US ECONOMICS ANALYST

Jobless Growth (Mei/Mericle)

- The modest job growth alongside robust GDP growth seen recently is likely to be normal to some degree in the years ahead. We expect the great majority of US potential GDP growth to come from solid productivity growth boosted by advances in artificial intelligence (AI), with only a modest contribution from labor supply growth due to population aging and lower immigration.
- The key question is whether labor demand growth is and might remain a bit too weak to keep up with even modest labor supply growth. There are already concerning signs of this in the very weak job growth seen recently outside of healthcare and the growing focus among company management teams on using AI to reduce labor costs. This week's *Analyst* considers the potential macro, monetary policy, and market implications of rapid technological progress that delivers solid productivity growth while also making it a bit harder to maintain full employment.
- There has been widespread concern over the last decade about technology displacing old job categories more quickly than in the past, but so far the employment data show little sign of this. More recently, AI appears to be hurting the employment prospects of the most closely exposed workers, such as young technology workers, but the economywide impact looks modest so far.
- While we are skeptical of the boldest claims that rapid technological progress could lead to very high unemployment, some transitional friction is possible. We find that in the past, faster technological progress has caused a larger share of the workforce to change occupation and has put modest upward pressure on the unemployment rate for a while. The type of technology is important: employment has tended to grow more quickly in occupations where technological progress has been labor-augmenting, but more slowly where it has been labor-substituting. If AI is mainly labor-substituting, it could present a greater challenge to maintaining full employment.
- History also suggests that the full consequences of AI for the labor market might not become apparent until a recession hits. In past recessions, employment of workers in routine occupations has dropped sharply—especially when they followed productivity booms—and did not recover after. During the so-called "jobless recovery" after the 2001 recession, total employment took a long time to recover as companies continued to shed routine jobs.

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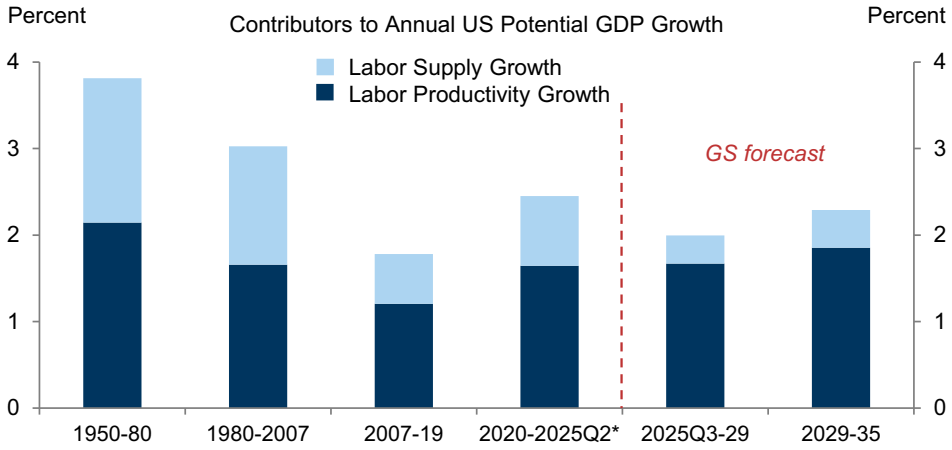
- Past pick-ups in productivity growth have also tended to initially put some downward pressure on inflation. As a result, the Fed has on average been able to respond to the combination of somewhat higher unemployment and somewhat lower inflation in periods of faster technology-driven productivity growth by keeping the funds rate a bit lower to support the labor market.
- We see mixed implications for markets. A combination of solid productivity-led GDP growth and lower interest rates could in principle support asset prices, but only if the labor market weakness remained contained and limited enough not to push the economy toward recession.

Jobless Growth

The modest job growth alongside robust GDP growth seen recently is likely to be normal to some degree in the years ahead. We expect the great majority of US potential GDP growth to come from solid productivity growth boosted by advances in artificial intelligence (AI), with only a modest contribution from labor supply growth due to population aging and lower immigration (Exhibit 1).

Exhibit 1: Going Forward, the Majority of Potential GDP Growth Will Likely Come from Productivity Growth, With Only a Modest Contribution from Labor Supply Growth

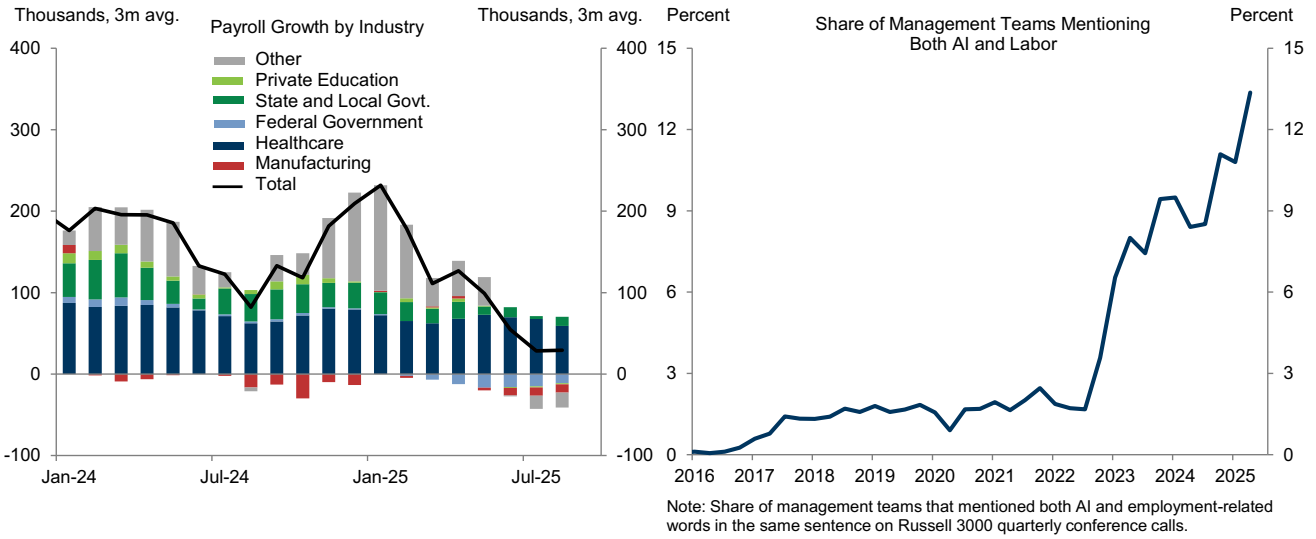


* Includes our estimates of the contributions from undermeasured AI investment in GDP, the impact of the QCEW revisions on hours, and the undermeasurement of hours in the productivity statistics.

Source: Goldman Sachs Global Investment Research, Department of Labor, Department of Commerce

The key question is whether labor demand growth is and might remain a bit too weak to keep up with even modest labor supply growth. There are already some concerning signs of this. The labor market is now somewhat weaker than it was just before the pandemic, job growth has turned negative on net in recent months outside of the healthcare industry (Exhibit 2, left), and company management teams are increasingly focused on using AI to reduce their labor costs (Exhibit 2, right), a potentially long-lasting headwind to labor demand.

Exhibit 2: Job Growth Is Already Very Weak Outside of Healthcare, and Company Management Teams Appear Increasingly Focused on Using AI to Save on Labor Costs



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

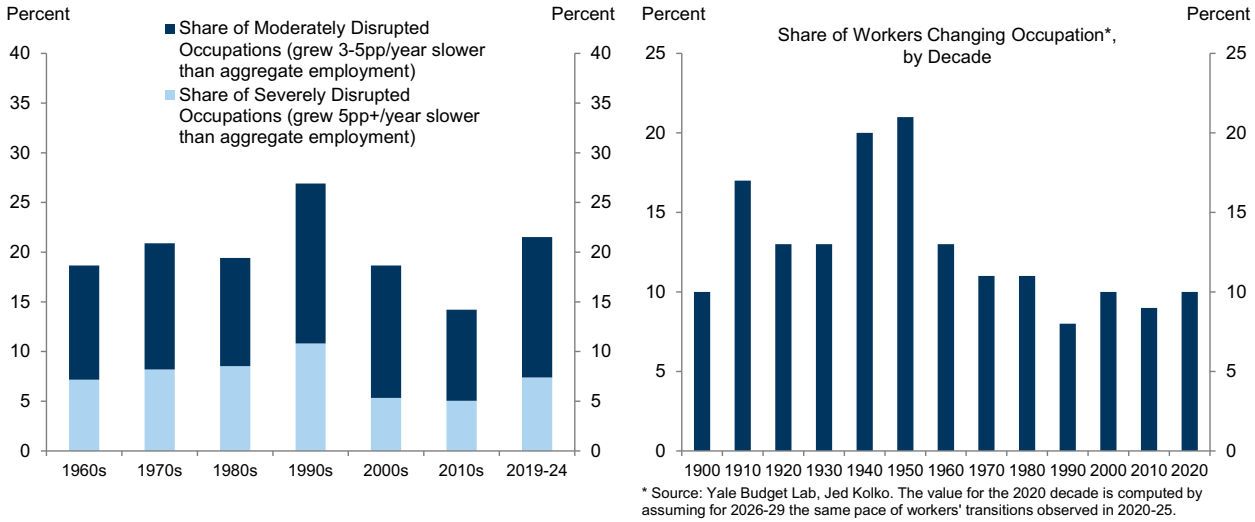
This week's *Analyst* considers the potential macro, monetary policy, and market implications of rapid technological progress that delivers solid productivity growth while also making it a bit harder to maintain full employment.

Little Sign of Faster Technological Displacement of Old Occupations So Far

There has been widespread concern over the last decade about technology displacing old job categories more quickly than in the past, but so far the employment data show little sign of this.

Using data from the Census and the American Community Survey, we update a measure we introduced in earlier research of the share of "disrupted" occupations for each decade since the 1960s. We define occupations as moderately disrupted if their employment grew at an annualized rate 3-5pp lower than aggregate employment in the same period, and as severely disrupted if growth was even slower. The left panel of Exhibit 3 shows that the share of disrupted occupations in both categories has risen since the 2010s but remains roughly in line with the historical average. Similarly, a measure of the change in the occupational composition of the workforce—the share of the workforce that had to switch occupations to generate the change in the overall composition each decade—has also remained stable since the 1960s (Exhibit 3, right).

Exhibit 3: So Far, Neither the Rate of Disruption of Occupational Categories Nor Shifts in the Occupational Composition of the Workforce Appear Particularly Elevated by Historical Standards



Source: Goldman Sachs Global Investment Research, Yale Budget Lab, Kolko (2018), Census Bureau, US Bureau of Labor Statistics

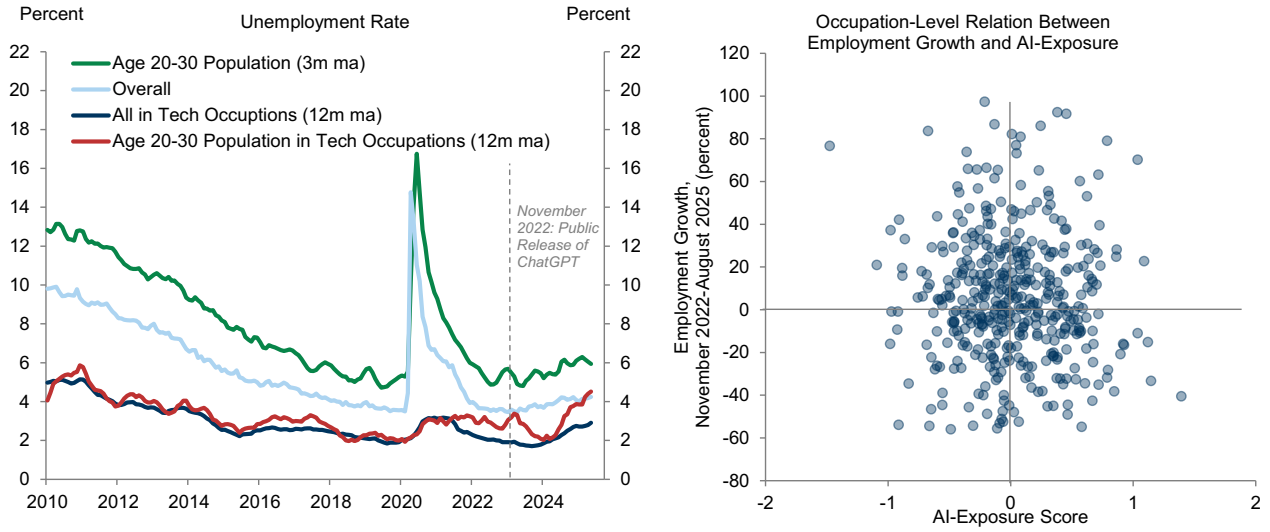
Over just the last few years, AI does appear to be hurting the employment prospects of the most closely exposed workers, such as young technology workers (Exhibit 4, left). Our global economics team recently showed that employment growth has turned negative in the most AI-exposed industries, but that the aggregate labor market impact remains limited so far, as seen in the lack of a clear statistical link between AI exposure and industry- and occupational-level labor market outcomes (Exhibit 4, right).

Other researchers have reached similar conclusions. Economist Erik Brynjolfsson and co-authors found that early-career workers—those aged between 22 and 25—in the most AI-exposed occupations have experienced a 13 percent decline in employment since November 2022, the month of ChatGPT's public release, with the largest declines in occupations where AI is more likely to automate, rather than augment, human labor.[1] And at the aggregate level, research from economists at the Yale Budget Lab also concludes that overall labor market disruption does not appear elevated relative to history so far.[2]

[1] Brynjolfsson, Chandar and Chen (2025), "Canaries in the Coal Mine? Six Facts about the Recent Employment Effects of Artificial Intelligence," Stanford Digital Economy Lab Working Paper.

[2] Gimbel, Kinder, Kendall and Lee (2025), "Evaluating the Impact of AI on the Labor Market: Current State of Affairs," Yale Budget Lab (link).

Exhibit 4: While AI Already Appears to Be Hurting the Employment Prospects of Young Technology Workers, There Is Less Clear Evidence So Far of a Broader Economywide Impact on Employment



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

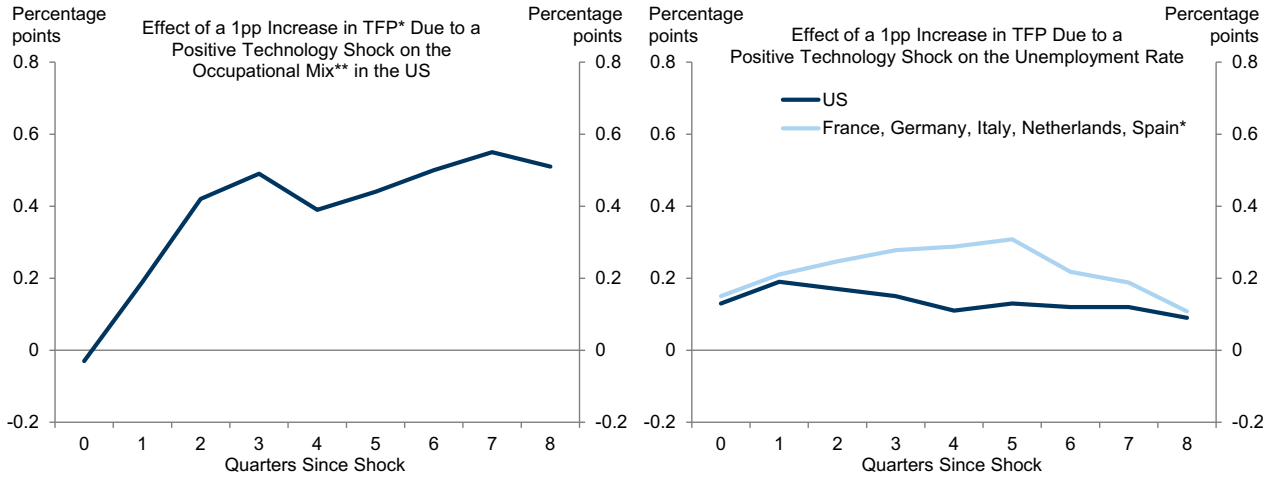
Rapid Technological Progress and Employment: Lessons from Recent Decades

We are skeptical of the boldest claims that rapid technological progress could lead to very high unemployment because, as our global economics team recently noted, innovation and greater spending power as output and income rise will also create new work opportunities that offset job losses. That said, some transitional friction has been normal historically and is certainly possible in the future.

We analyze the effects of technological change on the labor market using estimates of total factor productivity (TFP) shocks since 1947 constructed by economists Susanto Basu, John Fernald and Miles Kimball.[3] We find that in the past, faster technological progress has caused a larger share of the workforce to change occupation (Exhibit 5, left) and has put modest upward pressure on the US unemployment rate for around two years (Exhibit 5, right). Using a similar methodology to construct analogous TFP shocks for the five largest Euro-area economies since 1998, we find the same pattern.

[3] Basu, Fernald and Kimball (2006), "Are Technology Improvements Contractionary?," *American Economic Review*.

Exhibit 5: Technology-Driven Productivity Gains Increase the Share of Workers Switching Occupations and Put Modest Upward Pressure on the Unemployment Rate for a While



* TFP shocks based on the Basu, Fernald and Kimball (2006) methodology.
** Share of workers changing occupation in a given quarter (Yale Budget Lab data).

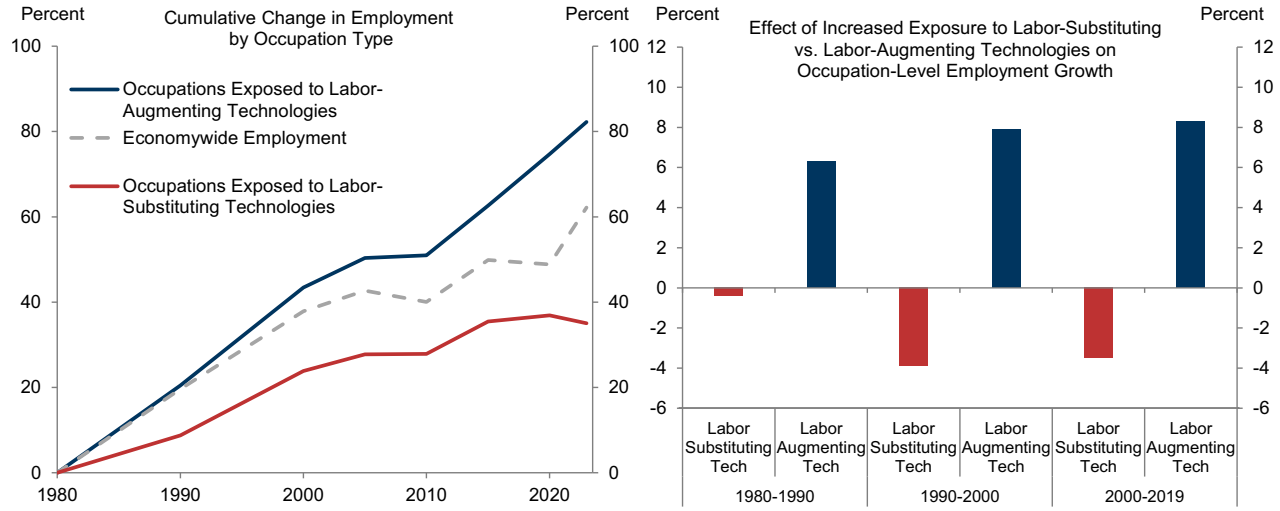
* TFP shocks from Comin et al. (2025) based on the Basu et al. (2006) methodology.

Source: Goldman Sachs Global Investment Research, Basu Fernald and Kimball (2006), Comin Quintana Schmitz and Trigari (2025), Yale Budget Lab

Economic research highlights that the type of technology is important for understanding the impact on the labor market. We assess the effects of labor-augmenting and labor-substituting technological progress on employment leveraging a new measure of each derived from patent data introduced by economist David Autor and co-authors.[4] The left panel of Exhibit 6 shows that since 1980 employment in occupations that were more exposed to labor-augmenting technologies has grown much faster than the economywide average. Meanwhile, job growth in occupations that were more exposed to labor-substituting technologies has been sluggish, and the negative impact of these technologies has increased since the 1990s (Exhibit 6, right). This suggests that if AI proves to be a primarily labor-substituting technology, it would be a more significant headwind to employment.

[4] Autor, Chin, Salomons and Seegmiller (2024), "New Frontiers: The Origins and Content of New Work, 1940–2018," *The Quarterly Journal of Economics*.

Exhibit 6: Labor-Substituting Technological Progress Has Had a Negative Impact on Aggregate Employment in Affected Occupations, While Labor-Augmenting Technology Has Boosted Employment



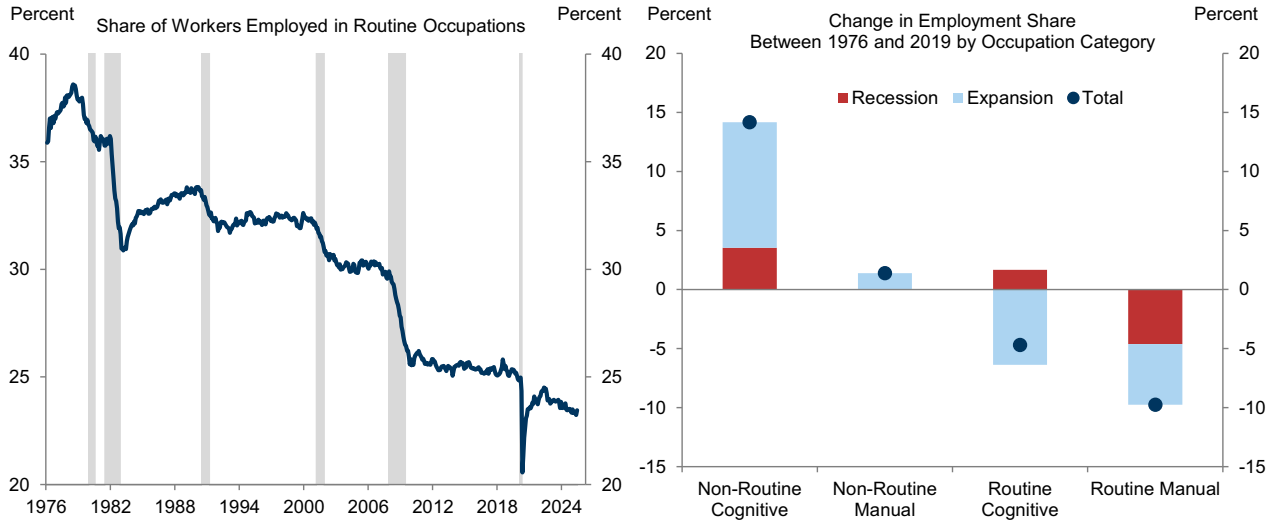
Source: Goldman Sachs Global Investment Research, Autor Chin Salomons and Seegmiller (2024), Census Bureau, US Bureau of Labor Statistics

The Full Impact of AI on Employment Might Not Appear Until a Recession

History also suggests that the full consequences of AI for the labor market might not become apparent until a recession hits. Economists Nir Jaimovich and Henry Siu have estimated that since the 1970s, most employment losses in routine manual occupations—those particularly exposed to the technological innovations of the past half-century—have come during recessions (Exhibit 7, left).[5] Around half of the total decline in the employment share of these occupations has taken place in recessions, as the right panel of Exhibit 7 shows. While job losses were more minimal during this period in occupations classified as "routine cognitive," these jobs are likely to be most at risk from AI.

[5] Jaimovich and Siu (2020), "Job Polarization and Jobless Recoveries," *The Review of Economics and Statistics*.

Exhibit 7: Employment of Workers in Routine Occupations Has Dropped Sharply During Recessions—Especially When They Followed a Period of Rapid Productivity Growth—and Has Not Recovered

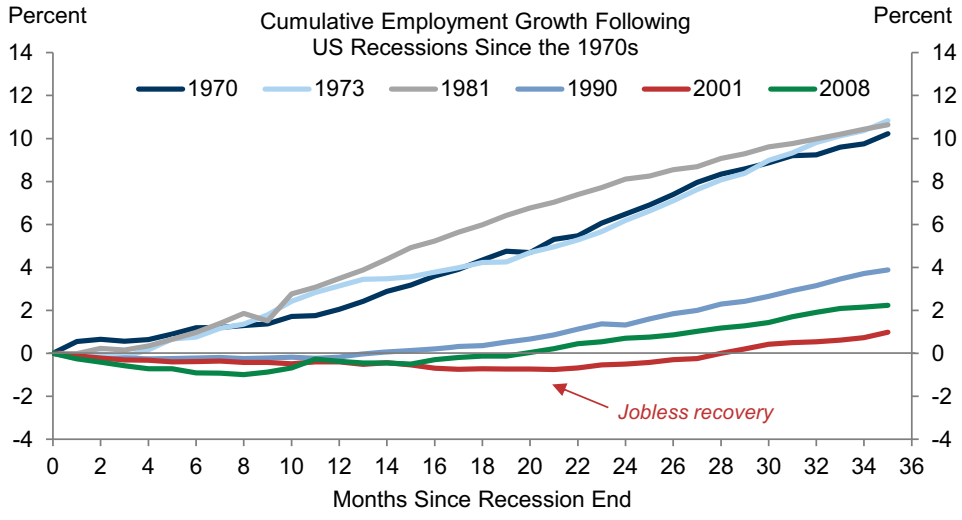


Source: Goldman Sachs Global Investment Research, Jaimovich and Siu (2020)

A leading explanation for this phenomenon is that companies use recessions to restructure and streamline their workforce by laying off workers in less productive areas. This is especially true when recessions follow productivity booms that give companies some pent-up ability to cut labor costs and improve efficiency without significantly hurting their productive capacity.

One notable example of this was the so-called "jobless recovery" after the 2001 recession, which followed the technology-led productivity boom of the late 1990s. As Exhibit 8 shows, total employment took a long time to recover as companies continued to shed routine jobs for several quarters after the end of the recession. During that recovery, despite a soft labor market, productivity growth remained elevated and GDP growth rebounded earlier than employment growth.

Exhibit 8: During the So-Called "Jobless Recovery" That Followed the 2001 Recession, Employment Took More Than Two Years to Return to Its Pre-Recession Level as Companies Continued to Shed Routine Jobs



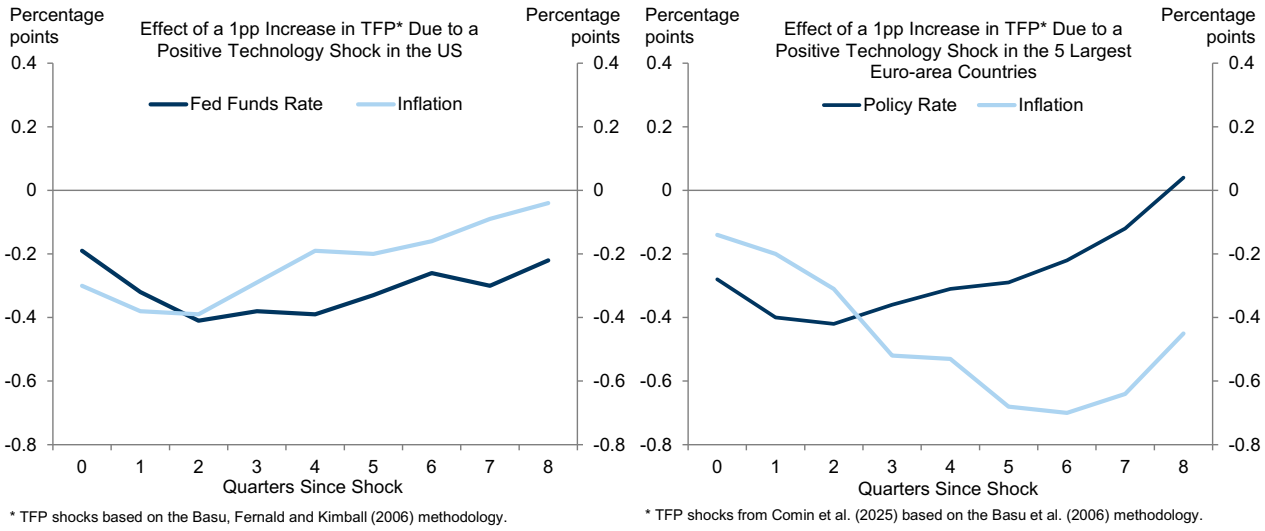
Source: Goldman Sachs Global Investment Research, Census Bureau, US Bureau of Labor Statistics

Higher unemployment is not the only risk to the labor market from more rapid technological progress. As we noted in an earlier report, some technological advances have had a more significant effect on labor market polarization than on the unemployment rate, boosting wages for workers who can leverage new technology effectively while lowering the wages of middle-skilled workers, a pattern that economists have called the "hollowing out of the middle." AI presents risks in both directions—while it could have the same "hollowing out" effect on middle-wage white collar jobs that an earlier era of factory automation had on skilled blue collar jobs, early evidence suggests that at least in some applications it might benefit less-skilled workers more than highly skilled workers.[6]

Jobless Growth: Implications for Monetary Policy and Markets

Past pick-ups in productivity growth have also tended to initially put some downward pressure on inflation. Our estimates suggest that past TFP shocks have reduced inflation for around two years in both the US and the Euro area, as shown in Exhibit 9. As a result, the Fed and the ECB have on average been able to respond to the combination of somewhat higher unemployment and somewhat lower inflation in periods of faster technology-driven productivity growth by keeping the policy interest rate a bit lower to support the labor market.

Exhibit 9: Faster Technology-Driven Productivity Growth Tends to Raise Unemployment and Lower Inflation Somewhat, Leading Central Banks to Keep Interest Rates a Bit Lower in Response



* TFP shocks based on the Basu, Fernald and Kimball (2006) methodology.

* TFP shocks from Comin et al. (2025) based on the Basu et al. (2006) methodology.

Source: Goldman Sachs Global Investment Research, Basu Fernald and Kimball (2006), Comin Quintana Schmitz and Trigari (2025)

The Fed's response to the "jobless recovery" in the early 2000s provides a good illustration. In a speech in November 2003, then-Governor Ben Bernanke argued that the combination of low levels of inflation, robust productivity growth, and weakness in the labor market suggested the need to keep monetary policy in accommodative territory.[7] He noted that in periods of unusually high productivity growth but low job creation, lower rates are important for supporting consumer spending and inducing firms to hire and invest more aggressively. The monetary policy implications would be different, he also noted, if rapid technological progress and the resulting occupational

[6] Brynjolfsson, Li and Raymond (2025), "Generative AI at Work," *The Quarterly Journal of Economics*.

[7] Bernanke (2003), "Remarks on the Jobless Recovery," Federal Reserve Board.

shifts raised the structural unemployment rate, resulting in excessive wage and price pressures even in a labor market with higher than usual unemployment, but that was not the case at the time.

We see mixed implications for markets. A combination of solid productivity-led GDP growth and lower interest rates could in principle support asset prices, but only if the labor market weakness remained contained and limited enough not to push the economy toward recession.

Pierfrancesco Mei

David Mericle

The US Economic and Financial Outlook

(% change on previous period, annualized, except where noted)

	2022	2023	2024	2025	2026	2027	2025 Q1	2025 Q2	2025 Q3	2025 Q4	2026 Q1	2026 Q2	2026 Q3	2026 Q4
OUTPUT AND SPENDING														
Real GDP	**2.5**	**2.9**	**2.8**	*1.9*	*1.8*	*2.1*	**-0.6**	**3.8**	*2.8*	*0.9*	1.5	1.8	*2.0*	*2.0*
Real GDP (annual=Q4/Q4, quarterly=yoy)	**1.3**	**3.4**	**2.4**	*1.7*	*1.8*	*2.1*	**2.0**	**2.1**	*1.9*	*1.6*	2.3	1.9	*1.8*	*2.1*
Consumer Expenditures	**3.0**	**2.6**	**2.9**	*2.5*	*1.8*	*2.1*	**0.6**	**2.5**	*2.9*	*0.8*	1.8	1.9	*2.0*	*2.1*
Residential Fixed Investment	**-8.1**	**-7.8**	**3.2**	*-2.1*	*-1.8*	*2.3*	**-1.0**	**-5.1**	*-5.1*	*-5.0*	-2.0	0.5	*3.0*	*3.5*
Business Fixed Investment	**6.5**	**7.3**	**2.9**	*3.7*	*2.8*	*4.0*	**9.5**	**7.3**	*1.5*	*-0.8*	2.2	4.8	*4.8*	*4.4*
Structures	**3.5**	**16.7**	**1.1**	*-5.3*	*-1.2*	*3.0*	**-3.1**	**-7.5**	*-6.3*	*-4.0*	-1.0	3.0	*3.0*	*3.0*
Equipment	**2.8**	**2.9**	**3.5**	*7.6*	*3.0*	*3.6*	**21.3**	**8.5**	*3.4*	*-2.5*	3.0	5.0	*5.0*	*4.0*
Intellectual Property Products	**11.7**	**6.2**	**3.5**	*5.3*	*4.7*	*4.9*	**6.5**	**15.0**	*4.0*	*2.5*	3.0	5.5	*5.5*	*5.5*
Federal Government	**-3.3**	**3.3**	**3.8**	*-1.2*	*-1.6*	*0.6*	**-5.6**	**-5.3**	*-5.3*	*-3.0*	0.0	0.0	*0.0*	*0.0*
State & Local Government	**0.0**	**3.6**	**3.8**	*2.3*	*0.7*	*1.2*	**1.9**	**3.1**	*1.0*	*0.5*	0.3	0.3	*0.5*	*1.0*
Net Exports ($bn, '17)	**-1,024**	**-925**	**-1,033**	*-1,104*	*-978*	*-1,018*	**-1,381**	**-1,058**	*-1,009*	*-968*	-959	-972	*-984*	*-997*
Inventory Investment ($bn, '17)	**146**	**47**	**44**	*36*	*50*	*61*	**172**	**-18**	*-11*	*0*	30	50	*60*	*60*
Nominal GDP	**9.8**	**6.7**	**5.3**	*4.6*	*4.6*	*3.0*	**2.9**	**6.0**	5.2	3.5	4.8	4.8	4.5	4.1
Industrial Production, Mfg.	**2.7**	**-0.5**	**-0.5**	*1.1*	*1.9*	*2.9*	**3.6**	**1.8**	*1.9*	*0.0*	1.8	2.8	*3.1*	*2.9*
HOUSING MARKET														
Housing Starts (units, thous)	**1,552**	**1,421**	**1,371**	*1,291*	*1,224*	*1,315*	**1,401**	**1,354**	*1,234*	*1,176*	1,179	1,209	*1,239*	*1,269*
New Home Sales (units, thous)	**637**	**665**	**685**	*656*	*670*	*644*	**655**	**670**	*620*	*680*	690	690	*662*	*638*
Existing Home Sales (units, thous)	**5,083**	**4,103**	**4,067**	*3,983*	*3,978*	*4,132*	**4,127**	**3,990**	*3,888*	*3,926*	3,937	3,956	*3,989*	*4,030*
Case-Shiller Home Prices (%yoy)*	**7.5**	**5.3**	**3.8**	*0.4*	*0.7*	*2.2*	**3.8**	**2.3**	*1.4*	*0.4*	-0.4	0.4	*0.6*	*0.7*
INFLATION (% ch, yr/yr)														
Consumer Price Index (CPI)**	**6.4**	**3.3**	**2.9**	*2.6*	*2.4*	*0.3*	**2.7**	**2.5**	*2.9*	*2.8*	2.5	2.7	*2.5*	*2.4*
Core CPI **	**5.7**	**3.9**	**3.2**	*3.1*	*2.4*	*0.0*	**3.1**	**2.8**	*3.1*	*3.0*	2.9	3.0	*2.8*	*2.5*
Core PCE** †	**5.0**	**3.1**	**3.0**	*3.0*	*2.4*	*0.0*	**2.8**	**2.7**	*2.9*	*2.9*	2.8	2.8	*2.7*	*2.5*
LABOR MARKET														
Unemployment Rate (%)^	**3.5**	**3.8**	**4.1**	*4.5*	*4.3*	*4.1*	**4.2**	**4.1**	*4.4*	*4.5*	4.5	4.5	*4.4*	*4.3*
U6 Underemployment Rate (%)^	**6.6**	**7.2**	**7.5**	*8.3*	*8.1*	*7.7*	**7.9**	**7.7**	*8.2*	*8.3*	8.4	8.3	*8.2*	*8.1*
Payrolls (thous, monthly rate)	**380**	**216**	**168**	*66*	*105*	*115*	**111**	**55**	*47*	*50*	80	110	*115*	*115*
Employment-Population Ratio (%)^	**60.1**	**60.1**	**60.0**	*59.5*	*59.5*	*59.5*	**59.9**	**59.7**	*59.6*	*59.5*	59.5	59.5	*59.5*	*59.5*
Labor Force Participation Rate (%)^	**62.3**	**62.5**	**62.5**	*62.3*	*62.2*	*62.0*	**62.5**	**62.3**	*62.3*	*62.3*	62.3	62.2	*62.2*	*62.2*
Average Hourly Earnings (%yoy)	**5.4**	**4.4**	**3.9**	*3.7*	*3.3*	*3.2*	**3.9**	**3.8**	*3.7*	*3.5*	3.3	3.3	*3.3*	*3.3*
GOVERNMENT FINANCE														
Federal Budget (FY, $bn)	**-1,376**	**-1,694**	**-1,833**	*-1,850*	*-1,950*	*-2,150*	--	--	--	--	--	--	--	--
FINANCIAL INDICATORS														
FF Target Range (Bottom-Top, %)^	**4.25-4.5**	**5.25-5.5**	**4.25-4.5**	*3.5-3.75*	*3-3.25*	*3-3.25*	**4.25-4.5**	**4.25-4.5**	**4-4.25**	*3.5-3.75*	3.25-3.5	3-3.25	*3-3.25*	*3-3.25*
10-Year Treasury Note^	**3.88**	**3.88**	**4.58**	*4.20*	*4.20*	*4.25*	**4.23**	**4.24**	**4.16**	*4.20*	4.20	4.20	*4.20*	*4.20*
Euro (€/$)^	**1.07**	**1.11**	**1.04**	*1.19*	*1.25*	*1.25*	**1.08**	**1.18**	**1.17**	*1.19*	1.23	1.23	*1.24*	*1.25*
Yen ($/¥)^	**132**	**141**	**157**	*145*	*127*	*120*	**150**	**144**	**148**	*145*	137	137	*136*	*127*

* Weighted average of metro-level HPIs for 381 metro cities where the weights are dollar values of housing stock reported in the American Community Survey. Annual numbers are Q4/Q4.
** Annual inflation numbers are December year-on-year values. Quarterly values are Q4/Q4.
† PCE = Personal consumption expenditures. ^ Denotes end of period.
Note: Published figures in bold.
Source: Goldman Sachs Global Investment Research.

Source: Goldman Sachs Global Investment Research

Disclosure Appendix

Reg AC

We, Jan Hatzius, Alec Phillips, David Mericle, Ronnie Walker, Manuel Abecasis, Elsie Peng, Pierfrancesco Mei and Jessica Rindels, hereby certify that all of the views expressed in this report accurately reflect our personal views, which have not been influenced by considerations of the firm's business or client relationships.

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