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The Future of U.S. Productivity: Cautious Optimism amid Uncertainty

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Introduction

From 2023:Q2 to 2024:Q3, U.S. productivity growth averaged 2.6 percent, more than twice the average rate of the pre-pandemic decade. This unexpected strength in productivity has sparked debate among economists and policymakers about its drivers and sustainability. Some attribute recent productivity growth to cyclical factors (short-term economic fluctuations) and caution that longer-term, structural changes such as demographic shifts may dampen future productivity growth. Others view recent growth as the beginning of a robust productivity era, driven in part by the widespread adoption of remote work and the early stages of a technological boom driven by artificial intelligence (AI).

Whether this recent strength in productivity growth is sustainable has substantial implications for the economy. Productivity is a critical determinant of long-term economic growth and living standards. Higher productivity allows economies to produce more output per hour worked, leading to increased real wages and incomes. Understanding the drivers and sustainability of U.S. productivity growth is thus important as policymakers forecast long-term economic growth and set monetary policy.

In this article, we examine the recent increase in productivity and assess whether it represents a durable acceleration from the sluggish growth of the 2010s. Our analysis suggests that while the recent productivity uptick likely embodies elements of both temporary cyclical factors and more persistent structural changes, neither a return to the pre-pandemic trend of slow productivity growth nor a sustained productivity boom is yet assured. We find that recent productivity growth has been led by growth in total factor productivity (TFP) alongside contributions from capital deepening and improvements in labor composition. However, the increase in TFP growth, a key driver of long-term productivity, remains modest compared with previous technology-driven episodes, suggesting a substantial acceleration in productivity growth may still be on the horizon. Although structural factors (such as slowing improvements in educational attainment or the diminishing effects of recent innovations) may present headwinds to long-run productivity growth, the COVID-19 pandemic accelerated the adoption of remote work and AI technologies, which have the potential to boost productivity over time. Overall, evidence suggests cautious optimism about the future of U.S. productivity growth.

The article proceeds as follows. Section I reviews trends in productivity and their drivers. Section II discusses structural factors that could limit long-run productivity growth. Section III assesses the latest research on the productivity effects of remote work and the potential for AI to drive productivity gains.

I. The Importance and Dynamics of U.S. Productivity Growth

Productivity is crucial for long-term economic growth and living standards and determines an economy's potential output—the maximum amount of goods and services an economy can produce at full capacity. Productivity can be measured simply as output per hour, and higher output per hour generally leads to higher wages and incomes. As former Federal Reserve Chair Ben Bernanke noted in a 2006 speech, "in the long run, productivity growth is the principal source of improvements in living standards." For instance, with an annual productivity growth rate of 1.44 percent (the 1973–95 average), output per hour would rise by 33.2 percent after 20 years. However, with a 2.84 percent growth rate (the 1995–99 average), output per hour would rise by a substantial 74.9 percent.[1]

Productivity growth also has important implications for monetary policy, affecting economic variables such as inflation and wage growth. Higher productivity can mitigate inflation by allowing firms to produce more efficiently, thus lowering production costs and consumer prices. In 2022,

Federal Reserve Board Governor Lisa D. Cook emphasized that productivity growth enables firms to keep prices low even as wages rise, maintaining profitability without fueling inflation. This balance is crucial for the Federal Reserve, which aims to achieve maximum employment and stable prices. Thus, understanding and fostering productivity growth is vital for sustaining economic development and improving living standards.

Drivers of productivity growth

Several factors contribute to labor productivity growth, including capital deepening, labor composition, and total factor productivity (TFP). Capital deepening refers to an increase in the amount of capital per worker, and may arise from investments in machinery, equipment, and infrastructure that enhance labor productivity. Typically, capital deepening is measured as the contribution to output growth of capital services per hour worked (Fernald 2014).[2] Labor composition captures changes in the quality of the workforce, including education, experience, and skills that increase labor productivity, and is often measured as the difference between the growth of labor input (which accounts for changes in the composition of the workforce) and the growth of total hours worked. Finally, TFP measures the efficiency with which labor and capital are used together in the production process, reflecting improvements in technology, organizational innovation, and other factors that increase output without increasing inputs. TFP is calculated as the residual growth in output not accounted for by the growth of capital and labor inputs. All these factors can have both short-run and long-run effects on productivity.

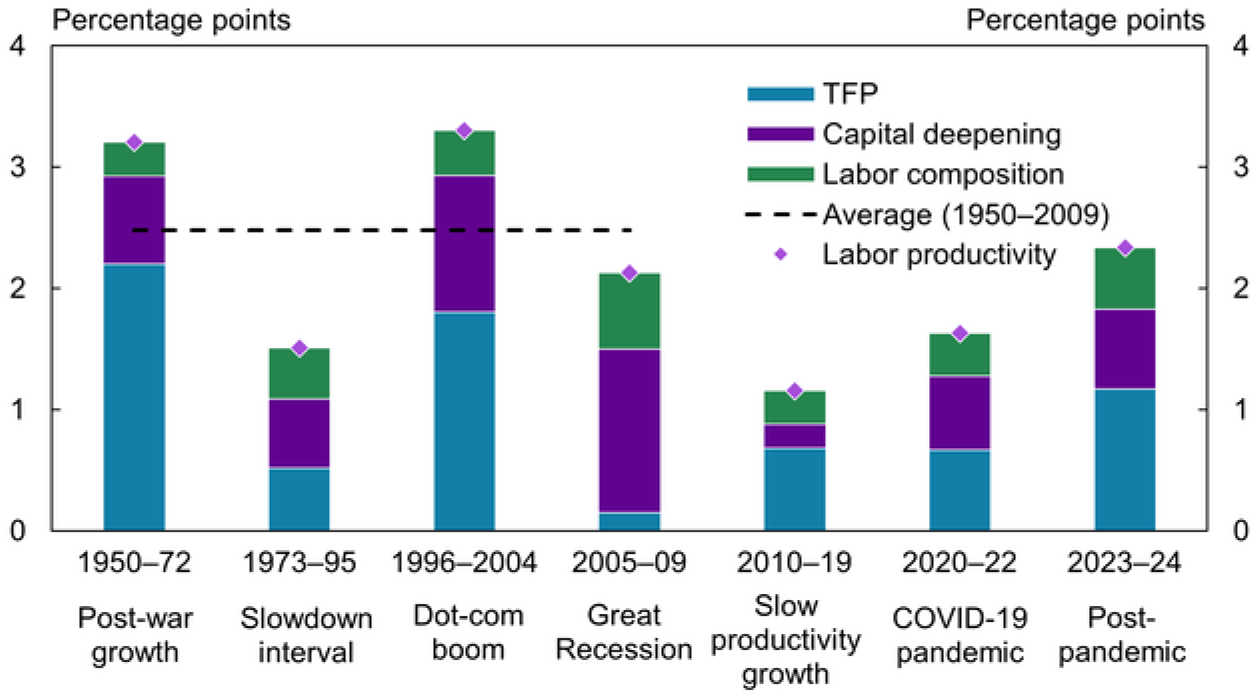
In the short run, cyclical factors such as labor hoarding during recessions or increased capacity utilization during expansions can affect labor productivity (Fernald and Wang 2016). Labor hoarding refers to firms' reluctance to lay off workers during downturns, leading to a decline in measured productivity as firms retain workers even as output falls. Capacity utilization, on the other hand, captures the extent to which firms use their existing capital stock, with higher utilization boosting measured productivity. Basu, Fernald, and Kimball (2006) find evidence of procyclical input utilization, with both labor effort and capital utilization rising during expansions and falling during recessions.

Over the long run, labor productivity growth is primarily driven by technological progress and human capital accumulation (Fernald and Jones 2014). Technological improvements enable firms to produce more output with the same inputs, while a more educated and skilled workforce performs tasks more efficiently. TFP growth reflects these elements and is thus a key driver of long-run productivity growth. Research and development (R&D), innovation, and the diffusion of new technologies further contribute to TFP growth.

Drivers of productivity growth across historical episodes

Chart 1 shows how much capital deepening, labor composition, and TFP contributed to labor productivity growth across different historical episodes.[3] The post-World War II era, for example, saw rapid productivity growth, driven largely by TFP (blue bar). During this period, technological advancements such as the commercialization of mainframe computers, the introduction of commercial jet airliners, and the development of integrated circuits and early computer networking systems contributed substantially to TFP growth. The post-war era also saw rising educational attainment, which likely contributed to both the labor composition and TFP components of productivity growth (Fernald and Jones 2014). In 1973–95, factors such as oil shocks and the maturing of earlier innovations likely dampened productivity growth (Gordon and Sayed 2022). During the dot-com boom (1996–2004), productivity growth resurged, fueled by the widespread adoption of information and communication technologies, which boosted both capital deepening and TFP growth (Fernald 2014; Gordon and Sayed 2022).

Chart 1: Decomposition of Labor Productivity Growth



Notes: Chart depicts productivity growth in the business sector. Dashed line shows average labor productivity growth from 1950 to 2009. Bars are averages of quarterly data. Rates are annualized. Data through 2024:Q2.
Sources: Fernald (2014), Federal Reserve Bank of San Francisco, and authors' calculations.

In the years leading up to the COVID-19 pandemic, the U.S. economy experienced a prolonged period of slow productivity growth. From 2010 to 2019, the United States recorded the slowest average productivity growth of any decade in its history at just 1.1 percent per year, significantly lower than the post-war average (dashed black line) of 2.5 percent per year (1950–2009). This slowdown in productivity growth was a major factor behind the stagnation in real wages and economic growth during the 2010s (Gordon and Sayed 2022).

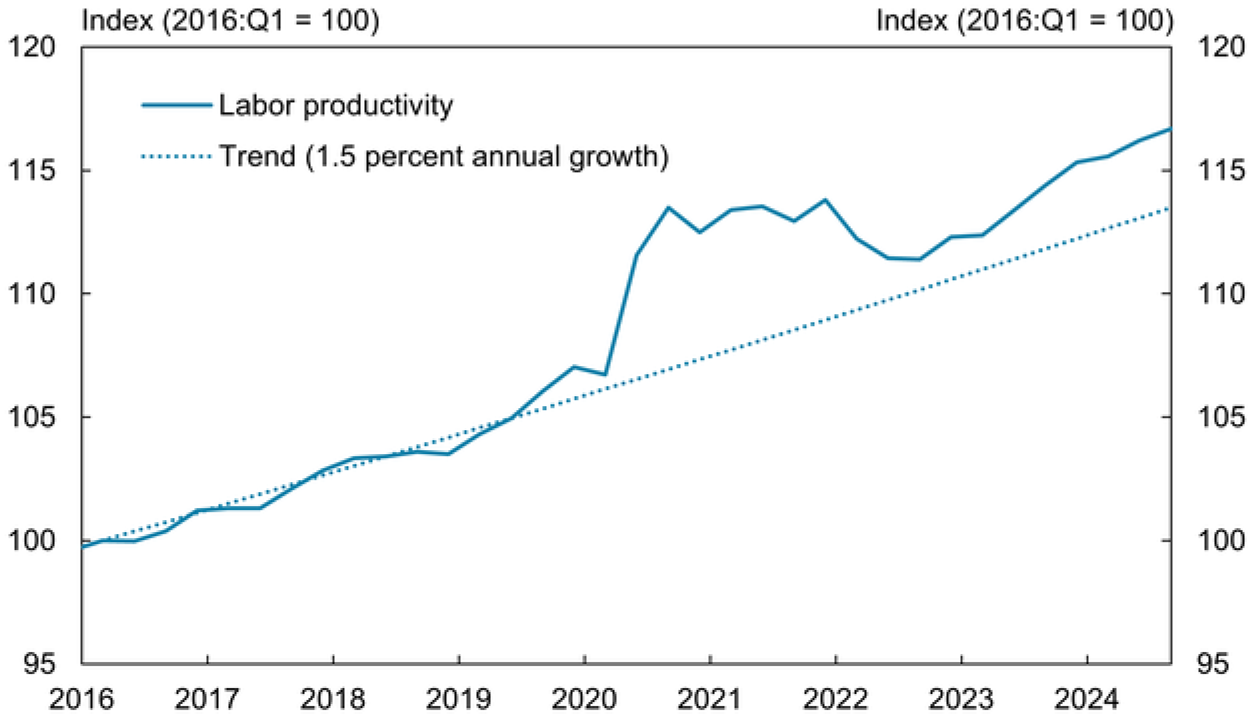
The COVID-19 pandemic brought unique challenges and disruptions. Chart 2 shows that productivity (blue line) surged mechanically in early 2020 as pandemic restrictions disproportionately affected low-wage, low-productivity sectors such as leisure and hospitality. As these sectors shut down or reduced operations, many low-productivity jobs were lost, artificially boosting overall productivity. According to Gordon and Sayed (2022), this phenomenon mirrored the 2008–09 recession, where excess layoffs led to higher measured productivity due to reduced hours worked without a corresponding decline in output.

As the economy reopened and low-productivity sectors rehired workers, productivity growth slowed in 2021–22, moving closer to its pre-pandemic trend (dotted line in Chart 2). However, the adoption of remote work and digital technologies during the pandemic likely helped sustain productivity in some sectors.

Overall, while average productivity growth throughout the pandemic era (2020–22) was higher than its pre-pandemic (2010–19) average (see Chart 1), the composition differed. TFP was the primary driver of growth during 2010–19, while pandemic-era gains were driven by both TFP and capital deepening.

In 2023–24, productivity growth picked up further, exceeding its long-term trend once again (see Chart 2). This recent uptick has been led by TFP, followed by contributions from capital deepening and labor composition, respectively. Investment in digital technologies and AI, firms adapting to labor market conditions, an increase in new business creation, and structural changes prompted by the pandemic, such as the widespread adoption of remote work and digital tools, have likely all contributed to this productivity increase.

Chart 2: Labor Productivity Growth and Trend



Notes: Chart depicts labor productivity in the business sector. Trend line assumes 1.5 percent annual growth, reflecting an estimate of long-term productivity trends. This rate roughly corresponds to the average growth for labor productivity from 2004 to 2019, calculated using a four-quarter rolling average.
Sources: U.S. Bureau of Labor Statistics (BLS) and authors' calculations.

Whether the recent productivity surge represents a sustained shift to a higher growth trajectory or a temporary boost driven by cyclical factors and pandemic-induced changes remains unclear. The growth accounting exercise in Chart 1 suggests that the recent uptick in productivity growth has not yet translated to a substantial acceleration in TFP growth, a key driver of long-term productivity gains.

II. Structural Factors that Could Limit Long-Run Productivity Growth

Although cyclical factors may have contributed to the recent productivity increase, several structural factors suggest long-run productivity growth may remain constrained. From 2010 to 2019, GDP per hour worked—a measure of labor productivity—rose at an annual pace of only 1.1 percent. Fernald and Li (2022) argue that this slow pace is likely to continue, and that the pandemic has not substantially altered this trajectory.

One key factor limiting productivity growth is the slowing pace of improvement in labor quality, particularly educational attainment. Gordon (2018) notes that high school completion is no longer a significant source of labor productivity growth, as the rate of increase in high school graduates has plateaued since the 1980s. Similarly, the rise in four-year college degree completion has slowed due to a combination of rapidly increasing costs of higher education and declining demand for cognitive skills (Gordon 2018; Beaudry and others 2016). Specifically, Beaudry and others (2016) show that demand for cognitive skills surged from 1980 to 2000 but has since reversed, leading to underemployment among college graduates as they move into lower-skilled jobs. Additionally, the rising cost of higher education has deterred many from pursuing four-year degrees (Gordon 2018). Gordon (2024) notes that the percentage of individuals completing a bachelor's or more advanced degree has plateaued for those born after 1968, suggesting an end to education's contribution to productivity growth.

Demographic shifts such as slowing population growth and aging may also weigh on productivity growth. The decline in labor force participation, especially among prime-age men with lower education levels, has been a drag on growth in overall hours worked (Gordon 2018 and Bengali, Duzhak, and Zhao 2023). Factors such as childcare challenges, early retirements, and health concerns may also weigh persistently on labor force participation (Fernald and Li 2022). Reduced labor supply implies a lower potential output level, constraining long-run productivity growth.

Another concern is the paradox of slowing productivity growth despite ongoing innovation. Although innovative activity as measured by patents has increased, productivity growth has slowed to the lowest rates of the industrial era (Gordon 2018). This slowing growth suggests that recent innovations may have had less effect on productivity compared with earlier periods, such as the dot-com era. Jones (2024) notes that the increasing difficulty of finding new ideas further exacerbates this issue, suggesting firms may have to invest increasingly larger resources in R&D just to maintain a constant rate of economic growth.

Philippon (2023) offers a novel perspective on the productivity paradox, arguing that TFP growth is additive rather than exponential. Traditional growth models assume that TFP grows exponentially, meaning that the growth rate increases with the current level of TFP. However, Philippon finds that TFP grows in constant increments over time, regardless of its current level. This additive model implies that each innovation contributes a fixed amount to productivity. As the base level of productivity rises, these fixed increments result in a lower percentage increase in productivity, leading to a natural slowing of productivity growth over time, even if other factors such as demographics, education, and capital investment remain constant.

Philippon's perspective helps explain why increased R&D efforts have not resulted in proportional gains in productivity. However, if transformative technologies such as AI were to lead to significant and widespread efficiency gains across multiple sectors, they could potentially result in larger absolute increments in productivity—amplifying the additive growth model's effects, potentially reversing the trend of slowing productivity growth, and fostering a new period of robust productivity increases.

III. Potential Productivity Effects of Remote Work and Artificial Intelligence

Technological innovations and changes in work arrangements have the potential to shape long-run productivity growth, and the past few years have brought two significant developments in these areas. The widespread adoption of remote work during the COVID-19 pandemic sparked debates about its potential to drive a new era of productivity growth. As organizations and workers adapted, researchers sought to understand the implications for productivity. Meanwhile, the rapid development of artificial intelligence (AI), especially generative AI, has spurred discussions on AI's effects on productivity.

Remote work and productivity

Before the COVID-19 pandemic, research suggested remote work could lead to gains in productivity. Bloom and others (2015) conducted a randomized controlled trial at a Chinese travel agency, assigning call center employees to work from home or the office for nine months. They found a 13 percent increase in performance for home-working employees due largely to a quieter work environment and fewer breaks. This early evidence suggested that for certain types of routine and independent work, remote work could lead to significant productivity gains.

The pandemic-induced shift to remote work has prompted further research, and post-pandemic studies provide a more nuanced view on the productivity effects of remote work. Gibbs and others (2023) analyzed skilled professionals performing cognitive and collaborative work at a large Asian IT services company during the pandemic. They found that although employees increased their total hours worked, including outside normal business hours, average output slightly declined, leading to a productivity drop of 8–19 percent. The decline was more pronounced for employees with children at home. The study also highlighted that employees with less company experience had a harder time adapting to remote work.

Other studies suggest that the productivity effects of remote work may vary depending on the type of remote work arrangement and the nature of the work itself. Analyzing white-collar workers at a large Italian company, Angelici and Profeta (2023) found that a hybrid work arrangement (one day of remote work per week) led to increased productivity compared with traditional, fully office-based work. The authors attribute these gains to reduced absenteeism and improved self-reported productivity, driven by better work-life balance and well-being. In contrast, Emanuel and Harrington (2024) found that fully remote work decreased productivity by 4 percent compared with office-based work for call center employees, largely because less productive workers were more likely to choose remote jobs.

The pandemic has altered perceptions of remote work's practicality and productivity effects. Barrero, Bloom, and Davis (2021) reported improved perceptions of "work-from-home" and stabilized work-from-home rates in 2023 at about four times the 2019 level. These higher rates suggest a more positive assessment of remote work's effects on productivity, potentially leading to a persistent increase in remote work. Indeed, data from Kastle Systems indicates that the average office occupancy rate across the largest 10 cities in the United States has stabilized at around 50 percent since 2023 (compared with about 97 percent before the pandemic).

Some studies highlight potential trade-offs between short-term output and long-term skill development in remote work settings. For example, Burdett and others (2024) and Emanuel, Harrington, and Pallais (2023) find that proximity to coworkers can facilitate valuable mentoring and feedback, particularly for women and junior employees, but may come at the cost of reduced short-term output. These findings suggest that hybrid approaches that balance independent work with collaboration and mentorship may be necessary to optimize both short-term productivity and long-term human capital development.

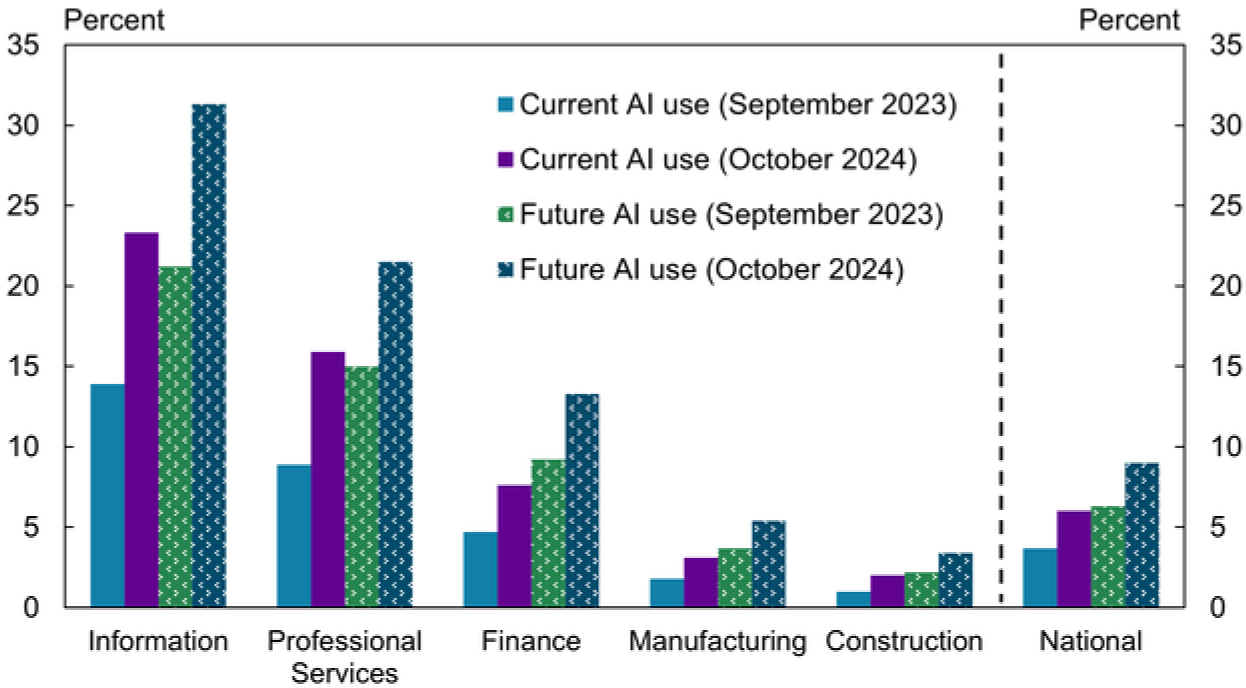
In sum, evidence suggests that remote work can potentially drive productivity growth over time, but its effects vary across work types and individuals. Researchers have observed significant productivity gains from remote work for routine and independent tasks, while the results for collaborative and cognitive work seem more mixed.

Artificial intelligence and productivity

Recent advancements in AI, particularly the development of generative AI such as ChatGPT, have also sparked discussions about AI's potential to drive productivity growth. AI generally refers to computer algorithms and programs capable of performing tasks that traditionally required human intelligence (Chui and others 2023). Proponents argue that AI can automate tasks, freeing workers to focus on more complex and strategic aspects of their jobs, thereby boosting productivity.

Multiple surveys indicate that AI use is growing. Chart 3 presents current and expected AI adoption rates across U.S. sectors using data from the U.S. Census Bureau's Business Trends and Outlook Survey, as reported in Bonney and others (2024). The chart shows a general increase in the use of AI since 2023, with significant sectoral variation. For example, in October 2024, 23 percent of surveyed companies in the information sector currently used AI (purple bar), while 31 percent anticipated adopting AI by April 2025 (blue patterned bar). In Denmark, Humlum and Vestergaard (2024) report higher AI adoption rates, from 34 percent for financial advisors to 79 percent for software developers, suggesting rapid AI adoption by individual workers.[4] The difference between the two studies likely reflects that Humlum and Vestergaard focus on highly exposed occupations while Bonney and others examine the broader economy. Additionally, worker-level surveys may capture incidental AI use that firm-level surveys miss.

Chart 3: AI Adoption Rates in the United States and Selected Sectors



Note: Chart shows percentages of companies that answered yes to two questions: "In the last two weeks, did this business use Artificial Intelligence (AI) in producing goods or services?" (current AI use) and "During the next six months, do you think this business will be using Artificial Intelligence (AI) in producing goods or services?" (expected AI use).
Source: U.S. Census Bureau.

Experimental studies on AI indicate significant potential for productivity gains, particularly in routine tasks and for lower-skilled workers. Brynjolfsson, Li, and Raymond (2023) find that advice based on OpenAI's generative pre-trained transformer (GPT) model increased technical support agents' productivity by 14 percent, as measured by the number of chats handled per hour. Notably, the productivity gains were more pronounced among less-skilled workers, who experienced a 34 percent increase in chats handled per hour. The authors suggest that this disparity may be due to the AI tool's ability to disseminate the knowledge and skills of experienced workers to those with less experience, allowing them to perform at a higher level.

Research suggests some productivity gains for cognitive and higher-skill occupations as well. In an experiment involving mid-level professional writing tasks, Noy and Zhang (2023) observe a 40 percent reduction in task completion time and an 18 percent improvement in output quality for professional writing tasks aided by AI. Notably, participants who initially performed worse on the preliminary task without ChatGPT saw greater improvements when using ChatGPT, indicating that less-skilled writers benefit more from using the tool. Similarly, Peng and others (2023) examine GitHub Copilot's effects on developers and find a 55.8 percent increase in coding task completion speed without a significant drop in success rates.[5] The study also finds that less-experienced, busier, and older developers experience more substantial productivity gains from using Copilot.[6]

However, the benefits of AI are not universal. In a field experiment with Boston Consulting Group, Dell'Acqua and others (2023) assess AI's effects on nonroutine tasks performed by high-skill "knowledge workers." Specifically, the authors categorize tasks into those they believe to be within AI's capabilities ("within the frontier") and those beyond its capabilities ("outside the frontier"). For tasks within the frontier, such as creative idea generation and qualitative market analysis, AI assistance resulted in a 12.2 percent increase in tasks completed, a 25.1 percent reduction in task completion time, and a 40 percent improvement in quality. These benefits were more significant for below-average performers. Conversely, for complex tasks outside the frontier, such as strategic recommendations based on detailed data, AI assistance led to solutions that were 19 percentage points less likely to be correct. Finally, Kreitmeir and Raschky (2024) use Italy's brief ban of ChatGPT in April 2023 as a natural experiment, analyzing data from GitHub on programmers in Italy, Austria, France, and Spain. They find that less experienced workers produced higher-quality output during the ban, while more experienced workers saw little difference—suggesting inexperienced coders may spend more time fixing issues generated by ChatGPT than they save using the tool.

Macroeconomic forecasts of AI's effects on productivity

Although studies show AI has the potential to boost productivity, translating these findings into broader macroeconomic effects is challenging. Private-sector forecasts offer varying predictions about AI's effects on productivity in the longer term. Goldman Sachs predicts a 15 percent increase in labor productivity over the next decade, attributing this increase to AI-driven automation across two-thirds of U.S. occupations and suggesting that most occupations will experience significant, though not complete, automation of their workload (Briggs and Kodnani 2023). McKinsey & Company, on the other hand, forecasts an annual productivity boost ranging from 0.5 percent to 3.4 percent through 2040, with generative AI contributing 0.1 percent to 0.6 percent annually (Chui and others 2023).

In contrast to these optimistic views, Acemoglu (2024) estimates a more modest effect of AI on TFP growth.[7] Using a framework developed with Pascual Restrepo and incorporating estimates from studies by Brynjolfsson and others (2023) and Noy and Zhang (2023), Acemoglu calculates an upper bound on the boost to TFP growth at around 0.06 percentage points per year, totaling 0.66 percent over 10 years. Alternative estimates range from 0.5 percent to 0.9 percent over the same period. Although these estimates are lower than other reports, Acemoglu emphasizes their significance when placed in historical context, as TFP grew by about 7 percent during the 2010s (Fernald 2014). The gap between Acemoglu's estimates and those of Goldman Sachs and McKinsey highlights the uncertainty surrounding AI's long-term effects. One factor contributing to this discrepancy is the optimism regarding labor reallocation and new task development cited by Goldman Sachs. Depending on how increased AI usage plays out, these estimates might be reconciled in the future.

Addressing the productivity paradox—why productivity growth has slowed despite technological advances—is also crucial. Brynjolfsson, Rock, and Syverson (2019; 2021) suggest that lags in implementing general-purpose technologies such as AI could explain this phenomenon. These technologies often require significant investments and time to mature and fully integrate into the economy. During this period, productivity growth might stagnate, even though substantial advances could occur later. Judging AI's future effects solely on its early effects may overlook the potential for significant long-term gains.

Initial implications of remote work and AI for productivity

Research on remote work and AI suggests these factors have the potential to drive productivity gains, particularly for certain sectors, types of work, and workers. However, the gains are generally context-dependent and may be limited for some industries and tasks. Macroeconomic forecasts of AI's effects on productivity vary widely, reflecting different assumptions about the capabilities of AI technologies and the speed at which these technologies will be developed and adopted across industries.

The ongoing debates about the roles of remote work and AI in productivity growth underscore the need for continued research and careful monitoring. Optimizing AI and remote work will require human oversight to mitigate errors, tailored hybrid work arrangements, and strategic investments in complementary technologies and infrastructure.

Conclusion

The United States recently experienced a notable increase in productivity growth, driven by a modest contribution from total factor productivity (TFP) growth, followed by contributions from capital deepening and labor composition. A combination of cyclical factors (for example, firms enhancing efficiency amid worker shortages) and structural changes driven by the accelerated adoption of remote work and AI appear to have contributed to productivity growth.

However, the sustainability of this productivity growth remains uncertain due to structural headwinds, including slowing improvements in educational attainment, demographic shifts, and the paradox of slowing productivity growth despite ongoing innovation. These factors suggest that neither a return to the sluggish productivity growth of the pre-pandemic era nor a sustained productivity boom is yet assured.

Our review of research on remote work and AI adoption highlights the potential of these developments to drive productivity gains but also underscores the nuances and limitations of their effects. Evidence suggests that remote work can significantly enhance productivity for certain types of work, particularly routine and independent tasks, but its effects vary across different work arrangements and individual circumstances. Similarly, AI has shown promise in automating routine tasks and supporting more complex work processes, but its ability to drive productivity gains depends on the nature of the tasks and the skill level of the workers involved. Moreover, the full macroeconomic effect of AI remains uncertain, with empirical estimates of its potential to boost productivity varying widely based on different assumptions about AI's capabilities and adoption rates across industries. Translating the productivity gains observed in specific studies and occupations to the broader economy will likely take time and require ongoing investment in complementary technologies, infrastructure, and workforce adaptations.

Appendix: Growth Accounting for Labor Productivity

Chart 1 presents the decomposition of labor productivity growth into three components as outlined by Fernald (2014), using data published by the Federal Reserve Bank of San Francisco. The decomposition follows the equation:

$$\Delta \ln LP = \alpha(\Delta \ln K - \Delta \ln H - \Delta \ln LQ) + \Delta \ln LQ + \Delta \ln TFP,$$

where LP is labor productivity, α is capital's share of income, K is capital input, H is hours worked, LQ is labor composition, and TFP is total factor productivity. We define capital deepening as $\alpha(\Delta \ln K - \Delta \ln H - \Delta \ln LQ)$. Labor productivity is defined as $\Delta \ln Y - \Delta \ln H$, where Y is output.

Capital input is obtained from quarterly National Income and Product Accounts (NIPA) data using the perpetual inventory method. Data on hours worked for the business sector are sourced from the U.S. Bureau of Labor Statistics (BLS). Labor composition is interpolated from BLS data and calculated following Aaronson and Sullivan (2001), which involves rolling Mincer wage regressions to weight workers by observable skill levels. TFP is calculated using the methodology described in Fernald (2014).

Endnotes

[1] The rate refers to compound annual growth rate. The corresponding calculation is as follows: (100 * (1 + 0.0284)^20 = 174.9).

[2] Capital services are the productive output derived from capital assets. Essentially, capital services serve as the appropriate measure of capital input in production analysis, reflecting how effectively capital contributes to economic output over time.

[3] We use a growth accounting framework for the decomposition, details of which can be found in the appendix.

[4] These rates are based on surveying 100,000 workers across 11 exposed occupations from November 2023 to January 2024.

[5] Copilot is a specialized version of OpenAI's GPT models that is tuned for use in coding.

[6] Other studies have explored AI applications beyond large language models. For example, Kanazawa and others (2022) studied the use of AI to provide route information to Tokyo taxi drivers, resulting in a 5 percent reduction in search time, with even greater benefits for less-skilled drivers.

[7] Acemoglu's estimates focus on TFP growth, not labor productivity.

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