Special Commentary — August 19, 2025

A Bolder Blend: The Forces Behind Stronger Productivity Growth

Summary

- Productivity growth has taken on increased importance at a time when labor force growth is stumbling. Not only is it a determinant of the economy's potential rate of growth, but it also helps absorb higher input costs and serves as the key driver of real per capita income growth.
- Productivity growth tends to vacillate from one quarter to the next. But, through its recent ups and downs, productivity growth has firmed this cycle, averaging an annualized rate of 1.8% compared to 1.5% in the prior economic cycle. What's behind the uptrend, and can it be sustained?
- Labor productivity, or output per hour worked, can be broken down into three components: the composition of labor, capital input and total factor productivity (TFP). The contribution to productivity growth stemming from labor quality and capital investment has changed minimally this cycle. That leaves TFP, which can be viewed as productivity derived from new technology and processes, as the differentiating factor.
- The drivers of TFP can be difficult to pinpoint in real time since it is measured as the residual of productivity gains not directly accounted for by hours worked and the capital stock. The jury is still out on any lift to productivity growth from remote work, although increased dynamism in the economy—evidenced by greater rates of business formation and job-switching—has likely provided a boost in recent years. Tight labor market conditions through this cycle also have helped spur the adoption of leading-edge technologies, giving workers better—not just more—capital at their disposal.
- The advent of generative AI leads us to expect TFP and labor productivity growth more broadly to improve further this cycle. While the commercial use of genAI is still in its early days, its technological promise is bolstering the capital contribution to labor productivity while its potential speed of adoption could soon move the dial on TFP growth more discernibly.
- That said, recent economic policies provide cross-currents to the productivity outlook. A lighter regulatory environment should help businesses to focus more on their core operations. Yet, in the near term, the fluidity of trade policy stands to do the opposite, and higher trade barriers could discourage future efforts to enhance efficiencies. Meantime, the sharp slowdown in low-skill immigration could incite stronger capital investment, but the current environment may also deter high-skill immigration, which historically has been an out-sized source of technological innovation.
- The Congressional Budget Office projects nonfarm labor productivity growth to settle at an annual rate of 1.5% by 2030, essentially in-line with its 2010s average. We are more optimistic, and expect productivity to run closer to, if not slightly higher than, its historic trend of 2.1%. The firmer trend in productivity stands to counteract slower growth in the labor force and still keep the U.S. economy's potential rate of growth higher than it was in the cycle preceding the pandemic.

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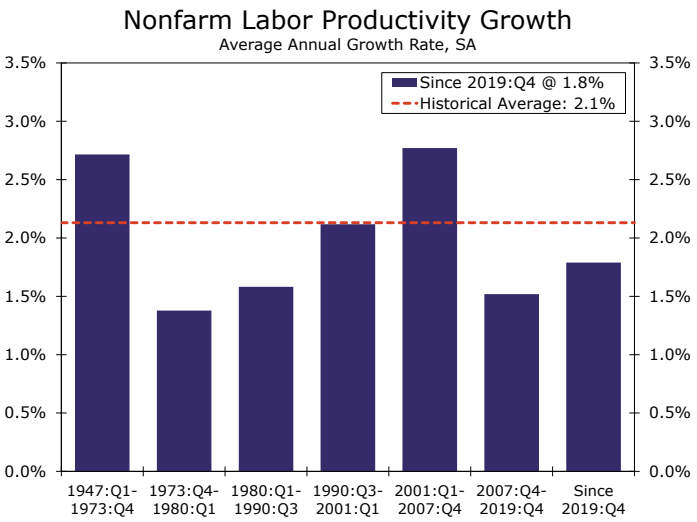
Give Me Some More of that Secret Sauce

The adage that productivity is the elixir of economic growth continues to ring true. An economy's potential output growth can be broken into two parts: labor productivity growth and labor force growth. With stricter immigration and population aging weighing on growth in the labor supply, strong labor productivity growth is all the more necessary to keep output growth solid. When workers are more productive, firms tend to enjoy increased profitability, which can provide them flexibility to absorb higher costs, reinvest in the business or lower selling prices. Solid productivity growth has contributed to inflationary pressures easing since the pandemic.

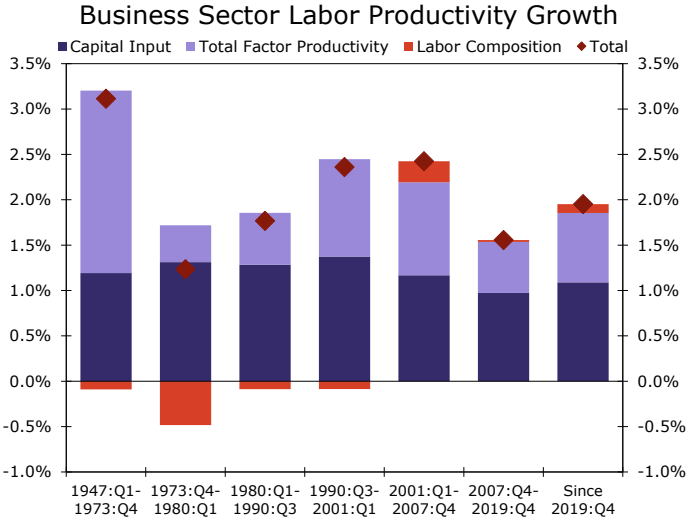
Labor productivity measures the efficiency of production and is calculated as output per hour worked. Productivity growth is typically noisy quarter-to-quarter, and this year has been more volatile than usual due to massive swings in trade flows distorting overall output growth. For instance, output per hour worked in the nonfarm business sector rose at a 2.4% annualized pace in the second quarter, bouncing back from a 1.8% annualized *decline* in the first quarter. Smoothing through the noise with a four-quarter moving average, nonfarm labor productivity was up 1.8% year-over-year in the second quarter, matching its average annualized pace since the end of 2019. At that pace, this cycle's run-rate is noticeably higher than the prior cycle's average of 1.5% and is closer to its historic average of 2.1% (Figure 1).

Figure 1



Source: U.S. Department of Labor and Wells Fargo Economics

Figure 2



Source: Federal Reserve Bank of San Francisco and Wells Fargo Economics

Three Key Ingredients

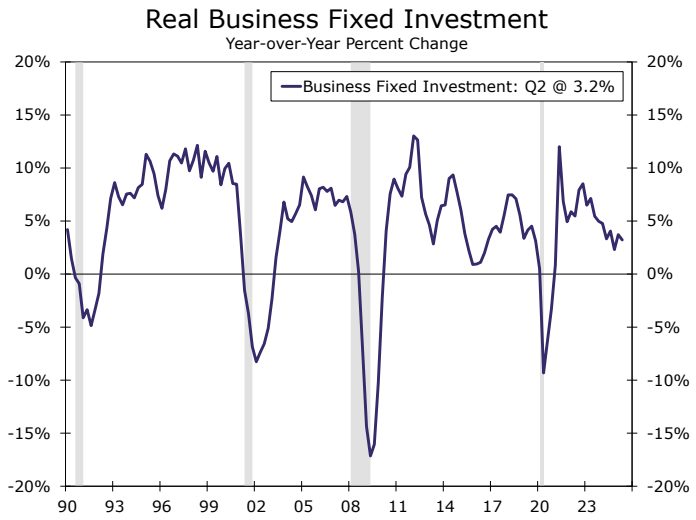
So what has been behind the solid trend in productivity recently? To frame the discussion, we decompose labor productivity growth into three broad categories: labor composition, capital input and total factor productivity (Figure 2). Labor composition reflects shifts in the skills and experience of the workforce and can be thought of as a measure of labor quality. Capital input reflects investment in tangible and intangible assets, less depreciation. This category essentially tracks the tools workers have at their disposal. Meantime, total factor productivity (TFP) is the portion of productivity not accounted for by labor and capital inputs. TFP can be viewed as a proxy for process improvements and other innovations that give workers *better* tools and methods for production.

Labor composition has had a small effect on productivity growth over the past few decades and is not a major driver of the recent rise. Data on age and education are used to proxy worker experience and skills, and while educational attainment has risen, sustained improvements in labor composition have been restrained by cyclicity.[1] Workers with less education and experience disproportionally lose jobs during recessions, which raises the average quality of the remaining workforce and translates to a short-term boost in labor composition. The boost is subsequently unwound during economic expansions as sidelined workers return to the workforce, thereby lowering the average quality of labor.

This dynamic was turbocharged during the pandemic, although an older, more experienced workforce has generated a modest lift to estimates of labor productivity in recent years.

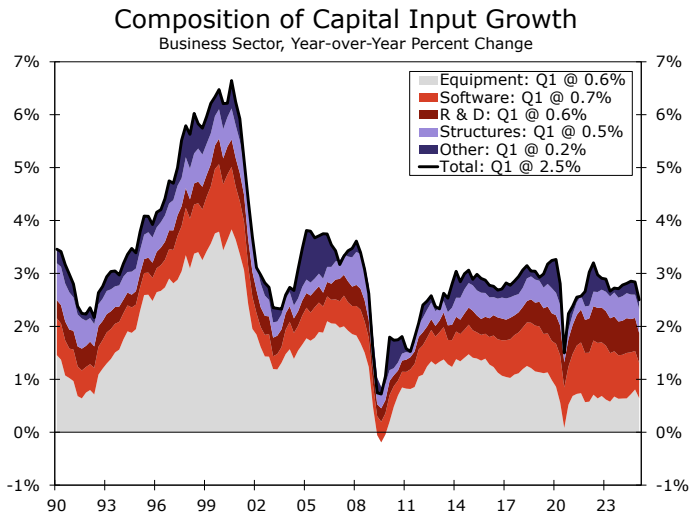
Unlike labor composition, capital deepening has been a steadfast source of productivity growth. Capital investment has contributed an average of 1.08 percentage points to labor productivity growth since the end of 2019, roughly on par with the 1.04 percentage point contribution in the cycle before the pandemic (revisit Figure 2). Although gross business fixed investment jumped following the pandemic lockdowns, elevated borrowing costs and economic uncertainty have weakened growth over the past few years (Figure 3), underpinning the roughly unchanged contribution from capital input in the cycle to date.

Figure 3



Source: U.S. Department of Commerce and Wells Fargo Economics

Figure 4



Source: Federal Reserve Bank of San Francisco and Wells Fargo Economics

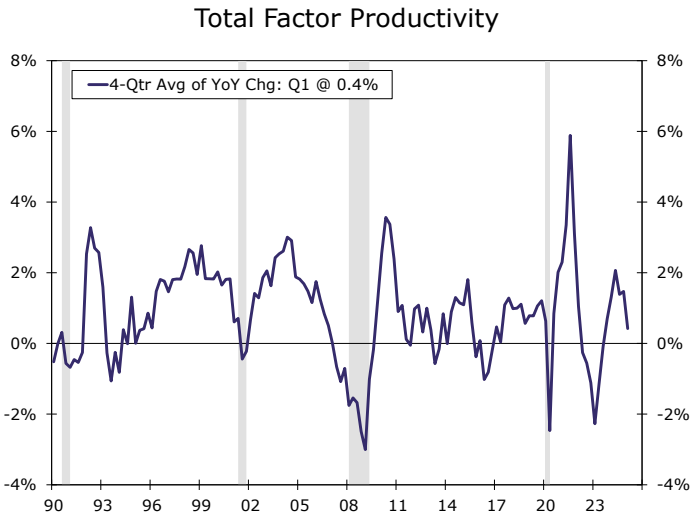
Even as the capital stock's contribution to labor productivity growth has moved sideways over the past decade, the composition of investment has shifted. Before the pandemic, capital investment was broad-based across equipment, software and research & development (Figure 4).[2] Today, business investment has pivoted away from equipment and more toward software and research & development. The shift reflects further diffusion of automation software and broadening experimentation with artificial intelligence. Investment in structures has also picked up. Federal government incentives have underpinned private construction of manufacturing facilities that will eventually produce “high-tech" equipment and components, such as computers and semiconductors, while at the same time, investment in data centers has boomed.

After accounting for the contributions from capital input and labor composition, faster growth in total factor productivity has been the differentiating factor behind stronger labor productivity growth this cycle (revisit Figure 2). Since the end of 2019, TFP has risen at a 0.7% average annualized pace, running a bit hotter than the prior cycle's average of 0.5% (Figure 5). Identifying the sources of TFP is inherently difficult, as the measure itself is computed as a residual and thus is not directly observable. That said, research has pointed to several potential TFP enhancers.

Some Sugar and Spice to Make TFP Nice

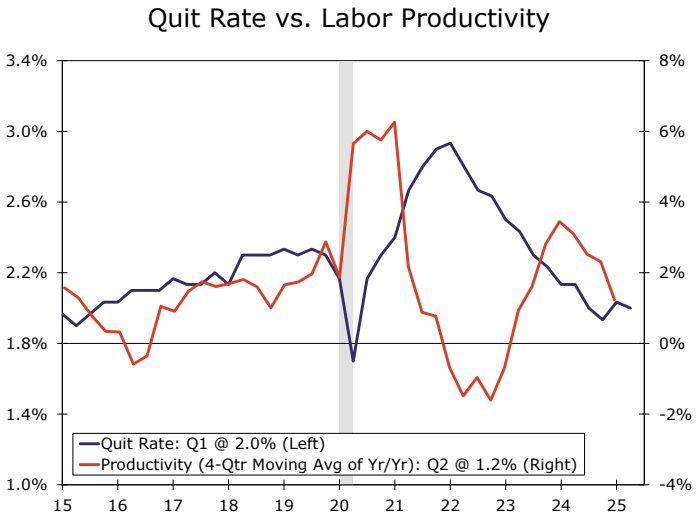
One prominent theory on stronger TFP growth this cycle centers around work-from-home. Roughly 27% of paid work days were worked remotely in July, up from 7% in 2019.[3] While the focus time afforded by working from home may help experienced employees work more efficiently, it can also make collaboration difficult.[4] Less experienced workers cannot as easily consult with co-workers or supervisors on issues when working remotely, which can stunt their productivity growth.[5] In short, the casual relationship between the rise in work-from-home and higher TFP growth since the pandemic remains contested.

Figure 5



Source: Federal Reserve Bank of San Francisco and Wells Fargo Economics

Figure 6

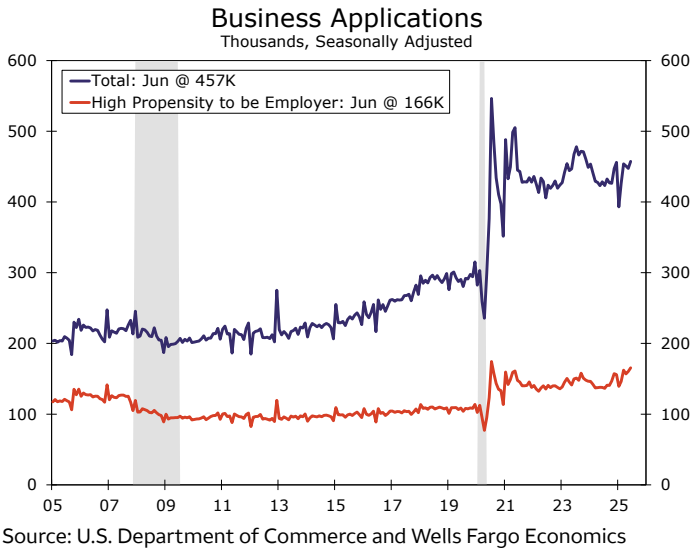


Source: U.S. Department of Labor and Wells Fargo Economics

Another theory points to the period of significant labor market churn in the wake of the pandemic. The quit rate soared to its highest on record in 2022 (3.0%), reflecting the droves of workers switching jobs in pursuit of higher wages and better skills matches. The broad reallocation of labor likely boosted TFP growth in subsequent years as employees brought fresh ideas to their new employers and employee effort improved with the more preferable job match. The recent normalization in the quit rate, however, suggests any lift to productivity from worker reallocation has likely run its course (Figure 6).

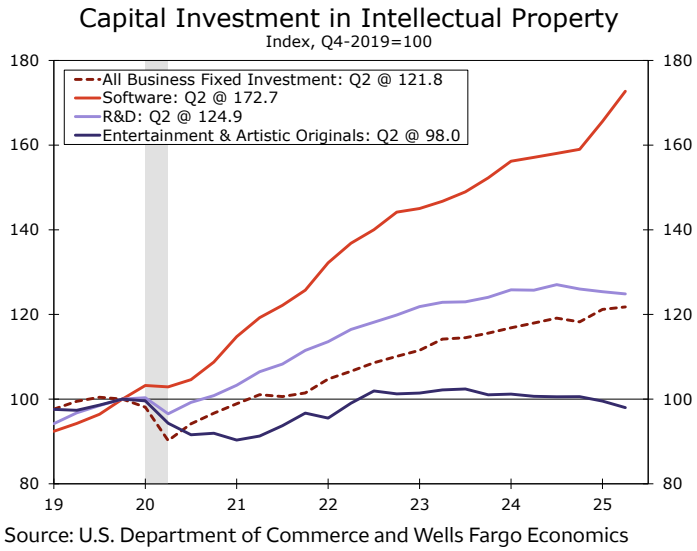
Another potential source is an increase in entrepreneurship since the pandemic. Applications for business formations jumped roughly 50% in the second half of 2020 from the same period in 2019 and are continuing to run well-ahead of pre-pandemic levels (Figure 7). The burst of new firms along with increased job-switching can help spur innovation within industries and increase dynamism across the economy.[6]

Figure 7



Source: U.S. Department of Commerce and Wells Fargo Economics

Figure 8



Source: U.S. Department of Commerce and Wells Fargo Economics

What about today's most gripping innovation of all—generative AI? While it is still early to see the effect on TFP growth, generative AI will likely play a more integral role in the coming years. Capital

investment in software and R&D has already strengthened amid broadening adoption (Figure 8), which has supported the capital input contribution to labor productivity growth. As workers learn to work with and gradually integrate generative AI into their processes, the second-order effect of today's capital deepening should be a rise in efficiency and other process improvements that manifest in TFP gains tomorrow.

Yet, there remains significant uncertainty on how long it will take AI to diffuse throughout the economy. The Census Bureau estimates just 9% of firms used AI in the production of goods or services in May, which is a far cry from widespread adoption.[7] Although that is a low starting point, we suspect the speed of AI adoption will be faster than that of personal computers and the internet, as the adoption cost associated with AI is generally low. Many office places already have the physical hardware needed and many workers have likely experimented with AI tools outside of work.[8]

Spread Too Thin?

As the tailwinds from generative AI continue to muster, the outlook for productivity growth remains positive, but momentum has somewhat dissipated this year due to other factors. The whipsawing of trade policy left many businesses scrambling to reconfigure production flows and delaying major investments amid elevated uncertainty. With more time allocated to defensive maneuvers and less time allocated to growth-enhancing activities, nonfarm labor productivity has been essentially unchanged since the end of 2024.

Should economic growth continue to moderate, the trend in productivity is unlikely to pick up meaningfully this year. Slower sales pose a particularly acute threat to small businesses who often operate on thin profit margins and are at greater risk of closure, which would unwind some of the lift from entrepreneurship since the pandemic. Other firms may hunker down rather than ramp up capital investment or launch new products and processes this year.

As economic activity improves in 2026 with less restrictive monetary policy and more stimulative fiscal policy, we expect labor productivity growth to edge higher again. Stronger growth is poised to bolster capital investment, which stands to benefit from deregulation as well; a less restrictive regulatory environment could enable businesses to focus resources on their primary areas of production. Improvement in the labor market could also rekindle job-switching.

The degree of improvement in the medium term remains uncertain with the countervailing forces of lower immigration and higher trade barriers. While a cut-off in low-skill immigration could force domestic businesses to invest more heavily in capital, the current environment could deter high-skill immigration as well, which would curtail knowledge spillover and innovation. Meantime, higher tariffs reduce foreign competition and weigh on the incentive for domestic firms to improve efficiency. That said, the manufacturing sector has a higher output per hour worked than most of the service sector, so faster growth in this industry than the broader economy could bolster overall productivity growth.

The Last Bite

The Congressional Budget Office projects nonfarm labor productivity growth to settle at an annual rate of 1.5% by 2030, essentially in-line with its pre-pandemic average. We are optimistic that productivity will run stronger than that— likely closer to, if not a bit higher than, its historic trend of 2.1%. Capital deepening has already gathered momentum this cycle and is likely to continue to intensify amid the diffusion of generative AI and re-shoring of "high-tech" production. We have less conviction on TFP, as the timing and degree of efficiency gains from AI remain uncertain. We are somewhat cautious in the near term given pandemic-related tailwinds have faded and policy cross-currents could dampen the jolt from AI. Even so, productivity growth a little over 2% would counteract slowing growth in the labor force and still keep potential output growth stronger than it was in the cycle preceding the pandemic.

Endnotes

1 - John Fernald, Huiyu Li, Brigid Meisenbacher, and Aren S. Yalcin. "Productivity During and Since the Pandemic." Federal Reserve Bank of San Francisco Economic Letter. November 2024. (Return)

2 - The Bureau of Economic Analysis categories research & development as a capital good because it treats such expenditures as investment that contributes to the future production and income generation of a business. (Return)

3 - See the U.S. Survey of Working Arrangements and Attitudes (SWAA). (Return)

4 - Jose Maria Barrero, Nicholas Bloom & Steven J. Davis. "Why Working From Home Will Stick," National Bureau of Economic Research Working Paper #28731. April 2021. (Return)

5 - Michael Gibbs, Friederike Mengel, and Christoph Siemroth. "Work from Home and Productivity: Evidence from Personnel and Analytics Data on Information Technology Professionals." Journal of Political Economy Microeconomics, Volume 1, Number 1. February 2023. (Return)

6 - Ryan Decker and John Haltiwanger. "Surging Business Formation in the Pandemic: Causes and Consequences?" Brookings Papers on Economic Activity. Fall 2023. (Return)

7 - See the Census Bureau's Business Trends and Outlook Survey (BTOS). (Return)

8 - Alexander Bick, Adam Blandin & David J. Deming. "The Rapid Adoption of Generative AI." National Bureau of Economic Research Working Paper #32966. September 2024. (Return)

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