MEASURING CONSUMER INFLATION IN A DIGITAL ECONOMY

Marshall Reinsdorf
IMF Statistics Department

Paul Schreyer
OECD Statistics and Data Directorate

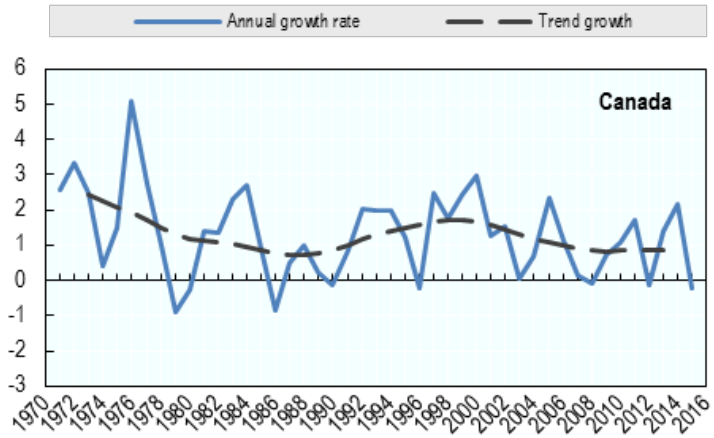
High-level Seminar on Digital Economy
November 2018

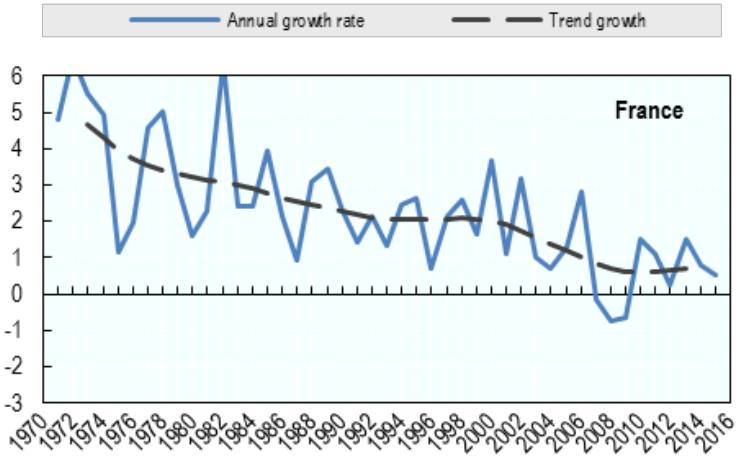
DES POLITIQUES MEILLEURES POUR UNE VIE MEILLEURE

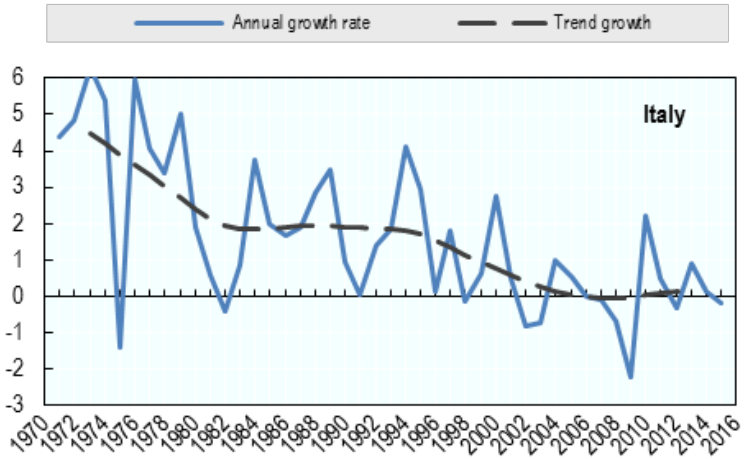
The debate...

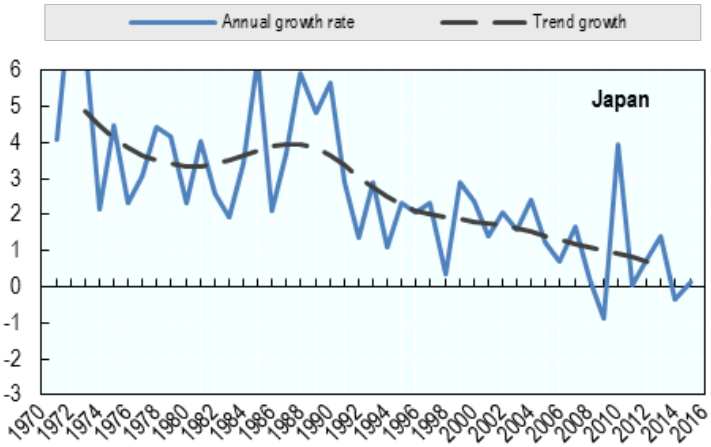
Pervasive long-term slowing of labour productivity growth

Total economy, average annual rates of change in %





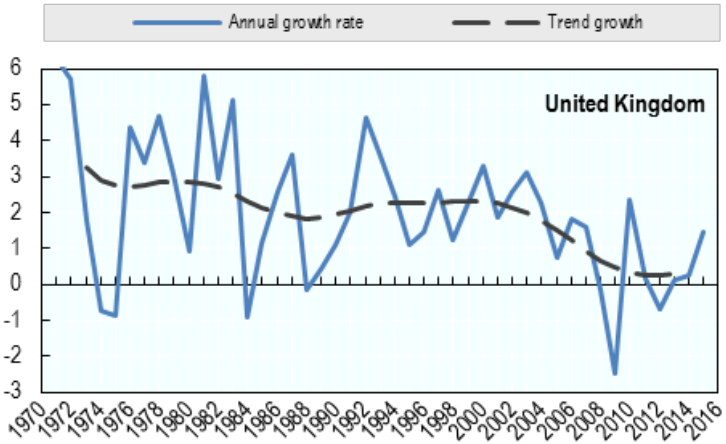


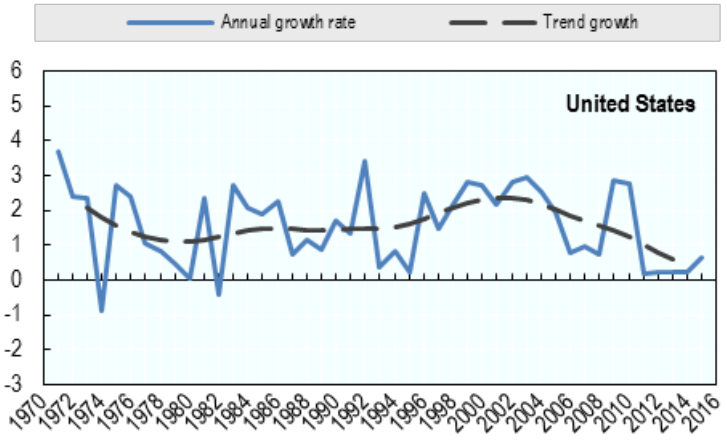


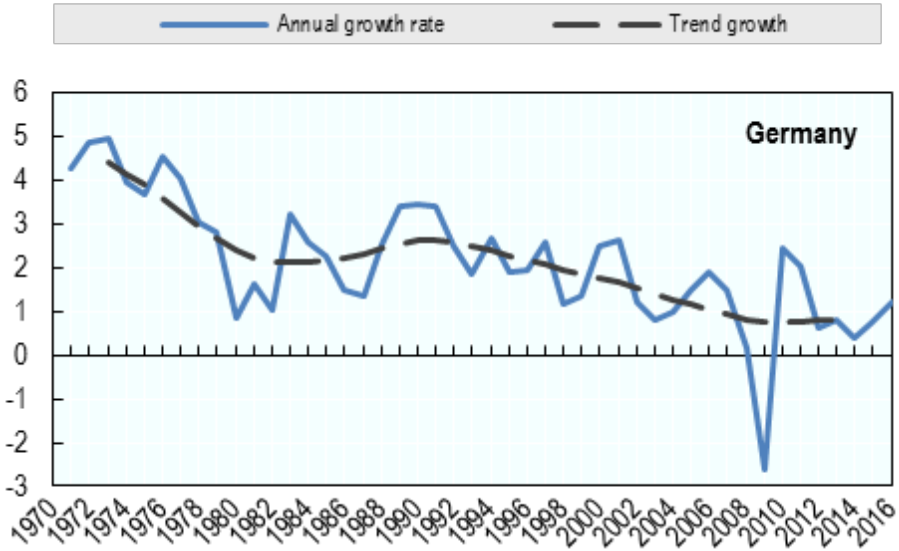
Source: OECD Productivity Compendium 2017

Pervasive long-term slowing of labour productivity growth

Total economy, average annual rates of change in %







Source: OECD Productivity Compendium 2017

Some explanations

- Shortage of ideas, innovation slowdown
- Break-down of the diffusion machine

- Digital economy not picked up in GDP and productivity figures:

➢ **The Mismeasurement Hypothesis**

Presence in the public debate

Marty Feldstein: "I have concluded that, despite the various improvements to statistical methods that have been made through the years, the official data understate the changes of real output and productivity."

Charlie Bean: "statistics have failed to keep pace with the impact of digital technology"

Diane Coyle: The pace of change in OECD countries is making the existing statistical framework decreasingly appropriate for measuring the economy

THE WALL STREET JOURNAL.

Silicon Valley Doesn't Believe U.S. Productivity

The U.S. Underestimates Growth

FINANCIAL TIMES

The internet and the productivity slump

ComputerWeekly.com

Why we're measuring the digital economy in the wrong way

The Economist

Some optimists argue instead that the problem is one of measurement. Technological progress often raises productivity in ways that statistical agencies struggle to detect

…the ill-defined nature of the issue has not helped

- Conceptual vs. Empirical issues
- Production vs. Welfare
- Volumes vs. Prices
- Discussion of consumer inflation relates to many of these issues

Consumer prices and welfare effects of digitalisation

Possible welfare effects

1. Quality change in existing product types	2. Appearance of truly novel products	3. Appearance and use of free products
(a) Quality change in existing digital products through evolving characteristics embodied in new varieties of digital products (e.g. computers)	e.g., smartphones	e.g., free communication services through apps
(b) Digital replacement of non-digital products (e.g., streaming services replacing CDs)		
(c) Improved variety selection among products, digital and other (e.g., clothing, books)		

1. Quality change in existing product types

a) Appearance of new models/varieties of existing products and new products

b) Digital replacements

c) Improved variety selection

- How should new varieties be linked in?
- Explicit quality adjustment?
- Reservation price?
- When should new varieties be linked in?

→'Pessimistic' scenarios

2. Truly novel products

- Theory: estimate a reservation price to capture initial welfare change from innovation
- Problems:
  - Estimation of reservation prices in practice
  - Communication/user acceptance
- Of interest for welfare measurement, but much less practical for official price index

3. Free products

- Transaction price = 0 ⇒ excluded from price index

- Shadow price > 0
  - Implicit transaction (advertising, user da
  - Value of time (opportunity cost)
  - Willingness to pay
  - Willingness to forego/accept

3. Free products (ctd)

- Imputation?
  - Consistency with treatment of other nonmarket consumption (child care, cook
  - Own-account production of leisure services
  - Estimating shadow price in practice difficult but research exists
  - Brynjolfsson et al 2018; discrete choice experiments

- Conclusion: not practicable for official index, except at point of appearance as free replacement *(case 1. (b))*

Simulating effects:
Quality change in existing product types

Method

- 145 private final consumption expenditure items
  - '*affected*'
  - '*possibly affected*'
  - 'not affected'
- 34 OECD countries, *expenditure weights* for 2005 and 2015 (national accounts)
- Examining '*pessimistic*' *scenarios* for upward bias in deflators base on literature e.g.,
  - Byrne and Corrado (2015, 2017a, 2017b, 2017c)
  - Abdirahman et al. (2017)
  - Greenstein and McDevitt (2010)
  - Byrne, Fernald and Reinsdorf (2017)

...or assumptions

(a) Quality adjustments in deflators of existing digital products

- Digital products where ***advances in technology*** are causing rapid quality improvement
- ***Affected:***
  - Example: computers and software
  - Assumption over-estimation of the price change
  - ***10 % points/year*** for communication services
  - ***5 % points/year*** other affected products

- ***Possibly affected:***
  - Example: motor vehicles
  - Assumption: ***2 % points/year*** *over-estimation of the price change*

(b) Digital replacements

- Free or cheaper replacement for a more expensive item that used to be the only alternative
- ***Affected:***
  - Example: passenger transport
  - Assumption: ***5 % points/year*** *over-estimation of the price change*
- ***Possibly affected:***
  - Example: books
  - Assumption: ***2 % points/year*** *over-estimation of the price change*

(c) Better selection of varieties

- Expanded access to varieties + reduced search costs for finding the best match for one's individual needs and tastes

- ***Affected:***
  - Many products, e.g., clothing, furniture, even restaurant choices
  - Assumption: ***0.3 % points/year*** *over-estimation of the price change*

‘Pessimistic Bounds’ for Potential Effects on PCE Deflator

	Assumed Error in Growth Rate of Prices (% points per year)	2005 Weight (average across 34 OECD countries) (%)	2015 Weight (average across 34 OECD countries) (%)	Adjustment to Growth Rate of Consumption Deflator, 2005 Weights (% points)	Adjustment to Growth Rate of Consumption Deflator, 2015 Weights (% points)
Significant potential for under adjustment for quality change (‘affected products’) except communication services	5	0.8	0.1	-0.04	–0.05
Communication services	10	2.7	2.4	-0.27	-0.24
Some potential for under adjustment for quality change (‘potentially affected prods.’)	2	7.4	6.2	–0.15	–0.12
Potential effect of under adjustment for quality change				**–0.46**	**–0.41**
Significant replacement by digital products (‘affected products’)	5	2.4	1.0	–0.12	–0.05
Some replacement by digital products (‘potentially affected products’)	1	5.8	5.7	–0.06	–0.06
Potential effect of digital replacements				**–0.18**	**–0.11**
Potential for improved variety selection	0.3	16.8	15.6	**–0.05**	**–0.05**
All potential effects		**35.9**	**31.5**	**–0.69**	**–0.58**

Conclusion

- Digital economy makes price measurement harder and raises questions about possibly neglected welfare effects (positive and negative)
- But not every welfare change belongs in official price index although no firm line here – purpose of index, feasibility, credibility count
- Pessimistic adjustment: ~0.6 % points/year, but declining
- Not insignificant
- But declining and can't explain slow GDP and productivity growth

Thank you!

Additional slides
Expenditure weights

Affected or Potentially Affected by Under Adjustment for Quality

	2005 Weights (% points)	2015 Weights (% points)
Affected:		
Telecommunication equipment	0.21	0.41
Telecommunication services*	2.71	2.38
Information processing equipment and software	0.45	0.49
Photographic/cinematographic equipment*	0.13	0.09
Potentially Affected:		
Major and small HH appliances	1.12	0.95
Equipment for the reception and recording of sound and vision*	0.70	0.53
Motor vehicles and parts	5.08	4.26
Games, toys and hobbies	0.48	0.42

* Includes effects of digital replacement

Affected or Potentially Affected by Low-Cost Digital Replacement

	2005 Weights (% points)	2015 Weights (% points)
Taxi or hired car with driver	0.31	0.30
Pre-recorded recording media	0.22	0.12
Unrecorded recording media	0.11	0.04
Newspapers and periodicals	0.68	0.45
Film developing and printing	1.04	0.07
Potentially Affected:		
Books	0.47	0.33
Passenger transport by air	0.68	0.89
Package holidays	0.81	0.93
Accommodation services	1.41	1.56
Maintenance and repair of dwelling	0.46	0.41
Postal services	0.11	0.09
Jewellery, clocks and watches	0.43	0.39
FISIM	1.42	1.46

Improved Variety Selection due to Expanded Access or Better Information

	2005 Weights (% points)	2015 Weights (% points)
Cloth and clothing	5.16	4.45
Furniture, floor coverings, HH textiles, and repairs thereof	2.50	1.98
Games, toys and hobbies	0.48	0.42
Newspapers and periodicals	0.68	0.45
Books	0.47	0.33
Other durable and nondurable HH goods	1.83	1.69
Restaurants, cafes and dancing establishments	3.84	4.26
Accommodation services	1.41	1.56
Maintenance and repair of dwelling	0.46	0.41