

Statistics for the Digital Age

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“[The economy’s] complexity and structure are becoming increasingly difficult to capture within the basic conceptual framework of the national accounts. When the statistical framework was first devised, the economy was one in which most businesses were engaged in the production of reasonably homogenous goods in a single country. The reality today is ...many businesses operating across national borders and producing a range of heterogeneous goods & services that may be tailored to the tastes of individual consumers.”

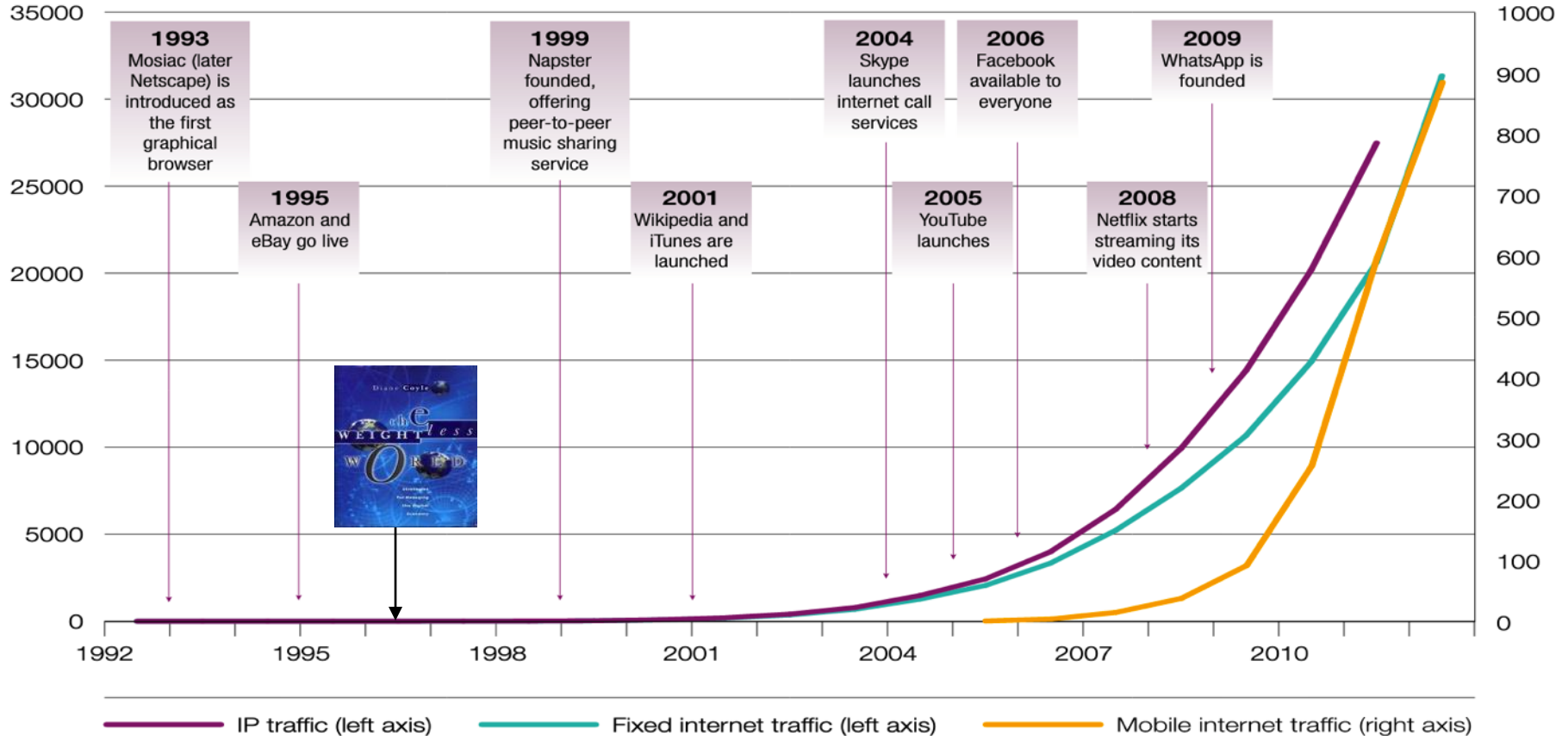
Independent Review of UK Economic Statistics

Professor Sir Charles Bean

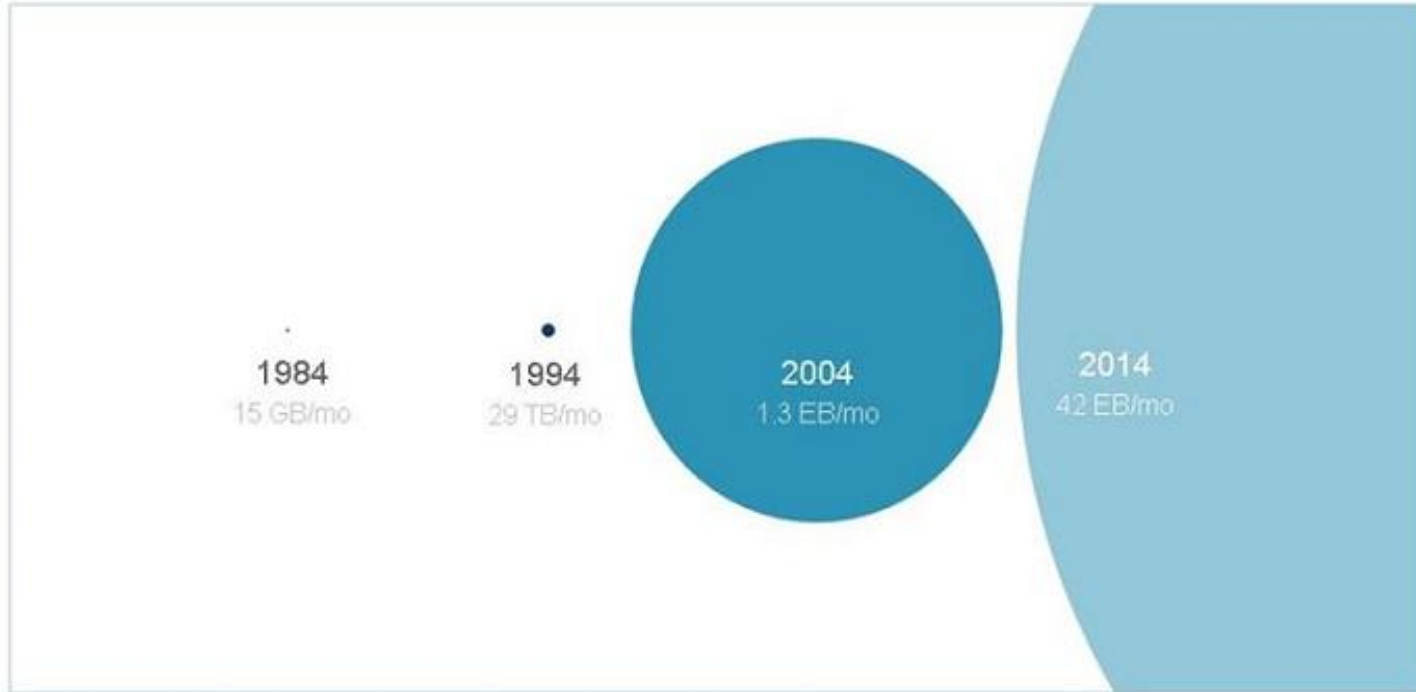


Chart 3.A: Global internet traffic trends

NB total now 130,000 PB/month



Global Internet Traffic



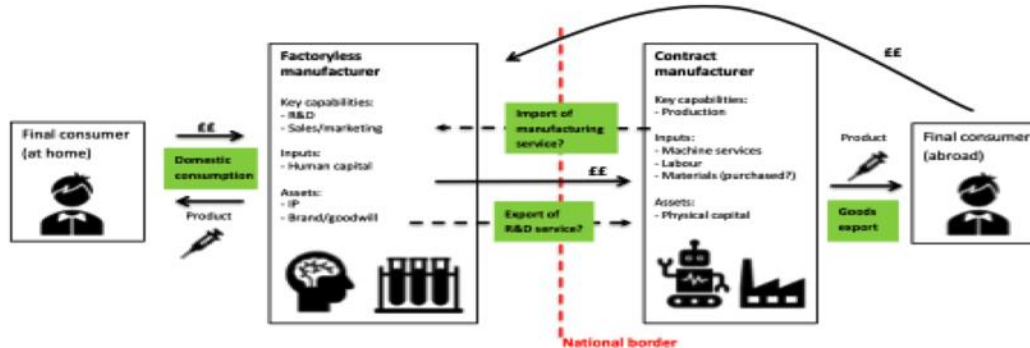
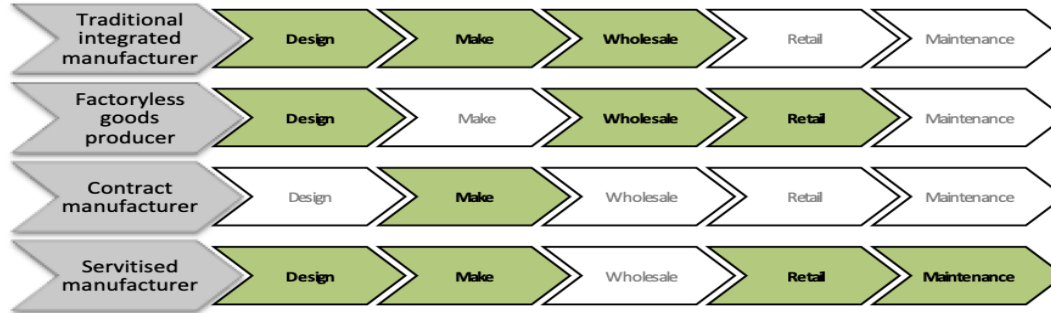
Multiple challenges

- Classifications
- Production changes
 - Supply chains
 - Cloud computing
- Deflators
 - Quality change
 - Consumer behaviour
- Conceptual challenges

Production

Contract manufacturing

Figure 2. Value chain choices in manufacturing



Sector distribution of contract manufacturing

Table 3. Sector distribution of firms with a base in the UK that use or provide Contract Manufacturing Services. N=498. Source: Glass.AI, June 2019.

Sector	Share
1 Chemicals	18%
2 Life Sciences & Pharmaceuticals	18%
3 Biotechnology	15%
4 Electrical and Electronic Manufacturing	13%
5 Mechanical & Industrial Engineering	9%
6 Medical Devices	7%
7 Cosmetics & Toiletries	3%
8 Machinery	3%
9 Textiles	3%
10 Plastics	2%
11 Venture Capital & Private Equity	2%
12 Outsourcing and Offshoring	1%
13 Logistics & Supply Chain	1%
14 Packaging & Print	1%
15 Food & Beverages	1%

Table 4. . Sector distribution of firms with a base in the US that use or provide Contract Manufacturing Services. N=2,534. Source: Glass.AI, June 2019.

Sector	Share
1 Electrical & Electronic Manufacturing	14%
2 Life Sciences & Pharmaceuticals	11%
3 Plastics	10%
4 Medical Devices	9%
5 Chemicals	8%
6 Machinery	7%
7 Semiconductors & Electronic Systems	7%
8 Biotechnology	6%
9 Mechanical & Industrial Engineering	6%
10 Industrial Automation	3%
11 Outsourcing & Offshoring	3%
12 Aviation, Aerospace & Defence	3%
13 Cosmetics & Toiletries	2%
14 Mining and Minerals	2%
15 Logistics & Supply Chain	1%
16 Food & Beverages	1%
17 Investment Banking & Advisory	1%
18 Computer Hardware	1%
19 Packing & Print	1%
20 Venture Capital & Private Equity	1%

Cloud computing: Multiple products, no weights

AWS has 21 product categories and 144 different products

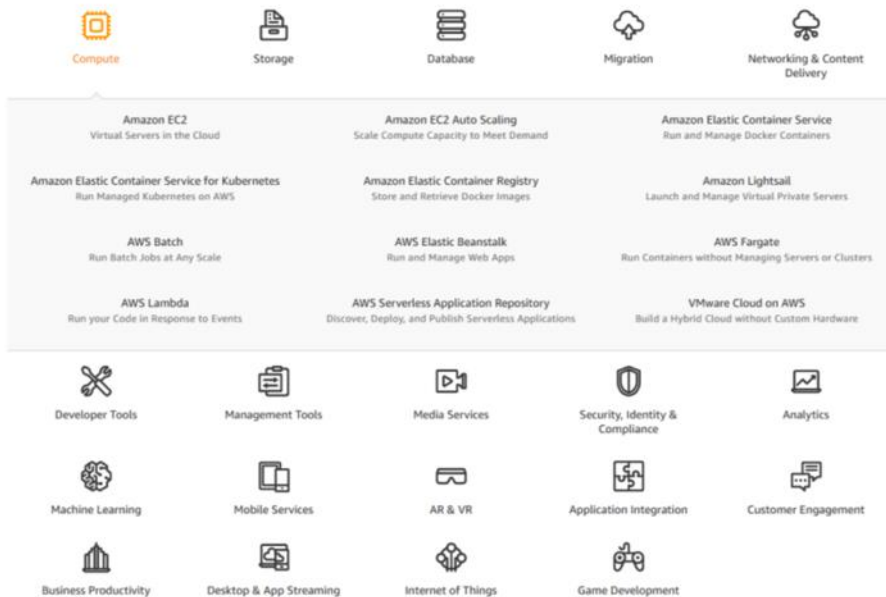
Microsoft Azure lists 399 products and Google 108

Prices vary by location & OS

Collecting all prices not feasible

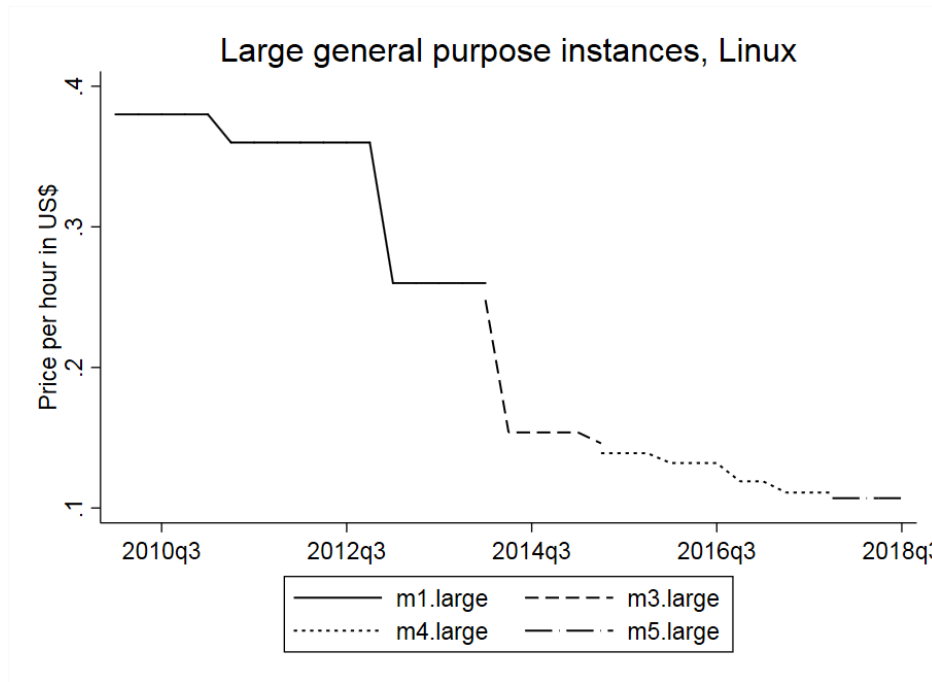
Weights would help but not available

AWS S3 (storage) and EC2 (compute) most used products in 2017



Source: AWS website, August 2018

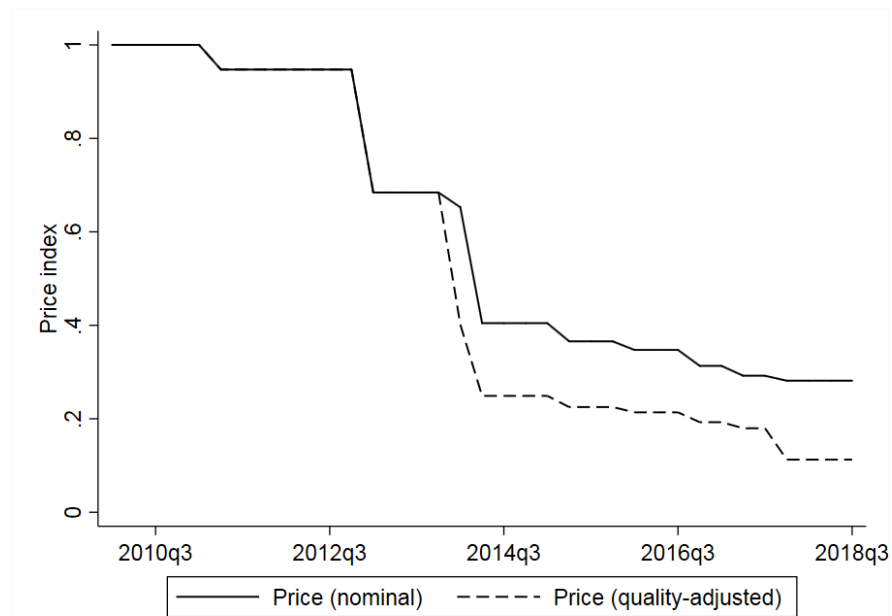
Nominal cloud service prices are declining...



Coyle & Nguyen
ESCoE DP2018-19

Trend similar to other instance types (small, x.large, ...)
Google's compute products look similar
Prices declined by 72% over 35 quarters

...Quality-adjusted prices declining faster



Quality-adjustment not relevant pre-2014, but from Q1-2014 adjusted prices fall more rapidly
Price index dropped by 83% over 35 quarters
11 pp faster than nominal prices (25 pp for Windows)

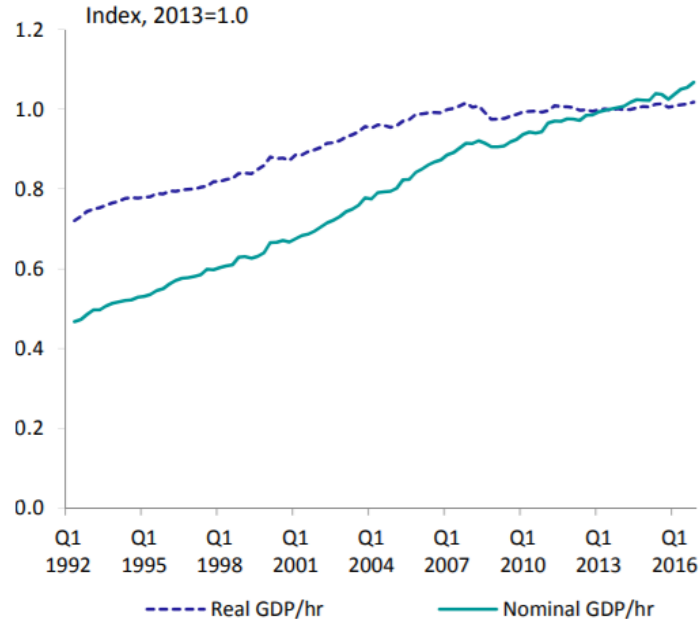


Data

Deflators

Real vs Nominal GDP

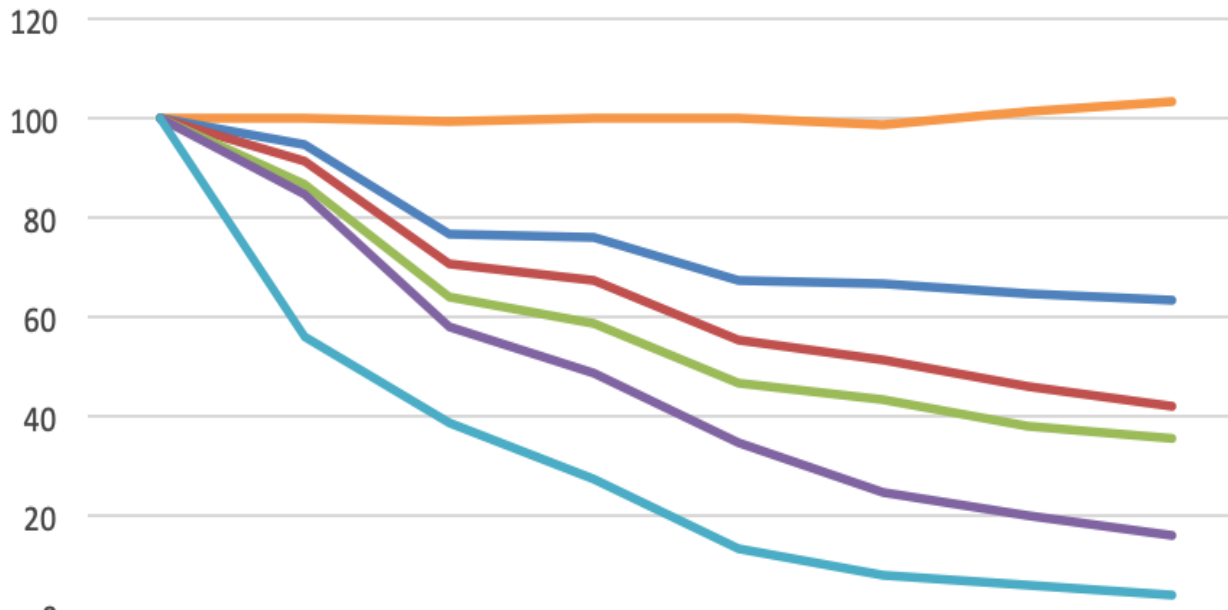
Figure 1: Real and nominal GDP per hour worked

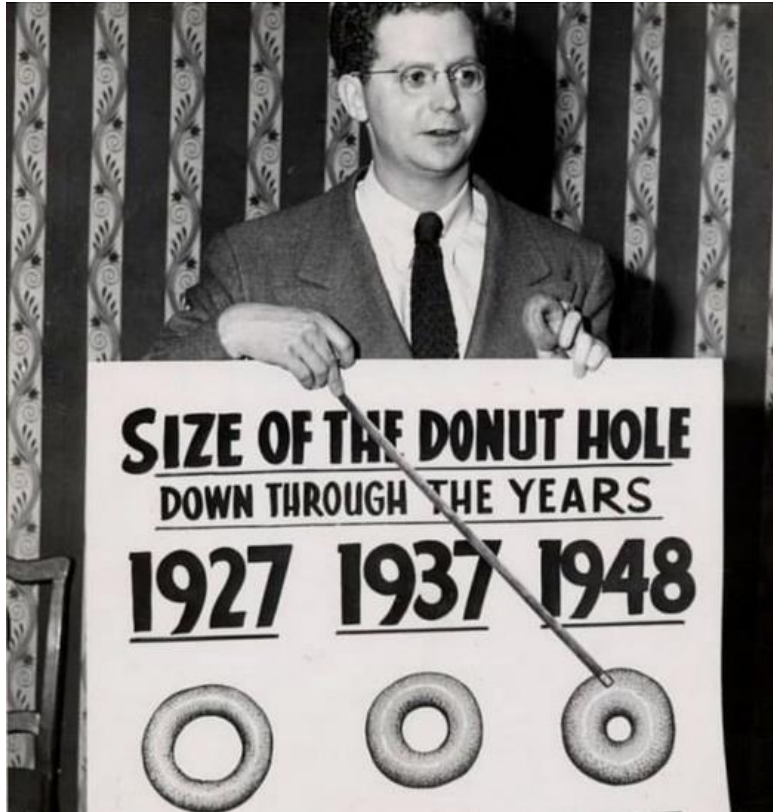




Telecoms services prices

Figure 4: Range of potential Telecoms Deflators



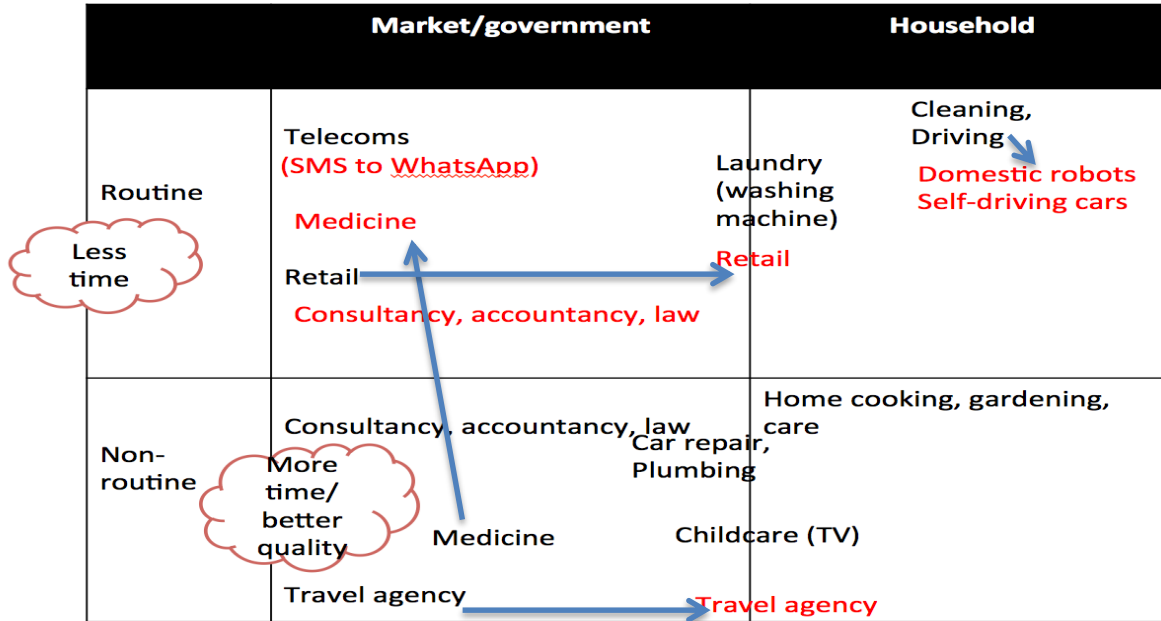


'DIY' digital production

Type	Examples	Marketed substitute	Scale?
Open source software	R, Python, Apache, Linux, Mozilla	Proprietary software	Large
Online software/tech advice	Stack Overflow, GitHub etc	Consultancy, software services	Potentially large
Writing/editing online material	Wikipedia, blogs	Purchased reference works, magazines	Moderate
Uploading videos, other entertainment	YouTube & more	Purchased entertainment	Very large
Other advice, discussion forums	MumsNet, health forums	Club subscriptions	Small
Educational material	Khan Academy, CORE Economics, EdX	Textbooks, tutors, fees	Small-moderate
Crowdsourced information, UGC	Waze	Local radio	Small
Innovative product designs	Medical devices, household products	Various	Small markets, wide scope

Concepts

What is 'productivity'?



Value of digital goods

Table 1.

[View popup](#)

Median WTA estimates for most popular digital goods categories

Category	WTA per year 2016, \$	WTA per year 2017, \$	95% CI WTA per year 2016, \$		95% CI WTA per year 2017, \$		n
			Lower	Upper	Lower	Upper	
All search engines	14,760	17,530	11,211	19,332	13,947	22,080	8,074
All email	6,139	8,414	4,844	7,898	6,886	10,218	9,102
All maps	2,693	3,648	1,897	3,930	2,687	5,051	7,515
All video	991	1,173	813	1,203	940	1,490	11,092
All e-commerce	634	842	540	751	700	1,020	11,051
All social media	205	322	156	272	240	432	6,023
All messaging	135	155	98	186	114	210	6,076
All music	140	168	112	173	129	217	6,007

What is economic welfare?

What shall I buy
today?

What shall I do
today?



Multiple challenges

- Data collection methods – need to change
- Data, intangibles – need to measure
- Structure of production – transformed
- Consumer behaviour – transformed
- What is the purpose of the statistics?