



Analysis of capital related productivity indicators disseminated by Eurostat

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Outline

- The new capital productivity indicators disseminated under the Growth and productivity accounts project
- First test estimates on total and main assets at EU level and some comparisons
- Some considerations
- Conclusion

Growth and Productivity Accounts Project 1/2

The project was focused on: improving Eurostat and national dissemination of productivity indicators

Main output: *New productivity indicators*

- Additional annual **labour** and **capital** productivity indicators (LPis and CAPis) on Eurobase (nama_10_prod) based on annual national accounts, transmitted by EU Member States and EFTA countries in accordance with the ESA transmission programme, regularly updated;
- New breakdowns by industry, region and asset based on annual national accounts data;



Growth and Productivity Accounts Project 1/2

- *Accompanied by metadata information and by the dedicated webpage*

<https://ec.europa.eu/eurostat/web/national-accounts/methodology/european-accounts/productivity-indicators>

- *Statistics Explained article on productivity trends was published on Eurostat website*

https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Productivity_trends_using_key_national_accounts_indicators

Capital Productivity Indicators

Capital productivity should be calculated using data on *capital services*. Estimation of capital services requires additional information and further assumptions to aggregate detailed asset types into 'capital services'.

Eurostat decided to follow a practical and transparent approach.

The CAPIs are:

- Based on annual data on net stocks of fixed assets transmitted by MS and EFTA countries;
- Easy to be calculated/ready to use
- Comparable across countries and over time

Capital Productivity Indicators

Eurostat provides a set of **four simple indicators** to assess capital evolution in relation to value added and to labour input.

- **Gross value added per unit of net fixed assets** = Value added (CLV)/net fixed assets (CLV)
- **Net fixed assets to gross value added** = Net fixed assets (CLV)/value added (CLV)
- **Net fixed assets per employed person** = Net fixed assets (CLV)/persons employed
- **Net fixed assets per hour worked** = Net fixed assets (CLV)/hours worked

Overview of Capital Productivity Indicators

| EUROBASE CODE | Capital Productivity Indicators (CAPIs) | FORMULA | | TOTAL ECONOMY & TOTAL FIXED ASSET | | | TOTAL ECONOMY & MAIN ASSET TYPES * | | | BY INDUSTRY (A*21) & TOTAL FIXED ASSET | | | | |
|---------------|--|----------------------|----------------------|-----------------------------------|-----------------|----------|------------------------------------|-----------------|----------|--|-----------------|----------|---|---|
| | | numerator | denominator | growth rate | | Index | growth rate | | Index | growth rate | | Index | | |
| | | | | 1y | 3y 5y 10y | 2015=100 | 1y | 3y 5y 10y | 2015=100 | 1y | 3y 5y 10y | 2015=100 | | |
| | | | | | | | | | | | | | | |
| GVA_NCS | Gross value added per unit of net fixed assets | Value added in CLV | Capital stock in CLV | ✦ | ✦ | ✦ | | | | | | ✦ | ✦ | ✦ |
| NCS_GVA | Net fixed assets to gross value added | Capital stock in CLV | Value added in CLV | ✦ | ✦ | ✦ | ✦ | ✦ | ✦ | ✦ | ✦ | ✦ | ✦ | ✦ |
| NCS_EMP | Net fixed assets per employed person | Capital stock in CLV | Persons employed | ✦ | ✦ | ✦ | ✦ | ✦ | ✦ | ✦ | ✦ | ✦ | ✦ | ✦ |
| NCS_HW | Net fixed assets per hour worked | Capital stock in CLV | Hors worked | ✦ | ✦ | ✦ | ✦ | ✦ | ✦ | ✦ | ✦ | ✦ | ✦ | ✦ |

* The 4 main asset types are the following: 1)N11K (Dwellings + Other buildings and structures); 2)N11M (Machinery and equipment and weapon systems); 3)N115(cultivated biological resources); 4)N117(intellectual property products) plus N1132 (ICT equipment).

✦ available

The choice of dimensions for CAPIs

Indicators presented in growth rate and not in level

- ✓ More comparable across countries because growth rates are less affected by differences in national compilation methods for fixed assets

Asset type dimension

- ESA2010 transmission programme requires that, according to the specifications given in Table 20, all asset types, must be delivered at the total economy level
- Only a few selected assets types must be delivered at NACE A*21 industry level on a compulsory basis. Many countries also transmit additional breakdowns (A*64) on a voluntary basis

The choice of dimensions for CAPIs

Considering data availability the decision was to provide the indicators for:

- Total economy – Total fixed assets
- Total economy – four main asset types plus ICT equipment detail
- Industry level (A*10, A*21) – Total fixed assets

As a consequence of the analysis, it was decided to exclude indicators at Industry level (A*10, A*21) and detailed asset types, to avoid to have a lot of missing data.

Main assets types considered

Considering data availability the decision was to provide the indicators for the following assets types:

- N11K - Dwellings + Other buildings and structures;
- N11M - Machinery and equipment and weapons systems;
 - Of which: N1132-ICT equipment
- N115 - Cultivated biological resources;
- N117 - Intellectual property products.

Capital productivity indicators are provided by industry only at total assets level of detail

T20 data history: progress achieved

- From ESA 95 TP
 - total fixed assets, net & gross,
 - NACE rev 1, A*17 compulsory

- To ESA 2010 TP:
 - Much higher level of detail
 - NACE rev 2; A*21 compulsory for main asset types
 - Many initial derogations & compliance gaps
 - Very large & complex dataset, linked to T302/T22, T26

Table 20 – Cross classification of fixed assets by industry and by asset

| Code | List of variables | Breakdown Industries (1) | Breakdown Assets | Unit |
|--------|------------------------|--------------------------|--------------------|---|
| AN.11g | 1. Fixed assets, gross | A17/A31/A60 | AN_F6 [†] | — Current replacement costs, — Constant replacement costs, |
| AN.11n | 2. Fixed assets, net | A17/A31/A60 | AN_F6 [†] | — Current replacement costs, — Constant replacement costs, |

(1) A17 mandatory
A31/A60: on a voluntary basis.

Table 20 — Cross classification of fixed assets by industry and by asset (stocks)

| Code | List of variables | Breakdown Industries (1) | Current replacement costs | Previous year's replacement costs |
|------------------|---|--------------------------|---------------------------|-----------------------------------|
| AN.11g | 1. Fixed assets, gross | | x | x |
| AN.111g | 2. Dwellings, gross | A*21/A*38/A*64 | x | x |
| AN.112g | 3. Other buildings and structures, gross | A*21/A*38/A*64 | x | x |
| AN.113g+AN.114g | 4. Machinery and equipment, gross + weapon systems, gross | A*21/A*38/A*64 | x | x |
| AN.1131g | 5. Transport equipment, gross | A*21/A*38/A*64 | x | x |
| AN.1132g | 6. ICT equipment, gross | | x | x |
| AN.11321g | 7. Computer hardware, gross | | x | x |
| AN.11322g | 8. Telecommunications equipment, gross | | x | x |
| AN.1139g+AN.114g | 9. Other machinery and equipment, gross + weapon systems, gross | | x | x |
| AN.115g | 10. Cultivated biological resources, gross | A*21/A*38/A*64 | x | x |
| AN.117g | 11. Intellectual property products, gross | | x | x |
| AN.1173g | 12. Computer software and databases, gross | | x | x |
| AN.11n | 13. Fixed assets, net | | x | x |
| AN.111n | 14. Dwellings, net | A*21/A*38/A*64 | x | x |
| AN.112n | 15. Other buildings and structures, net | A*21/A*38/A*64 | x | x |
| AN.113n+AN.114n | 16. Machinery and equipment, net + weapon systems, net | A*21/A*38/A*64 | x | x |
| AN.1131n | 17. Transport equipment, net | A*21/A*38/A*64 | x | x |
| AN.1132n | 18. ICT equipment, net | | x | x |
| AN.11321n | 19. Computer hardware, net | | x | x |
| AN.11322n | 20. Telecommunications equipment, net | | x | x |
| AN.1139n+AN.114n | 21. Other machinery and equipment, net + weapon systems, net | | x | x |
| AN.115n | 22. Cultivated biological resources, net | A*21/A*38/A*64 | x | x |
| AN.117n | 23. Intellectual property products, net | | x | x |
| AN.1173n | 24. Computer software and databases, net | | x | x |

(1) A*21 compulsory
A*38/A*64: on a voluntary basis
If no breakdown is indicated, that means total economy.



Main issues for EU/EA estimates

- Country data transmitted nearly fully consistent
 - with respect to additivity of total and main aggregates
- Some missing data before 2000 (ES, PT, SI, MT, SK, EE, BG, PL, RO)
 - Not requested by ESA TP but appreciated voluntary extension to 1995!
 - EU/EA dummy approach for back cast (or series could start 2000)
- Analysis of data quality and confidential flags (countries)
 - Some CONF_STATUS flags: C and D for CY and IE , RO (2001-2003), N for ES
 - Some OBS_STATUS flags: B (break in time series) flag for EL year 2010; D flag for SE for definition differs; N for CZ (not significant value)

First EU/EA aggregates estimation experience

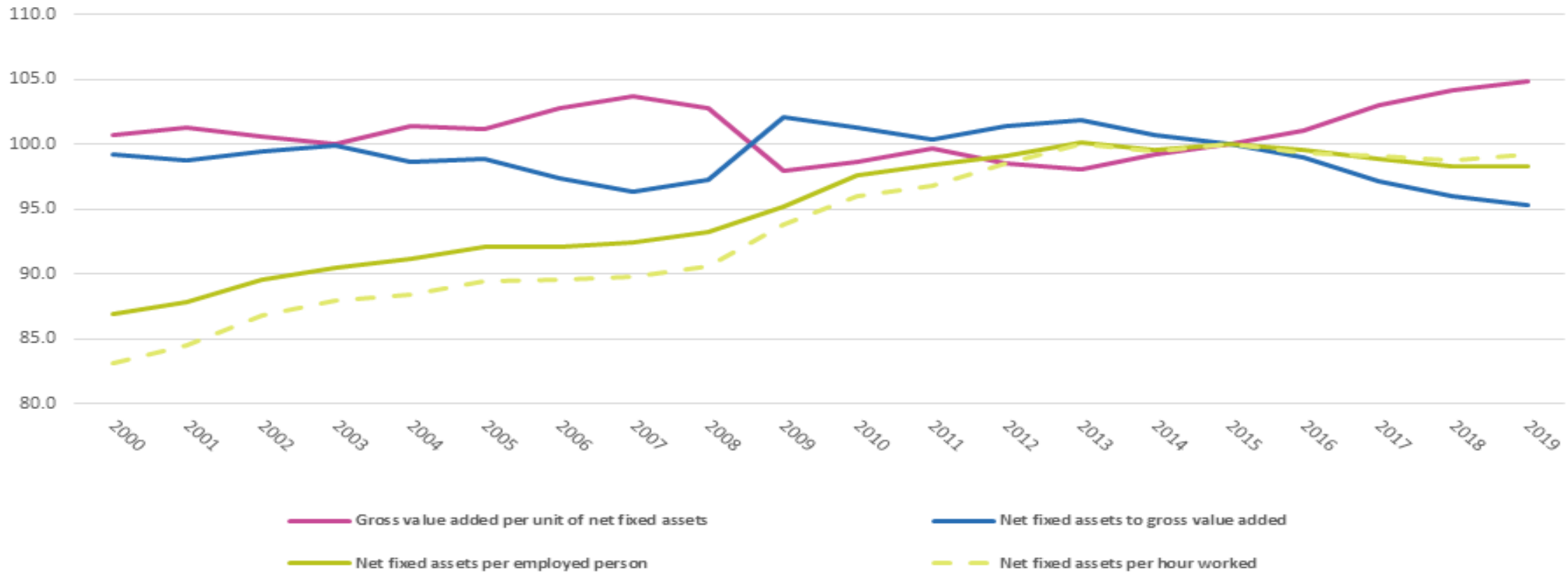
- Compilation starting with total NACE:
 - Total assets (N11), total NACE (_T)
 - Main asset types N111, N112, N115, N11M , M117
 - As well as N1131, N1132 and N11O
- Test estimates using EU MS
 - Current & previous year replacement costs
 - Gross capital stocks and Net capital stocks
 - Extract with flags, without flags & imputations
 - Analysis of additivity checks and balancing process

Results of the preliminary estimations: Complement EU productivity indicators

Focussing on:

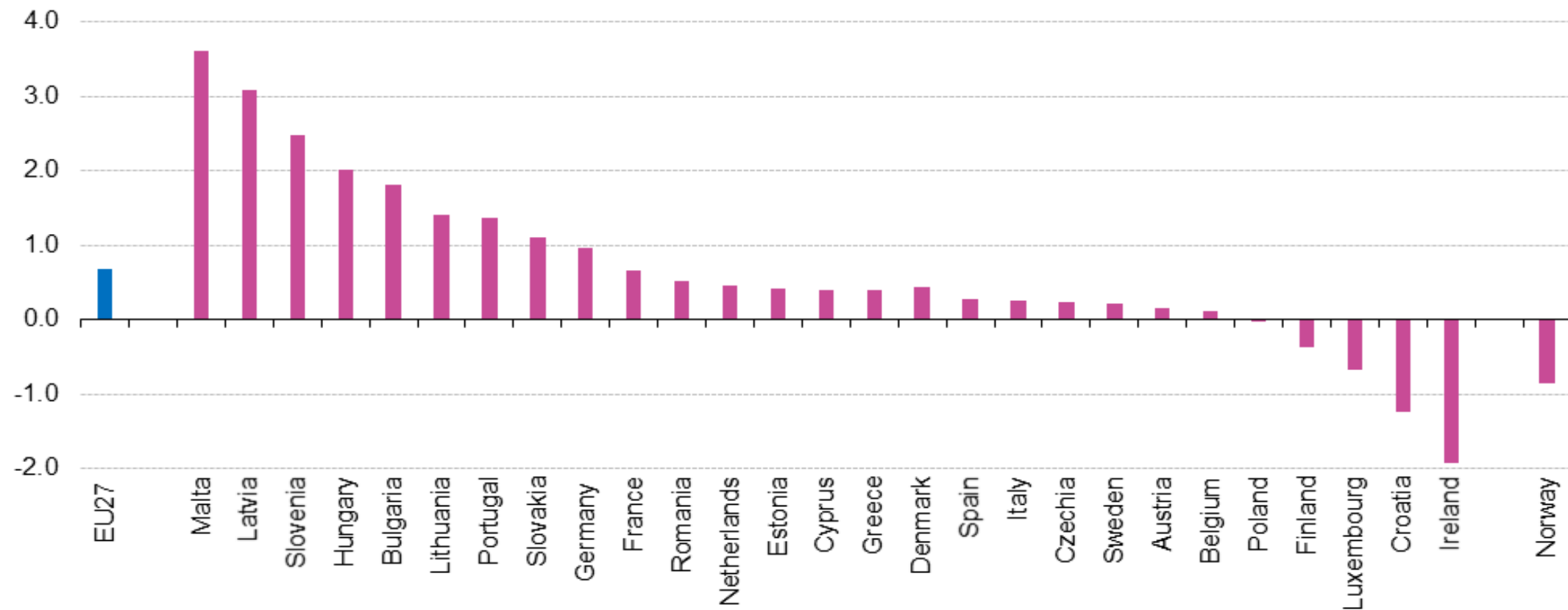
- Evolution over time (2000-2019) of the four CAPIs calculated at EU level, for total economy and total assets
- Average growth rates (period 2010-2019) for comparison across countries (MS and NO).
- Evolution over time (2000-2019) of Net fixed assets per employed person by main assets type, for total economy.

Evolution of capital productivity indicators , EU, 2000-2019 (2015 = 100)



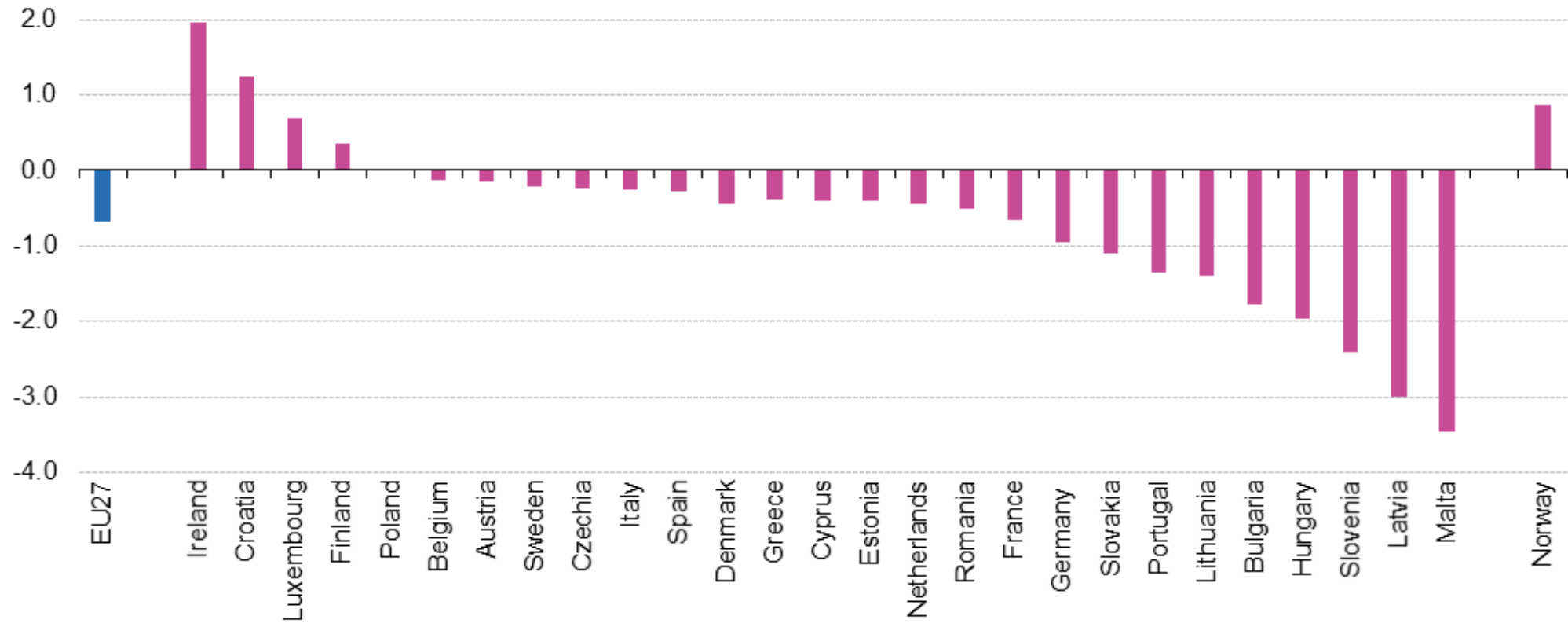
Source: Eurostat (online data code: nama_10_cp_a21) and elaborations for EU

Gross value added per unit of net fixed assets, annual average growth rate by country and EU, 2010-2019



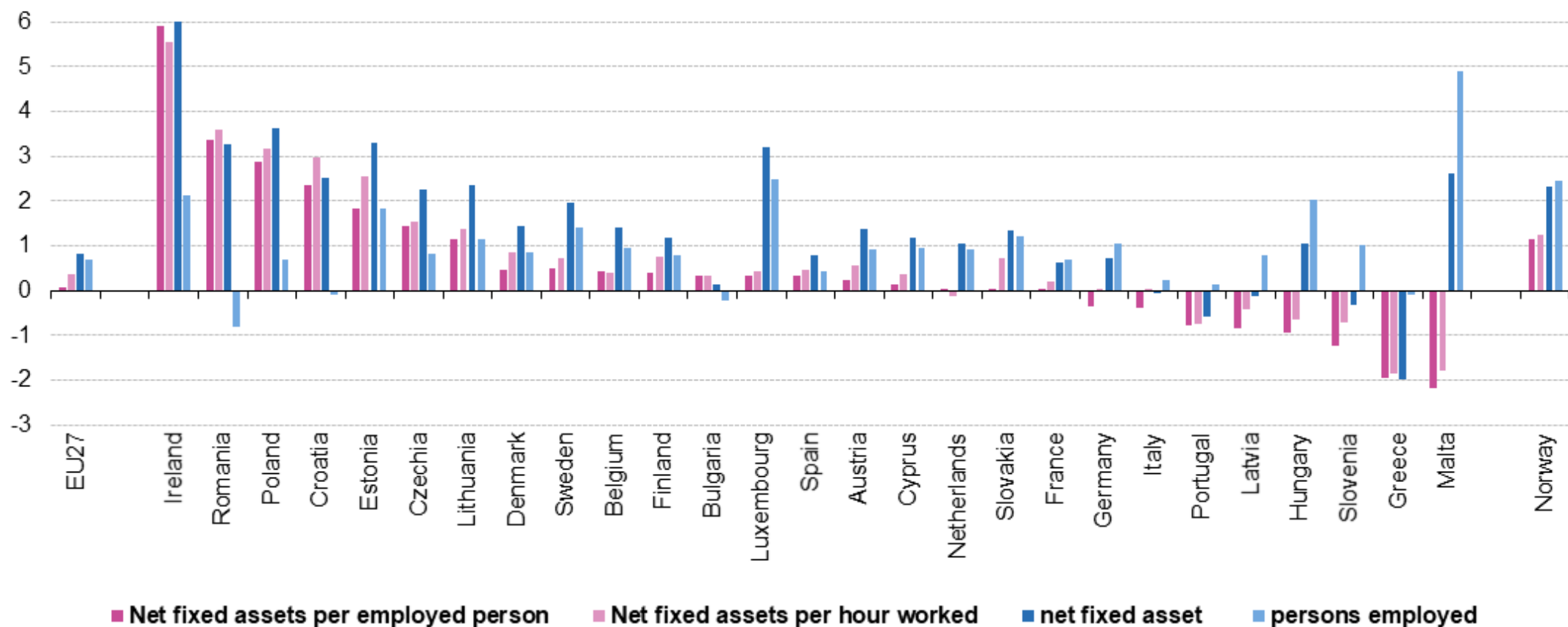
Source: Eurostat (online data code: nama_10_cp_a21) and elaborations for EU

Net fixed assets to gross value added, average growth rate by country and EU, 2010-2019



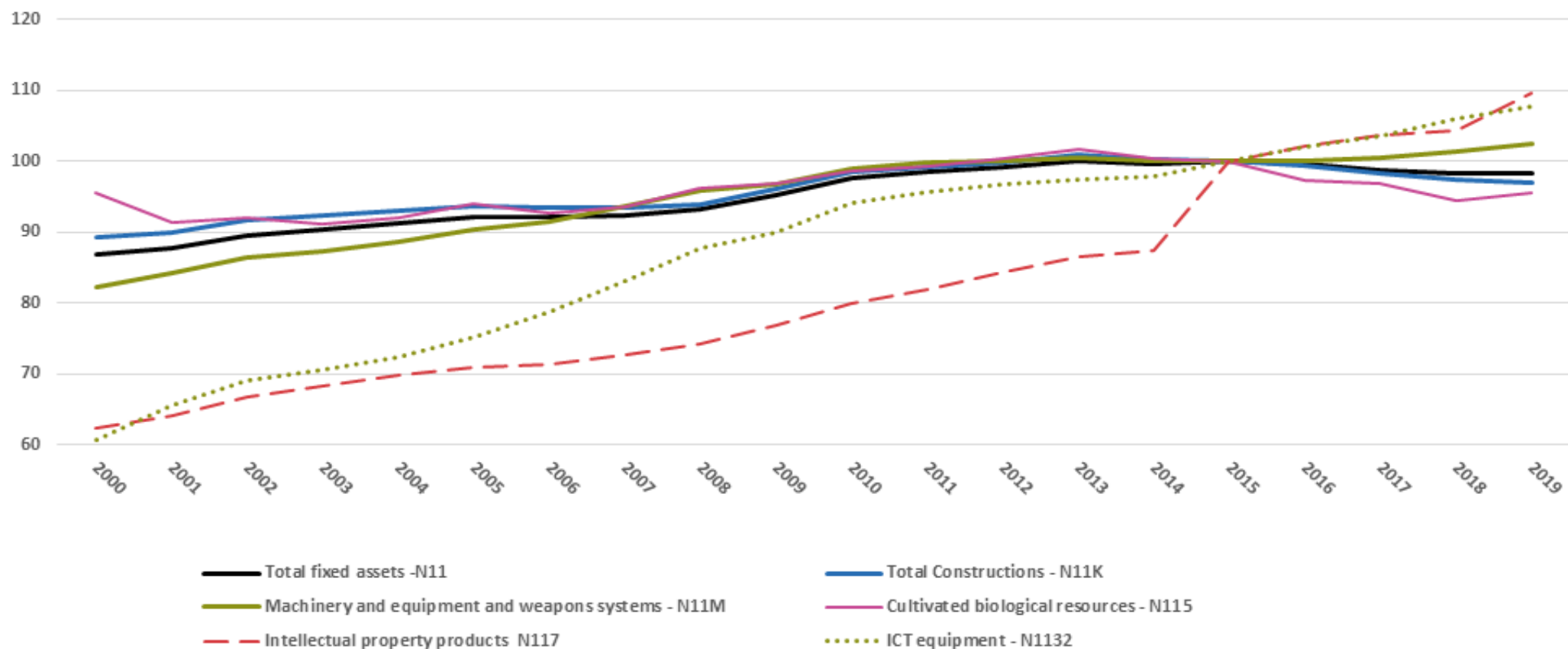
Source: Eurostat (online data code: nama_10_cp_a21) and elaborations for EU

Net fixed assets per employed person and per hour worked, net fixed assets and persons employed, average growth rate by country and EU, 2010-2019



Source: Eurostat (online data codes: nama_10_nfa_st, nama_10_pe and nama_10_cp_a21) and elaborations for EU

Evolution of net fixed assets per employed person by main assets type, EU, 2000-2019 (2015 = 100)



Source: Eurostat (online data code: nama_10_cp_a21) and elaborations for EU

Some considerations

- Publication of total NACE estimates would already fill an important gap in current dissemination of asset stock data/ productivity indicators as
 - indicators would allow EU/EA specific analysis
 - be reference for cross country comparisons

But:

- The aggregated European Union (EU) data have not been published so far as further analysis of the overall dataset in terms of coverage, consistency and comparability, is still ongoing in view of progressively compiling and publishing a more comprehensive set of European asset stock aggregates
- The allocation of assets by industries by different countries is also currently analysed

Conclusion

- The compilation of EU/EA aggregates is an important improvement for the dissemination of data on fixed assets and derived CAPI productivity indicators (complementing Eurostat's GPA project)
- Eurostat aims to progressively publish indicators starting with total NACE main asset breakdowns, subject to clarification of confidentiality requirements with countries, after next transmissions. Improvements requested to national compilers
- Eurostat is carrying on a parallel work with the ongoing task force on fixed assets and estimation of consumption of fixed capital under ESA2010 (TF FIXCAP), aiming to harmonize compilation practices (e.g. in relation to asset depreciation patterns and service lives) and improve the quality, coherence and comparability among countries with the next benchmark revision in 2024. The expected improvements in accuracy and comparability of asset stock data will also benefit productivity analysis.

Thank you!