Recent Trends in Productivity Growth

Prepared for the Federal Reserve Bank of New York
Economic Advisory Panel

Paula Campbell Roberts

APRIL 2026

Disclaimer

The views expressed in this presentation are the personal views of Paula Campbell Roberts of Kohlberg Kravis Roberts & Co. L.P. (together with its affiliates, "KKR") and do not necessarily reflect the views of KKR itself or any investment professional at KKR. This presentation is not research and should not be treated as research. This presentation does not represent valuation judgments with respect to any financial instrument, issuer, security or sector that may be described or referenced herein and does not represent a formal or official view of KKR. This presentation is not intended to, and does not, relate specifically to any investment strategy or product that KKR offers. It is being provided merely to provide a framework to assist in the implementation of an investor's own analysis and an investor's own views on the topic discussed herein.

The views expressed reflect the current views of Ms. Campbell Roberts as of the date hereof and neither Ms. Campbell Roberts nor KKR undertakes to advise you of any changes in the views expressed herein. References to "we", "us," and "our" refer to Ms. Campbell Roberts and/or KKR's Global Macro and Asset Allocation team, as context requires, and not of KKR. Opinions or statements regarding financial market trends are based on current market conditions and are subject to change without notice. References to a target portfolio and allocations of such a portfolio refer to a hypothetical allocation of assets and not an actual portfolio. The views expressed herein and discussion of any target portfolio or allocations may not be reflected in the strategies and products that KKR offers or invests, including strategies and products to which Ms. Campbell Roberts provides investment advice to or on behalf of KKR. It should not be assumed that Ms. Campbell Roberts has made or will make investment recommendations in the future that are consistent with the views expressed herein, or use any or all of the techniques or methods of analysis described herein in managing client or proprietary accounts. Further, Ms. Campbell Roberts y may make investment recommendations and KKR and its affiliates may have positions (long or short) or engage in securities transactions that are not consistent with the information and views expressed in this document.

This presentation has been prepared solely for informational purposes. The information contained herein is only as current as of the date indicated, and may be superseded by subsequent market events or for other reasons. Charts and graphs provided herein are for illustrative purposes only. The information in this presentation has been developed internally and/or obtained from sources believed to be reliable; however, neither KKR nor Ms. Campbell Roberts guarantees the accuracy, adequacy or completeness of such information. Nothing contained herein constitutes investment, legal, tax or other advice nor is it to be relied on in making an investment or other decision.

There can be no assurance that an investment strategy will be successful. Historic market trends are not reliable indicators of actual future market behavior or future performance of any particular investment which may differ materially, and should not be relied upon as such. Target allocations contained herein are subject to change. There is no assurance that the target allocations will be achieved, and actual allocations may be significantly different than that shown here. This presentation should not be viewed as a current or past recommendation or a solicitation of an offer to buy or sell any securities or to adopt any investment strategy.

The information in this presentation may contain projections or other forward-looking statements regarding future events, targets, forecasts or expectations regarding the strategies described herein, and is only current as of the date indicated. There is no assurance that such events or targets will be achieved, and may be significantly different from that shown here. The information in this presentation, including statements concerning financial market trends, is based on current market conditions, which will fluctuate and may be superseded by subsequent market events or for other reasons. Performance of all cited indices is calculated on a total return basis with dividends reinvested. The indices do not include any expenses, fees or charges and are unmanaged and should not be considered investments.

The investment strategy and themes discussed herein may be unsuitable for investors depending on their specific investment objectives and financial situation. Please note that changes in the rate of exchange of a currency may affect the value, price or income of an investment adversely.

Neither KKR nor Ms. Campbell Roberts assumes any duty to, nor undertakes to update forward looking statements. No representation or warranty, express or implied, is made or given by or on behalf of KKR, Ms. Campbell Roberts or any other person as to the accuracy and completeness or fairness of the information contained in this presentation, and no responsibility or liability is accepted for any such information. By accepting this presentation in its entirety, the recipient acknowledges its understanding and acceptance of the foregoing statement.

Key Discussion Points

- What is most interesting about recent improvements in US labor productivity growth are the **factors that are detracting**.

- Debates around the **productivity declines experienced post GFC** persist:
  - Secular stagnation: lack of investment (despite near zero interest rates) or demographics,
  - Zombie firms: Ultra-low rates kept unviable firms alive, misallocating capital and suppressing competitive pressure that drive productivity. Covid and the subsequent rate shocks flushed out some excess paving the way for more healthy business formation, but the proportion of listed firms unable to cover their interest expense remains elevated
  - 'Great innovations are behind us' e.g., electricity, plumbing, or internet
  - Mismeasurement.

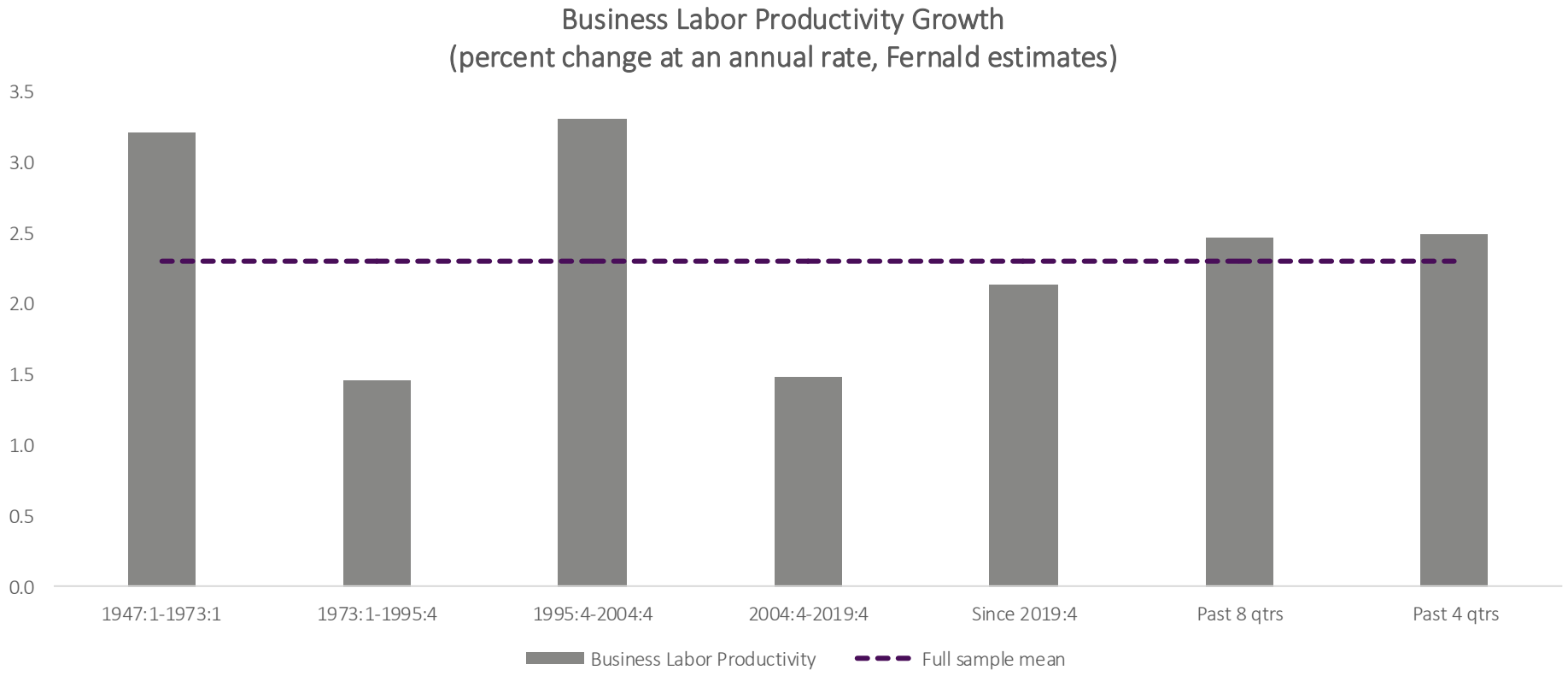
- The core drivers of the recent albeit modest improvements in productivity growth are a combination of significant increases in capex and modest increases in total factor productivity.
  - **Capital Input has significantly increased**. Classical industrial policy measures including the CHIPs Act (e.g., subsidies, tax credits) catalyzed ~$160bn in capital investments over 2 years. Manufacturing construction spending experienced 44% annualized growth with semiconductor and green energy manufacturing as the dominant drivers. The AI wave – a privately funded competitively driven supercycle has dwarfed the CHIPs effect. Estimates for AI spending in 2026 are up to $527bn. The open question is whether the revenue and productivity improvements materialize fast enough to service the debt.
  - **Labor Quality may represent a drag**. A lack of investment in worker retraining, mass Baby boomer retirements accelerated by Covid, constraints on immigration and labor force growth, as well as health crises have contributed to stagnation in labor quality. **AI impact is in early innings** and may not yet be a major, consistent contributor.

- Private Equity firms are using AI both internally as well as in their portfolio companies:
  - Internal: automating repetitive data heavy tasks across sourcing, due diligence, portfolio operations and risk management.
  - Portfolio companies: Firms are investing in power generation, data centers, supply chains, cybersecurity and are beginning to see EBITDA uplift from using AI to drive automation, digital transformation and efficiency improvements.

Note: We define zombie firms as firms whose interest coverage ratio falls below 1 for 3 or more consecutive years, meaning it cannot cover its interest payments from operating earnings alone, and is effectively dependent on inexpensive credit or asset sales to survive. Sources: Federal Reserve Bank of Boston, Peterson Institute, Goldman Sachs.

Despite Recent Downward Revisions Estimates for Annual Labor Productivity Growth Remain Modest But Solid

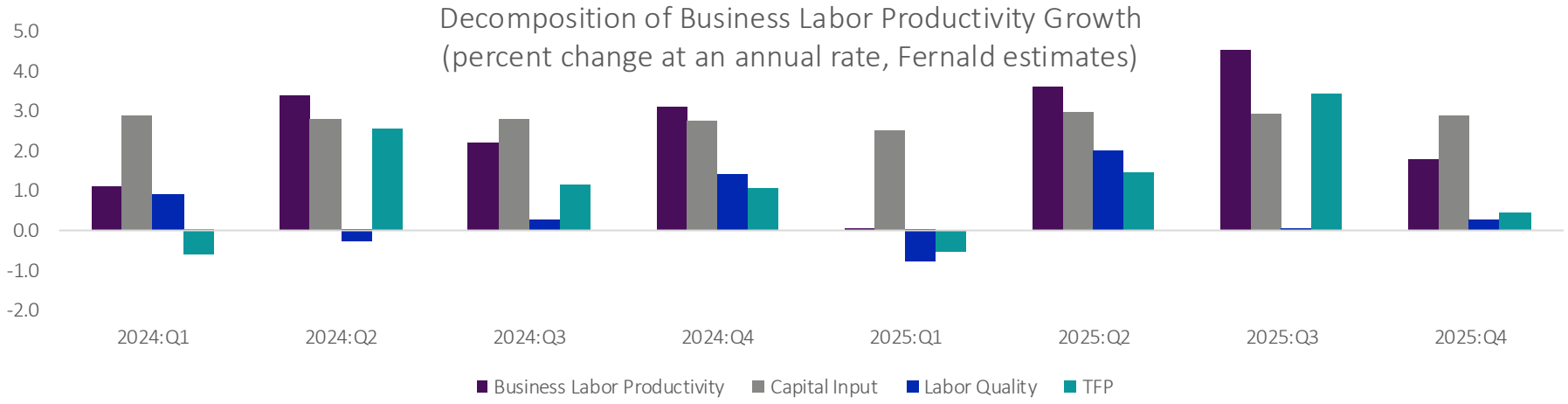
Using output measures of both the BLS and Fernald's utilization adjusted measure, the data shows some improvement in productivity – from 2.2% to 2.6% from 2024 to 2025 for BLS, and from 2.6% to 2.7% in the Fernald estimates over the same period.

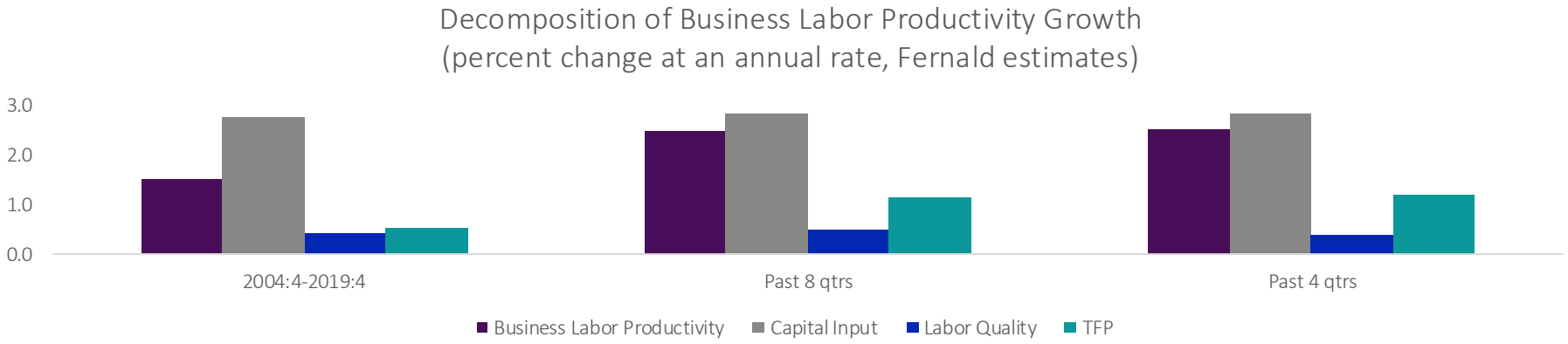


Note: All variables are percent change at an annual rate (=400 * change in natural log). Produced on March 24, 2026 10:07 AM. Source: San Francisco Fed, John G. Fernald, "A Quarterly, Utilization-Adjusted Series on Total Factor Productivity." FRBSF Working Paper 2012-19. . the dataset implements an adjustment for variations in factor utilization—labor effort and the workweek of capital.

The Combination of Improvements to Capital Input and TFP Are Driving Recent Surges in Labor Productivity Growth

Productivity is driven by capital deepening, labor quality and total factor productivity e.g., technology, efficiency, organization – and includes AI. Recent productivity gains must be understood through this decomposition – not in aggregate alone. ΔLabor Productivity = ΔCapital Deepening + ΔLabor Quality + ΔTFP.





Source: San Francisco Fed, John G. Fernald, "A Quarterly, Utilization-Adjusted Series on Total Factor Productivity;" Note: Fernald adjusts Total Factor Productivity (TFP) for utilization to isolate true technological change from cyclical fluctuations in factor intensity, such as changes in worker effort or capital workweek. This approach removes the downward bias during recessions where unadjusted TFP falls simply because inputs are used less intensely, not because technology decreased. Authors calculations.

Labor Quality Has Been Stagnant

We see evidence of deterioration in the human capital contribution to productivity. Labor quality is no longer a neutral contributor, but a constraint.

Skills Mismatch

- According to McKinsey, 40% of U.S. workers report skills misalignment. Automation is displacing middle-skill jobs.
- Many companies remain in a "low hire-low fire", now "low-hire-fire" mode of operation.

Health & Opioid Crisis

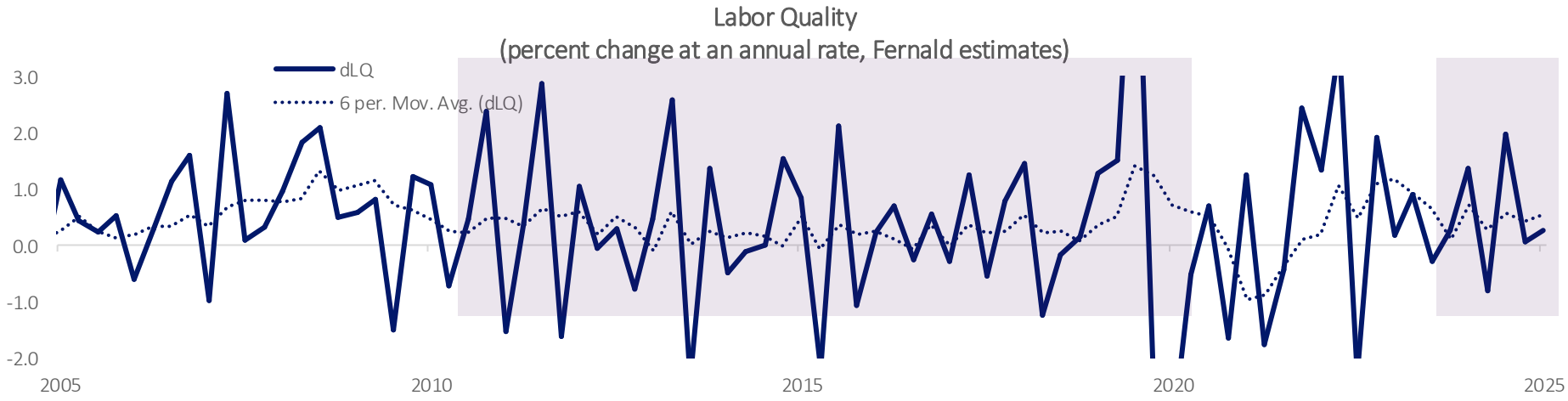
- The health and opioid crisis is reducing effective labor supply.
- Princeton economists (Case & Deaton) link opioid epidemic to 30% of male LFPR decline. Mental health costs employers $1T/yr globally (WHO).

Baby Boomer Retirement

- We are losing experienced workers via early retirement.
- Pre-covid, the US averaged 1MM retirees per year. In 2020, 3.5 million retired.

Declining Firm-Sponsored Training

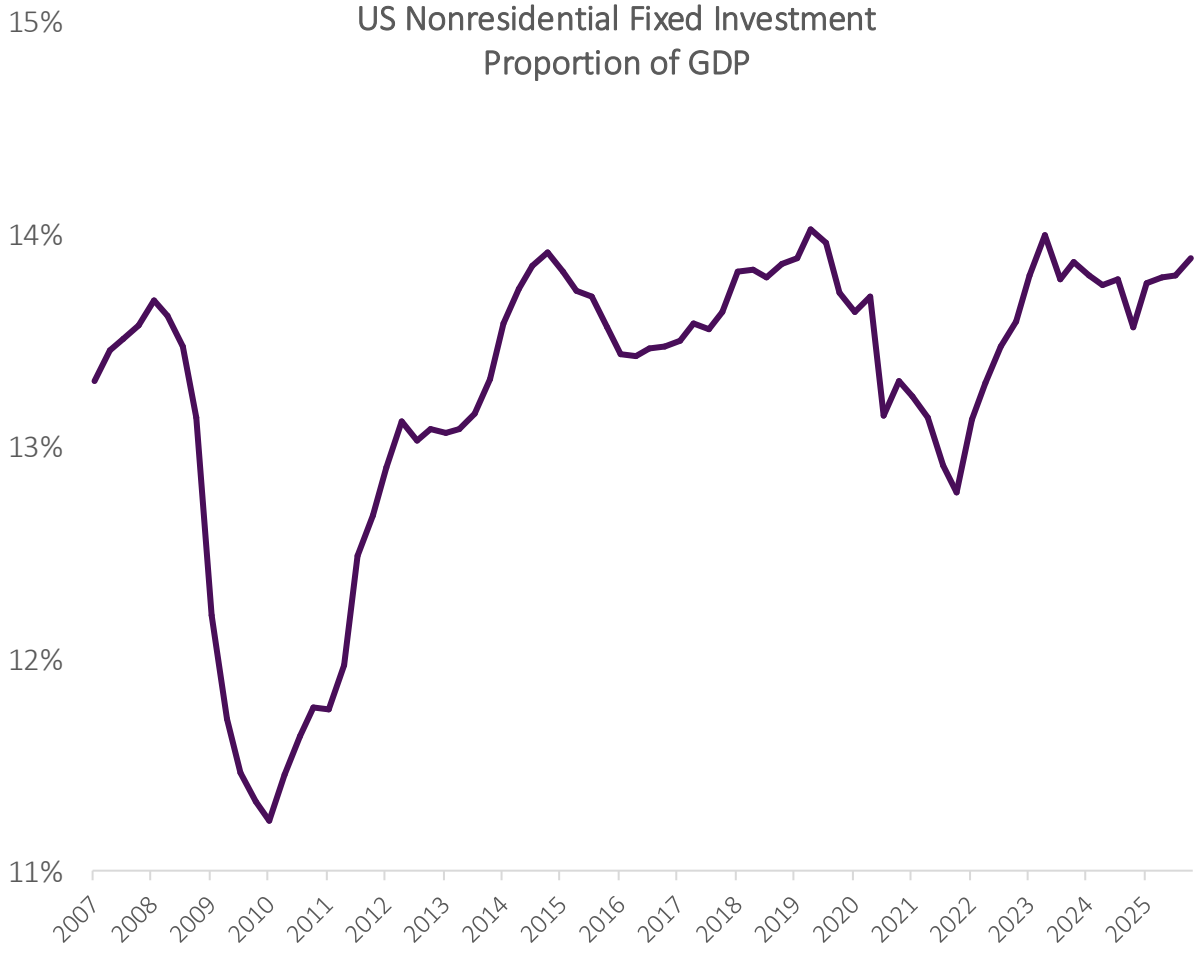
- According to NBER firm-sponsored training fell sharply as labor turnover rose. Gig economy expansion may have exacerbated under-investment in worker development.



Sources: McKinsey Global Institute, Acemoglu & Restrepo (2018), Case & Deaton (2020), NAEP 2022, NBER, Federal Reserve, Pew Research Center, : San Francisco Fed, John G. Fernald, "A Quarterly, Utilization-Adjusted Series on Total Factor Productivity." FRBSF Working Paper 2012-19.

Capital Investment Has Reaccelerated Sharply

Intangible and tech investment now represent ~45% of capex vs 25% pre-GFC.



KEY STRUCTURAL SHIFTS

Post-GFC Retrenchment

- CapEx fell as credit tightened
- Sluggish recovery despite near-zero rates.
- Secular stagnation debate intensified.

Tax Reform (2017)

- The Tax Cuts and Jobs Act cut the corporate tax rate from 35% to 21% and introduced 100% bonus depreciation.

Covid (2020)

- Firms hoarded cash as consumer and business demand cratered and supply chains collapsed and oil price declines

Fiscal Stimulus (2022 -)

- Inflation Reduction Act and CHIPS and Science Act trigger capex in manufacturing, construction, clean energy and semiconductor production.

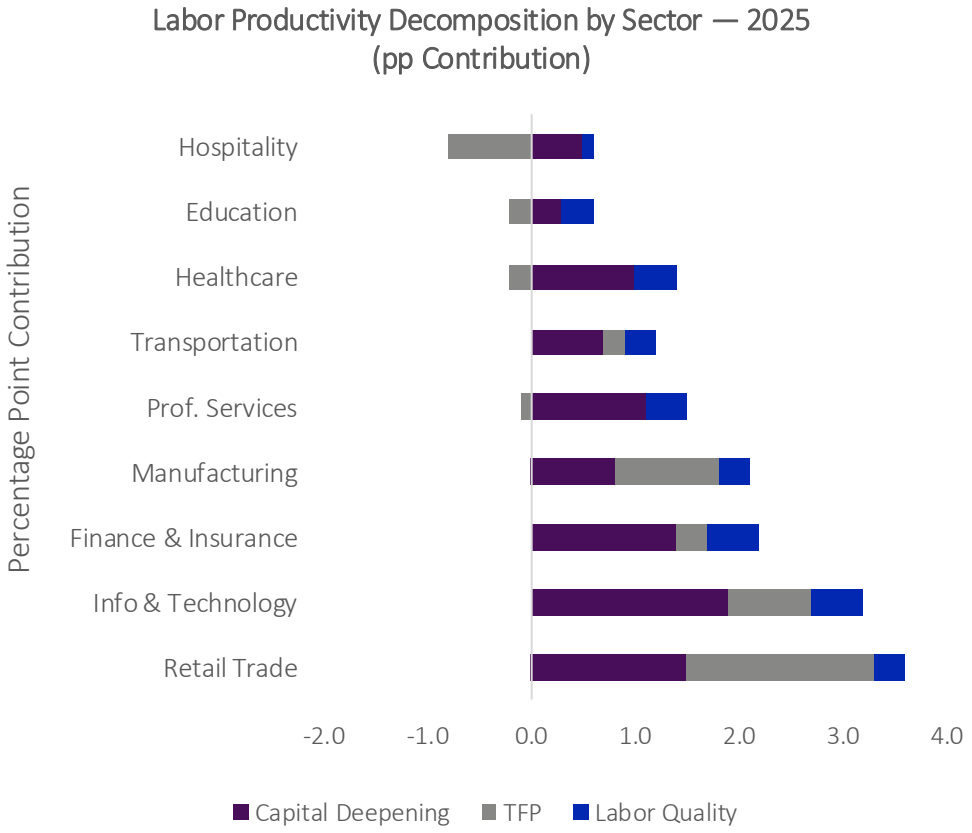
AI Investment (2023 -)

- 2023-2026 Massive increase in AI data center buildout. Intangible & tech-related investment now represents ~45% of total capex vs ~25% pre-GFC.

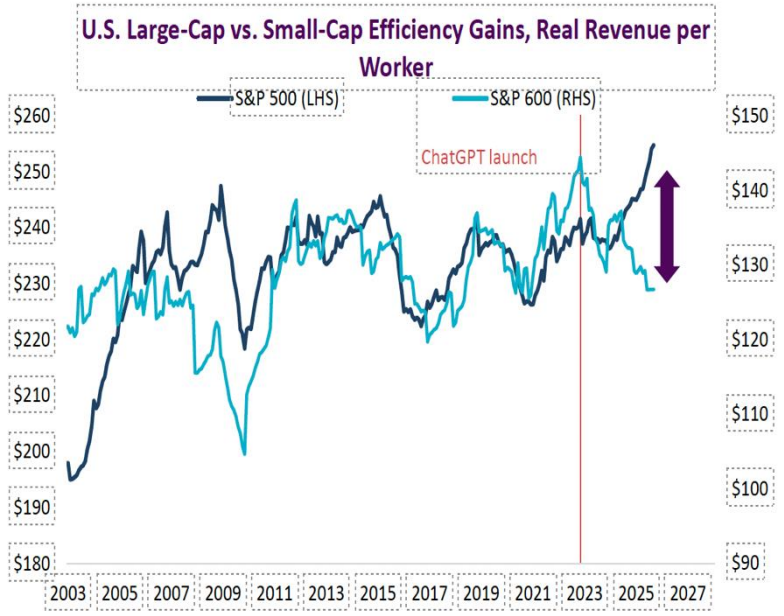
Source: U.S. Bureau of Economic Analysis, Haver Analytics.

AI Investment Is High, But Broad-Based Deployment Outside of Large Cap Firms Is Low

According to Wells Fargo analysis, AI has significantly widened the productivity gap between large-cap companies and small-cap companies with productivity for the S&P500 soaring by 5.5% while it has declined by 12.3% for the Russell 2000.



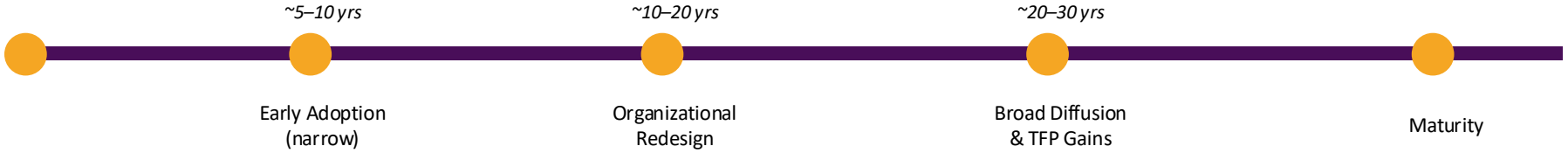
KKR's US Macro Team Highlights the Divergence Between Worker Efficiency in the S&P500 versus the S&P600



Left hand chart: Source: Bureau of Labor Statistics Total Factor Productivity 2025.
Right hand chart: Data as of September 30, 2025. Source: Wells Fargo Securities, Factset.

AI and the TFP J-Curve: History Suggests We Have A Few More Years Before We Witness True AI-Driven Transformation

Historical General Purpose Technology Diffusion Pattern



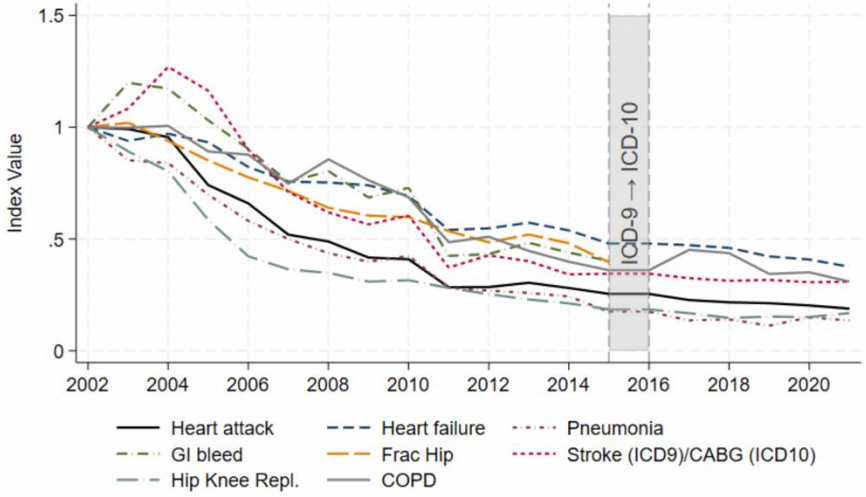
Technology	Invention	Broad TFP Impact	Lag (yrs)	Mechanism
• **Steam Engine**	1769	1820–1850	~50–80	Factory system, transport
• **Electricity**	1880s	1910–1940	~25–50	Motor system, factory layout
• **ICT / Internet**	1970s–80s	1995–2005	~15–25	Process reengineering, e-comm
• **Generative AI**	2017–22	2028–35 (projected)	~7–15?	Knowledge work automation

Sources: Bresnahan & Trajtenberg (1995) RAND JE | David (1990) AER 'Dynamo & Computer' | Brynjolfsson, Rock & Syverson (2021) 'The Productivity J-Curve'

Measurement and Misinterpretation: Are We Underestimating Productivity?

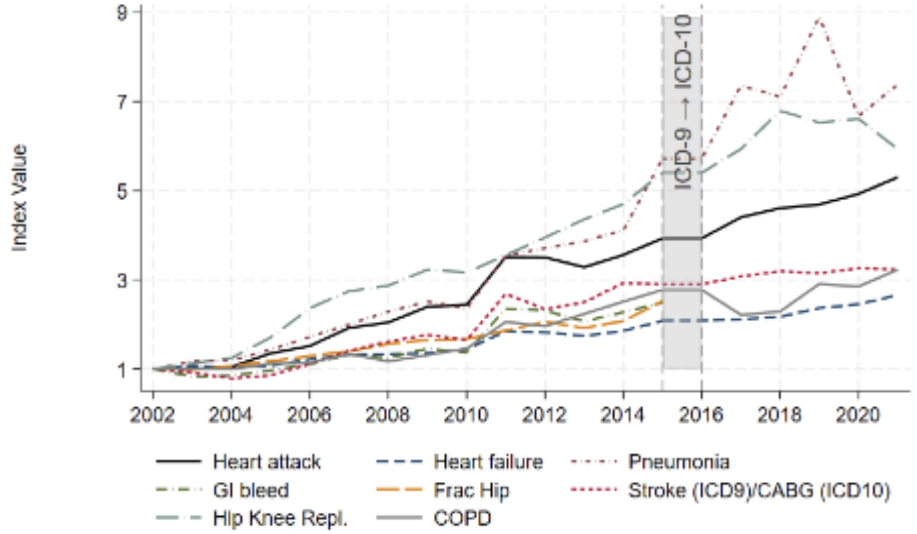
A recent study posits that healthcare productivity gains are closer to 7.5% for a broad set of conditions, given declines in quality adjusted cost and improvements in post-treatment quality of life and longevity. AI outputs (intangibles, time savings) are poorly captured in GDP. While we may have always mismeasured productivity, it is worth noting that true TFP may be higher than measured – especially in services.

Figure 5. Quality-Adjusted Cost Index Adjusted With Change in Lifetime QALY ($VQALY 100,000), 2002–2015 (ICD-9) and 2016–2021 (ICD-10)



Notes: This figure shows chained index applying the risk-adjusted cost index. The figure shows the pre-2015 indexes (left

Figure 6. Quality-Adjusted Productivity Index Adjusted With Change in Lifetime QALY ($VQALY 100,000), 2002–2015 (ICD-9) and 2016–2021 (ICD-10)



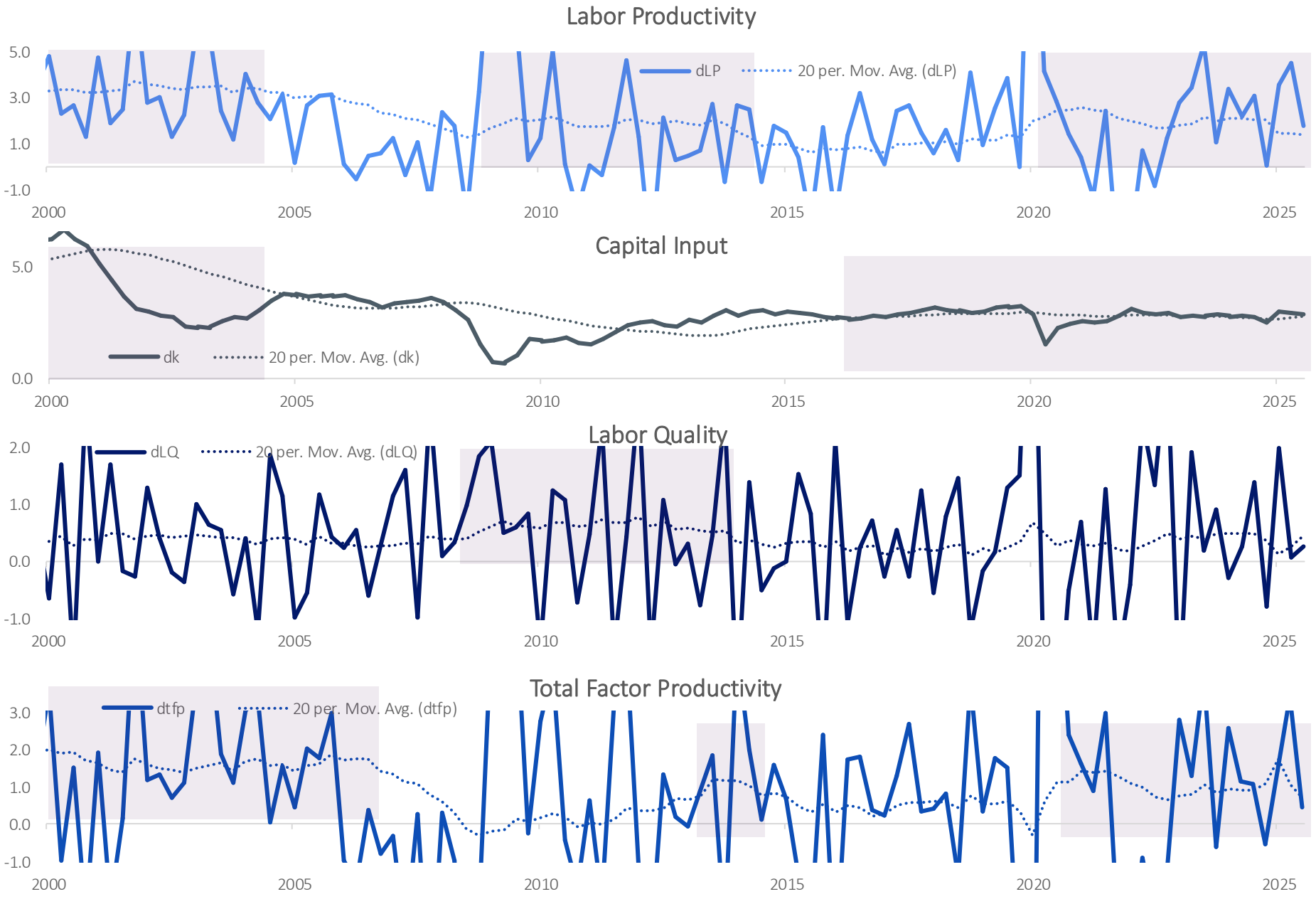
Source: Quantifying Productivity Growth in Medical Care: 20 Years of Evidence from Nine Health Conditions, Calvin Ackley, Abe Dunn, U.S. Bureau of Economic Analysis, and John A. Romley, University of Southern California, BEA Working Paper Series, WP2026-5

Additional Discussion Points/ Outstanding Questions

- Recent productivity improvements appear to be led by capital and modest gains in efficiency
- Labor is a constraint. Weak labor quality and weak demographics limit upside.
- AI is a future TFP story. We are investing significantly today, but broad productivity gains are likely delayed.
- What conditions are required for AI to transition from capital deepening to sustained TFP growth?
  - Diffusion across firms?
  - Labor reallocation and reskilling?
  - Organizational redesign?
  - Measurement improvements?
- How do we incentivize market participants to reinvest in labor? What is the backup plan?

APPENDIX

Decomposition of Labor Productivity



Source: San Francisco Fed, John G. Fernald, "A Quarterly, Utilization-Adjusted Series on Total Factor Productivity." FRBSF Working Paper 2012-19.