Then and Now: What a Difference 25 Years Makes!

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CAGE
Competitive Advantage in the Global Economy

Overview

- Aim is to reflect on intellectual progress
- Better ideas, improved interpretations of past performance

But also

- New puzzles, new hypotheses to address
- More time needed … it’s too soon to tell!

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**
2007-2016	**0.4**	**0.9**	**-0.1**	**0.4**
2014-23			**1.0**	**0.8**
2016-26	**1.0**	**1.4**		

Sources: The Conference Board (2016); Havik et al. (2014); United States Congressional Budget Office (2016)

New Growth Economics

- In 1992, AK models still very popular; **Baldwin (1989)** projected that the Single Market would permanently raise the EU growth rate by 0.9 per cent per year

- Subsequent research has suggested that the constant returns to capital accumulation assumption is implausible

- **Badinger (2005):** European economic integration has had a significant levels effect but no growth-rate effect on incomes

Endogenous Innovation

- Lots of evidence that some predictions from these models are plausible and useful (Aghion and Howitt, 2006)
- Insights on role of policy and institutions (and social capability) in growth outcomes
- But maybe growth is only semi-endogenous and levels effects are to be expected

Semi-Endogenous Growth

(Fernald & Jones, 2014)

- **End of 'transitory gains'** (Solow-type levels effects) from rising HK and R&D intensities is a big brake on future U.S. growth

- These contributed 28% and 58%, respectively, of growth in labour productivity between 1950 and 2007

- USA may have to revert to being an importer of technological progress (as in the early 20th century) as world R & D intensity rises

Social Capability

- Catch-up not automatic: depends on social capability and effective assimilation of technology
- Incentive structures central to catch-up growth prospects; connects with new growth economics
- **Appropriation** and **agency** problems key
- Institutions and policy matter .. but which ones and how much?

A Quote from Abramovitz (1986)

- *"The trouble with absorbing social capability into the catch-up hypothesis is that no-one knows just what it means or how to measure it."*

Social Capability since Abramovitz

- Conditional-convergence growth regressions
- OECD structural-reforms analysis
- Varieties of capitalism: CME vs. LME
- Importance of context: proximity to frontier, technological epoch and history matter
- Competition: Hicks vs. Schumpeter

Europe and ICT

- European countries have generally not matched USA in ICT contribution to growth; UK does relatively well
- This would not have happened in the 1970s
- **"American diagnosis"** is too much regulation, too much taxation, too little competition
- Competitive product markets and flexible labour markets were favourable to relatively rapid diffusion of ICT (Cette & Lopez, 2012)

Labour Productivity Growth in the Market Sector, 1995-2007 (% per year)

	Labour Quality	*ICTK/HW*	*Non-ICT K/HW*	*TFP*	*Y/HW Growth*
UK	**0.4**	**0.8**	**0.4**	**1.0**	**2.6**
France	**0.3**	**0.3**	**0.4**	**0.9**	**1.9**
Germany	**0.0**	**0.5**	**0.5**	**0.7**	**1.7**
USA	**0.3**	**0.9**	**0.3**	**1.1**	**2.6**

Source: Van Ark (2011)

Social Capability and ICT

- Standard American criticisms of Europe at least equally valid for 20 years before 1995
- Social capability depends on requirements of the technological epoch
- It is not that there is more regulation but rather that **existing regulation is more costly in the ICT world**
- LMEs have opportunity to do better in this period

Golden-Age Britain Did Fail

- Slower growth not fully explained by less scope for catch-up
- Social capability issues loom large
- **Not just catch-up but overtaking** by European peer group including both France and West Germany

Table 3. Real GDP/Head (UK = 100 in each year)

Maddison (2010) and The Conference Board (2016)

	USA	*Germany*	*France*
1870	**76.6**	**57.6**	**58.8**
1913	**107.7**	**74.1**	**70.8**
1929	**125.3**	**73.6**	**85.6**
1950	**137.8**	**61.7**	**74.7**
1979	**142.7**	**115.9**	**111.1**
2007	**132.9**	**107.0**	**98.6**
2015	**133.4**	**113.6**	**95.4**

Traditional Criticisms of Postwar British Industry

- Weak and incompetent management
- Debilitating industrial relations
- Seriously inefficient use of inputs
- NB: these were all **nurtured by inadequate competition** in product markets interacting with the institutional legacy

Competition

- Depends on entry threats as well as market structure so is influenced by trade policy and regulation
- Matters more when shareholders are weak because it is an antidote to agency problems within the firm
- Competition promotes better management practices (Bloom & van Reenen, 2007)
- Absence generates rents from market power that can be dissipated through effort bargains that undermine productivity

Institutional Legacies of the Early Start

- Trade unions were in a privileged position in a structure of decentralized collective bargaining and craft control
- UK was on a trajectory leading to a very high degree of separation of ownership and control
- These features **impaired productivity post-1950** when there was weak competition, low unemployment and a new era of economic growth dawned
- LME not CME; Eichengreen co-operative equilibrium unattainable

Golden-Age UK Policy Errors

- **Policy was constrained** by pursuit of full employment through wage restraint based on trade-union cooperation
- Key supply-side policy concerns include: taxation, industrial relations, industrial policy, nationalization, protectionism
- These have bigger adverse effects than elsewhere in Europe because errors more serious

Competition in Golden-Age UK

- Undermined by nationalization, protectionism and largely ineffective competition policy
- Average manufacturing CR3 rose from 26% in 1935 to 41% in 1968 (Clarke, 1985)
- At least 35% manufacturing cartelized in late 1950s (Broadberry & Crafts, 2001)
- Supernormal profits large and persistent in UK but not in West Germany (Geroski & Jacquemin, 1988); PCM much higher in UK than WG (Crafts & Mills, 2005)

Competition and Productivity: Evidence

- Competition strongly positive for productivity in UK firms without dominant shareholder (Nickell et al., 1997)
- In the 1970s and 1980s greater competition increased innovation (Blundell et al., 1999; Geroski, 1990)
- Restrictive labour practices were accepted by firms where competition was weak (Zweig, 1951); inefficient use of labour a serious issue where competition was weak in 1970s case studies (Prais, 1981)
- D-in-D analysis of impact of 1956 Restrictive Practices Act shows it had a strong effect on productivity growth in colluding sectors (Symeonidis, 2008)

UK in the 1980s

- **Increase in competition** provides out of sample test of diagnosis of Golden-Age failure
- Substantial impact of greater competition on productivity via management and industrial relations (Crafts, 2012)
- **NB:** impact from joining EEC was key component

The Solow Productivity Paradox

You can see the computer age everywhere except in the productivity statistics

Robert Solow, 1987

General Purpose Technologies

- Substantial literature developed in 1990s partly prompted by the Solow Paradox
- **A 'great inventions' paradigm** but part of the agenda was to explain initial weak or even negative impact on productivity (Helpman, 1998)
- The First Industrial Revolution is an example (Crafts, 2004)
- Growth accounting provided an important reality check

GPT Definition

Lipsey et al. (2005)

"A GPT is a single generic technology, recognizable as such over its whole lifetime, that **initially** has much *scope for improvement*, and **eventually** *comes to be widely used, to have* many uses, and to have *many spillover effects*"

Growth Accounting for GPT

- **3 aspects**

  GPT capital deepening

  TFP growth in GPT production

  TFP spillovers

GPT Growth Accounting

- Augment standard formula to allow 2 types of capital, own TFP growth in 2 sectors, and TFP spillovers

$$\Delta(Y/L)/(Y/L) = \alpha_1\Delta(K_O/L)/(K_O/L) + \alpha_2\Delta(K_{GPT}/L)/(K_{GPT}/L) + \beta\Delta(HK/L)/(HK/L) + \eta\Delta A_O/A_O + \phi\Delta A_{GPT}/A_{GPT} + \gamma\Delta(K_{GPT}/L)/(K_{GPT}/L)$$

The final 3 terms are each part of TFP growth and the last one is TFP spillovers from GPT capital deepening

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	0.34	0.06	0.40
1919-1929	0.23	0.05	0.28
1919-1929 + spillovers	0.23	0.41	0.64
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

Source: Crafts (2015)

Real Price Falls (%)

Steam Horsepower (UK)	
1760-1830	**39.1**
1830-1870	**60.8**
1870-1910	**50.0**
Electric Motors (Sweden)	
1901-1925	**38.5**
ICT Equipment (USA)	
1970-1989	**80.6**
1989-2007	**77.5**

Note:
Price fall for ICT equipment includes computer, software and telecoms; the price of computers alone fell much faster (22.2% per year in the first period and 18.3% per year in the second period).
Sources: Crafts (2004), Edquist (2010) and Oulton (2012).

Solow Paradox Revisited

- Even before the mid-1990s, ICT had a much bigger impact than steam or electricity
- The **Solow Paradox was based on unrealistic expectations** … initially new technologies have a small weight in the economy
- The growth potential of GPTs has been realized more quickly over time
- Weakness of recent TFP growth reflects performance outside of ICT

A New Productivity Paradox

- Productivity growth has slowed down yet technology seems to be advancing rapidly

- **Possible explanations** include:

  measurement issues
  aftermath of crisis
  declining business dynamism
  low economic impact of innovation
  technology impact high but not here yet

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)

But Could Reflect Declining 'Business Dynamism'

- An **accounting decomposition** says slowdown due to smaller contributions from entry and from covariance of employment shares and productivity growth among continuers (Decker et al., 2017)

- Business start-up rate, employment share in young firms, job reallocation rate in USA a lot lower than in 1980s (Haltiwanger, 2017)

- **Explanation not clear** nor is the direction of causality

- What roles do competition and regulation play?

OECD Estimates of Trend Productivity Growth (% per year)

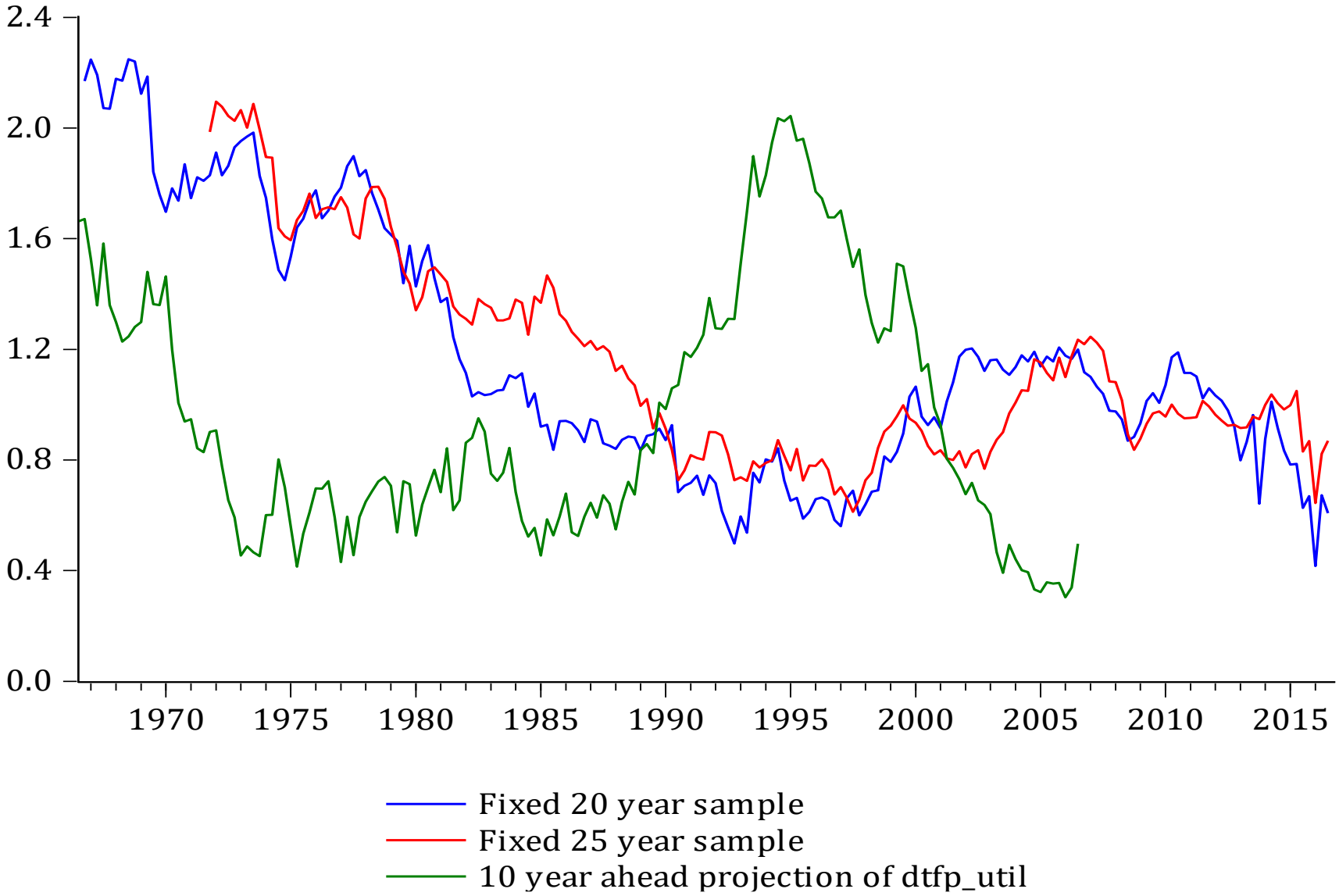
	TFP			*Y/L*		
	2000	***2007***	***2015***	***2000***	***2007***	***2015***
France	**0.7**	**0.3**	**0.3**	**1.1**	**0.8**	**0.5**
Germany	**0.7**	**0.5**	**0.5**	**1.1**	**0.6**	**0.2**
UK	**1.1**	**0.0**	**0.4**	**2.1**	**0.9**	**0.9**
United States	**1.1**	**0.9**	**0.7**	**2.0**	**1.5**	**1.0**

Note: estimates obtained using an HP-filter methodology.

Source: Ollivaud et al. (2016)

Medium-Term U. S. TFP Growth

- Pessimism fuelled by (backward-looking) time series econometrics
- Unlike Gordon, many (forward-looking) commentators optimistic, e.g. Brynjolffson and McAfee (2014)
- Current 10-year forward **projections range from 0.4 to 2.0% per year**
- Forecasting this is really hard – for example, an econometrician in 1992 would have got it very wrong (Crafts and Mills, 2017)


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

Some Technology Pundits

- **47% American employment** has ≥ 0.7 chance of being computerized by 2035; robot prices will fall fast (Frey & Osborne, 2013)
- AI has the potential to raise average labour productivity by 30-35 per cent over the next 20 years (Frontier Economics, 2016)
- Although few jobs will be completely automated, over the next 20 years 35-45% have a chance of substantial automation (Arntz et al., 2016)
- So rapid productivity growth after the usual GPT delay

Is the 'Great Inventions' Story Really True?

- **Gordon (2016):** U.S. productivity growth in the 20th and 21st centuries is dominated by the flow and ebb of 'great inventions' whose impact peaked following the 2nd industrial revolution

BUT

- These claims are not evidence based and may be misconceived

- **Harberger (1998):** TFP growth is a 'mushrooms' process of many disparate real costs reductions rather than the pervasive impact of GPTs

A View from the 1930s

- A ‘technologically progressive’ decade; it is not just the ‘great inventions’ but **broadly based TFP growth**
- The ‘great inventions’ only outperform ICT if distribution is included
- It is ‘other TFP’ that is weak now but was strong then
- Harberger’s mushrooms more important than Gordon allows

TFP Growth in the U. S. Private Domestic Economy, 1899-2007 (% per year)

1899-1909	0.93
1909-1919	0.64
1919-1929	1.63
1929-1941	1.86
1948-1960	1.98
1960-1973	2.21
1973-1989	0.48
1989-2000	0.97
2000-2007	1.44

Source: Bakker et al. (2017)

Contributions to TFP Growth in the U. S. Business Sector (% per year)

	1929-1941	*1899-1941*
TFP Growth	**1.87**	**1.30**
Great Inventions	**0.82 (0.33)**	**0.51 (0.29)**
Other	**1.05 (1.54)**	**0.79 (1.01)**

	1974-1995	*1995-2004*	*2004-2012*	*1974-2012*
TFP Growth	**0.50**	**1.61**	**0.34**	**0.73**
IT Sectors	**0.36**	**0.72**	**0.28**	**0.43**
Other	**0.14**	**0.89**	**0.06**	**0.30**

Note: 'great inventions' comprise technology clusters around electricity, internal combustion engine, re-arranging molecules, communications & entertainment. Figures in parentheses re-classify distribution as other.

Sources: Bakker et al. (2017); Byrne et al. (2013)

The New Productivity Paradox: Half-Time Score

- The **productivity slowdown is real but not necessarily permanent**
- Techno-optimists should not be too dismayed by current estimates of trend productivity growth
- Gordon's 'great-inventions' lens may not be the best guide either to the past or the future
- A worthy successor to the Solow Paradox

Concluding Comments

- We have made a lot of **progress since 1992**
- Empirical economics of growth and productivity is a notable case in point
- Fortunately, the ‘low-hanging-fruit’ metaphor does not apply
- Economic historians have a lot for which to thank GGDC