Spanish Capital Stock at Regional Level
Methodology and (Some) Results

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Spanish Capital Stock at Regional Level

Background:

After Franco´s death in 1975 a new democratic Constitution was approcved in 1978 which introduced the "State of Autonomies" (= Regions = Nuts 2) which implied te transition from very centralized country to a rather decentralized one composed by 17 regions **+ 2 Autonomous cities (Ceuta and Melilla)**

In the política process of decentralizing the former State it became necessary to evaluate the **Capital owned** by the Public Sector in all regions and also to estimate the **needs** according to a selected set of parameters (total population age structure, infrastructures endowments,…)

The public capital stock in each region at **the time of the assessment** would affect the annual transfer of funds needed to **cover future depreciation**

Spanish Capital Stock at Regional Level

Ivie comes into the picture

1. **In 1991**, several regions (8/17) asked the Ivie to carry out the estimates of their public capital stock as an important instrument in the negotiation.

2. **Since 1991**, the BBVA Foundation (FBBVA) has annually funded the capital stock estimates for Spain and its regions. Thus, the **FBBVA has been supporting** Spanish capital estimates **for over 3 decades**.

3. **FBBVA** has also supported estimates of **other forms** of capital (human, social, natural) and **specific assets** (housings, ICT), but not on a regular basis.

4. **Cotec Foundation** for Innovation has been funding estimates of **Intangible** assets since 2015.

All these databases place a special emphasis on the public/regional dimension which is Ivie's *House Brand*

Spanish Capital Stock at Regional Level

Summary of main characteristics:

1. Its immediate use was meant for **policy making** since it was to be used as a tool in the regional negotiation associated with the **decentralization** of Spain;
2. Thus, the **territorial dimension (regional/provincial)** was central from the very beginning;
3. A **detailed analysis of the public → much attention to**: a) **infrastructures** (roads, railways, ports, airports, water infrastructures and urban infrastructures; and b) distinguishing between **market and non-market health and education**.
4. **Funded** on a **regular basis** by a **private institution (FBBVA)**.

5. The **methodology follows** the **international standards: 1. EU KLEMS** and **2. INTAN-Invest →**

6. Regional information **same quality** than **national / international**

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Spanish GFCF and capital data at Regional Level

Methodology

FBBVA capital stock database

- It has followed the most suitable methodologies that have become available over the last 30 years (Ward 1976; OECD 1992, 2001 and 2009).
- **Since the 2021** edition, it follows the latest methodological approach developed by the OECD (2009) which is also in line with the procedure followed by the BLS and the EU KLEMS database.

Here I must thank **Paul Schreyer** for his continuous support

COTEC intangibles database

- It follows the most recently updated methodology published by EU KLEMS, which is based on the work of Corrado, Hulten and Sichel (2005, 2009) and the INTAN-Invest methodology

Spanish Capital Stock Databases

- **BBVA Foundation- Ivie Database: "El stock y los servicios del capital en España"**

  (https://www.fbbva.es/bd/el-stock-y-los-servicios-del-capital-en-espana/)

- **Cotec Foundation-Ivie Database: "La Economía intangible en España"**

  (https://economiaintangible.cotec.es/contexto)

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FBBVA-Ivie Database: GFCF and Capital Stock

- **Variables**:
  - Gross Fixed Capital Formation (GFCF), current prices
  - Gross Fixed Capital Formation (GFCF), 2015 constant prices and volume index
  - Net capital stock, current prices
  - Net capital stock, 2015 constant prices and volume index
  - Productive capital stock, 2015 volume index
- **Period**: 1964-2021 (1964-2018 for regions and provinces).
- **Classifications**:
  - Industries (CNAE 2009/NACE Rev.2)
  - Assets
  - Regions and provinces
- **Sources**: National Accounts (INE), SUT tables (INE), SBS (INE and Eurostat), LFS (INE), IGAE (General Comptroller of the State Administration), MITMA Statistical Yearbook.
- **Geographical coverage**:
  - Spain, its regions (NUTS II) and provinces (NUTS III)

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FBBVA-Ivie Database: GFCF and Capital Stock

Assets breakdown

a. Basic assets
1. Tangible assets
1.1. Dwellings
1.2. Non-residential structures
1.3. Transport equipment
1.3.1. Motor vehicles
1.3.2. Other transport material
1.4. Other machinery and equipment
1.4.1. Metallic products
1.4.2. Machinery and mechanical equipment
1.4.3. Office equipment and hardware
1.4.4. Other machinery and equipment
1.4.4.1. Communications
1.4.4.2. Other machinery and equipment n.e.c.
1.5. Biological cultivated assets
2. Intellectual property products
2.1. Software
2.2. Other intangible assets
2.2.1. R&D
2.2.2. Rest of intangible assets

b. Public infrastructures
1. Road infrastructures
2. Public water infrastructures
3. Railway infrastructures
4. Airport infrastructures
5. Port infrastructures
6. Urban infrastructures (local public authorities)

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FBBVA-Ivie Database: GFCF and Capital Stock

Industry breakdown at national level (34 industries)

Description	CNAE 2009
0. Total activities	**01-96**
1. Agriculture, forestry and fishing	**01-03**
2. Industry	**05-39**
2.1. Mining and quarrying and utilities	***05-09, 35-39***
2.1.1. Mining and quarrying	05-09
2.1.2. Electricity, gas and water supply	35-39
2.1.2.1. Electricity, gas, steam and air conditioning supply	35
2.1.2.2. Water supply; sewerage, waste collection, treatment and disposal activities	36-39
2.2. Manufacturing	***10-33***
2.2.1. Manufacture of food products, beverages and tobacco products	10-12
2.2.2. Manufacture of textiles, apparel, leather and related products	13-15
2.2.3. Manufacture of wood and paper products, and printing	16-18
2.2.4. Manufacture of coke, and refined petroleum products	19
2.2.5. Manufacture of chemicals and chemical products; Manufacture of pharmaceuticals	20-21
2.2.6. Manufacture of rubber and plastics products, and other non-metallic mineral products	22-23
2.2.7. Manufacture of basic metals and fabricated metal products, except machinery and equipment	24-25
2.2.8. Electrical and optical equipment	26-27
2.2.9. Manufacture of machinery and equipment n.e.c.	28
2.2.10. Manufacture of transport equipment	29-30
2.2.11. Other manufacturing, and repair and installation of machinery and equipment	31-33
3. Construction	**41-43**
4. Wholesale and retail trade, transportation and accommodation and food services	**45-56**
4.1. Wholesale and retail trade and repair of motor vehicles and motorcycles	45-47
4.2. Transport and storage	49-53
4.3. Accommodation and food services	55-56
5. Information and communication	**58-63**
5.1. Publishing, audiovisual and broadcasting activities	58-60
5.2. Telecommunications	61
5.3. Computer programming, consultancy and related activities; Information service activities	62-63
6. Financial and insurance activities	**64-66**
7. Real estate activities	**68**
8. Professional, scientific, technical, administration and support service activities	**69-82**
8.1. Professional, scientific and technical activities	69-75
8.2. Administration and support service activities	77-82
9. Public administration, defense, education, human health and social work activities	**84-88**
9.1. Public administration	84
9.2. Non-market education	85(P)
9.3. Market education	85(P)
9.4. Non-market health services	86(P)
9.5. Non-market social services	87-88(P)
9.6. Market health and social services	86-88(P)
10. Other services	**90-96**

Note: The "P" indicates that the code is related to more than one sector in the BBVA Foundation-Ivie classification.

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FBBVA-Ivie Database: GFCF and Capital Stock

Industry breakdown at regional (NUTS II) level (25 industries)

Description	CNAE 2009
0. Total activities	**01-96**
1. Agriculture, forestry and fishing	**01-03**
2. Industry	**05-39**
2.1. Mining and quarrying and utilities	***05-09, 35-39***
2.1.1. Mining and quarrying	05-09
2.1.2. Electricity, gas and water supply	35-39
2.2. Manufacturing	***10-33***
2.2.1. Manufacture of food products, beverages and tobacco products	10-12
2.2.2. Manufacture of textiles, apparel, leather and related products	13-15
2.2.3. Manufacture of wood and paper products, and printing	16-18
2.2.4. Manufacture of coke, and refined petroleum products; Manufacture of chemicals and chemical products; Manufacture of pharmaceuticals	19-21
2.2.5. Manufacture of rubber and plastics products, and other non-metallic mineral products	22-23
2.2.6. Manufacture of basic metals and fabricated metal products, except machinery and equipment	24-25
2.2.7. Electrical and optical equipment	26-27
2.2.8. Manufacture of machinery and equipment n.e.c.	28
2.2.9. Manufacture of transport equipment	29-30
2.2.10. Other manufacturing, and repair and installation of machinery and equipment	31-33
3. Construction	**41-43**
4. Wholesale and retail trade, transportation and accommodation and food services	**45-56**
4.1. Wholesale and retail trade and repair of motor vehicles and motorcycles	45-47
4.2. Transport and storage	49-53
4.3. Accommodation and food services	55-56
5. Information and communication	**58-63**
6. Financial and insurance activities	**64-66**
7. Real estate activities	**68**
8. Professional, scientific, technical, administration and support service activities	**69-82**
9. Public administration, defense, non-market education and human health activities	**84-86 (P)**
9.1. Public administration	84
9.2. Non-market education	85(P)
9.3. Non-market health services	86(P)
10. Other services	**85(P), 86(P), 87-88, 90-96**

Note: The "P" indicates that the code is related to more than one sector in the BBVA Foundation-Ivie classification.

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FBBVA-Ivie Database: GFCF and Capital Stock

Industry breakdown at provinces (NUTS III) level (15 industries)

Description	CNAE 2009
0. Total activities	**01-96**
1. Agriculture, forestry and fishing	**01-03**
2. Industry	**05-39**
2.1. Mining and quarrying and utilities	***05-09, 35-39***
2.2. Manufacturing	***10-33***
3. Construction	**41-43**
4. Wholesale and retail trade, transportation and accommodation and food services	**45-56**
4.1. Wholesale and retail trade and repair of motor vehicles and motorcycles	45-47
4.2. Transport and storage	49-53
4.3. Accommodation and food services	55-56
5. Information and communication	**58-63**
6. Financial and insurance activities	**64-66**
7. Real estate activities	**68**
8. Professional, scientific, technical, administration and support service activities	**69-82**
9. Public administration, defense, non-market education and human health activities	**84-86 (P)**
9.1. Public administration	84
9.2. Non-market education	85(P)
9.3. Non-market health services	86(P)
10. Other services	**85(P), 86(P), 87-88, 90-96**

Note: The "P" indicates that the code is related to more than one sector in the BBVA Foundation-Ivie classification.

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Cotec Foundation-Ivie Database: Intangibles

- **Variables**:
  - Gross Fixed Capital Formation (GFCF), current prices
  - Gross Fixed Capital Formation (GFCF), 2015 constant prices
- **Period**: 1995-2016 (published) / 1995-2020 (forthcoming).
- **Classifications**:
  - Industries (CNAE 2009/NACE Rev.2)
  - Intangible assets
  - Regions
- **Sources**: National Accounts (INE), SUT tables (INE), SBS (Eurostat), LFS (INE), Structure of Earnings Survey (INE), Labour Cost Survey (INE and Eurostat), EUKLEMS (2022).
- **Geographical coverage**: Spain and its regions (NUTS II)

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Cotec Foundation-Ivie Database: Intangibles

Intangible assets breakdown

Intangible asset	Included in GDP
1. Digitalised information	
1.1. Computer software and databases	YES
2. Innovative property	
2.1. R&D	YES
2.2. Entertainment, artistic and literary originals + Mineral explorations	YES
2.3. Design	NO
3. Economic competencies	
3.1. Brand (advertisement + market research)	NO
3.1.1. Advertisement	NO
3.1.2. Market research	NO
3.3. Training	NO
3.4. Organisational capital	NO
3.4.1. Purchased organisational capital	NO
3.4.2. Own-account organisational capital	NO

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Cotec Foundation-Ivie Database: Intangibles

Industry breakdown (27 industries)

Industries	CNAE_2009
01. Agriculture, forestry and fishing	01-03
02. Mining and quarrying	05-09
03. Food products, beverages and tobacco	10-12
04. Textiles, wearing apparel, leather and related products	13-15
05. Wood and paper products; printing and reproduction of recorded media	16-18
06. Coke and refined petroleum products; chemicals and chemical products	19-21
07. Rubber and plastics products, and other non-metallic mineral products	22-23
08. Basic metals and fabricated metal products, except machinery and equipment	24-25.
09. Electrical and optical equipment	26-27
10. Machinery and equipment n.e.c.	28
11. Transport equipment	29-30
12. Other manufacturing; repair and installation of machinery and equipment	31-33
13. Electricity, gas and water supply	35-39
14. Construction	41-43
15. Wholesale and retail trade; repair of motor vehicles and motorcycles	45-47
16. Transportation and storage	49-53
17. Accommodation and food service activities	55-56
18. Information and communication	58-63
19. Financial and insurance activities	64-66
20. Real estate activities	68
21. Professional, scientific, technical, administrative and support service activities	69-82
22. Public administration and defence; compulsory social security	84
23. Market education	85-P1
24. Non-market education	85-P2
25. Market health and social activities	86-88(P1)
26. Non-market health and social activities	86-88(P2)
27. Other services	90-96
Total activities	**01-96**

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Spanish Capital Stock Databases

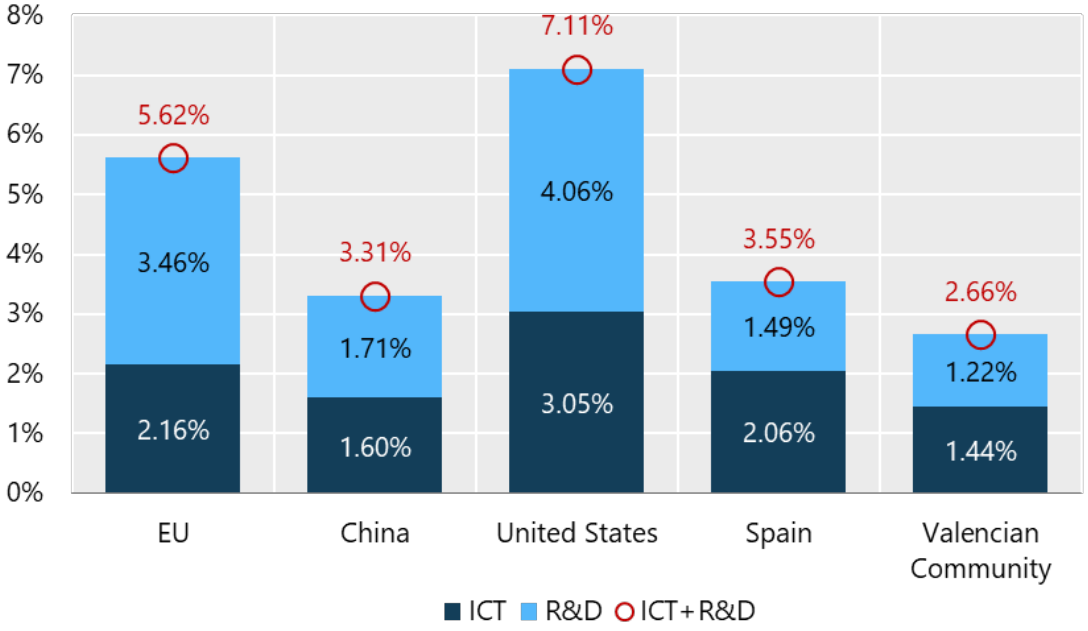
The regional series have been used in around **1,000 publications** (national and international)

Main subject areas:

1. Sources of growth from many different perspectives (all kinds of econometric approaches, growth accounting, …)
2. Role of capital accumulation in development (economic history perspective)
3. Spanish, European and international perspectives
4. Main focus on infrastructures and ICT
5. Growth pattern of specific industries
6. Convergence / divergence of Spanish regions
7. Role of EU Structural funds in capital accumulation
8. …

The use of a common methodology allows Spanish regions to be treated the same as other countries

ICT and R&D capital stock. Share on total capital (2019, percentages)



Notes:
- EU includes thirteen countries: Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Italy, Latvia, Netherlands, Slovakia, Spain and Sweden
- 2018 for Valencian Community

Source: JRC Digital Economy. Twin Transition Dataset 2022 and FBBVA Foundation-Ivie.

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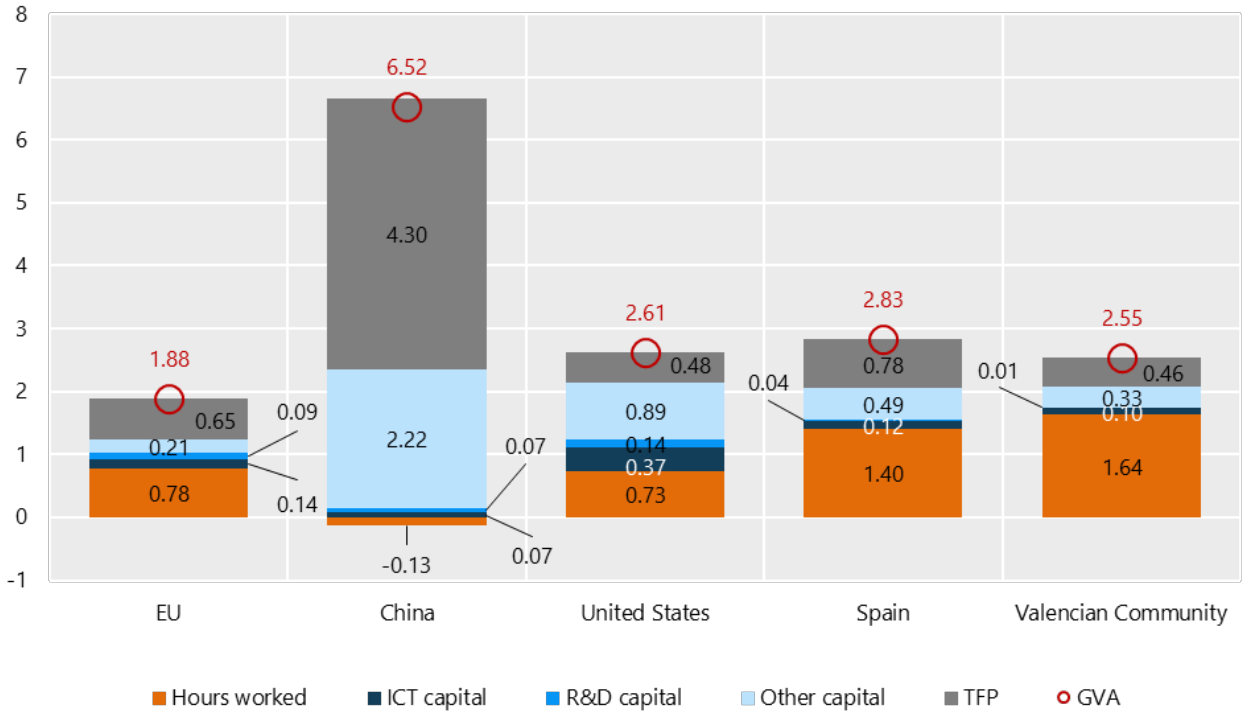
Including Growth Accounting

Input contributions to GVA growth. Total economy (2014-2019, percentages)



Notes:
- EU includes thirteen countries: Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Italy, Latvia, Netherlands, Slovakia, Spain and Sweden.
- 2014-2018 for Valencian Community.
- Persons employed (instead of hours worked) for Valencian Community.
Source: JRC Digital Economy. Twin Transition Dataset 2022, FBBVA Foundation-Ivie and Ministerio de Hacienda y Función Pública (BD.MORES).

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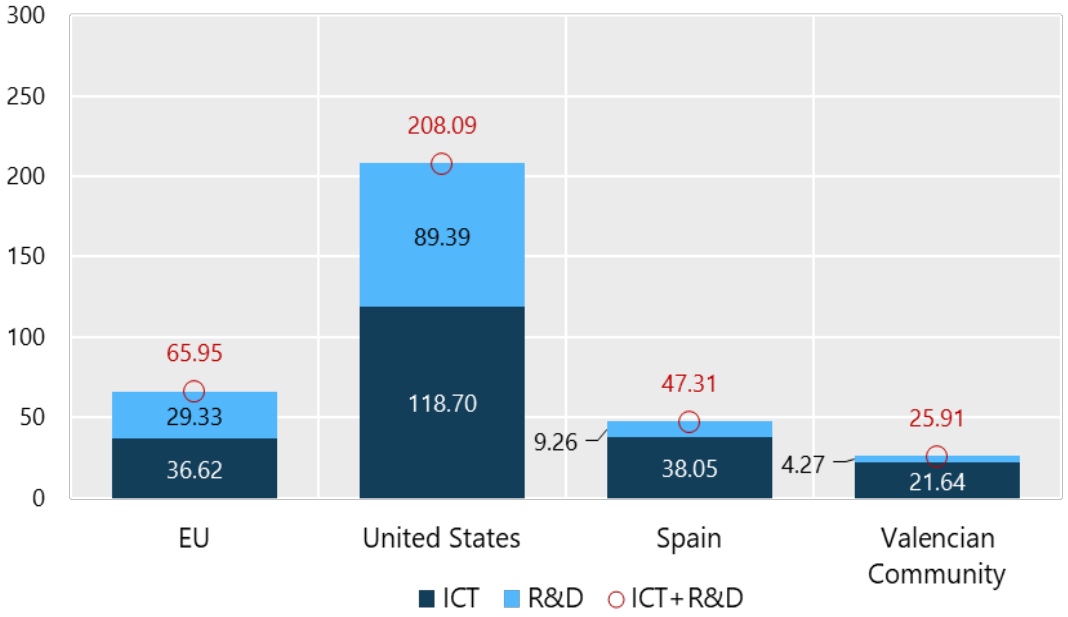
The high level of sectoral disaggregation allows to distinguish among the group of industries according to digitalisation

ICT and R&D capital stock per person employed by digital intensity (2019, thousand EUR 2015 per person employed)

a) Digital producing industries (DP)



Notes:
- EU includes thirteen countries: Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Italy, Latvia, Netherlands, Slovakia, Spain and Sweden.
- 2018 for Valencian Community

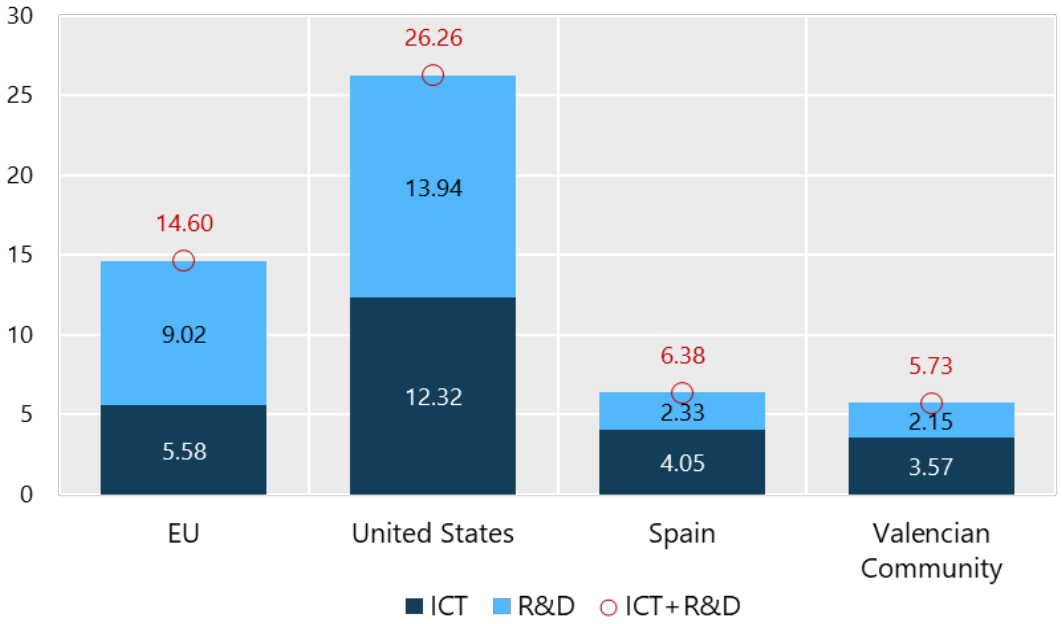
Source: JRC Digital Economy. Twin Transition Dataset 2022, FBBVA Foundation-Ivie and INE (CRE).

Ivie

The high level of sectoral disaggregation allows to distinguish among the group of industries according to digitalisation

ICT and R&D capital stock per person employed by digital intensity (cont.) (2019, thousand EUR 2015 per person employed)

b) Most digital intensive using industries (MDIU)



Notes:
- EU includes thirteen countries: Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Italy, Latvia, Netherlands, Slovakia, Spain and Sweden.
- 2018 for Valencian Community

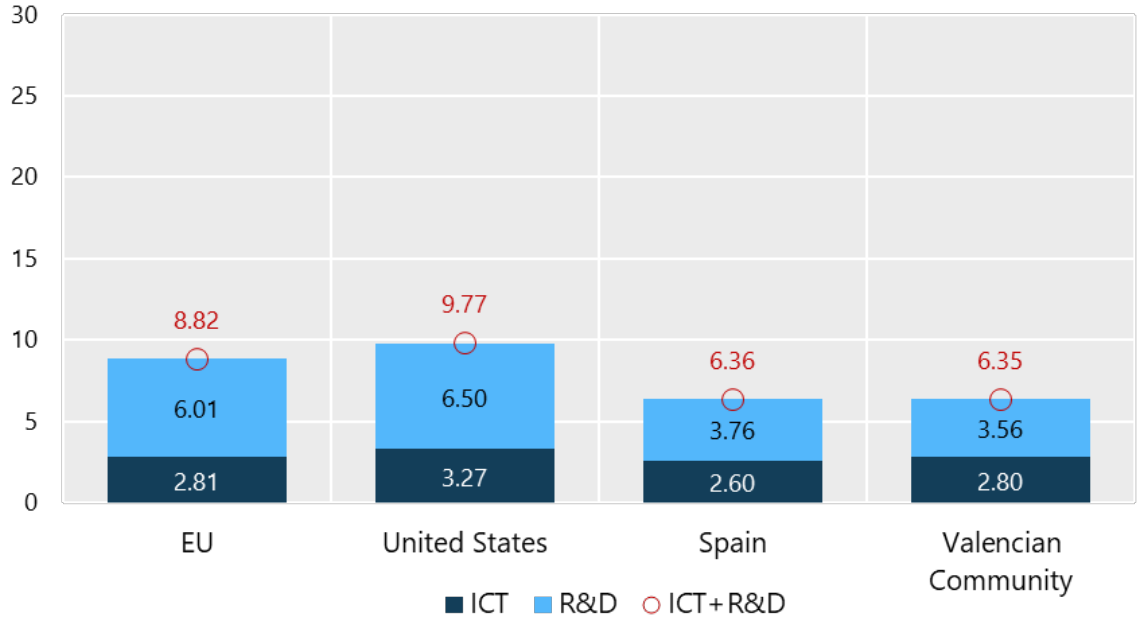
Source: JRC Digital Economy. Twin Transition Dataset 2022, FBBVA Foundation-Ivie and INE (CRE).

Ivie

The high level of sectoral disaggregation allows to distinguish among the group of industries according to digitalisation

ICT and R&D capital stock per person employed by digital intensity (cont.) (2019, thousand EUR 2015 per person employed)

c) Least digital intensive using industries (LDIU)



Notes:
- EU includes thirteen countries: Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Italy, Latvia, Netherlands, Slovakia, Spain and Sweden.
- 2018 for Valencian Community

Source: JRC Digital Economy. Twin Transition Dataset 2022, FBBVA Foundation-Ivie and INE (CRE).

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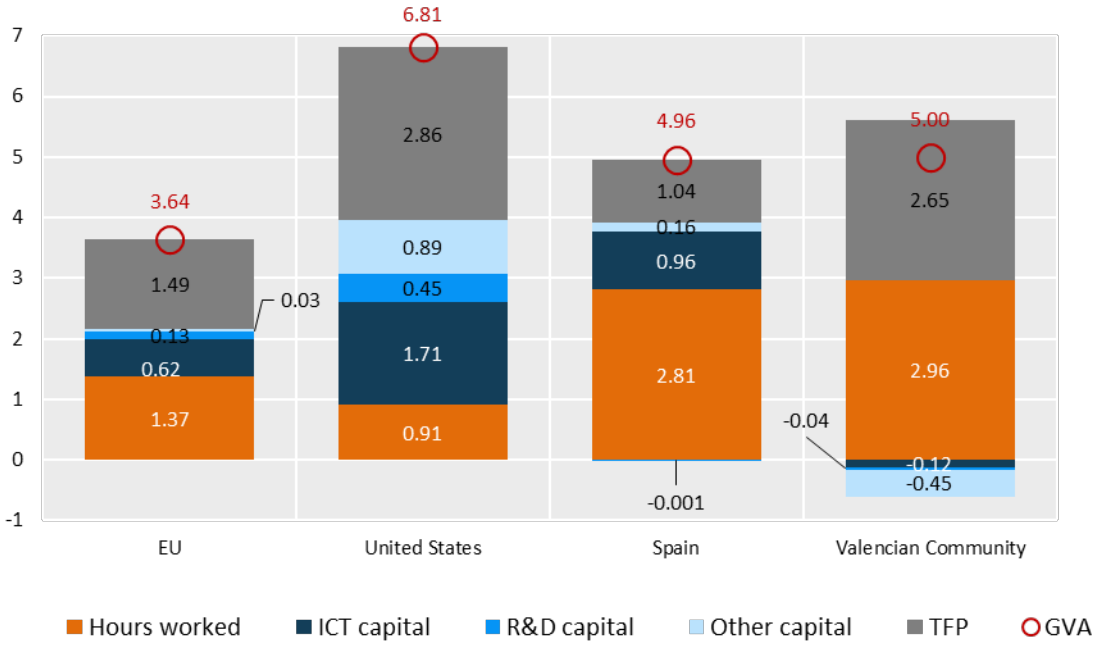
The high level of sectoral disaggregation allows to distinguish among the group of industries according to digitalisation

Input contributions to GVA growth by digital intensity (2014-2019, percentages)

a) Digital producing industries (DP)



Notes:
- EU includes thirteen countries: Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Italy, Latvia, Netherlands, Slovakia, Spain and Sweden.
- 2014-2018 for Valencian Community.
- Persons employed (instead of hours worked) for Valencian Community.

Source: JRC Digital Economy. Twin Transition Dataset 2022, FBBVA Foundation-Ivie and INE (CRE).

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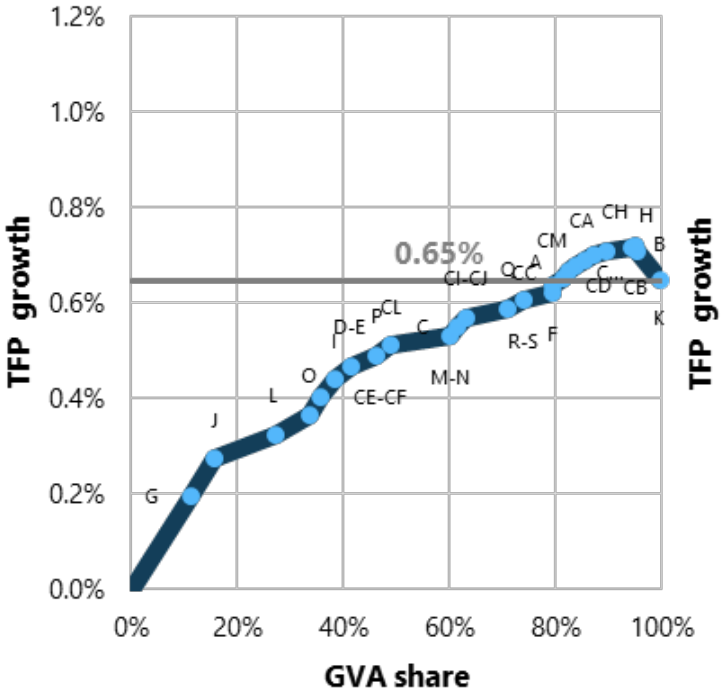
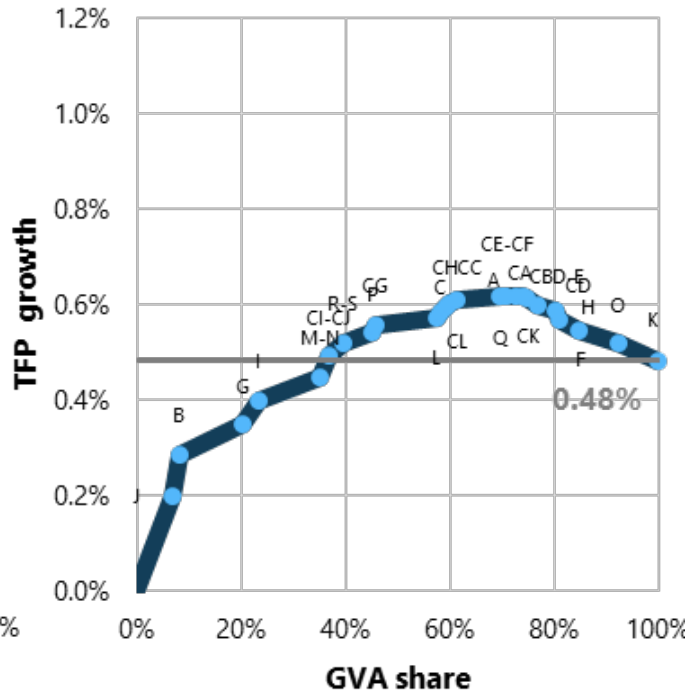
Alternative presentations to Growth Accounting

Harberger diagrams of TFP growth (2014-2019, percentages)

a) European Union



b) United States



Notes:
- The diagram shows the cumulative contribution of the industries to aggregate growth of TFP on the y-axis and the cumulative share on GVA of these industries on the x-axis.
- EU includes thirteen countries: Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Italy, Latvia, Netherlands, Slovakia, Spain and Sweden
- 2014-2018 for Valencian Community

Source: JRC Digital Economy. Twin Transition Dataset 2022 and own elaboration.

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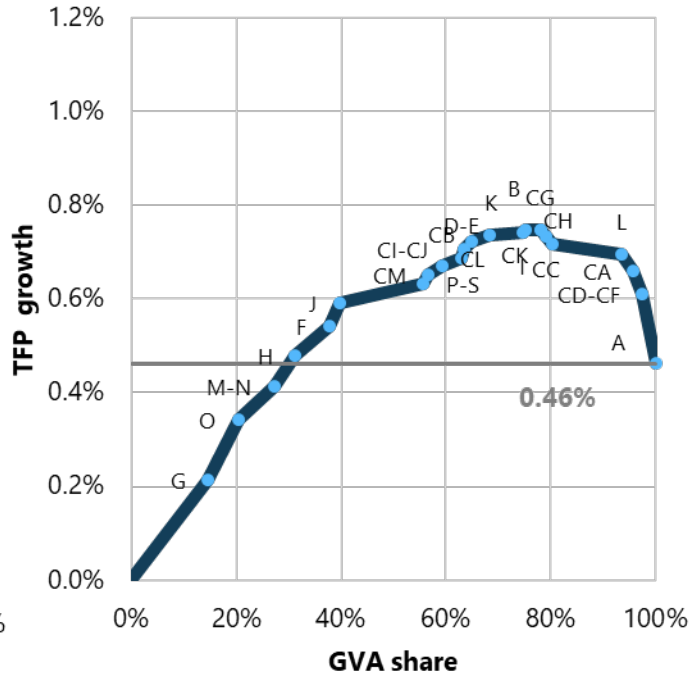
Alternative Presentations to Growth Accounting

Harberger diagrams of TFP growth (2014-2019, percentages)

c) Spain

d) Valencian Community



Notes:
- The diagram shows the cumulative contribution of the industries to aggregate growth of TFP on the y-axis and the cumulative share on GVA of these industries on the x-axis.
- EU includes thirteen countries: Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Italy, Latvia, Netherlands, Slovakia, Spain and Sweden
- 2014-2018 for Valencian Community

Source: JRC Digital Economy. Twin Transition Dataset 2022 and own elaboration.

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The Geography of Intangibles

Madrid and the Northeastern regions of Spain are more intensive in intangibles
Differences have increased between 1995-2018

Investment in intangible assets over total investment*. Total economy. CC. AA., 1995 and 2018 (Spain=100)

a) 1995

b) 2018

* Extended non-residential.
Source: Cotec-Ivie Foundation and BBVA Foundation-Ivie (2022)

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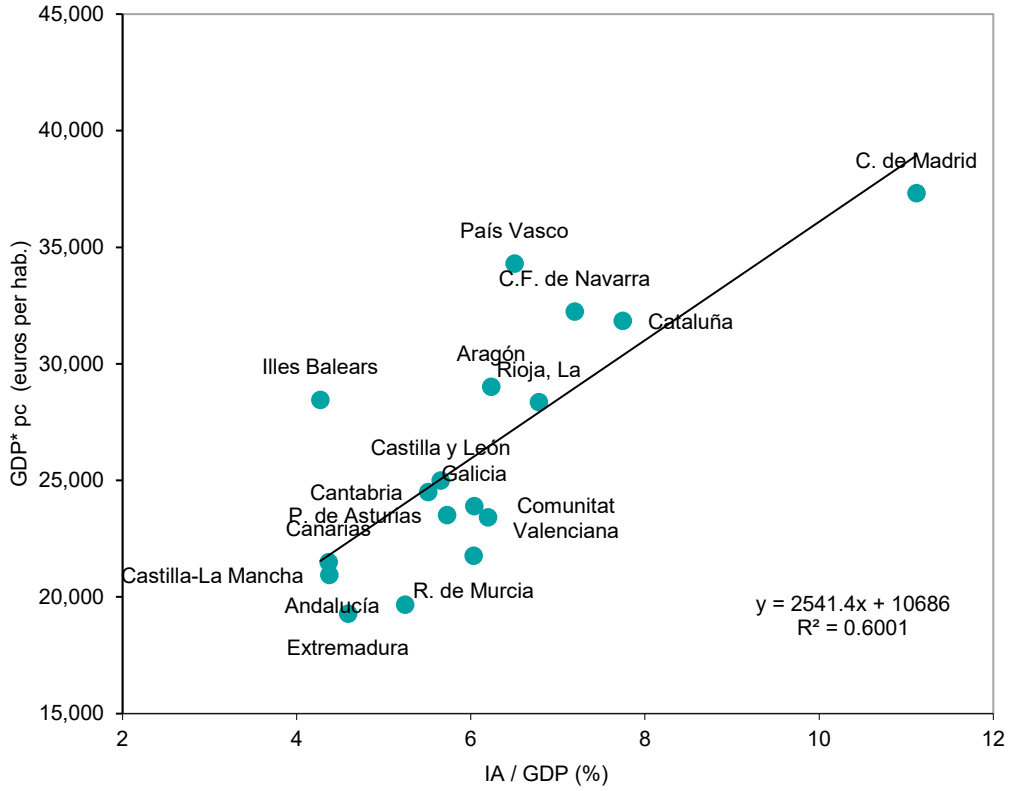
The Geography of Intangibles

Close positive relation between intangibles and per capita GDP

GDP* per capita and intangible investment over GDP. Total economy (2018)



* adjusted

Source: Cotec-Ivie Foundation, BBVA Foundation-Ivie (2022) and INE

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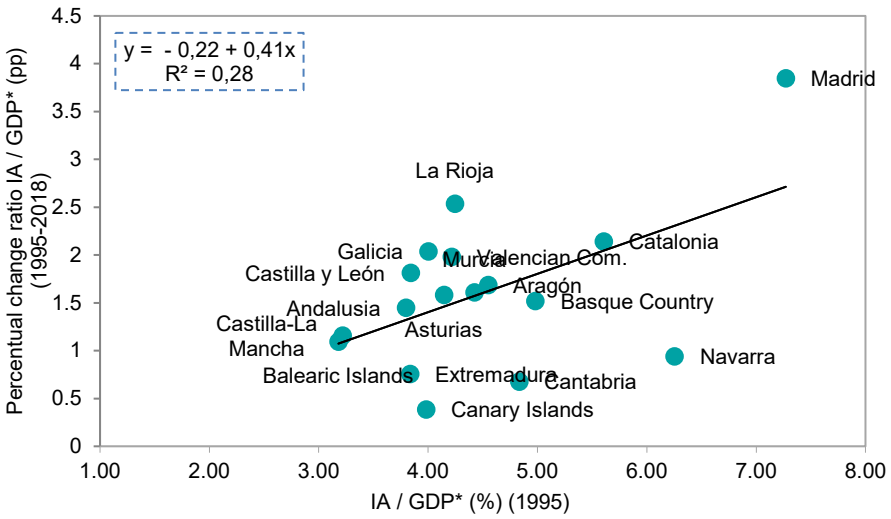
Territorial Differences

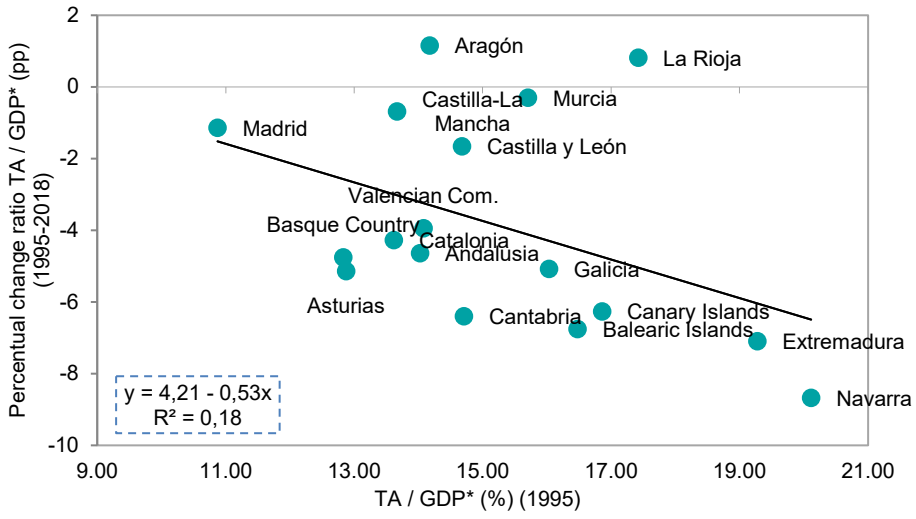
Decreasing in terms of tangible assets, but increasing in intangibles

β-convergence among CC.AA. Total economy. Investment in intangible and tangible assets over GDP* (1995) and percentage change in pp. (1995-2018)

a) Intangible assets (IA)



b) Tangible assets (TA)**



* adjusted; ** non-residential
Source: Cotec-Ivie Foundation, BBVA Foundation-Ivie (2022) and INE

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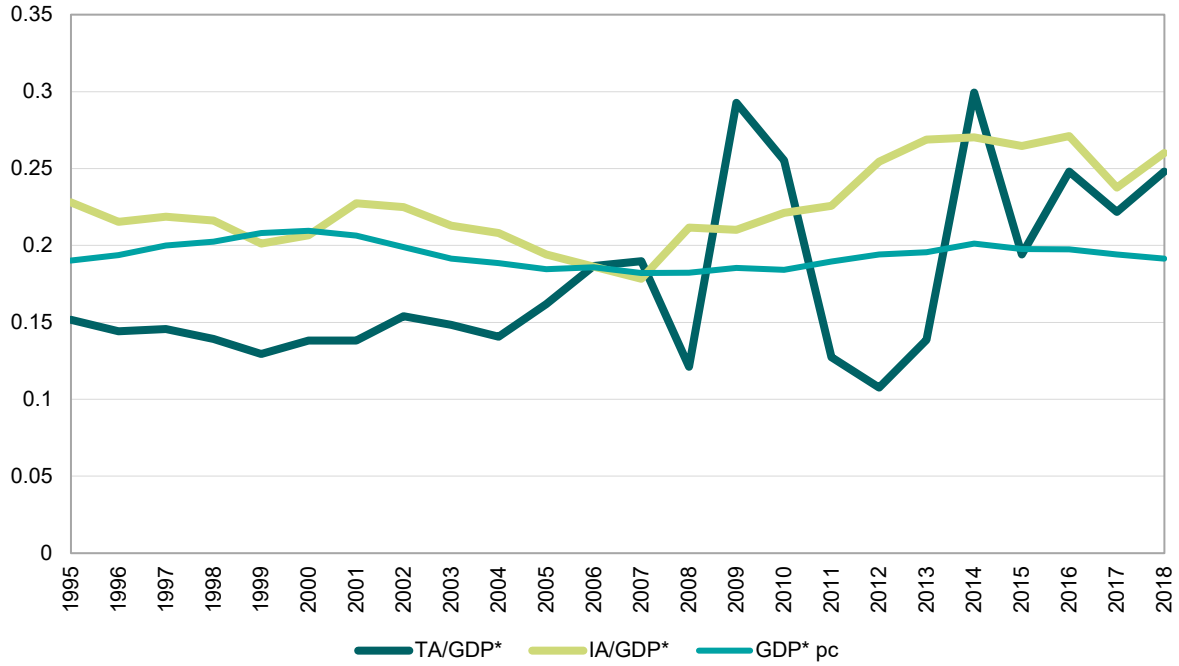
Territorial Differences

Regional differences higher for intangibles. Tangibles high volatility after 2008 Crisis

σ-convergence among regions. GDP* per capita, intangible and tangible investment over GDP*, 1995-2018 (coefficient of variation)**



* adjusted; ** non-residential
Note: Ceuta and Melilla not considered.
Source: Cotec Foundation-Ivie, BBVA Foundation-Ivie (2022) and INE

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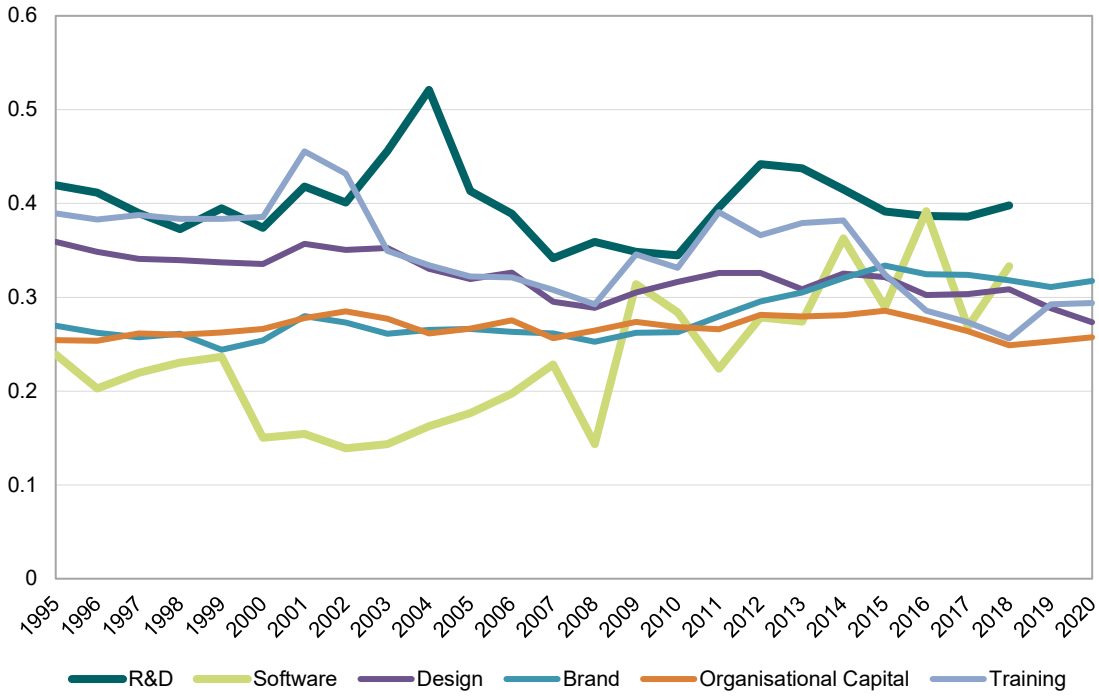
Territorial Differences

Higher in R&D and lower (though increasing) in Software

σ-convergence among regions. Intangible investment over GDP* by asset type, 1995-2020 (coefficient of variation)



* adjusted
Note: Ceuta and Melilla not considered.
Source: Cotec Foundation-Ivie, BBVA Foundation-Ivie (2022) and INE

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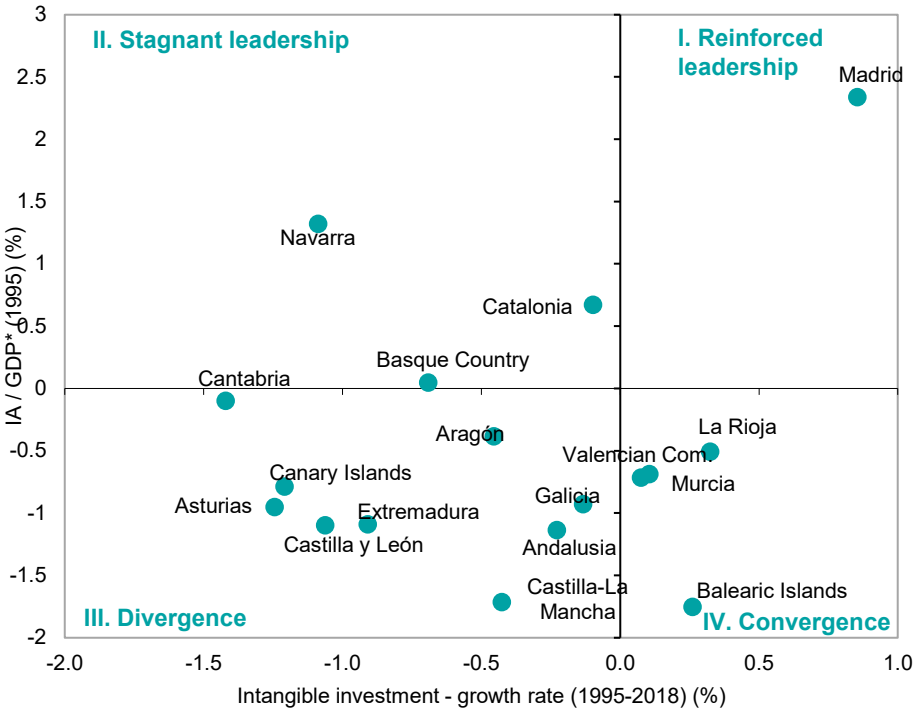
Leaders, Convergents and Divergents. Intangibles

Madrid has reinforced its leadership. Catalonia, Navarra and the Basque Country have maintained it. Valencian Community, Balearic Islands and Murcia and La Rioja have converged. The remaining ones have diverged

Deviation of the investment in intangible assets to GDP* ratio (1995) and average rate of change 1995-2018. Total economy. Spanish Regions over national average (percentage)



*adjusted.
Source: Cotec Foundation-Ivie, BBVA Foundation-Ivie (2019) and INE (2019d)

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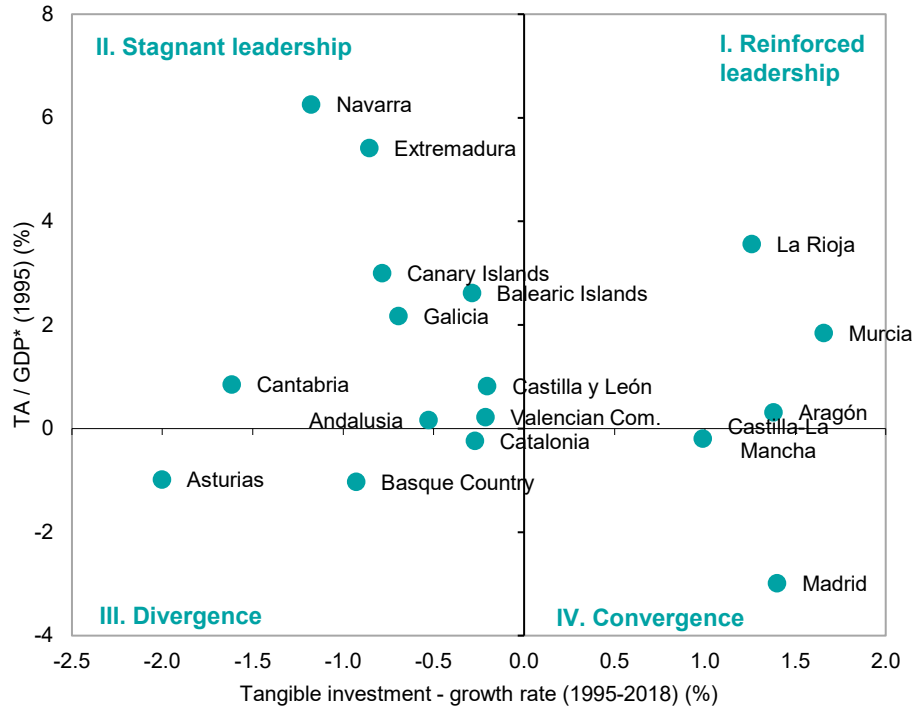
Leaders, Convergents and Divergents. Tangibles

Classification closer to per capita GDP in intangibles than tangibles

Deviation of the investment in tangible assets to GDP* ratio (1995) and average rate of change 1995-2018. Total economy. Spanish Regions over national average (percentage)



*adjusted.
Source: Cotec Foundation-Ivie, BBVA Foundation-Ivie (2019) and INE (2019d)

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Spanish Capital Stock at Regional Level
Methodology and (Some) Results

Matilde Mas
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