same way as above) impacts gross job losses and gross job gains. We again estimate that each 1pp increase in productivity raises the unemployment rate by 0.3-0.4pp, with the increase driven by a 0.5-0.6pp cumulative increase in the gross job loss rate and a smaller 0.2pp drag on gross hiring. The sum of these cumulative flow estimates are higher than the peak increase in the unemployment rate, which confirms that labor force exits or quick rehiring limits the rise in unemployment, even when automation is occurring.

Under our baseline forecasts that AI-related efficiency gains will ultimately deliver a 15% gross boost to economy-wide productivity, these estimates imply that up to 9% of workers could be displaced during the AI transition, with an additional headwind from slower hiring weighing on overall employment by 3%.

Exhibit 4: The Rise in Unemployment Is Disproportionately Driven by an Increase in the Job Loss Rate



Source: Goldman Sachs Global Investment Research

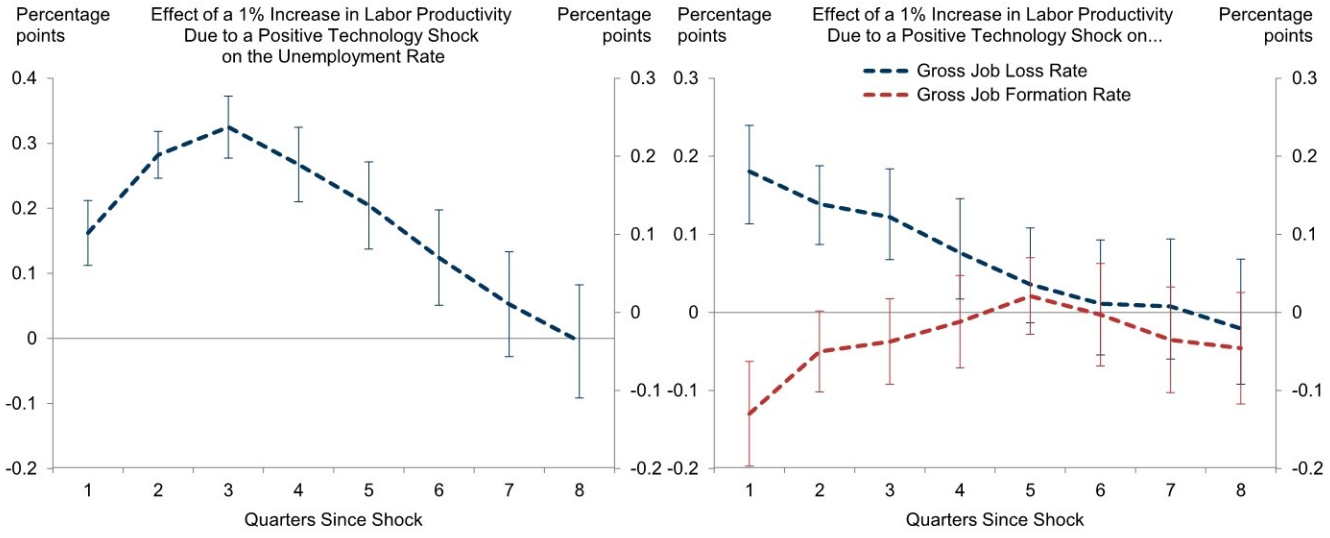
Industry-Level Evidence

Our second approach relies on industry-level productivity shocks. Using industry-level data from John Fernald's utilization-adjusted total factor productivity (TFP) shocks (regularly updated by the SF Fed[1]), in Exhibit 5 we examine how industry-level changes in utilization-adjusted TFP impact industry-level employment outcomes.

Our resulting estimates of the impact of productivity increases on unemployment and gross job gains and losses are very similar to the aggregate effects shown in Exhibit 3 and Exhibit 4, with the unemployment rate rising by 0.3-0.4pp reflecting a 0.6pp cumulative increase in the gross job loss rate and a 0.2pp decline in the gross job finding rate for each 1pp increase in labor productivity.

[1] We thank John Fernald for providing us with the underlying data on industry-level utilization-adjusted TFP.

Exhibit 5: Industry-Level TFP Shocks Imply a Similar Increase in the Unemployment Rate, as Well as a Similar Impact on Gross Job Losses and Job Finding

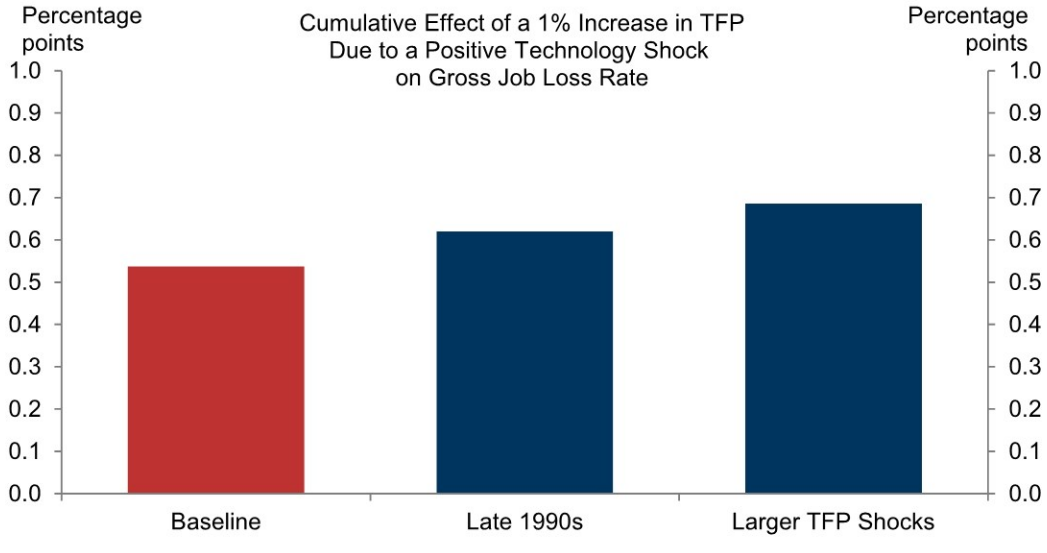


Source: Goldman Sachs Global Investment Research

That said, heterogeneous responses in our industry-level regressions—which we estimate by stratifying across the various dimensions shown in Exhibit 6—suggest several upside risks to our baseline displacement estimates.

First, we find that the effects of productivity gains on labor displacement were larger during the late-1990s/early-2000s productivity boom, the period most widely viewed as comparable to today. Second, displacement effects are larger following bigger productivity increases (defined based on TFP shocks above the 75th percentile of their historical distribution). Given that we anticipate the AI boost to productivity will be larger than most historical boosts from technology, this pattern suggests more scope for displacement during the AI transition.

Exhibit 6: Historically, Displacement Was Larger During the Late 1990s and Following Larger TFP Shocks



Source: Census Bureau, Bureau of Economic Analysis, Haver Analytics

Occupation-Level Evidence

For our third approach, we consider labor market outcomes for 25 occupations that were exposed to significant technological disruption (e.g., photo processing, proofreaders, file clerks), which we identify (both in terms of occupations and timing) based on historical anecdotes and our internal large language models. Given that these occupations were selected as cases where technology had the largest impact on labor demand, the observed headcount reductions are likely upper bounds for technology-driven labor displacement from AI. That said, the observed dynamics may be informative for how AI will impact labor market dynamics for workers in the most exposed occupations.

Exhibit 7 shows headcount reductions in these occupations in the five years after employment started to decline in response to a technological innovation. We find that among these occupations, employment fell by around 25% on average, suggesting that very large job losses are possible when technology makes labor redundant.

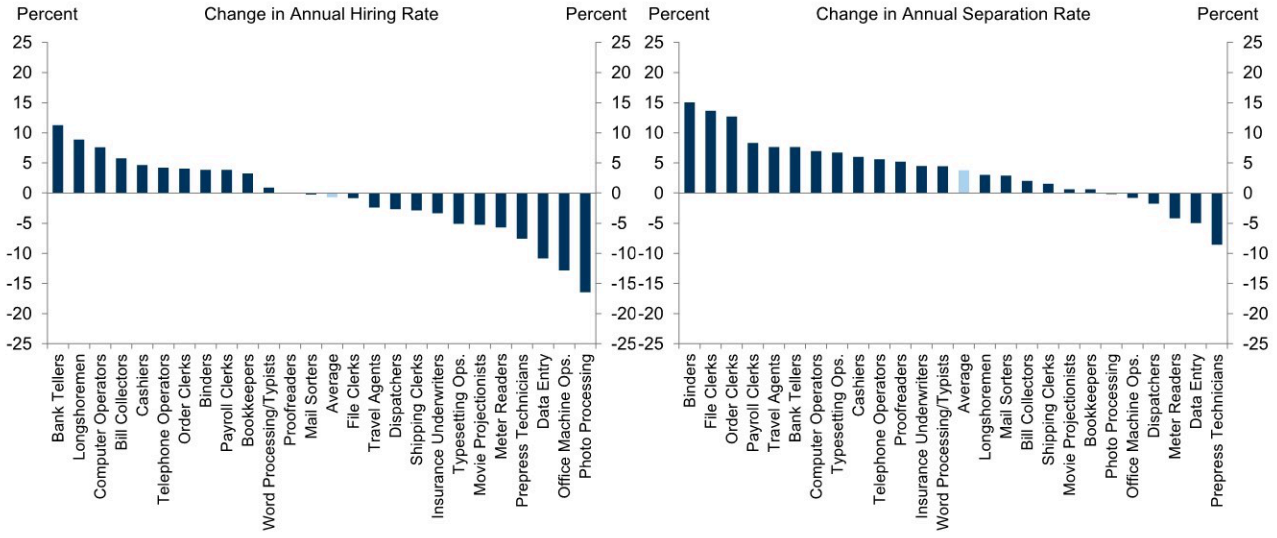
Exhibit 7: Our Sample of Automated Occupations Shows Large Employment Declines Over the 5 Years Following Technology Disruptions



Source: Goldman Sachs Global Investment Research

More importantly, we again find that the gross hiring rates declined and gross job separations increased following technological disruptions, but that the labor adjustment was again more skewed toward an increase in separations. Using microdata from the Current Population Survey to track individual hiring and separations from these occupations, Exhibit 8 shows that in 13/25 cases the annual gross hiring rate declined, with a -0.7pp reduction on average, while in 19/25 cases the annual gross separation rate increased, with a 3.8pp increase on average.

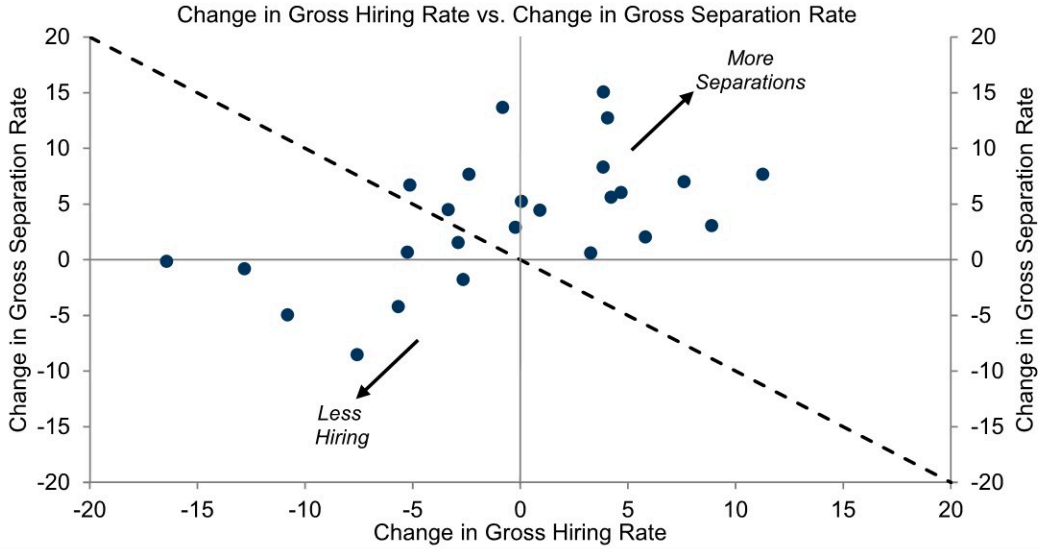
Exhibit 8: Gross Hiring Rates Declined and Gross Job Separations Increased Following Technological Disruptions, but Labor Force Adjustments Skewed Toward More Separations



Source: Goldman Sachs Global Investment Research

Exhibit 9 considers the change in occupational hiring and separation rates jointly. For 17/25 occupations considered, the point falls above the negative 45-degree line. While this scatter plot again suggests that both margins of adjustment are active, the skew suggests that large headcount reductions in these technology-disrupted occupations was on average more driven by increases in separations than slowdowns in hiring.

Exhibit 9: An Increase in Separations Was on Average More of a Driver of Headcount Reductions Than a Slowdown in Hiring in Our Sample of Technology-Disrupted Occupations



Source: Goldman Sachs Global Investment Research

We draw three conclusions from our analysis. First, under our baseline forecast for a 15% productivity increase in the US and other DMs, our estimates suggest that up to 9% of workers could be displaced from current roles during the AI transition, with an additional headwind from slower hiring weighing on overall employment by 3%. Second, all three approaches suggest that employment reductions are more likely to be driven by

actual job losses than a slowdown in hiring, which suggests that tracking AI-related layoffs should provide a good real-time guide for AI-related job disruption. Third, the heterogeneity documented in Exhibit 6 and the large job losses for occupations that were most significantly affected by new technologies shown in Exhibit 7 suggest upside risks to disruption.

Combined, these patterns point to a significant amount of labor market disruption over the AI transition if productivity gains are realized and job displacement follows historical patterns.

Automation Is Cyclical

Given that our estimates point to a significant amount of technology-related job losses to come, why has the impact been limited so far?

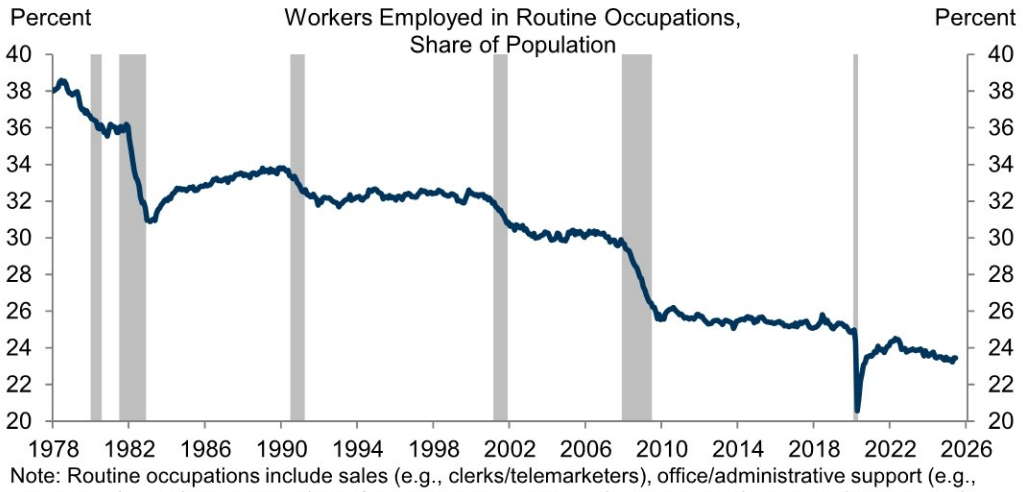
The most obvious reason is that the US economy is still in the early stages of the AI transition, with only 23% of US establishments having incorporated AI into some regular workflows. Furthermore, this extensive margin adoption rate overstates the amount of automation that is taking place today since most establishments have not yet incorporated AI into all work processes where it could ultimately be deployed. So, while there is some preliminary evidence that productivity growth has improved in industries where adoption is further along, most of the AI-enabled productivity gains remain in the future.

A second reason for the limited labor impact so far is that historically automation-related labor disruption is quite cyclical, with companies tending to automate work and shed labor costs when the economy starts to slow. Indeed, each of our three empirical approaches imply more limited disruption when productivity gains arrive in a healthy economy but more disruption when productivity gains align with a cyclical slowdown.

First (as we've noted previously), aggregate data imply that historically most of the labor headwinds from routine job automation are concentrated in economic recessions. Using the definition of routine occupations in Jaimovich and Siu 2018, Exhibit 10 shows that the share of routine occupations (as percent of the population) has remained stable during expansions but declined sharply during downturns.



Exhibit 10: Prior Automation Cycles Suggest That Aggregate Automation Speeds Up in Recessions

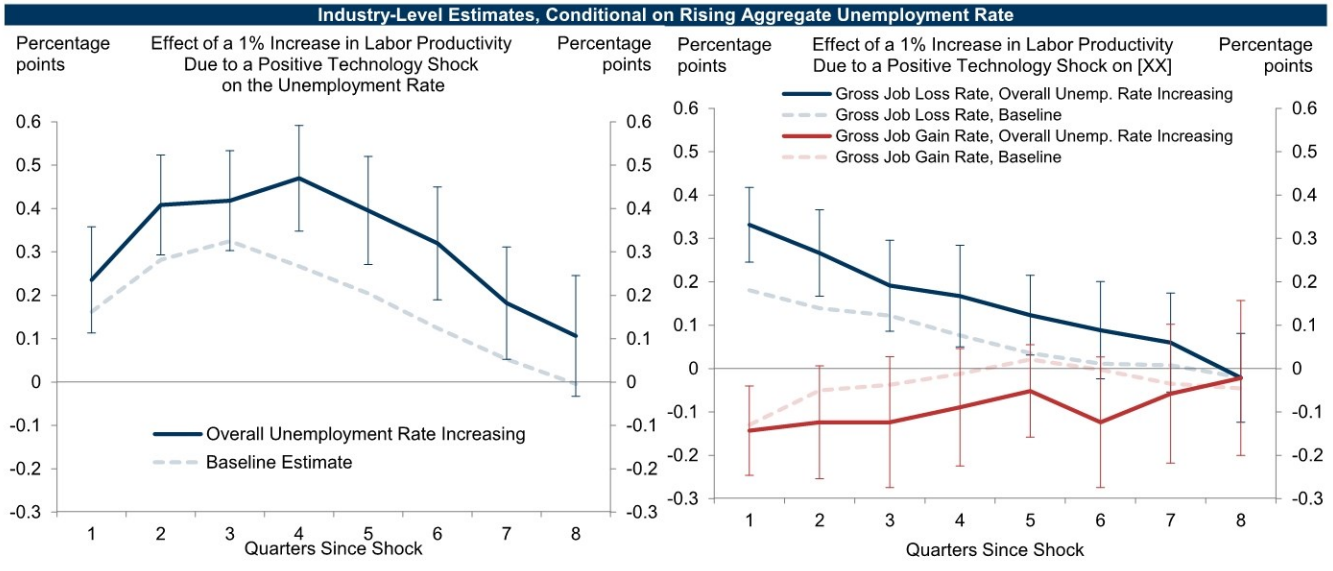


Note: Routine occupations include sales (e.g., clerks/telemarketers), office/administrative support (e.g., secretaries/typists), production (e.g., factory machine operators), construction/extraction (e.g., miners), and installation/maintenance/repair (e.g., mechanics).

Source: Jaimovich Siu 2018, Goldman Sachs Global Investment Research

Second, after stratifying our industry-level estimates depending on whether the economy-wide unemployment rate is rising, we again find that industry-level labor market displacement is more severe when the economic backdrop is less favorable. The left chart of Exhibit 11 shows that the effect of a 1pp increase in technology-driven productivity on unemployment rates is 0.1-0.2pp larger during periods of rising overall unemployment (solid line) than our baseline estimates (dotted line). The right chart shows that the impact of productivity gains on industry-level gross job loss and gross job finding rates—which will not necessarily follow the broader economy-wide trends—is notably larger when the overall unemployment rate is rising.

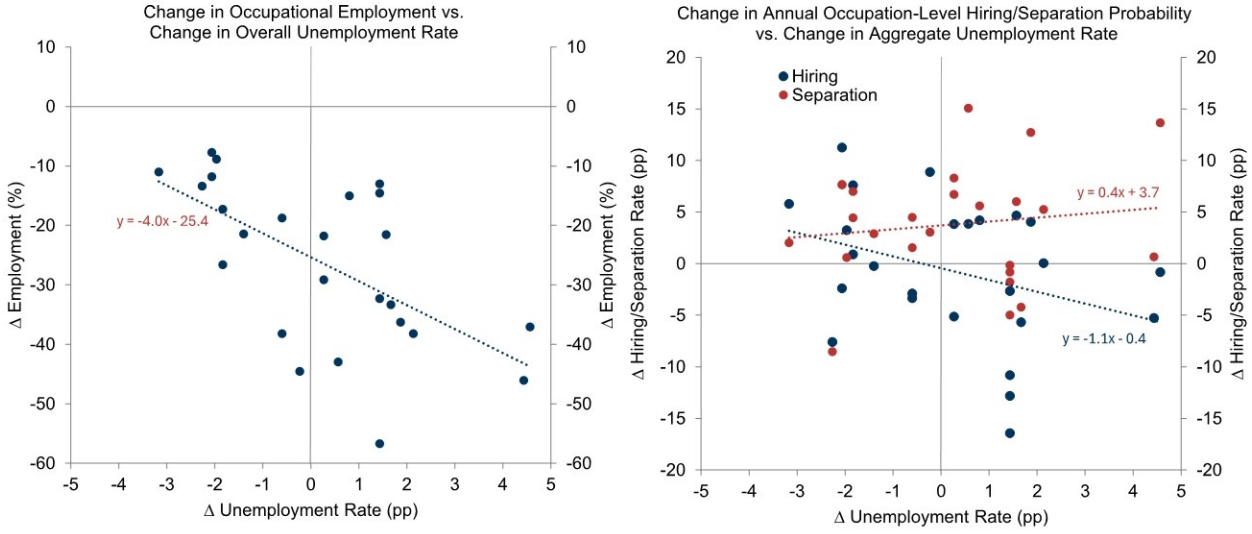
Exhibit 11: Industry-Level Estimates Suggest that Impacts on Unemployment, Gross Job Finding, and Gross Job Loss Rates Are Larger When the Overall Labor Market Is Weakening



Source: Goldman Sachs Global Investment Research

Third, our occupation-level analysis shows that occupation-level employment declines following the most significant technology disruptions are amplified by negative aggregate shocks. The left chart of Exhibit 12 plots changes in occupation-level employment for technology-disrupted jobs against the overall change in the overall unemployment rate, both measured over the five years post-technology shock. The significant negative correlation implies that occupation-level employment declines by an incremental 4% for each 1pp incremental increase in the overall unemployment rate. The right chart shows that occupation-level separation rates increase and that occupation-level job hiring rates decline when the labor market is weaker.

Exhibit 12: Employment Declines During Labor Saving Technology Adoption Cycles Skew Higher When the Overall Unemployment Rate Is Rising



Source: Goldman Sachs Global Investment Research

These patterns can help explain why the labor market impacts have been smaller than feared so far: Given that the overall economy and labor market have remained resilient in 2026, companies may have had less incentive to focus on aggressively cutting labor costs. And under our baseline forecasts for near potential growth next year, our estimates suggest that AI labor disruption will likely only gradually increase rather than delivering an abrupt labor market shock.

That said, a more concerning takeaway from our analysis is that a cyclical slowdown would likely accelerate AI-related automation and job losses, thereby amplifying the broader business cycle. The Fed and other central banks should therefore remain attuned to any emerging downside growth or labor market risks once the near-term inflation constraint is lifted, since a quick pivot to easing could help ensure that automation-related job losses do not accelerate at a time when the economy is ill-equipped to create the new jobs necessary to support a smooth AI transition.

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