

*Brief*

# THE PRODUCTIVITY SLUMP: A SUMMARY OF THE EVIDENCE

August 2016

**By Karim Foda**

Senior Research Associate  
Global Economy and Development  
at the Brookings Institution

This brief is part of a project on the “Great Paradox” of technological change, stalled productivity growth, and inequality being undertaken jointly by the Global Economy and Development Program at Brookings and the Chumir Foundation for Ethics in Leadership. The author thanks Zia Qureshi and Kemal Dervis for helpful comments and edits.

Technology, especially information and communication technology (ICT), is advancing rapidly and optimism in Silicon Valley is unbounded, yet, paradoxically, productivity growth is slowing down. The first step in understanding this “productivity paradox” is to establish the evidence. A close look at productivity trends over the last two decades reveals four key findings.

First, productivity growth has slowed in the past decade in both advanced and emerging market and developing (EMDEV) economies. Second, both total factor productivity (TFP) and labor productivity growth have declined appreciably, although the latter has held up relatively better in EMDEV economies due to higher investment rates and increases in capital intensity. Third, the productivity slowdown is not limited to a few sectors but is widespread across economies, spanning both service and manufacturing industries. Fourth, the slowdown in advanced economies predates the financial crisis, suggesting that it is more than a cyclical phenomenon. In the U.S., TFP and labor productivity growth temporarily peaked in 2004 while the decline in many European economies began even earlier. The productivity slowdown in most EMDEV economies began in the wake of the financial crisis and has continued since.

This note summarizes the major trends in TFP and labor productivity growth since 1990, with a particular focus on advanced economies (U.S., Japan, and Europe<sup>1</sup>) and select major emerging market economies.

### *Global overview*

Figure 1 reveals a global slowdown in TFP growth over the past decade while labor productivity growth is shown to have held up better, reflecting increased capital intensity in EMDEV economies. Across both measures, productivity growth peaked in 2004 in advanced economies and in 2007 in EMDEV economies. The slowdown in TFP since then has persisted across both groups of economies.

In advanced economies, TFP and labor productivity growth experienced a *rise* and then a *fall* in the post-1990 period. The *fall* in average productivity growth after 2004 yields a notably slower pace of growth than before the more modest *rise* that took place between 1996 and 2004 (Figure 2).

This holds for TFP and for both measures of labor productivity: output per hour worked and output per person employed. Average TFP growth slowed to 0.1 percent in the decade after 2004, well below the 0.6 percent pace prior to the 1996-2004 period when TFP growth accelerated.<sup>2</sup> Using periods that roughly align with breaks in U.S. productivity growth, labor productivity across advanced economies is growing at its slowest pace since 1950.<sup>3</sup>

The *rise and fall* pattern in productivity growth is primarily due to the U.S. while the sharp *fall* relative to the more modest *rise* is mainly due to Europe and other advanced economies (Figure 2). The latter economies did not benefit as strongly as the U.S. did from the ICT boom during 1996-2004. Rather, they experienced a more consistent slowdown after the early 1990s. This makes the aggregate *rise* from 1990-

---

<sup>1</sup> Advanced European economies as defined by the IMF.

<sup>2</sup> Productivity growth fluctuated between 1.3 and -1 percent since 1990, excluding 2009 and 2010.

<sup>3</sup> Output per hour worked. OECD (2015) and evident in data using time periods based on U.S. structural breaks estimated by Fernald (2014).

1995 to 1996-2004 appear modest and the subsequent *fall* from 1996-2004 to 2005-2014 appear relatively more pronounced.

In EMDEV economies, TFP and labor productivity growth also experienced a *rise and fall* pattern in the post-1990 period, though with three notable differences relative to advanced economies. First, taking a pre- versus post-global financial crisis view for EMDEV economies better reflects the economic cycle in this group given their peak in 2007. It also groups the impact of the East Asian and Russian crises into the 1990s decade when growth was relatively low (Figures 1 and 4). Using the same periods for advanced economies does not significantly change their story, though it would mask the fact that their TFP and labor productivity growth peaked earlier.

Second, the magnitude of the acceleration of TFP growth in 2000-2007 was especially strong and led by China.<sup>4</sup> The fall after 2007 brought average TFP growth back to where it was in the 1990s at 0.1 percent. Though the average pace since 2008 is as slow as that of advanced economies, TFP growth in EMDEVs since 2012 has been slower (and negative) than TFP growth in advanced economies despite faster GDP growth.

Third, unlike TFP growth, labor productivity growth in EMDEVs slowed down to a level higher than in the 1990s. Since 2012, labor productivity growth in EMDEV economies has increased due to higher investment rates and capital deepening. The stronger and continuing decline in TFP reflects weaknesses in embodying advances in knowledge and technology into production processes, as it is such technical progress that primarily drives growth in TFP.

In the aggregate, broad patterns in TFP and labor productivity growth have been similar between advanced economies and EMDEVs. A closer look, however, reveals more diversity at the country level over the last two decades.

#### *Diversity across countries*

Among advanced economies, the *rise and fall* of productivity growth since 1990 is mostly evident in the U.S. where the benefits of the ICT boom appear to have been the greatest. After this boom period from 1996-2004, the average pace of TFP growth in the U.S. has been positive yet slower than before the ICT boom and declining. Since 2013, TFP growth has hovered around zero. Meanwhile, labor productivity growth in the U.S. also fell to an average pace slower than what it had been before the rise (Figure 2).

The story in Europe is different in some ways. Across Europe, average TFP and labor productivity growth is notably lower than at the start of the 1990s. Led primarily by Germany, average productivity growth in the early 1990s was rapid but has since declined consistently (Figures 2 and 3). Less evident in Europe is an acceleration of productivity growth between 1996 and 2004 related to the ICT boom. The U.K. and France are slightly different, where productivity growth held up, or slightly improved, until the mid-2000s before joining the slowdown.

---

<sup>4</sup> Based on Conference Board data from official statistics. The Conference Board publishes a revised series for China based on different estimates of Chinese output (see Box 1).

Interestingly, Japan follows somewhat different patterns depending on the measure of productivity. Average TFP growth holds largely steady after 1990 before decelerating in the past decade. Labor productivity growth in terms of output per person employed follows the overall *rise and fall* pattern in the post-1990 period while growth in output per hour worked declines steadily.

A select group of EMDEV economies also reveal a *rise and fall* pattern on aggregate, although this also masks much variation by country. China leads the overall group in driving this pattern,<sup>5</sup> with TFP growth falling to levels slightly higher than in the 1990s after a rapid acceleration in 2000-2007 (Figure 4). India's TFP growth accelerates more modestly in 2000-2007 and then roughly holds steady after 2008. Labor productivity growth in India rises steadily from 1990 through 2014, reflecting increased investment and sustained output growth. In Mexico and Brazil, TFP growth declined and was negative over the past decade, while labor productivity rose modestly in Brazil.

A study by Ferreira et al. (2010) finds that breaks in TFP growth rates have been much more diverse in terms of timing in EMDEV economies than in advanced economies. Over the last few years, however, the slowdown in TFP growth has been common across these economies, similar to the picture in advanced economies.

#### *A sectoral view*

The observed productivity slowdown is not only widely distributed across countries, but also across sectors. Evidence on sectoral TFP growth in advanced economies reveals the slowdown's broad-based nature. For example, Figure 5 shows that about two-thirds of all industries in the U.S. experienced a decline in TFP growth from 2005-2013 relative to 1996-2004. By contrast, two-thirds of all industries experienced a rise in TFP growth from 1996-2004 relative to the prior period 1988-1995. Though the acceleration in aggregate U.S. TFP growth in 1996-2004 was led by the ICT boom, a majority of industries in the U.S. experienced a *rise* in TFP growth in 1996-2004 followed by a *fall*.

Based on IMF analysis of industry-level productivity data across advanced economies before the crisis,<sup>6</sup> structural shifts of employment from higher productivity to lower productivity sectors have been common across these economies. Rising shares of employment have occurred in personal, non-market and business services sectors where TFP growth declined, while employment has decreased in ICT goods and services industries where TFP growth increased and led all other sectors from 2000-2007.<sup>7</sup>

Although service industries are dominant and account for more than three-quarters of the total labor share in advanced economies,<sup>8</sup> the slowdown in TFP growth goes well beyond services. More than three-quarters of manufacturing industries in the U.S. have experienced a decline in TFP growth. Across all industries, the largest declines occurred in manufacturing industries (Figure 5).

---

<sup>5</sup> See Footnote 5.

<sup>6</sup> IMF (2015). Data from EU KLEMS and World KLEMS databases.

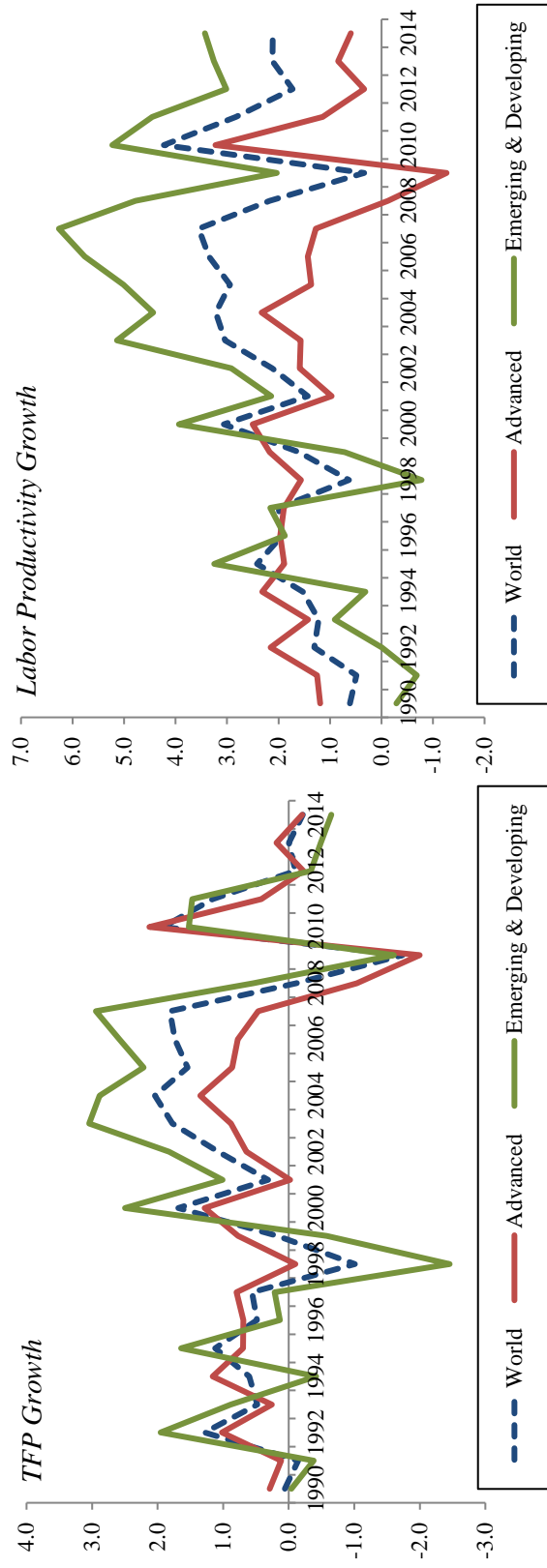
<sup>7</sup> In the U.S., TFP growth in these sectors began to slow in 2004. TFP growth also began to slow down prior to the crisis in distribution services, construction, real estate and extractive industries across advanced economies.

<sup>8</sup> IMF (2015).

## *Conclusion*

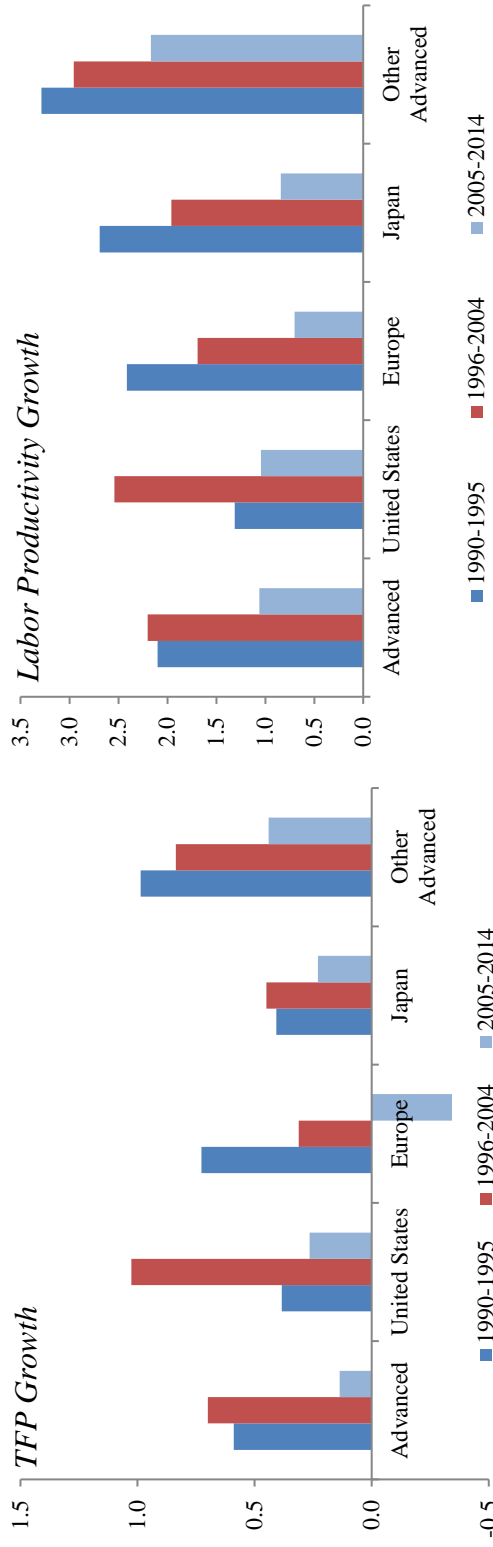
The evidence confirms a widespread and broad-based slowdown in TFP and labor productivity growth over the past decade or so. With the evidence established, what sense can we make of this slowdown and what does it mean for future growth? What are the drivers that help explain the paradox of slowing productivity while advances in ICT continue apace? A thorough understanding of this paradox and its causes and consequences can help direct appropriate policies to support the ultimate objective of sustainable and inclusive growth.

**Figure 1. Global overview of productivity growth**

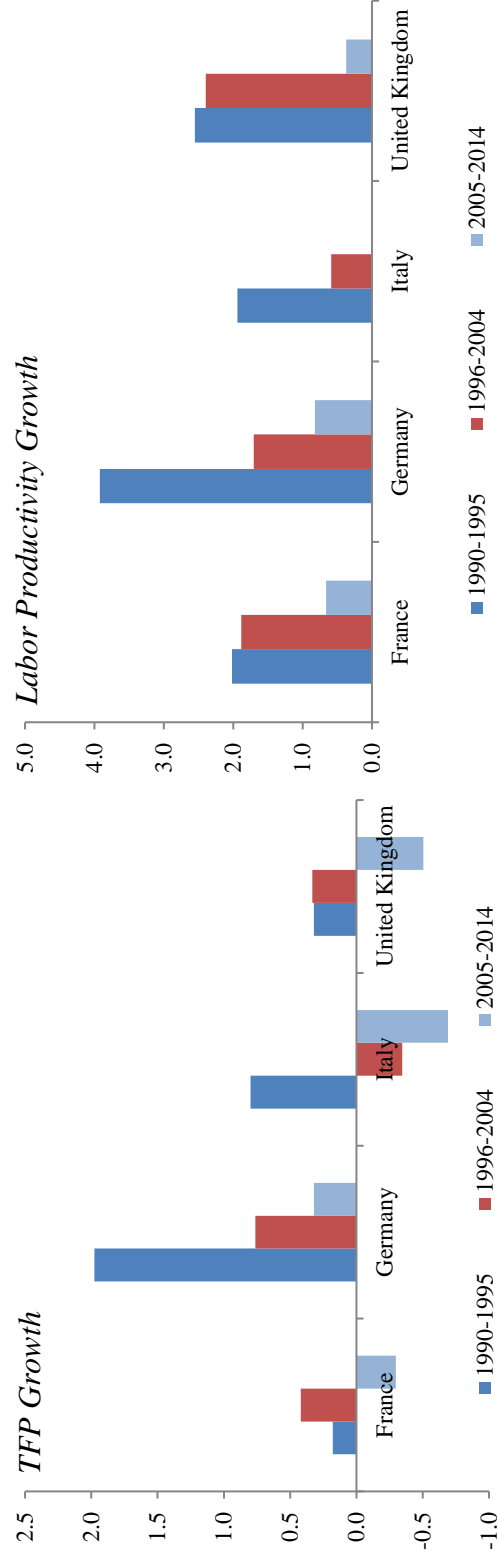


Notes: All figures in percent. Labor productivity in terms of output per person employed. Groups aggregated by The Conference Board.

**Figure 2. Productivity growth in advanced economies**

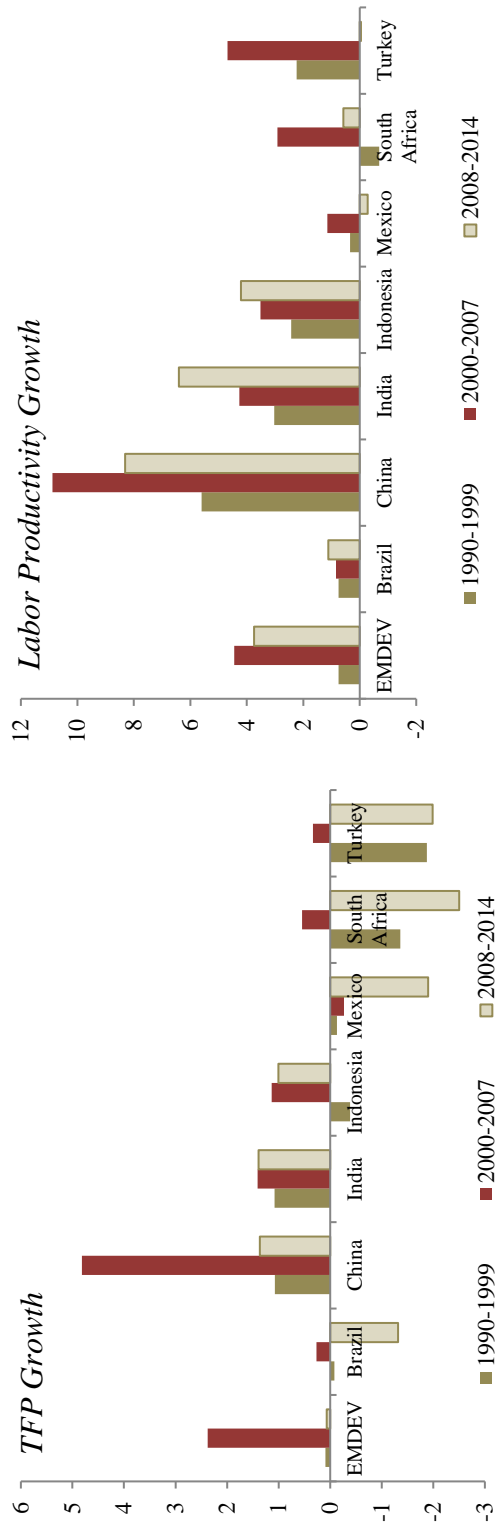


**Figure 3. Productivity Growth in Europe**



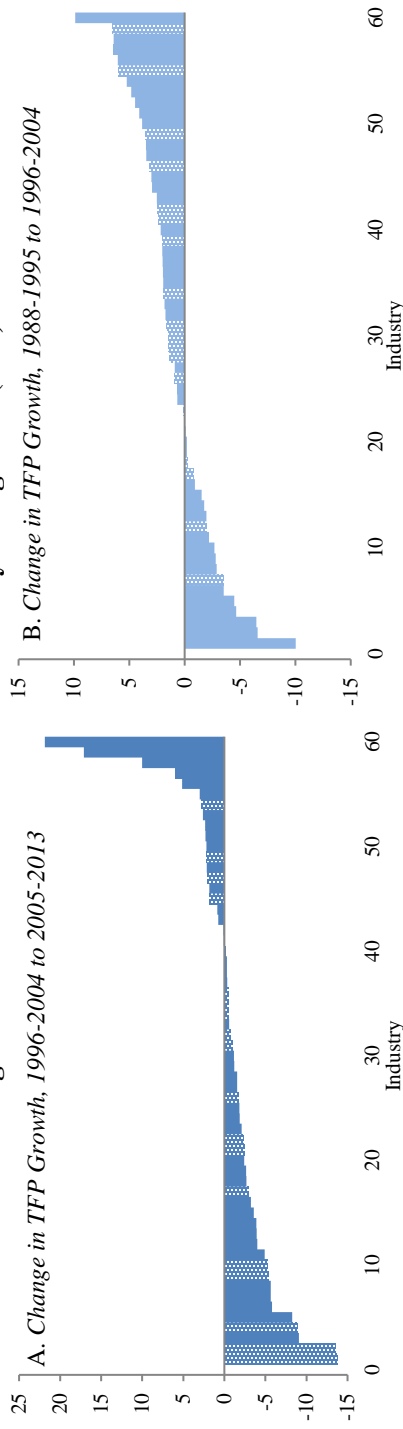
Notes: All figures in percent. Labor productivity in terms of output per hour. Europe consists of advanced European economies as defined by IMF, Other Advanced consists of remaining advanced economies as defined by IMF, aggregated by share of GDP at PPP.

**Figure 4. Productivity growth in emerging market & developing (EMDEV) economies**



Notes: All figures in percent. Labor productivity in terms output per person employed. EMDEV includes all emerging and developing economies. Data for China will be revised by The Conference Board in September 2016, using new estimates of Chinese output.

**Figure 5. A broad-based decline in industry TFP growth (U.S.)**



Notes: Lighter shade bars indicate manufacturing industries. Panel A recreated from Byrne, Fernald and Reinsdorf (2016), data from Bureau of Economic Analysis. Industries ranked by change in average value-added TFP growth between both periods. Industries with largest positive acceleration in 2005-2013 relative to 1996-2004 (Panel A) are (i) funds and trusts, (ii) water transport and (iii) oil and gas mining. Industries with the largest negative deceleration in the same period are (i) petroleum and coal products and (ii) computer and electronic products.



## References

Aeppel, Timothy. 2015. "Silicon Valley Doesn't Believe U.S. Productivity Is Down". Wall Street Journal. July 16.

Byrne, David, John Fernald and Marshall Reinsdorf. 2016. "Does the United States have a productivity slowdown or a measurement problem?" Brookings Papers on Economic Activity. March.

De Vries, Klaus and Abdul Azeez Erumban. 2015. "Total Economy Database: Sources & Methods". The Conference Board. August.

Eichengreen, Barry, Donghyun Park and Kwanho Shin. 2015. "The Global Productivity Slump: Common and Country-Specific Factors". NBER Working Paper 21556. September.

Fernald, John. 2014. "Productivity and Potential Output Before, During and After the Great Recession". NBER Working Paper 20248. June.

Ferreira, Pablo, Antonio Galvao, Fabio Reis Gomez and Samuel Pessoa. 2010. "The Effects of External and Internal Shocks on Total Factor Productivity." Unpublished manuscript, Getulio Vargas Foundation. Cited in Eichengreen et al. (2015).

IMF. 2015. "The New Normal: A Sector-Level Perspective on Growth and Productivity Trends in Advanced Economies." IMF. March.

OECD. 2015. *The Future of Productivity*. OECD.