



Key Issues in the Measurement of Service Sector Output and Productivity - an incomplete account

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By way of introduction (1)

- **Broad shifts** in our economies
 - **Globalisation** and interconnectedness of economies
 - **Digitalisation**, knowledge assets transform economies and shape competitive advantages
 - **Ageing societies**: financing of pension and health system
 - Quest for economic, social and environmental **sustainability**



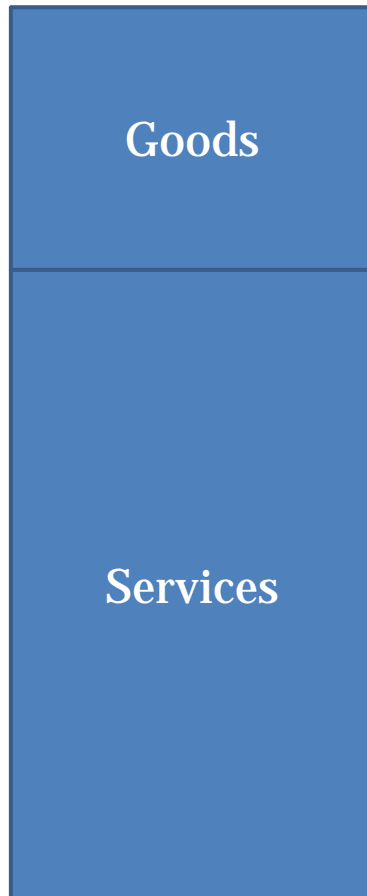
By way of introduction (2)

- All of these affect **productivity measurement**
 - **Globalisation** and interconnectedness of economies → *national value-added*
 - **Digitalisation** and knowledge assets shape competitive advantages → *capturing new business models*
 - **Ageing societies**: → measuring *health services*
 - **Sustainability** → measuring *capital*



By way of introduction (3)

Outputs



Inputs





By way of introduction (4)

Outputs



✓ Reasonably well measured

❖ **Hard-to-measure:**

- ❖ Financial services
- ❖ Communication services
- ❖ New business models (digitalisation)

- Defining service
- Customised products
- Bundling

❖ **Hard-to-measure**



By way of introduction (5)

- ✓ Reasonably well measured
- ❖ Although: new business models

- ❖ Human capital and skills – not very well captured

Inputs



ECD

BETTER POLICIES FOR BETTER LIVES



By way of introduction (6)

- ✓ Reasonably well measured
- ❖ Issue: R&D, software

- ❖ Measurement hard in some cases
- ❖ Typically left out of productivity calculations
- ❖ As a consequence, picked up by MFP residual

Produced
capital

Natural assets

Knowledge
capital

Institutions
and social
capital

Inputs

Capital

MFP



This presentation...

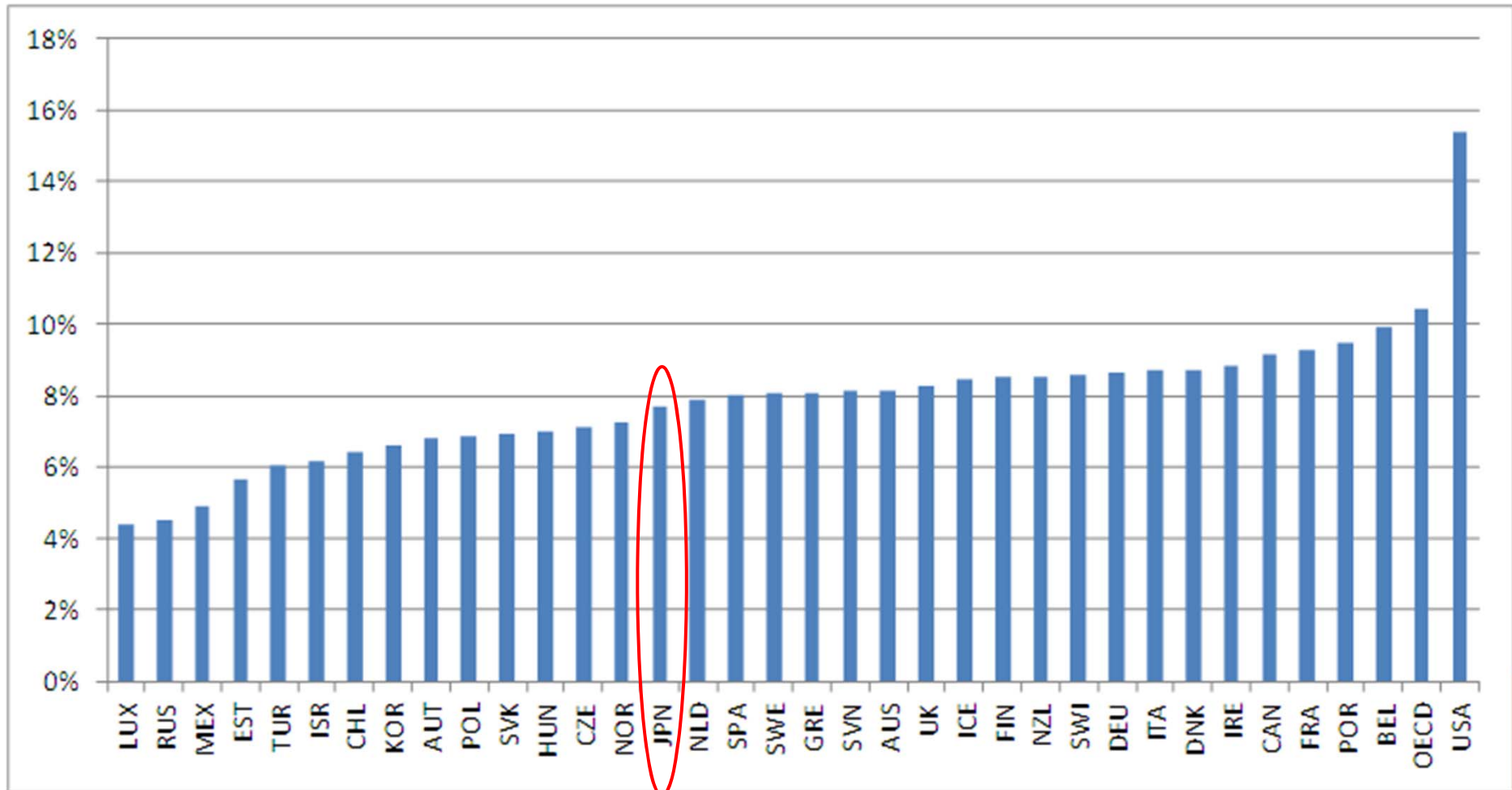
1. Looks at an important example of the hard-to-measure services: **health output**
2. Discusses **digitalisation** and output measurement
3. Takes a look at **knowledge-based assets** and **land**



1. HEALTH SERVICES



Domestic health care expenditure; % of GDP, 2011





Health care: accounting specificities

- Health care providers are often non-market producers
- This entails different accounting treatment for *nominal* output



Nominal output of health service providers

Market providers: output = revenues

Non-market providers: output = costs

Costs = Intermediate consumption
+ Compensation of employees
+ CFC
+ Other net taxes on production



Nominal output of health service providers

Non-market producers: capital costs = depreciation

Market producers: capital costs = depreciation + real return to capital

Asymmetric treatment depending on institutional sector



Volume output of health service providers (1)

- Market or non-market: volume of **output** should not be measured by volume of **input**
- **Output** = unit of (quality-adjusted) treatment
- **Input** = hours of doctors, nurses, capital equipment,...

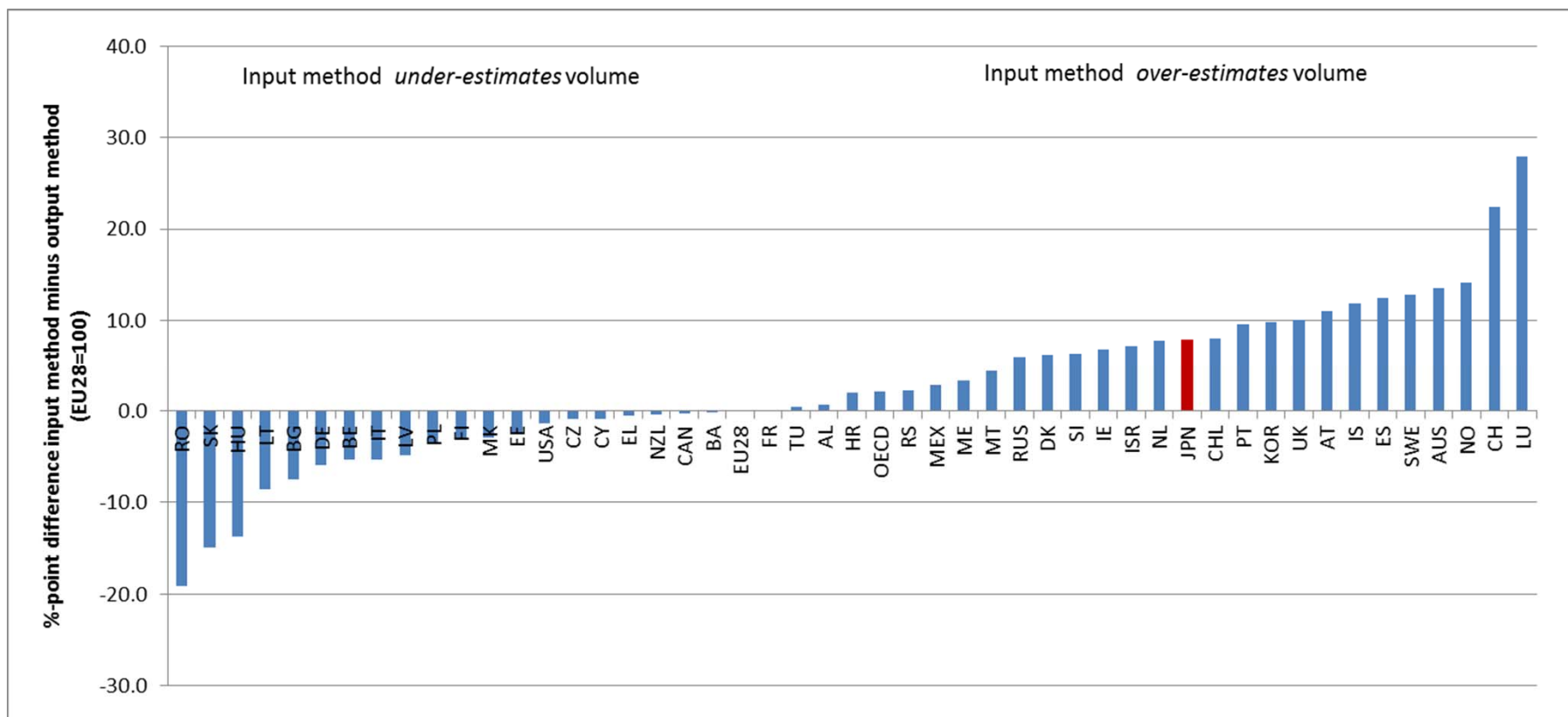


Volume output of health service providers (2)

- Progress has been made, partly driven by institutional developments:
 - DRG (**Diagnosis related group**)
 - **Cost accounting** systems
- Provide information on treatment
- OECD project defines comparable treatments and prices them across countries



OECD results for cross-country comparisons – PPP programme



Source: Koechlin, Konijn, Lorenzoni and Schreyer (2015) <http://link.springer.com/article/10.1007/s11205-015-1196-y>



Challenges

- **Quality change**
- Tracking **pathways through institutions** not possible: trends towards outpatient treatment can introduce bias
- **Residential care**: nearly universally input-based measures or number of days of care
- Introduction in **national accounts over time**



Significant heterogeneity of methods in OECD countries

- US, CAN, MEX, CHI, JPN, KOR: input-based volume measures
- AUS, NZL, (some) EU countries: output-based measures
- **But progress is made**
 - DRGs develop quickly
 - Research progresses; e.g., Gu and Morin (2014) for Canada
- **Major programme in the United States (BEA): health satellite accounts**



2. DIGITALISATION: ARE WE MISSING OUT ON MEASURES OF PRODUCTION?



Uberisation, Sharing economy – what is meant?

Airbnb averages 425,000 guests per night, nearly 22% more than Hilton Worldwide

“Five-year-old Uber operates in more than 250 cities worldwide and as of February 2015 was valued at \$41.2 billion³ – a figure that exceeds the market capitalization of companies such as Delta Air Lines, American Airlines and United Continental.”

Source: PWC The sharing economy – sizing the revenue opportunity

Sharing economy sector and traditional rental sector projected revenue growth

Sharing economy sector



Peer-to-peer lending and crowdfunding



Online staffing



Peer-to-peer accommodation



Car sharing



Music and video streaming

Traditional rental sector



Equipment rental



B&B and hostels



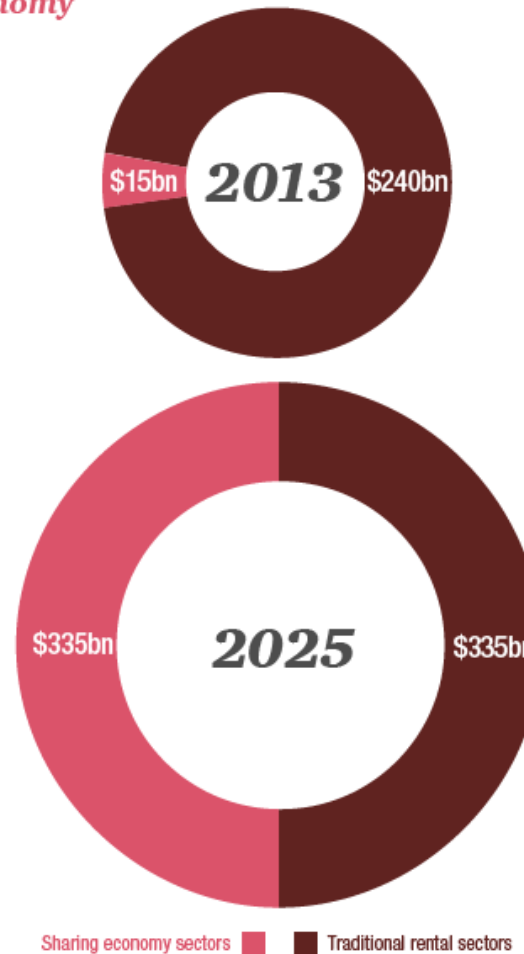
Book rental



Car rental



DVD rental



Source: PWC analysts



Activities and transactions moving between sectors (1)

- ***Intermediation function*** moves from original provider to technology-enabled platform
- Examples:
 - Travel agent -> *Booking*
 - Hilton online reservations -> *AirBnB*
 - *Taxi reservation service* -> *Uber*
- Revenues = commissions occur in other firms but **no basic measurement problem**



Activities and transactions moving between sectors (2)

- **Service provision** moves from corporate service sector to household sector
 - Rooms via *AirBnB*
 - Rides via *BlaBla Car* (France)
- Revenues = transactions for service (rooms or rides)
- Occur in (unincorporated enterprises) within the **household sector**
- Inside production boundary of GDP *in principle*
- **Outside GDP** if activity is
 - Regular but undeclared
 - Occasional, non-professional
 - On purely barter basis (*Home Exchange*)



Quality change – in which direction?

- *Increasing choice*: e.g. fine location of hotel services via AirBnB -> output underestimated
- *More free labour input provided by households*: e.g. self-check out in supermarkets, self-check in on airports) -> output over-estimated
- *Customisation* that is enabled by *digitalisation*: for unique products, price comparisons become more complicated.

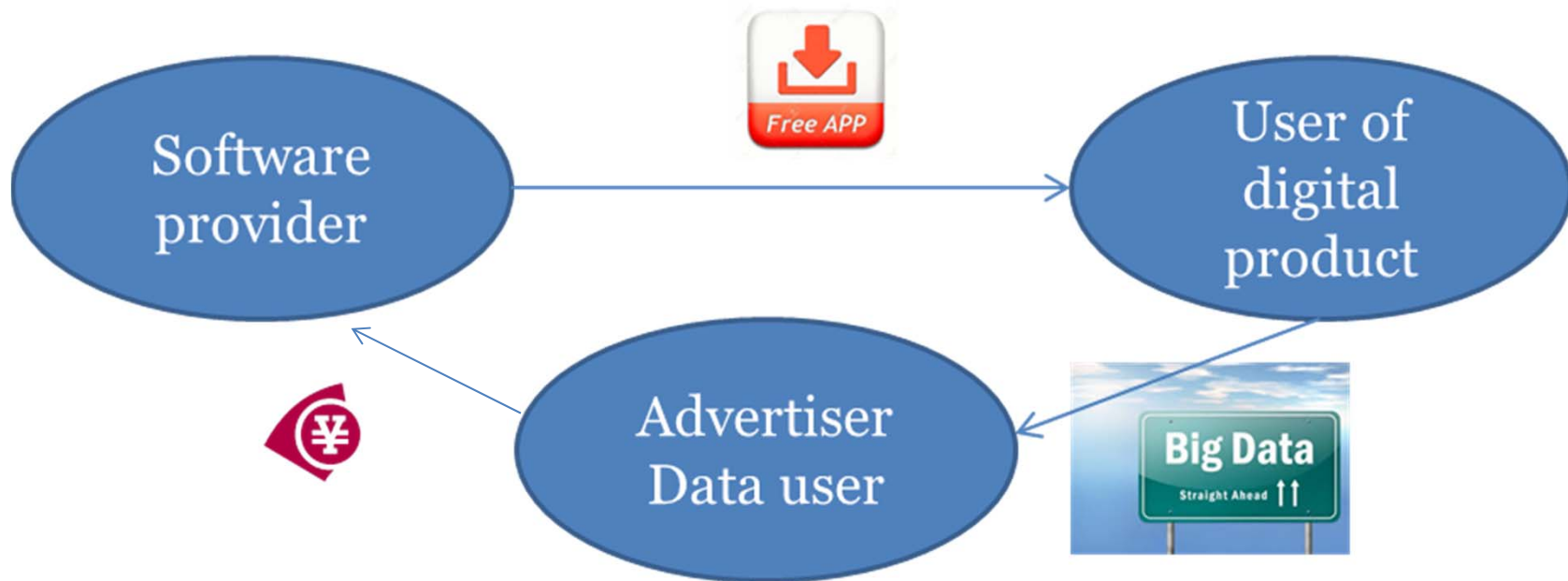


Free products: triangular transactions and zero price for some

- **Examples**
 - **Free Apps** for smartphones
 - **Free communication** via Skype
 - **Music or videos** via U Tube
 - **Search capacity** through search engines



Free products: transactions





Free products: triangular transactions and zero price for some

- **Implicit valuation** of free app with revenues from advertising services or from derived data
- **Implicit deflator: advertising price index**
 - If price = revenues/# of software users -> right direction
 - If price = revenue/ad -> volumes understated
- Not a measure of marginal utility to consumer
- And consumer disutility? « *When the product is free, the customer becomes the product* »
- Current practice is the best guess in town



Digitalisation: in summary

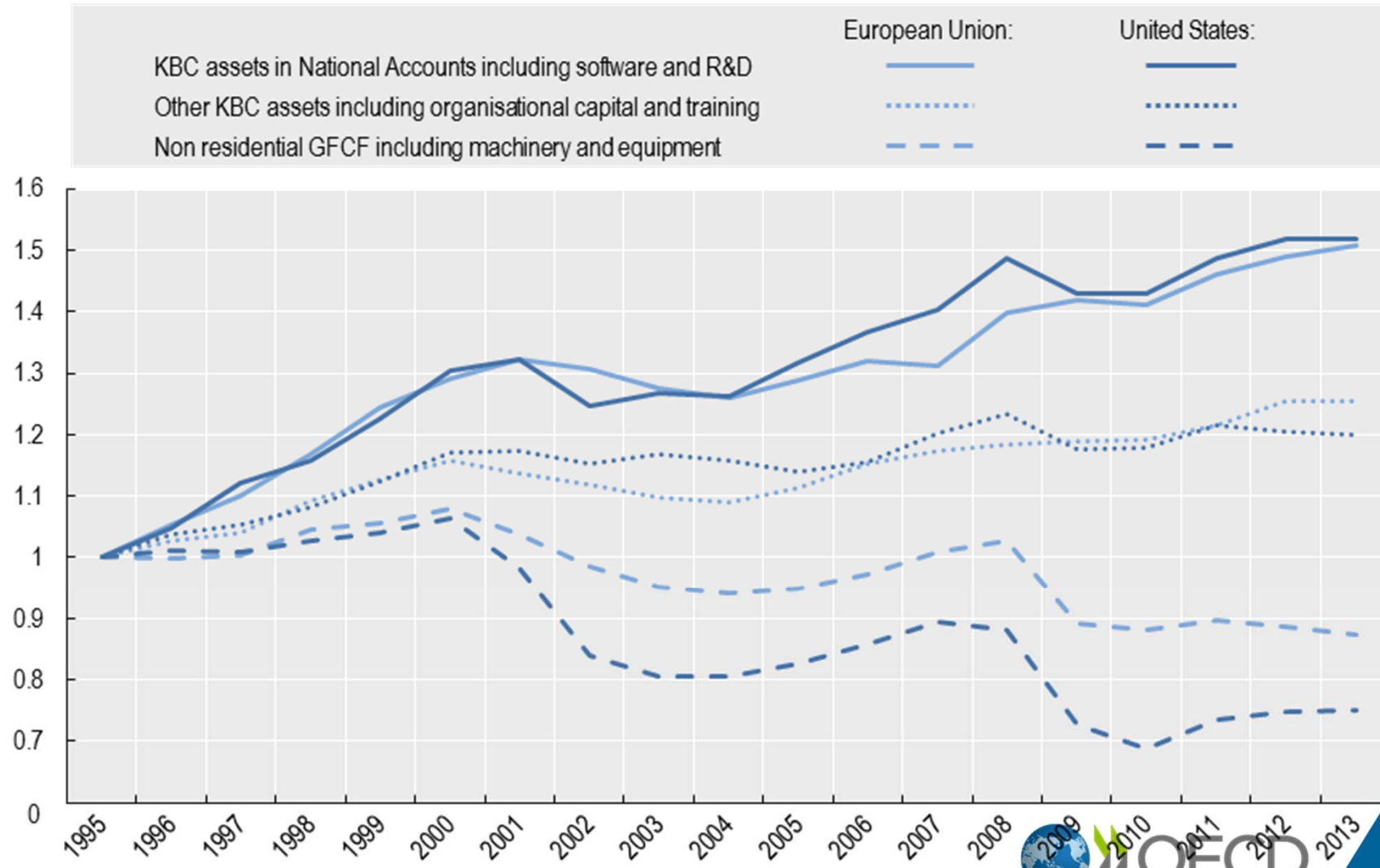
- *Too early* to say if we are losing out on measured production
- Even if *production* is understated, no implication that *productivity* is understated
- *Households* and their production activity move more centre-stage – needs to be reflected by statistical methods
- Digitalisation brings further into focus the fact that *GDP is not a measure of welfare* or consumer surplus



3. KNOWLEDGE CAPITAL (OWN-ACCOUNT PRODUCTION IN ALL INDUSTRIES)



Knowledge-based assets grow quickly...

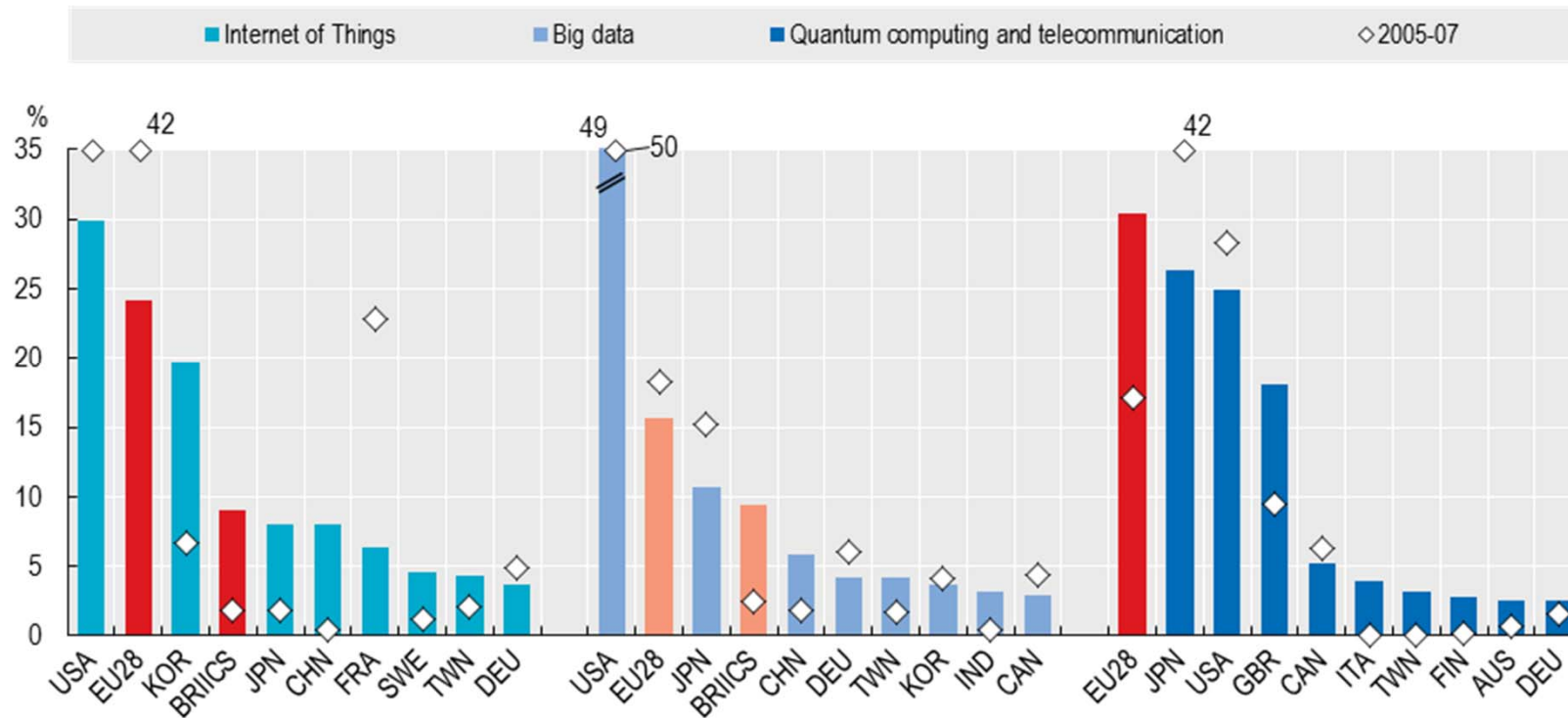


Source: OECD SCIENCE, TECHNOLOGY AND INDUSTRY SCOREBOARD 2015



...important for many OECD countries...

Economies' share of IP5 patent families filed at USPTO and EPO, selected ICT technologies



Source: OECD SCIENCE, TECHNOLOGY AND INDUSTRY SCOREBOARD 2015, p. 79

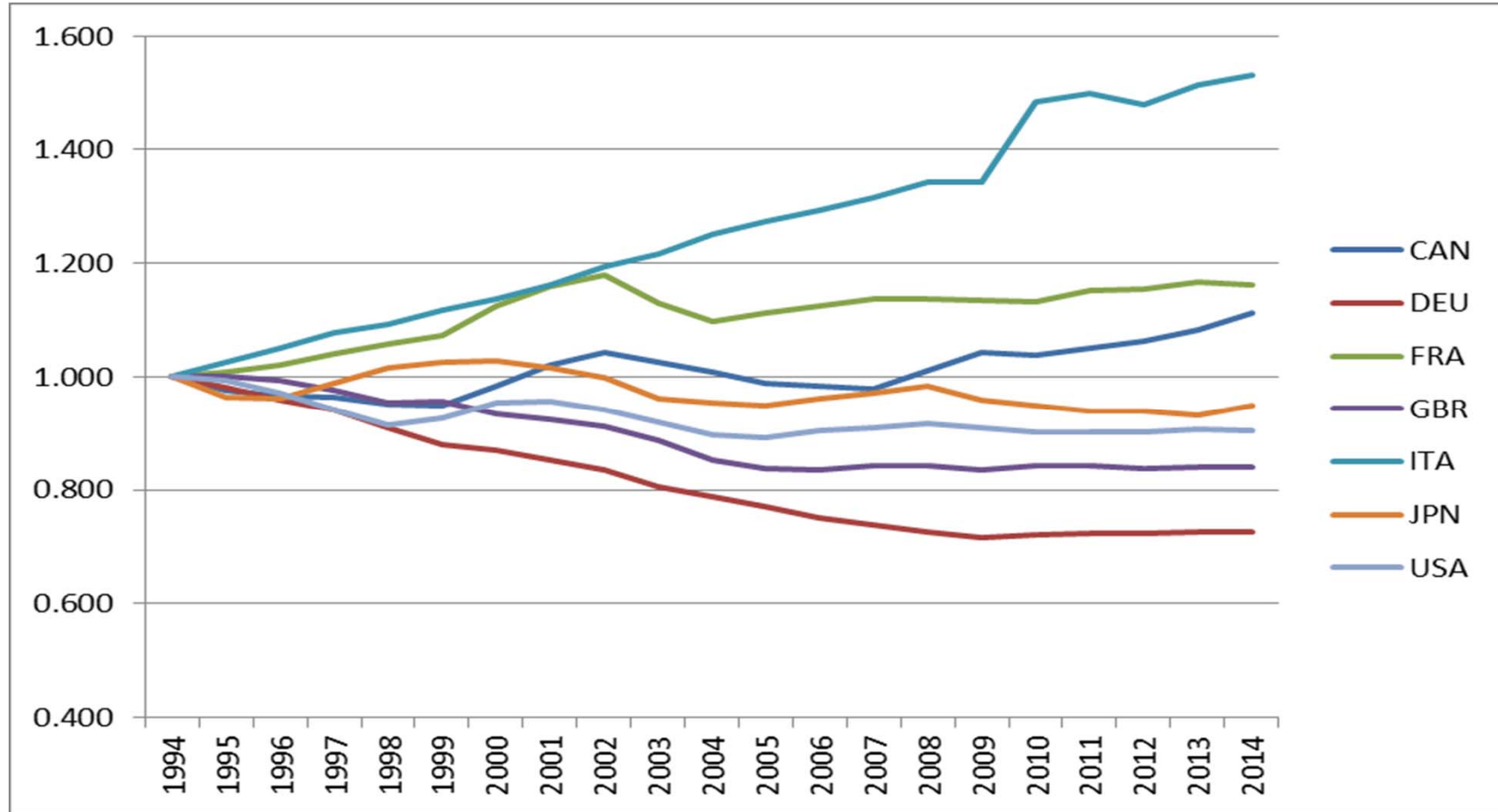


...but KBC measurement is not obvious...


- Value of investment = *sum of costs*
- How does knowledge *depreciate*?
- How do we *deflate* knowledge investment?
 - no market prices for own-account production and investment
- Example: software deflators



True or statistical differences in prices indexes for software and databases ?



Source: OECD Productivity Database



KBC – summary

- *Increasingly important* as source of competitiveness
- By its very nature *difficult to measure*
- Since widely quoted work by Corrado, Hulten and Sichel (2006), *international measurement work is moving ahead*



4. LAND (CONCERNS ALL INDUSTRIES)



Capital in productivity measurement

- Traditionally: produced, non-financial assets
- But non-financial, non-produced assets count:
 - **Mineral and energy resources**
 - **Land**
 - **Timber**

} **SNA**

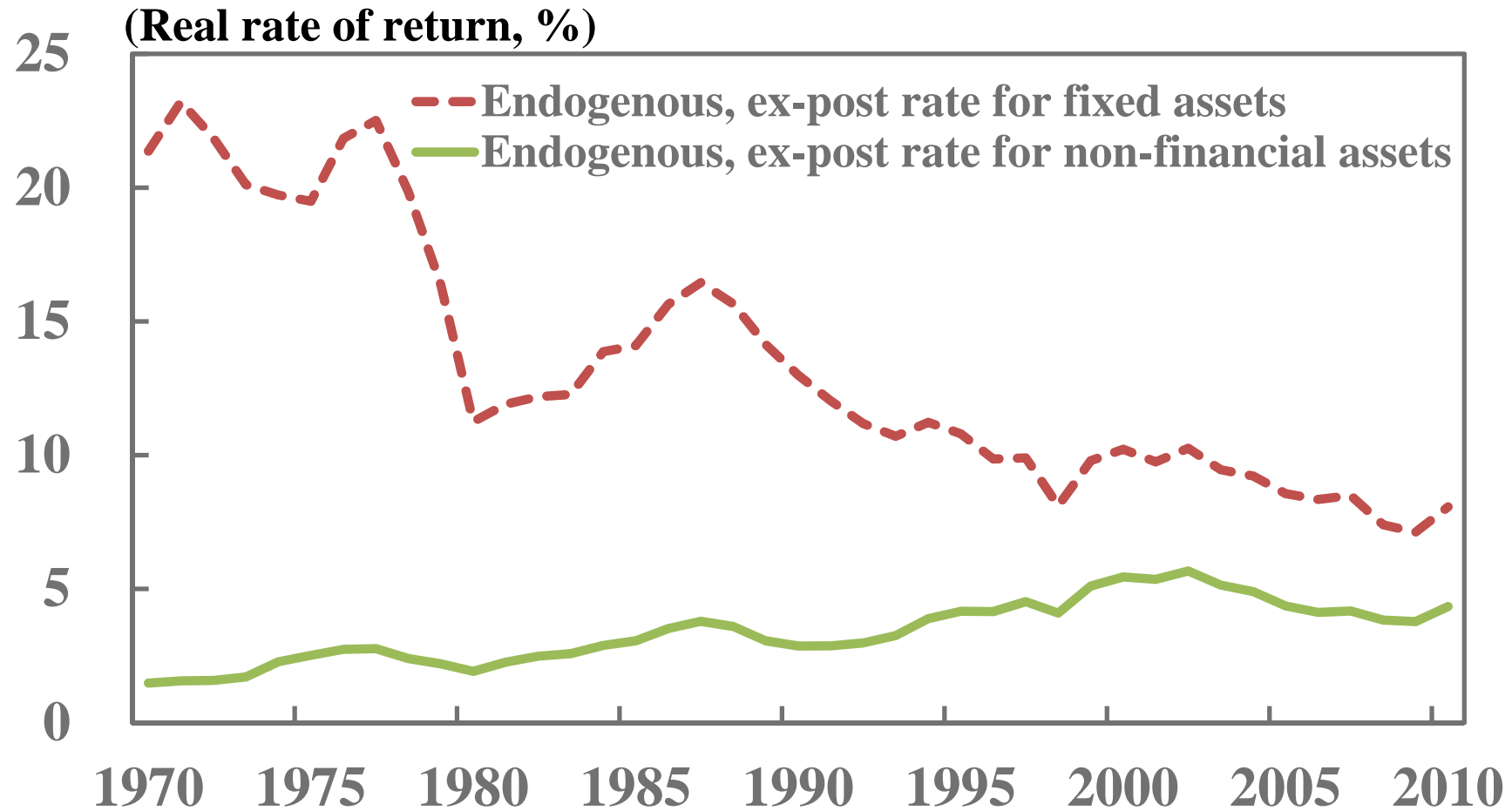


Land

- Surprisingly, quantity data *less than complete*
- *Valuation* even more so
- Few countries show land in national accounts *balance sheets*
- Volume of land changes slowly (compositional effect mainly) and value of land looms large
- Consequence: *inclusion of land in productivity measurement matters*



Korea: real rate of return on capital including and excluding land and inventories





Contributions to growth of real gross national income, Korea 1985-2012

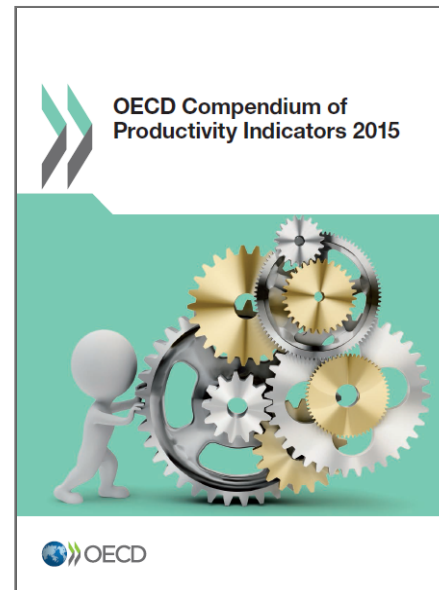
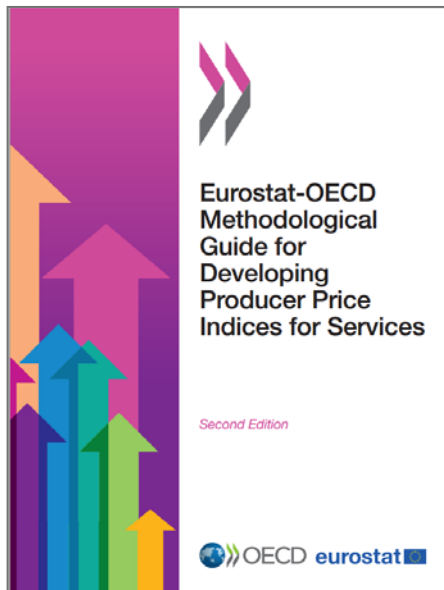




FINAL POINTS



Want to know more about productivity measurement and developments in OECD countries?





Conclusions

- **Hard-to-measure services** (health, education, finance, communication services)
 - there is progress in measurement but much remains to be done
- **Digitalisation** and new business models:
 - Disruptive in their economic effects
 - Measurement challenges in regards to household activities
 - No confusion between measuring welfare and measuring production
- **Measuring inputs:** KBC, land, hours worked



Thank you!