The Future Growth Path for Europe and Ireland

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Competitive Advantage in the Global Economy

Outline

- Focus on medium-term productivity growth
- Consider today's 'productivity paradox': is slow growth the 'new normal'?
- Review recent growth projections
- Note issues around realising growth potential

A New Productivity Paradox

- **TFP growth has slowed down** markedly but technology seems to be advancing rapidly
- Great excitement (or fear) about robots, AI etc.
- We can see the digital revolution everywhere but in the productivity statistics
- A worthy successor to the Solow paradox of 30 years ago

Growth Rates in Different Periods (% per year)

	USA Y/P	*USA Y/HW*	*EU 15 Y/P*	*EU 15 Y/HW*
1950-73	**2.5**	**2.6**	**4.0**	**4.9**
1973-95	**1.7**	**1.3**	**1.9**	**2.5**
1995-2007	**2.2**	**2.2**	**2.0**	**1.5**
2007-16	**0.4**	**0.9**	**-0.1**	**0.4**
2021-30			**0.9**	**1.1**
2019-29	**1.2**	**1.4**		

Sources: The Conference Board (2016); European Commission (2018); United States Congressional Budget Office (2019): estimates for EA in 2021-30

Phases of European Growth

- ***1950-1973:*** rapid catch-up growth; gaps with USA in Y/P and Y/HW falling quickly
- ***1973-1995***: catch-up in Y/P ceases but catch up in Y/HW to slower growing USA
- ***1995-2007***: Europe no longer catching up but falling behind; Y/HW grows faster in USA
- ***2020s:*** Europe struggling to keep up with sluggish growth in USA**??**

Future TFP Growth in the Leader

- Very wide range of (implied) projections for medium-term TFP growth among technology pundits
- Gordon (2016): 0.4 % per year
- Brynjolfsson and McAfee (2014): 2.0% per year
- ‘Techno-optimism’ not reflected in recent econometric estimates of trend productivity growth

OECD Estimates of Trend Productivity Growth (% per year)

	TFP			*Y/L*		
	2000	***2007***	***2015***	***2000***	***2007***	***2015***
Euro Area	**0.6**	**0.2**	**0.2**	**1.2**	**0.7**	**0.3**
Ireland	**2.1**	**1.0**	**0.9**	**3.2**	**2.6**	**2.5**
UK	**1.1**	**0.0**	**0.4**	**2.1**	**0.9**	**0.9**
United States	**1.1**	**0.9**	**0.7**	**2.0**	**1.5**	**1.0**

Note: estimates obtained using an HP-filter methodology.

Source: Ollivaud et al. (2016)

Possible Resolutions of the New Productivity Paradox (1)

- Economic growth is faster than is captured by the national accounts and this discrepancy has increased recently (Brynjolfsson and McAfee, 2014)

- Estimates of trend productivity growth are unreliable and not necessarily a good guide to the future (Crafts and Mills, 2017)

- The financial crisis has adversely affected productivity growth but, post crisis, normal trend growth will eventually resume (OECD 2014)

Possible Resolutions (2)

- Important new technologies will have a strong impact on productivity only after a significant time lag (Brynjolfsson and McAfee, 2014)

- The new technologies may seem impressive but their economic impact is and will be modest; they will not match the ‘great inventions’ of the past (Gordon, 2016)

U.S. Slowdown is Not Mis-Measurement

- **Consensus** in recent papers (Aghion et al., 2017; Byrne et al., 2016; Syverson, 2017); but growth continues to be underestimated

- Significant fraction of welfare gains from digital economy are household production and won't/shouldn't be captured in GDP (Ahmad and Schreyer, 2016)

- **NB:** 'Missing output' = $2.7 trillion but estimates of omitted consumer surplus <5 per cent of this (Syverson, 2017)

Past U. S. TFP Growth

(Crafts and Mills, 2017)

- **Trend TFP growth has declined slowly** from 1.5% to 1% per year in the last 50 years based on smoothed full-sample estimates of an unobserved-components model in which trend growth follows a random walk

- However, average TFP growth **outcomes over a 10-year period vary a lot**

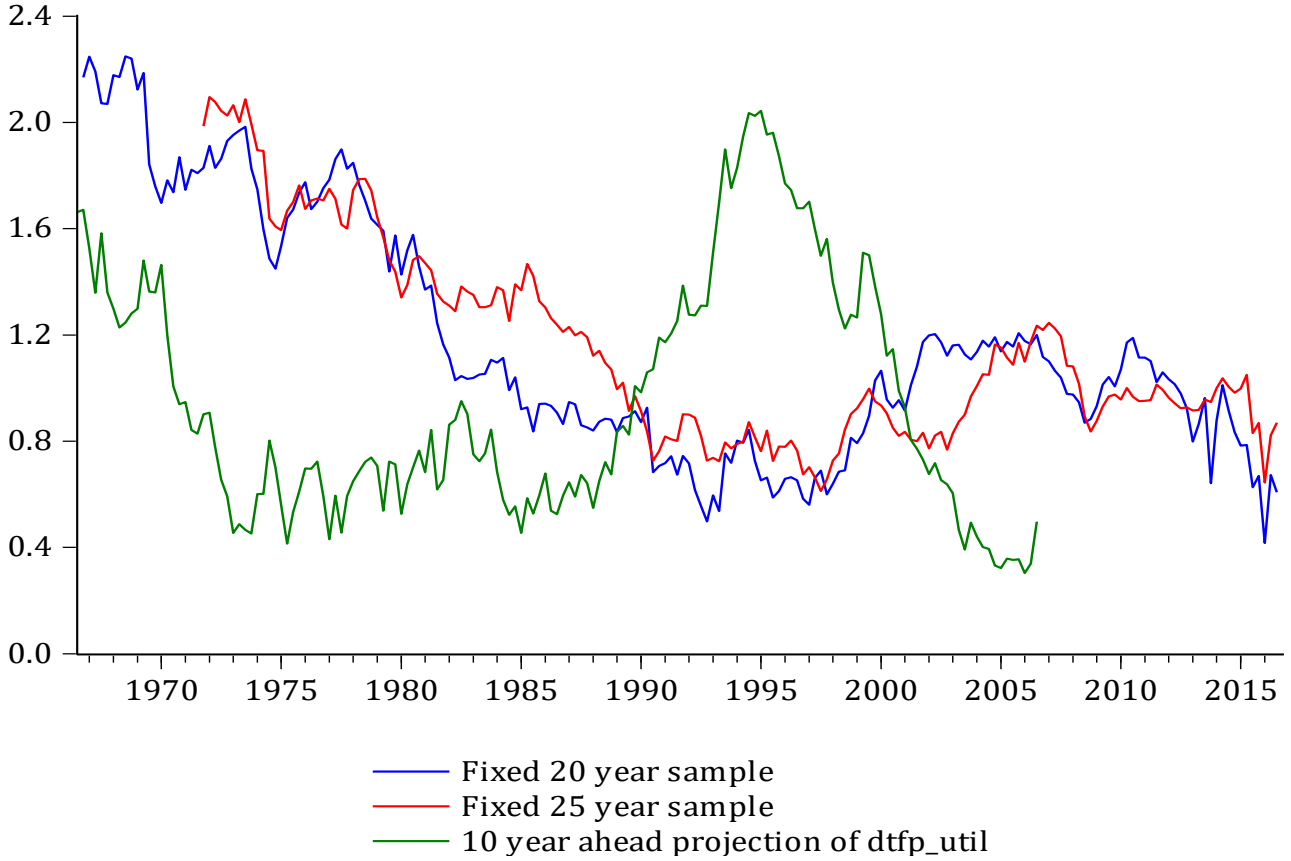
- Making a 10-year ahead projection using trends inferred from estimating the model on past information does not work well

Econometrics vs. Techno-Optimism

- Recent econometric estimates of trend U.S. TFP growth show a big fall (Antolin-Diaz et al., 2017; Ollivaud et al., 2016)

- Using similar methods, one would have been quite pessimistic ex ante in 1992 about medium-term TFP growth but seriously wrong ex-post

- **‘Techno-optimists’** may be wrong but **should not be too dismayed by econometricians**


2.4
2.0
1.6
1.2
0.8
0.4
0.0
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
Fixed 20 year sample
Fixed 25 year sample
10 year ahead projection of dtfp_util

Productivity Impact of Financial Crisis

- Expect levels effect: long-run impact on labour productivity = 1.1% per year of crisis (Oulton and Sebastia-Barrel, 2017)
- Short-run impacts from impaired resource reallocation (Adalat McGowan et al., 2017; Gamberoni et al., 2016; Schneider, 2018)
- TFP growth has fallen by more in firms which had weak balance sheets and suffered bigger interruption of credit supply; **might account for 1/3 TFP growth slowdown** in OECD countries through 2013 (Duval et al., 2017)

General Purpose Technologies

- **Macro-productivity implications typically modest initially:** arithmetic of growth accounting, time to realise full potential and make complementary investments
- Solow Paradox based on unrealistic expectations; actually ICT had strong and relatively rapid impact
- Possible that GPT can have big cumulative effect but never raise the aggregate productivity growth rate very much (e.g., steam)

GPTs: Contributions to Labour Productivity Growth

(% per year)

	K/L	*TFP*	*Total*
Steam (UK)			
1760-1830	**0.011**	**0.003**	**0.014**
1830-1870	**0.18**	**0.12**	**0.30**
1870-1910	**0.15**	**0.16**	**0.31**
Electricity (USA)			
1899-1919	**0.04**	**0.06**	**0.10**
1919-1929 (1)	**0.07**	**0.07**	**0.14**
1919-1929 (2)	**0.07**	**0.30**	**0.37**
1929-1941	**0.04**	**0.16**	**0.20**
ICT (USA)			
1974-1995	**0.41**	**0.36**	**0.77**
1995-2004	**0.78**	**0.72**	**1.50**
2004-2012	**0.36**	**0.28**	**0.64**

Sources: Bakker et al. (2018), Byrne et al. (2013) and Crafts (2004).

The New Productivity Paradox: Half-Time Score

- The productivity slowdown is real but not necessarily permanent
- Estimates of trend TFP growth are not a good guide to the medium-term future
- Perhaps another case of Amara’s Law in context of GPT
- A worthy successor to the Solow Productivity paradox

Growth Projections: European Commission

(% per year)

	Euro Area	*Ireland*	*Germany*	*Italy*
2021-2030				
Real GDP	**1.1**	**1.8**	**1.1**	**0.5**
Y/HW	**1.1**	**1.4**	**1.5**	**0.3**
TFP	**0.7**	**1.2**	**0.9**	**0.2**
ΔL/L	**0.0**	**0.4**	**-0.4**	**0.2**
2031-2040				
Real GDP	**1.1**	**1.9**	**1.1**	**0.3**
Y/HW	**1.3**	**1.6**	**1.5**	**0.9**
TFP	**0.9**	**0.9**	**0.9**	**0.6**
ΔL/L	**-0.2**	**0.3**	**-0.4**	**-0.6**

Source: European Commission (2018).

Comment

- EC takes cautious position on future TFP growth
- History suggests that a positive technology shock in the USA (similar to electricity in 20th century) could make things look quite a bit better
- Supply-side reform could make some difference
- Cette et al. (2017) explore these possibilities and have an interactive ready reckoner for different permutations in a Solow growth framework at www.longtermproductivity.com

Projected Growth 2015-2060: Secular Stagnation vs. Technology Shock (% per year)

	USA	*Euro Area (1)*	*Euro Area (2)*
Secular Stagnation			
Real GDP	**1.5**	**1.1**	**1.3**
TFP	**0.6**	**0.8**	**1.0**
Technology Shock			
Real GDP	**3.3**	**2.4**	**2.8**
TFP	**1.6**	**1.6**	**1.8**

Source: Cette et al. (2017).

A More Challenging Projection

McQuinn & Whelan, 2015

- Recent TFP growth is the ‘new normal’; in Euro Area **steady state ΔA/A = 0.2%,** Δ(Y/HW)/(Y/HW) = 0.3%
- Baseline projection for 2014-33, ΔY/Y = 0.4% **(Ireland = 1.05%),** Δ(Y/HW)/(Y/HW) = 0.6% **(Ireland = 0.9%)**
- Supply-side reforms might add 1.0% per year to Euro Area GDP growth – politics permitting - but only 0.15% to Irish growth
- Steady-state TFP growth matches a very sobering ‘semi-endogenous growth’ world view

Are Ideas Getting Much Harder to Find?

- **Bloom et al. (2017): Yes!** – since 1930s rising research intensity but falling TFP growth such that the number of researchers has to double every 13 years just to maintain TFP growth

- It's a semi-endogenous growth story where past TFP growth largely reflects the transitory impact of increases in R & D/GDP

- If this is the right model, given that U.S. employment growth will decline markedly, Gordon is too optimistic; **steady state TFP growth** could be as slow as **0.25%** per year (Kruse-Andersen, 2017)

Perhaps Not?

- TFP ≠ technological progress; 1930s' TFP growth not highly correlated with R & D
  (Bakker et al., 2018)
- Other indicators are less pessimistic for growth prospects; half-life for patents = 114 years and for tech books no diminishing returns
- A techno-optimistic view would be that productivity of R & D might increase significantly in digital world through much better data analysis and recombinant innovation (Mokyr, 2013)

R & D and the Production of Ideas in the United States, 1955-2010 (1965 = 100)

	R & D	*(R & D)/GDP (%)*	*New Tech Books*	*Patents*
1955	**68.2**	**1.45**	**51.8**	
1965	**100.0**	**2.72**	**100.0**	**100.0**
1980	**162.8**	**2.21**	**198.1**	**78.4**
1995	**258.1**	**2.40**	**301.2**	**124.2**
2010	**375.1**	**2.73**		**214.5**

Notes: tech books based on titles in the catalogue of the Library of Congress; patents are those of domestic origin; all data are 5-year averages.
Sources: Alexopoulos and Cohen (2011); National Science Foundation (2017); United States Patent and Trademark Office (2016)

Taking Full Advantage

- New technology at frontier provides growth opportunity but effective assimilation by individual countries not automatic, as ICT era underlined
- **Labour market adjustment** is a key aspect
- **Absorptive capacity** is central and should be a focal point for supply-side reform; this is a key message for Ireland (Jin and Westmore, 2018)
- More broadly, Ireland may have more scope to improve supply-side than is allowed by conventional wisdom about structural reforms

Irish Competitiveness Aspects: DTF Scores

Corporate Tax Rate (2017)	**100.00**	**Logistics Infrastructure (2016)**	**50.37**
Tangible Investment (average 1997-2017)	**100.00**	**Annual Hours in Congestion (2015)**	**43.06**
Intangible Investment (average 2000-2013)	**94.03**	**Product Market Regulation (2013)**	**35.37**
Competition Law and Policy (2013)	**65.94**	**Adult Literacy & Numeracy Skills (2013)**	**29.89**
Ease of Doing Business (2017)	**62.00**	**Management Quality (average 2004-2014)**	**20.24**
Employment Protection (2017)	**60.96**	**R & D (2016)**	**16.96**
PISA Maths & Science Score (2015)	**60.87**		

Source: database for Crafts (2018a)

Some Technology Analysis

- **Median American job** has 64% chance of being computerized by 2035; (Frey & Osborne, 2017); median OECD job has 48% chance (Nedelkoska & Quintini, 2018)
- AI has the potential to raise average labour productivity by 30-35 per cent over the next 20 years (Frontier Economics, 2016)
- So rapid productivity growth after the usual GPT delay … but low education/low-wage workers will be most vulnerable to job losses
- Key issue to realise potential gain in Y/P will be successful redeployment of these workers

Skill-Bias and Unemployment

- **Europe much less good at coping** with skill-biased technological changes than USA
- Model automation shock as raising dispersion of worker productivities in search and matching setting; impact of 0.4 ppts in USA compares with 4.8 ppts for Europe (Mortensen & Pissarides, 1999)
- Relatively high unemployment benefits and employment protection explain European ‘failure’
- Well-designed (but unpopular) labour market policies will be essential to restrain rise in U; flexible labour market plus ALMP

Exposure to Skill-Bias of Technological Change

	Low Educational Attainment (%)	*Unemployment Rate of Low Educated (%)*	*Employment Protection (0-6)*	*Net Replacement Rate (%)*
France	**22**	**26.3**	**2.38**	**59**
Germany	**13**	**15.2**	**2.87**	**94**
Ireland	**18**	**19.7**	**1.40**	**89**
Italy	**39**	**23.8**	**2.51**	**77**
Spain	**42**	**27.8**	**2.05**	**74**
UK	**19**	**9.5**	**1.03**	**78**
USA	**10**	**13.2**	**0.26**	**59**

Source: Crafts (2018b) based on OECD data.

Conclusions

- Future TFP growth is highly uncertain
- Even so, techno-optimism appeals more than econometric pessimism; waiting for economic impact of new GPT seems plausible resolution of productivity paradox
- In whichever scenario, expect Ireland to grow faster than the Euro Area
- Dealing with the skill bias of technological change is likely to be a serious policy challenge