

Capital productivity measures: Availability, definitions, and convergence

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Ongoing research within the project ESTAT/C/2018/016 “Growth and productivity accounts – Capital productivity and multifactor productivity”

Overview

- Assess 'quality of capital stock data' available from Eurobase
 - Relevance
 - Coherence
- Capital-productivity indicators
 - Definitions and potential usefulness
 - Comparison across countries and industries
- Convergence across countries
- Capital stocks, services, TFP and growth accounts

Preliminary ongoing work!

Relevance: (Potential) scope and availability

Scope of the analysis

Dimension	Details
Industries	Whole economy and NACE Rev.2 A*10/11, A*21, A*38 (and A*64)
Asset types	14 asset types (including total and subtotals) and a residual
	Gross and net (wealth) stocks
Currency	Million National currency (and euro series)
Prices	Current replacement costs and previous year's replacement costs
Time period	1995 to 2019
Countries	EU Member States, plus UK and NO
Reference date	Input data were last updated on 15 February 2021*
Source	Only publicly available data from the bulk download facility of the Eurostat website

*Note: Some results presented here based on data downloaded 17/11/2020

Asset types and industry requirements according to Transmission Programme ("Table 20")

		Total economy	A*21	A*38	A*64
AN.11n	13. Fixed assets, net				
	Total construction (net)				
AN.111n	14. Dwellings, net				
AN.112n	15. Other buildings and structures, net				
AN.113n+AN.114n	16. Machinery and equipment, net + weapon systems, net				
AN.1131n	17. Transport equipment, net				
AN.1132n	18. ICT equipment, net				
AN.11321n	19. Computer hardware, net				
AN.11322n	20. Telecommunications equipment, net				
AN.1139n+AN.114n	21. Other machinery and equipment, net+weapon systems, net				
AN.115n	22. Cultivated biological resources, net				
AN.117n	23. Intellectual property products, net				
	Research and development (net)				
AN.1173n	24. Computer software and databases, net				

"Table 26": Data on Research and Development* and detailed intangible assets (compulsory according to SDMX questionnaire)

Asset types available in Eurobase

NA code	Description
N11N	Total fixed assets (net)
...N11KN	Total Construction (net)
... ..N111N	Dwellings (net)
... ..N112N	Other buildings and structures (net)
...N11MN	Machinery and equipment and weapons systems (net)
... ..N1131N	Transport equipment (net)
... ..N1132N	ICT equipment (net)
... ..N11321N	Computer hardware (net)
... ..N11322N	Telecommunications equipment (net)
... ..N11ON	Other machinery and equipment and weapons systems (net)
...N115N	Cultivated biological resources (net)
...N117N	Intellectual property products (net)
... ..N1171N	Research and development (net)
... ..N1173N	Computer software and databases (net)

Note: Same structure for gross capital stocks

Source: Own elaboration based on Eurobase.

N117 not necessarily equal
to sum of subitems (N1171 + N1173)

Availability over various dimensions

(as of 15/02/2021)

- Countries
- Years
- Level of details by industry x asset types
 - Total economy, A*21 (and also A*10, A*38, ...)
 - Total fixed assets, main asset types, detailed asset types (plus split in IT and CT)

9 detailed asset types

Current replacement costs

[illegible]

CY: CT, OMach (conf. since 2010)
DK: OMach, R&D, SoftDB
ES: IT, CT
IE: OMach, R&D (conf. since 2015)
RO: IT, CT, OMach

9 detailed asset types (adj.*)

Current replacement costs

	A1995	A1996	A1997	A1998	A1999	A2000	A2001	A2002	A2003	A2004	A2005	A2006	A2007	A2008	A2009	A2010	A2011	A2012	A2013	A2014	A2015	A2016	A2017	A2018	A2019
AT	171	171	171	171	171	71	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171
BE	171	171	171	171	171	71	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171
BG	38	38	38	38	38	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	113	95	95	38
CY	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	38
CZ	171	171	171	171	171	71	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171
DE	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	114	114
DK	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	76	76	76
EE	38	38	38	38	38	71	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171
EL	171	171	171	171	171	71	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	38
ES	38	38	38	38	38	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	38
FI	171	171	171	171	171	71	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171
FR	171	171	171	171	171	71	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171
HR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HU	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	114	114	38
IE	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	74	74	74	38
IT	171	171	171	171	171	71	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	38
LT	171	171	171	171	171	71	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	38
LU	171	171	171	171	171	71	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	38
LV	152	152	152	152	152	62	152	152	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	38
MT	38	38	38	38	38																				
NO	171	171	171	171	171	71	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171
NL	171	171	171	171	171	71	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	38
PL	38	38	38	38	38	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	38
PT	38	38	38	38	38	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	38
RO	38	38	38	38	38	112	112	112	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	38
SE	171	171	171	171	171	71	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	38
SI	38	38	38	38	38	71	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171
SK	38	38	38	38	38	71	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171
UK	171	171	171	171	171	71	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171

*Adjustment: N111 (dwellings) and N115 (Cultivated biological resources as reported 0 or 'non applicable')

Note: Download 15/02/2021; net stocks
Source: own elaboration based on Eurobase

Summary of missing detailed asset types (A*19)

ICT equipment	Computer hardware	Tele-communications equipment	Other machinery and equipment and weapons systems	Intellectual property products	Research and development	Computer software and databases
N1132	N11321	N11322	N11O	N117	N1171	N1173
BG	BG	BG	BG			BG
CY	CY		CY		CY	CY
DE	DE	DE				
ES	ES	ES	ES		DK ES	DK ES
HU	HU	HU				
IE	IE	IE	IE	IE		IE MT
PL	PL	PL	PL		PL	PL
PT	PT	PT	PT			PT
RO	RO	RO	RO			

Note: Download 15/02/2021

Source: own elaboration based on Eurobase

Note: at this industry level in accordance with transmission programme

Asset types and industry requirements according to Transmission Programme ("Table 20" and "Table 26")

		Total economy	A*21	A*38	A*64
AN.11n	13. Fixed assets, net				
	Total construction (net)				
AN.111n	14. Dwellings, net				
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	Research and development (net)				
AN.1173n	24. Computer software and databases, net				

Note: R&D compulsory according to SDMX questionnaire © wiiw

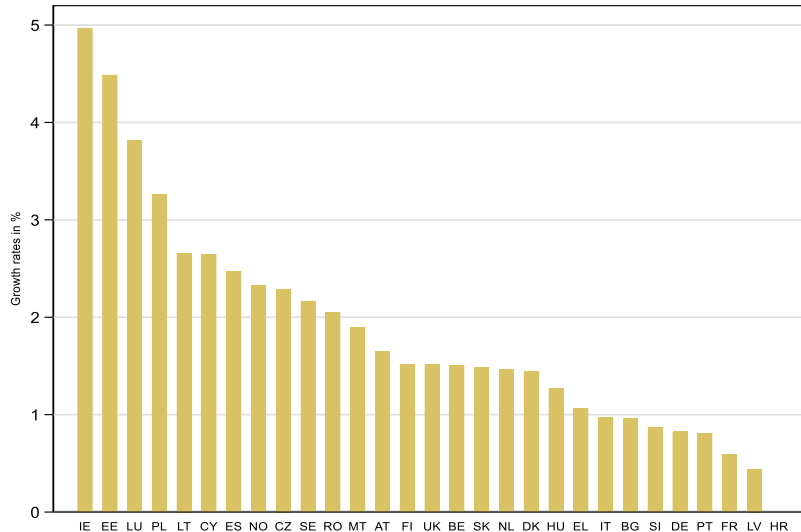
Coherence (Selected cross-country comparisons)

(here: focus on total economy)

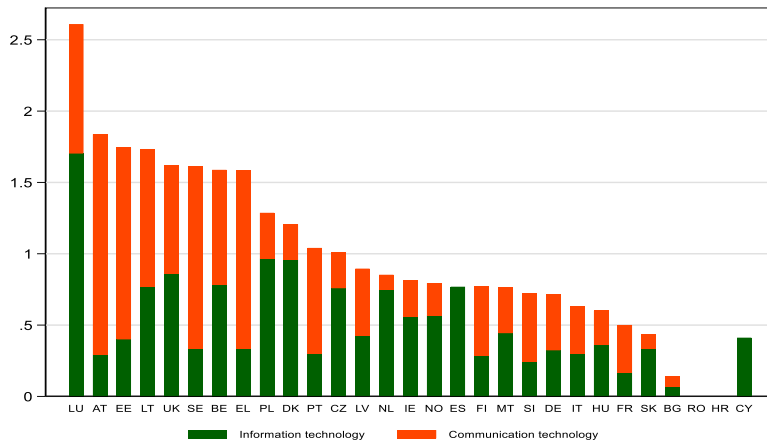
HERE: Growth rates and structures

Methodological differences in constructing capital stocks
(age/depreciation profiles, deflators, etc.) might matter

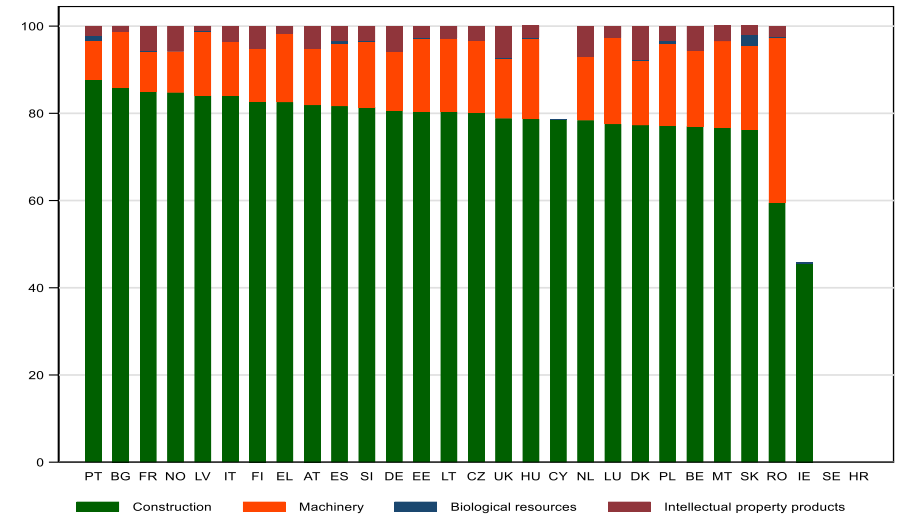
Growth rates (2000-): Total fixed assets



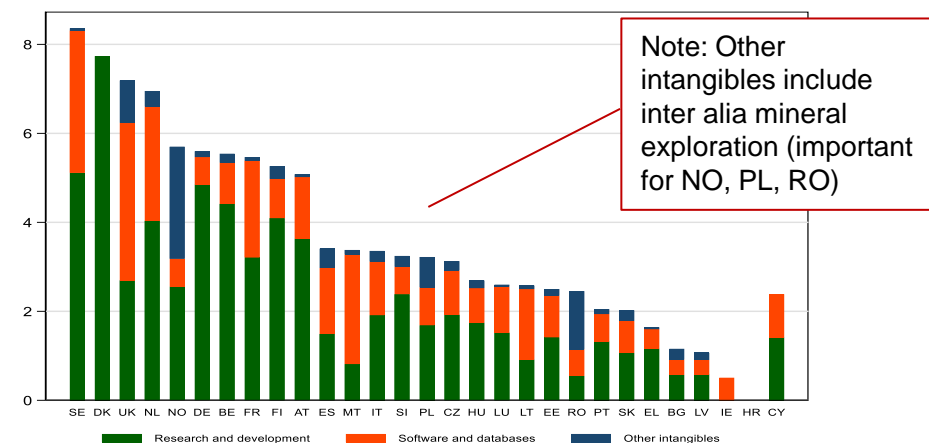
Structure: Share of ICT asset types in total (in %, 2017)



Structure: Share of main asset types in total (in %, 2018)



Structure: Share of intangibles asset types in total (in %, 2017)

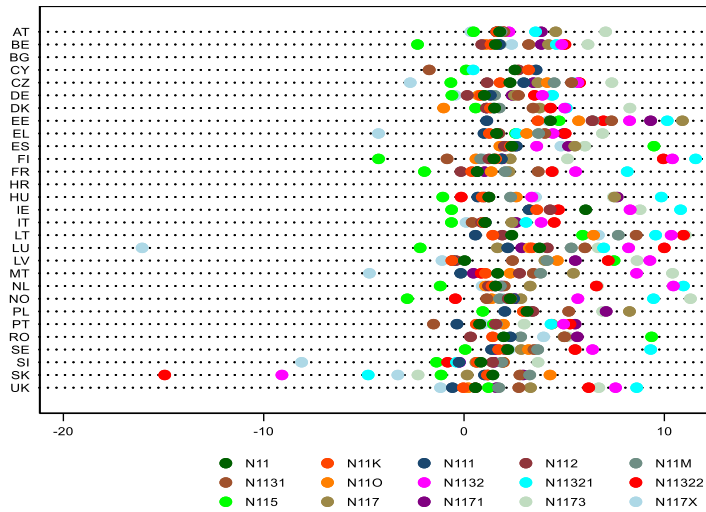


Note: Download 15/02/2021; ES total ICT (N1132); DK total IPP (N117)

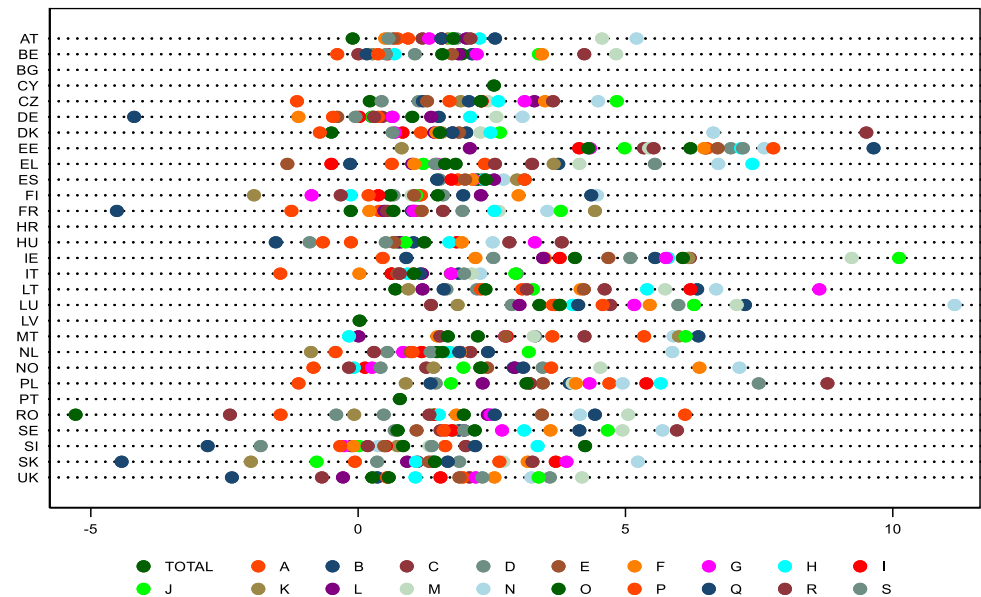
Source: own elaboration based on Eurobase.

Differentiated dynamics

Growth rates: Total economy by all asset types



Growth rates: A*19 and total fixed assets by industry

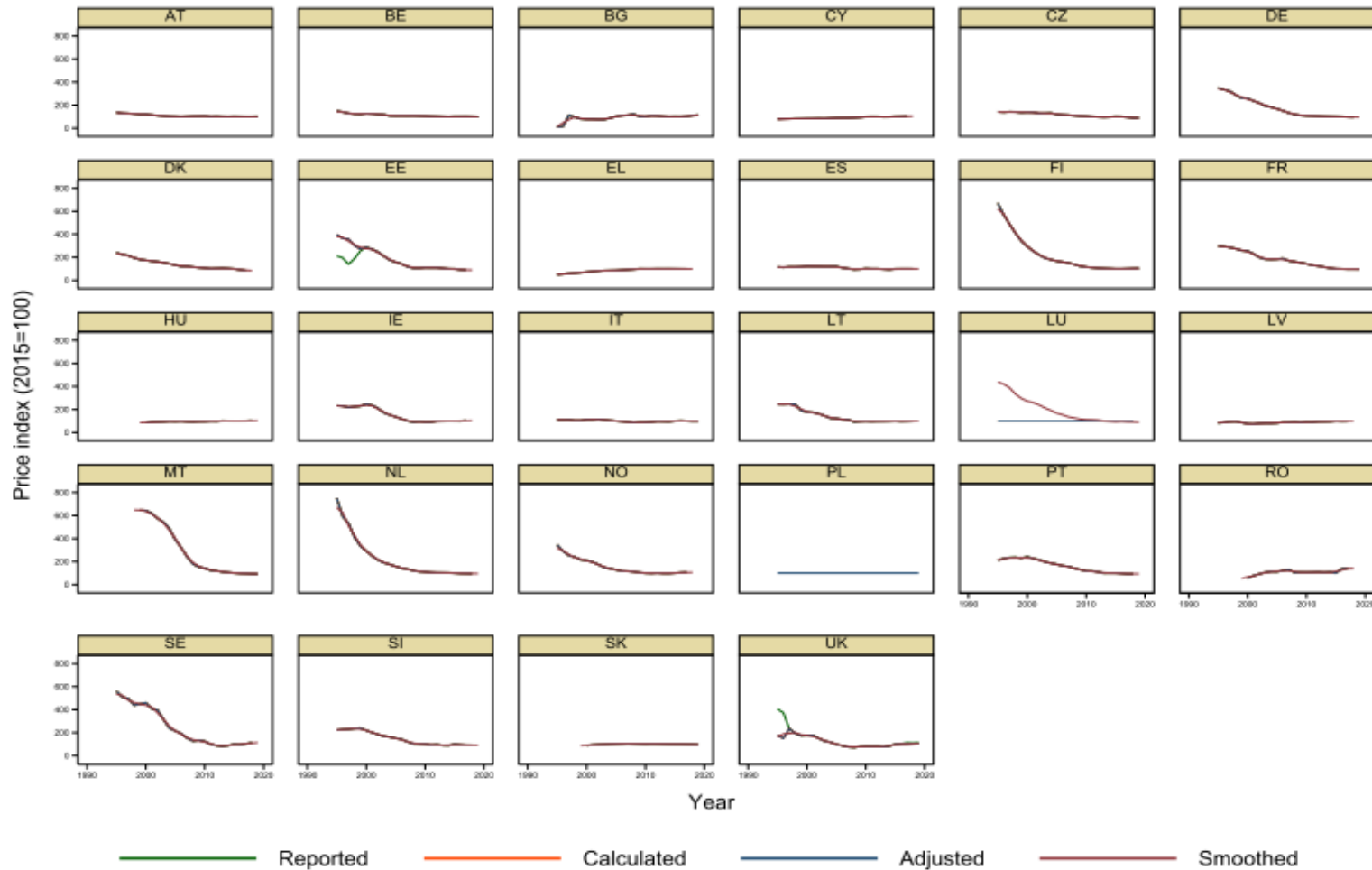


Note: Download 17/11/2020

Source: own elaboration based on Eurobase

GFCF price index (2015=100) for IT (N11321) by country, total economy

(Note: left scale ranges from 0 to 800)



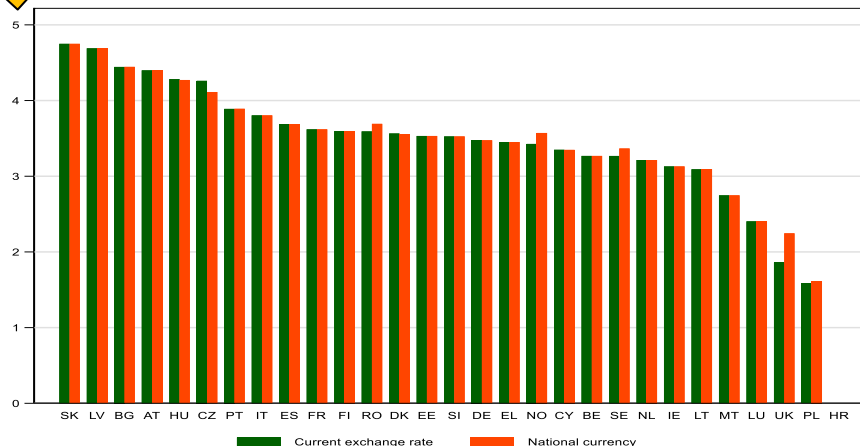
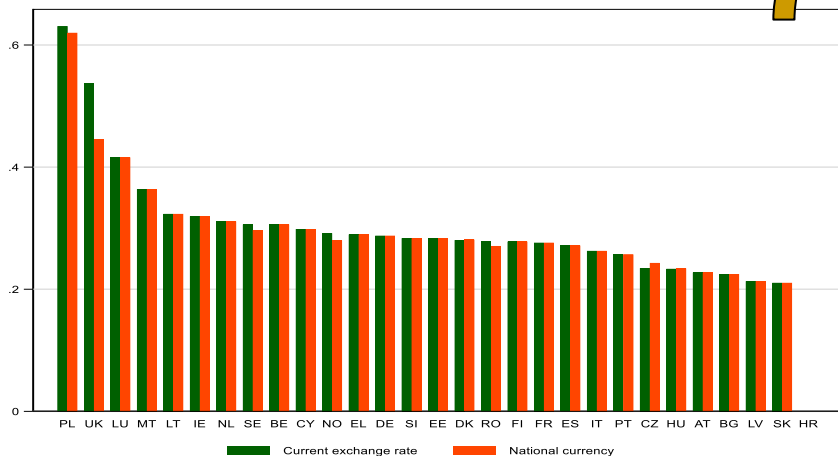
Capital productivity indicators

(again: focus on total economy level)

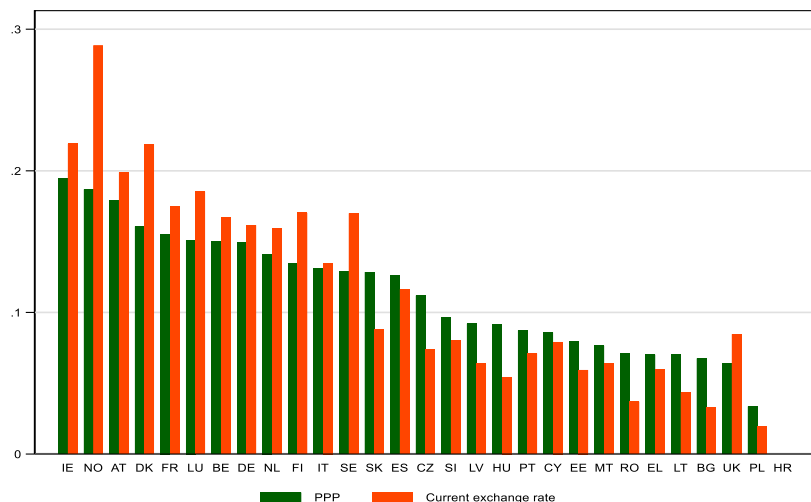
Level indicators: Total economy and total fixed assets, 2017

CAP1: Value added divided by capital stock

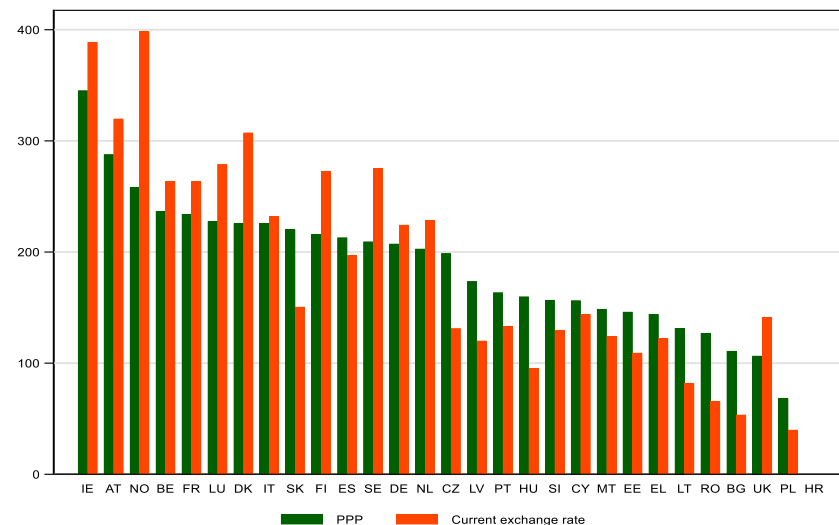
Capital stock divided by value added



Ratio of capital to hours worked (in 1000)



Ratio of capital to persons employed (in 1000)



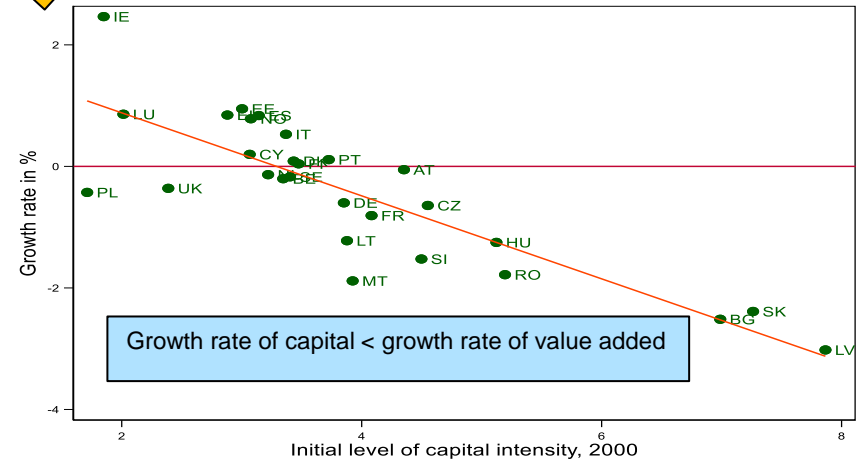
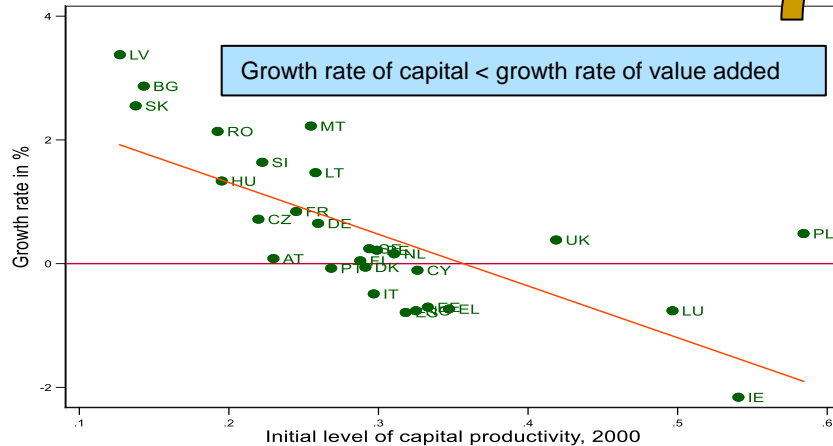
Note: Download 15/02/2021; Converted at 2015 GDP PPP

Source: own elaboration based on Eurobase

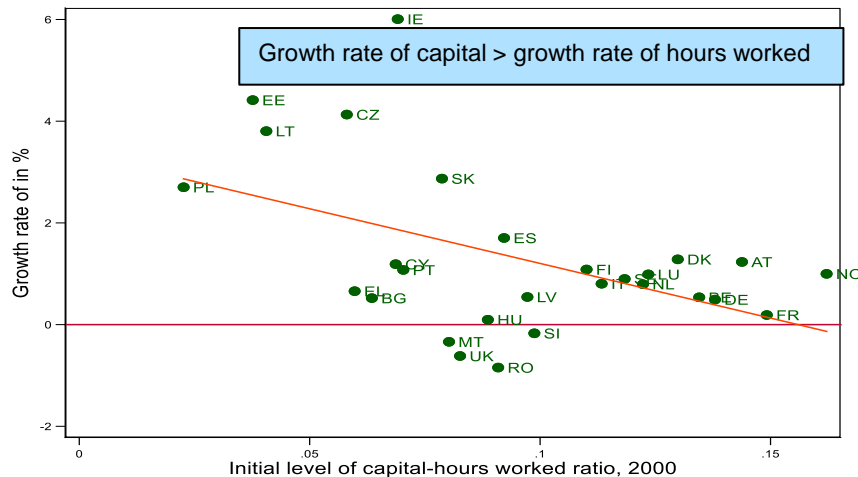
Growth and convergence: Total economy and total fixed assets (2000-2018)

CAP1: Value added divided by capital stock

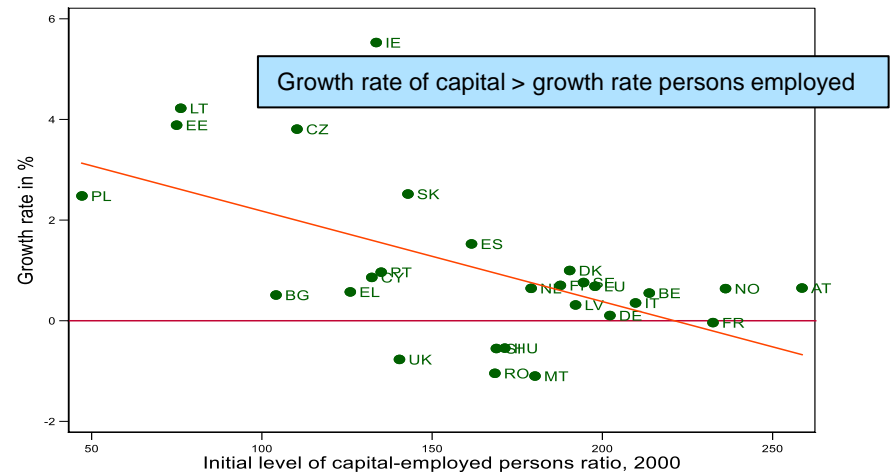
Capital stock divided by value added



Ratio of capital to hours worked (in 1000)



Ratio of capital to persons employed (in 1000)



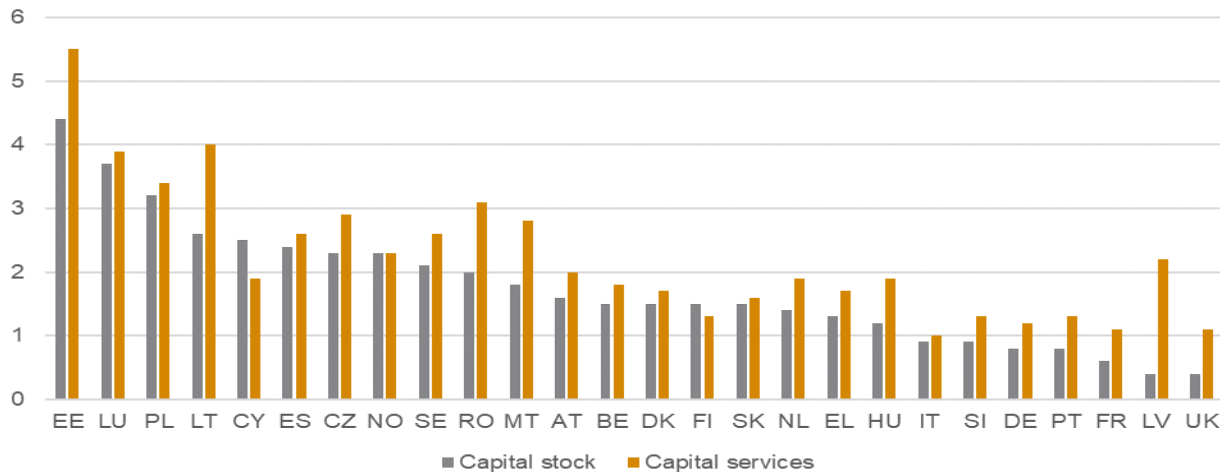
Note: Download 15/02/2021; Converted at 2015 PPP

Source: own elaboration based on Eurobase

Growth of capital stocks versus services and 'crude' TFP

(total economy, preliminary results)

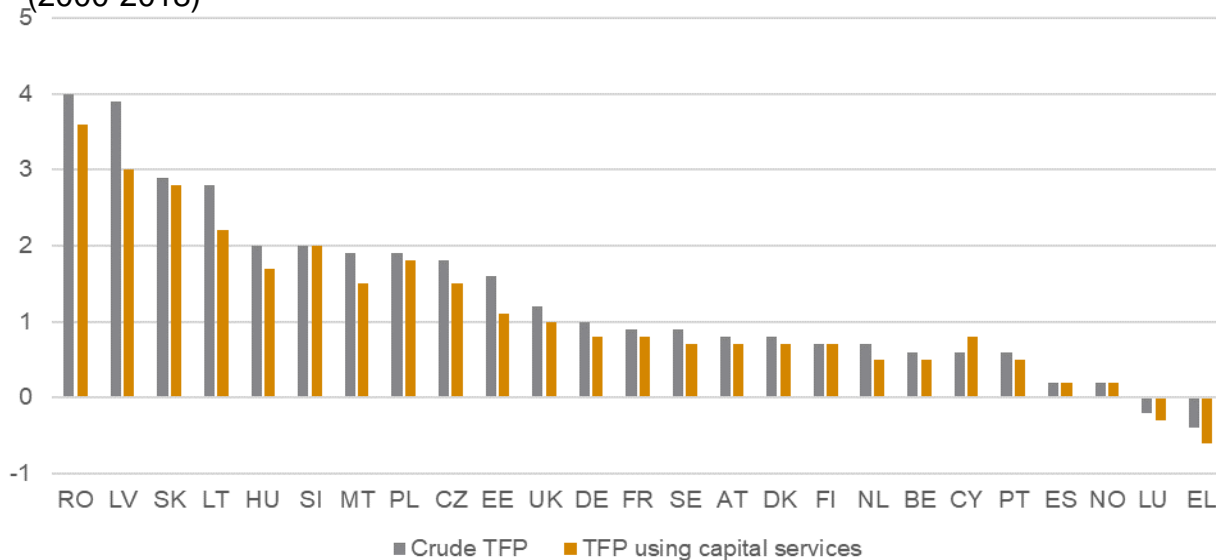
Growth rates of capital stock versus capital services (in %) (2000-2018)



Notes:

- EU KLEMS methodology for capital services (appendix)
- Note: requires in some cases imputations or assumptions for N117 subcomponents

Measures of TFP growth (in %) (2000-2018)



Notes:

- EU KLEMS methodology for capital services (appendix)
- Shares of capital and labour income (assumptions on mixed and self-employed income)
- Hours worked (not labour services)

More challenging at industry level:

- Missing asset types (see relevance)
- Calculation of labour and capital income shares (mixed and self-employed income)
- Treatment of intellectual property products (N117) due to reporting

Conclusions & recommendations*

➤ Data availability

- Aim at more consistent reporting of data across countries (e.g. 0s versus missings (different interpretations of flags), fill gaps (e.g. sum of subcomponents), etc.)
- Provide capital stock data (so far crc and pyr data are available)
- Fill gaps in accordance with transmission programme and aim at more details beyond (industry x detailed asset types at A*21, A*38, etc).
 - ICT ('EU digital agenda') and intangible assets (e.g. residual category) as important drivers

➤ Be(come) aware of methodological differences in the construction methodology for capital stocks

- Most importantly levels, but also impacts on growth rates

➤ Provision of additional 'capital productivity indicators:

- Capital productivity and/or capital-output ratios (capital intensity), and capital labour-ratios at various dimensions (industries x assets) in growth rates; check for level indicators (total economy as need for PPP adjustment and methodological aspects (see above))
- Share of various asset types
- Crude TFP for total economy (with assumption for calculating labour and capital income shares) and clearly flag differences to more sophisticated measures (which might be reported as 'experimental statistics')
 - Note for the latter: requires additional assumptions and calculation of capital and labour services; are even more challenging at more detailed industry level

Thank you for your attention!

Comments welcome!

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