THE MYSTERY OF LOW PRODUCTIVITY GROWTH IN EUROPE:
DEVELOPMENTS IN THE POST-CRISIS ERA

ROMAIN DUVAL

ADVISOR TO THE CHIEF ECONOMIST AND HEAD OF STRUCTURAL REFORMS UNIT
IMF RESEARCH DEPARTMENT

NATIONAL BANK OF POLAND, WARSAW
OCTOBER 26TH 2018
The productivity slowdown debate

• Productivity slowdown in advanced economies:
  o Started around late 1960s
  o Small transitory reversal during 1990s followed by renewed slowdown since early 2000s
  o Further slowdown following the global financial crisis (GFC)

• Productivity slowdown debate in a nutshell:
  o Has innovation slowed? Temporary or permanent? (techno-pessimists vs. techno-optimists)
  o Has diffusion slowed?
  o If so why? Role of market structure (winner-takes-all dynamics), skills deficiencies and mismatches, insufficient labor and product market reforms...in presence of disruptive ICT-related technological change

• Problem: these are all slow-moving forces ➔ better at explaining trend/pre-GFC slowdown
  o Post-GFC productivity slowdown too abrupt, large and persistent to reflect only slow-moving forces dragging on innovation or diffusion ➔ Additional role of the crisis itself
Sharp and persistent post-GFC TFP slowdown in AEs and EMs

TFP Growth 2000-21

(PPP-GDP weighted)

Sources: Penn World Table 9.0; World Economic Outlook, and IMF staff calculations.
Weighted averages (using PPP-GDP as weights) are reported for each income group. For AE (EMEs), 20 (18) largest economies are reported.
TFP loss accounts for almost half of post-GFC output loss in AEs...

Sources: Penn World Table 9.0; IMF, World Economic Outlook; Adler et al. (2017).
Note: GFC = global financial crisis, TFP = total factor productivity. Purchasing-power-parity-GDP-weighted average of largest 20 advanced economies is reported. Trend output = projection based on the Hodrick-Prescott filter trend in years preceding the GFC.
The post-GFC TFP slowdown: the role of GFC legacies

• Deep recessions induce “TFP hysteresis”

• At least three causes of hysteresis this time around:
  - Balance sheet vulnerabilities
  - Protracted weak demand and capital-embodied technological change
  - Elevated economic and policy uncertainty

• Common feature: conducive to lower and low risk/low return investment (# intangibles, ICT... etc)
Past deep recessions have created “TFP hysteresis” and the GFC was no different.

Sources: Duval, Timmer and Hong 2017, using Orbis data. Note: High/low rollover risk correspond to the 75th and 25th percentiles of the cross-country cross-firm distribution of rollover risk in the sample. Rollover risk is measured as debt maturing within a year in 2007, in percent of total sales.
Crisis legacy No. 1. Balance sheet vulnerabilities

Estimated Implied impact of pre-GFC firm vulnerabilities on post-GFC slowdown: the role of country-wide credit conditions

Difference in the Post-Crisis Decline of TFP growth
Between High-Rollover Risk and Low-Rollover Risk Firms

Note: ‘Rollover risk’ is the amount of debt maturing in 2008 divided by average total sales pre-crisis. ‘High (Low) Debt Maturing 2008’ corresponds to the 75th (25th) percentile of the cross-firm distribution of ‘Debt Maturing in 2008’. The ‘average country’ corresponds to a no change in CDS spread after standardizing the variable. The ‘country where credit conditions deteriorated more’ corresponds to one standard deviation larger change in standardized CDS spread compared to the average country CDS spreads. The post-crisis sample starts in 2008.
Crisis legacy No. 2. Protracted weak demand and investment

**Gross Fixed Capital Formation, 2000-14**
(Share of stock of physical capital)

Sources: Penn World Table 9.0; IMF World Economic Outlook, and IMF staff calculations.
Weighted averages (using PPP-GDP as weights) are reported for each income group. For AE (EMEs), 20 (18) largest economies are reported.
Crisis legacy No. 2. Protracted weak demand and investment

Estimated impact of change in investment rate on TFP growth around the GFC (percent)

Pre-GFC
2003-07 vs 2000-02

Post-GFC
2008-14 vs 2003-07

Source: Adler, Duval, Furceri, Koloskova and Poplawski-Ribeiro (2017) based on IMF WEO and PWT 9.0 data. PPP-GDP weighted average of 20 largest economies in each income group. Estimated contribution of capital accumulation to the change in TFP growth between stated periods. PPP-GDP weighted average by group. 90 percent confidence bands are reported.
Higher uncertainty can induce firms to adopt a “wait and see attitude”, tilting investment decisions toward more liquid, lower risk-return projects.

Economic policy uncertainty index (index, red dots on right scale)

- United States
- Europe
- Japan

Implied effect of increase policy uncertainty on change in average TFP growth between 2000-07 and 2008-16

Sources: Adler, Duval, Fuerer, Koloskova and Poplawski-Ribeiro (2017) based on data from Baker, Bloom, and Davis (2016), EU KLEMS, WORLD KLEMS and OECD. Index for each country normalized to 100 mean. 1/ Includes France, Germany, Italy, Spain, and the United Kingdom. 2/ Ten advanced economies included in the sample: Canada, France, Germany, Italy, Japan, Korea, the Netherlands, Spain, the United Kingdom, and the United States.
Policy remedies and non-remedies

• Remedies involve addressing remaining crisis legacies ...
  o Further efforts to strengthen bank and corporate balance sheets
  o Clarify course of fiscal, trade and regulatory policies to reduce uncertainty

• ...and structural headwinds ...
  o Education and innovation policies, labor and product market reforms, maintaining open trade system

• ... but not premature monetary policy tightening
Monetary policy and the productivity slowdown

- **Conflicting effects of accommodative monetary policy**
  - Has *strengthened* within-firm productivity growth (both K and TFP)...
  - ...but might have weakened K allocation between firms before and after GFC...
  - ...especially where credit market imperfections were large—Southern Europe
  - But no widespread zombie firms issue in Northern Europe ➔ not suggestive of common driver such as monetary policy...
  - ...and estimates of gains from addressing zombie firms << post-GFC TFP losses

- **Premature tightening is not part of the answer**
  - 1st-best policy is to address underlying market imperfections ➔ robust banking supervision and resolution, distressed debt markets, insolvency regimes
  - Even as 2nd-best, not clear whether tightening would pass cost-benefit test: misallocation gains vs job and output losses + operational risks
Rising capital misallocation before and after the GFC

Misallocation of capital in AEs, 2000-14
(standard deviation of log marginal product of capital across firms, median country-sector)

Sources: Adler, Duval, Furceri, Koloskova and Poplawski-Ribeiro (2017), based on Orbis data. Note: The calculation of the standard deviation of log marginal products of capital across firms in each country-industry follows the approach proposed by Hsieh and Klenow (2009).
Take aways

• While productivity slowdown is mostly structural, GFC itself has left scars, more so in the EU than in the US—through lower and lower-risk/lower-return investment, plus capital misallocation

• Policy response = addressing crisis legacies + structural reforms, not premature monetary policy tightening

• Where is productivity growth in Europe headed?
  o Plausible scenario—on track: TFP growth rises as crisis legacies dissipate, but does not return to pre-crisis rates as structural headwinds (demographics, human capital, trade) remain...
  o ...unless/until artificial intelligence and other breakthroughs save us all!
THANK YOU!!!
Extra slides
What drives total factor productivity growth?

Aggregate TFP Growth

- Within-firm productivity growth
- Resource allocation across firms (static and dynamic)
- Innovation
- Adoption
- Human capital, physical capital and intangible (R&D) capital
The GFC amplified a slowdown that was already under way

Sources: PWT 9.0; and IMF staff estimates and projections.
Note: HP filter trends computed up to 2007 and up to 2016. PPP-GDP weighted average by group, based on WEO country classification.
Post-GFC TFP loss has a clear structural component

TFP growth adjusted for capacity utilization
(Advanced economies, per cent)

Past deep recessions have created “TFP hysteresis” and the GFC was no different

Estimate response of cyclically-adjusted TFP to major past recessions using local projection method (Jorda, 2005):

\[ y_{i,t+k} - y_{i,t-1} = \alpha_j + \gamma_t + \sum_{s=1}^{2} \delta_s^k \Delta y_{i,t-s} + \beta_k D_{i,t} + \sum_{s=1}^{2} \theta_s^k D_{i,t-s} + \sum_{s=0}^{k-1} \rho_s^k D_{i,t+k-s} + \varepsilon_{i,t} \]

Where:

- \( y_{i,t+k} - y_{i,t-1} \) is the cumulative change of variable of interest (output, TFP) for country \( i \) between \( t-1 \) and \( t+k \)
- \( \alpha_j, \gamma_t \) are country and time fixed effects
- \( D \) is a dummy variable taking value 1 at the start of major recession
- Other controls include: i) past output growth (2 lags); ii) lagged recession dates (2 lags); iii) country-specific trends; iv) forward values of recession dummy between \( t \) and \( t+k-1 \) (bias correction proposed by Teulings and Zubanov 2014)
Crisis legacy No. 1. Balance sheet vulnerabilities

Estimate on firm-level (Orbis) data:

$$\Delta TFP_{isc}^{growth} = \beta_1 Vulnerability_{i}^{pre} + \beta_2 Vulnerability_{i}^{pre} \times \Delta CDS_i + \gamma'X_i + \alpha_{sc} + \varepsilon_{isc}$$

Where:

- $\Delta TFP_{isc}^{growth}$ is change in average TFP growth between 6 years before and after the GFC
- $Vulnerability$: i) debt maturing in 2008; ii) average pre-crisis leverage (total debt/assets)
- $\Delta CDS_i$ is change in average bank CDS spread in country $i$ between 2008H1 and H2 (hypothesis: stressed banking systems tightened credit conditions more, amplifying adverse TFP impact of firm vulnerabilities)
- $\alpha_{sc}$ is country-sector FE $\Rightarrow$ within country-sector comparison between different firms
- $X$ = controls: size, sales, EBITDA, employment

$\Rightarrow$ Comparison post-event vs. pre-event (see e.g. Giroud and Mueller 2017; Mian and Sufi 2014)
Crisis legacy No. 2. Protracted weak demand and investment

Estimate impact of investment on TFP using PWT (112 countries, 1970-2014), in spirit of, but improving upon Wolff (AER 1991) on capital-embodied technol change:

$$\overline{TPF}_{i,p} = \alpha + \beta_0 TFP_{i,p_0} + \beta_1 IK_{i,p} + \gamma_i + \delta_p + \varepsilon_{i,p}$$

Where:

- $\overline{TPF}_{i,p}$, $IK_{i,p}$ denote TFP growth and investment rate in country i in period p
- $TFP_{i,p_0}$ is initial TFP gap relative to US in initial period (1970)
- $\gamma_i$ and $\delta_p$ are country and period FE$s$ (country characteristics that may affect innovation, e.g. institutions; common shocks, e.g. frontier innovations)

Instrument $IK_{i,p}$ by $K_{i,0}/L_{i,0}$ and/or population growth (controlling for aging)
Crisis legacy No. 3. Elevated economic and policy uncertainty

• Higher uncertainty can induce firms to adopt a “wait and see attitude” (Bloom et al., 2014) and tilt investment decisions toward more liquid, lower risk-return projects (Aghion et al., 2010)

• Likely to be even more prevalent in industries that face tighter credit constraints (Choi, Furceri and Loungani 2016)

→ Use this as identification strategy to estimate differential impact of economy-wide uncertainty on industry-level TFP depending on industry dependence on external finance (Rajan and Zingales 1998)

→ Panel of 18 countries, 25 industries, 1985-2010 (EU and World KLEMS), controls for interactions between dependence on external finance and financial development, counter-cyclical fiscal policy...etc
Labor and product market reforms could lift TFP in a number of AEs

Estimate average response of cyclically-adjusted TFP to these major reform shocks (new “narrative” IMF database on major labor and product market reforms for 26 AEs over 1970-2013, see April 2016 IMF WEO Chapter 3):

\[ y_{i,t+k} - y_{i,t-1} = \alpha_i + \gamma_t + \beta_k R_{i,t} + \theta_k X_{i,t} + \varepsilon_{i,t} \]

Where:
- \( y_{i,t+k} - y_{i,t-1} \) is the change in cyclically-adjusted TFP in country i between t-1 and t+k
- \( R_{i,t} \) is the major reform shock considered (e.g. major liberalization of network industries, major easing of regular employment protection legislation)
- \( \alpha_i, \gamma_t \) are country and time FEs
- \( X_{i,t} \) is a set of controls including past growth, recession dummies, past reforms; expected growth (WEO forecasts) and reforms in other areas to address endogeneity
Labor and product market reforms could lift TFP in a number of AEs

Sources: Penn World Tables 9.0; Duval et al. (2016); and IMF staff calculations.
Note: Dashed lines denote 90 percent confidence bands. Capital deepening is defined as the difference between log labor productivity and log TFP. The effects are estimated using local projections method (Jorda (2005)), controlling for lagged growth, past reforms, and crisis dummies.