



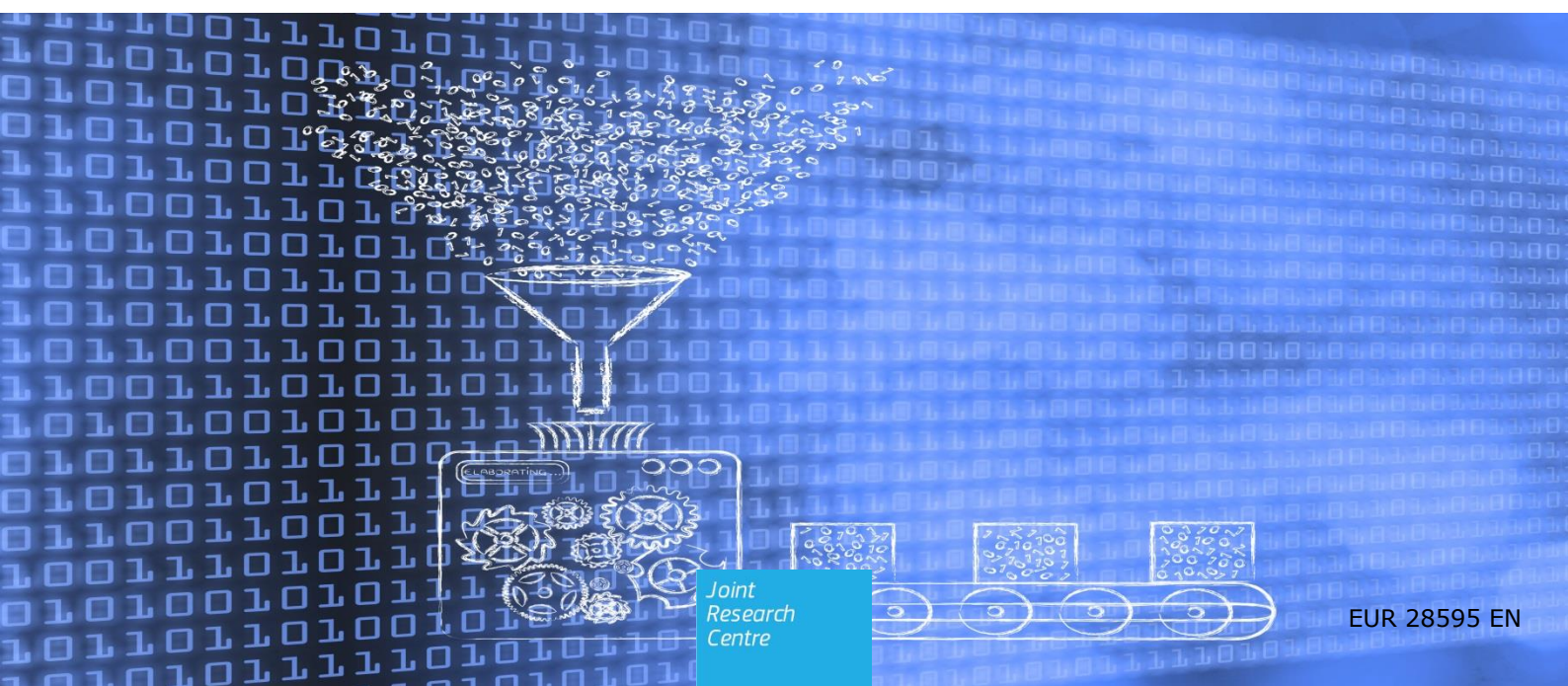
JRC TECHNICAL REPORTS

The 2017 PREDICT Dataset Methodology

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TABLE OF CONTENTS

Acknowledgements	4
Foreword	5
Abstract	6
1 Introduction	7
2 The Core PREDICT Dataset 1995-2014	8
2.1 The backward reconstruction of time series	12
2.2 The Media and Content Sector	14
3 Now-casting 2015 and 2016	16
4 Estimation of ICT GBARD	19
4.1 Estimation of GBARD and ICT GBARD by NACE sectors	19
4.2 Estimation of missing NABS chapters	22
4.3 Revision of the NABS-NACE (Rev 2 and Rev 1.1) correspondences and weights	23
Annex I: The Collection of Data	24
Variables of R&D, BERD, and Gross R&D expenditure	24
The European Union and the Member States	24
Norway	26
Switzerland	27
Australia	28
Brazil	30
Canada	31
China	33
India	34
Japan	35
South Korea	37
Russia	38
Taiwan	39
United States	41
R&D Personnel	42
The European Union and the Member States	42
Norway	44
Switzerland	45
Australia	45
Brazil	47
Canada	48
China	49
India	50

Japan	50
South Korea.....	51
Russia	52
Taiwan	53
United States	54
R&D Researchers.....	55
The European Union and the Member States	55
Norway	55
Switzerland.....	56
Australia.....	56
Brazil	58
Canada.....	59
China	60
India	61
Japan	61
South Korea.....	62
Russia	63
Taiwan	64
United States	65
Public Funding of ICT R&D	67
The European Union and the Member States	67
United States	67
Japan	68
Macroeconomic Variables: Gross Value Added, Gross Domestic Product and Gross Output	69
The European Union and the Member States	69
Norway	72
Switzerland.....	74
Australia.....	76
Brazil	78
Canada.....	80
China	81
India	83
Japan	84
South Korea.....	86
Russia	87
Taiwan	88
United States	90
Employment and Hours Worked.....	92

The European Union and the Member States	92
Norway	94
Switzerland.....	97
Australia.....	99
Brazil	100
Canada.....	101
China	102
India	103
Japan	104
South Korea.....	105
Russia	106
Taiwan	107
United States	108
Labour Productivity	110
Annex II: Tables of Correspondence	111
References	134
List of Tables	135
List of Tables of Correspondence	136

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Foreword

PREDICT: Prospective Insights on R&D in ICT

PREDICT produces statistics and analyses on ICT industries and their R&D in Europe since 2006. The project covers major competitors worldwide, including 40 advanced and emerging countries – the EU28 plus Norway, Russia and Switzerland in Europe, Canada, the United States and Brazil in the Americas, China, India, Japan, South Korea and Taiwan in Asia, and Australia. It also covers a growing array of indicators related to the ICT content of economic activities.

Rationale

ICTs determine competitive power in the knowledge economy. The ICT sector alone originates almost one fourth of total Business Expenditure in R&D (BERD) for the aggregate of the 40 economies under scrutiny in this project. Besides the impact that ICT uptake has on the organisation of businesses, ICTs also play an important enabling role for innovation in other technological domains. This is reflected at the EU policy level, where the Digital Agenda for Europe was identified in 2010 as one of the seven pillars of the Europe 2020 Strategy for growth. In addition, the achievement of a Digital Single Market (DSM) is one of the 10 political priorities set by the Commission in 2015.

Statistics and indicators

PREDICT provides indicators in a wide variety of topics, including value added, employment, labour productivity and BERD. It distinguishes fine grain economic activities in the ICT and media and content industries (up to 22 individual activities, 14 of which at the class level, i.e. at 4 digits in the ISIC classification) and at a higher level of aggregation for all the other industries in the economy. It also produces data on Government financing of R&D in ICTs, and total R&D expenditure at the country level. Now-casting of more relevant data in these domains is also performed, and time series go back to 1995.

Team

PREDICT is a collaboration between the JRC, Directorate B, and the Directorate General for Communications Networks, Content and Technology (CNECT) of the European Commission.

Since 2013, data collection and analysis has been carried out jointly by the JRC and the Valencian Institute of Economic Research (Instituto Valenciano de Investigaciones Económicas - Ivie).

Abstract

This methodological report details the work done in the *Prospective Insights on R&D in ICT* (PREDICT) project in 2017. PREDICT provides updated indicators for the Information and Communication Technologies (ICT) sector and for its Research and Development (R&D) in the European Union and in the major ICT leaders worldwide. This project is being carried out jointly by the Joint Research Centre, Directorate B and the Directorate General for Communications Networks, Content and Technology (DG CNECT) of the European Commission. The data and methodologies have been developed in collaboration with the Valencian Institute of Economic Research (IVIE).

The 2017 PREDICT Dataset has been deepened and expanded in this latest version in order to include complementary dimensions, such as the Media and Content sector. An updated methodology for estimating Government budget allocations for ICT R&D (ICT GBARD) has been applied. Furthermore, for the most important indicators, existing PREDICT time series have been reconstructed back to 1995, while figures are now-casted for 2015 and 2016.

1 Introduction

This methodological report details the work done in the *Prospective Insights on R&D in ICT* (PREDICT) project in 2017. PREDICT provides updated indicators for the Information and Communication Technologies (ICT) sector and for its Research and Development (R&D) in the European Union and in 12 of among the major ICT leaders worldwide. This project is being carried out jointly by the Joint Research Centre, Directorate B and the Directorate General for Communications Networks, Content and Technology (DG CONNECT) of the European Commission. The data and methodologies have been developed in collaboration with the Valencian Institute of Economic Research (IVIE).

Digital technologies are crucial to most capital goods, industrial products, and everyday life. The ICT industries are key enablers of both production and the knowledge systems. EU policies have therefore attributed a strategic role to digital technologies in the promotion of growth, innovation and competitiveness. Achieving the Digital Single Market has been identified as one of the top three priorities for the current Commission in the Digital Agenda for Europe. A competitive ICT industry in Europe, able to attract investments and produce innovation, is therefore of pivotal importance especially in a moment in which the digital transformation is affecting every aspect of economy and society.

PREDICT responds directly to the need for statistical information in order to design and monitor related policies effectively. The PREDICT core dataset has been deepened and expanded in order to include complementary dimensions and to allow for longer comparable time series. The 2017 release of the PREDICT dataset also covers the Media and Content sector. In addition, it includes estimates of the Government budget allocations for R&D (GBARD) and ICT GBARD estimates based on an updated and improved methodology. Furthermore, for the most important indicators, time series has been reconstructed backwards up to 1995, while figures have been now-casted for 2015 and 2016. Therefore, time series comparable across countries are covering for the main indicators the period between 1995 and 2016.

In the following chapters, a description of the main characteristics and features of the core dataset and of the complementary sector is provided, together with an overview of the backward reconstruction of the time series. Then, the main methodological aspects of the now-casting process are presented. The updated methodology to produce ICT GBARD estimated is detailed too. Finally, the Annexes collect all the relevant methodological notes concerning the process followed to build each indicator for each country in the dataset.

2 The Core PREDICT Dataset 1995-2014

The PREDICT dataset complies with the statistical definitions, classifications and methods to measure and compare the information society across countries established by the *Guide to measuring the Information Society* (Organisation for Economic Co-operation and Development, OECD 2011).

As compared with the 2016 dataset, PREDICT 2017 now includes three new aspects:

1. A classification dedicated to the Media and Content (MC) sector;
2. The new variables of gross output, hours worked, and the resulting variable of labour productivity per hour worked;
3. The time reference starts in 1995 and not in 2006 as it did in previous editions of PREDICT.

In order to reconstruct the data back to 1995 and include the Media and Content (MC) sector, it was necessary to fill in missing information. Additional technical information about this reconstruction is provided in the next section, however the new PREDICT 2017 data have been produced in the same way as the data from previous PREDICT editions.

With respect the geographical coverage, data is produced for the European Union aggregate (EU), the European Member States (MSs), and the major worldwide ICT players: Switzerland, Norway, Australia, Brazil, Canada, China, India, Japan, South Korea, Russia, Taiwan and United States. The PREDICT 2017 dataset ensures comparability with the industrial classification NACE-Rev.2¹ between 1995 and 2014². It provides detailed information about: the ICT sector and sub-sectors³; the Media and content sector (MC); the Retail sale via mail order houses or via Internet sector (RS); and additional economic sectors which allow relevant comparisons.

The indicators in the PREDICT 2017 core dataset are:

1. Business R&D Expenditure (BERD);
2. Gross R&D Expenditure (GERD);
3. R&D personnel (PERD);
4. R&D researchers (RERD);
5. Gross Value Added (GVA);
6. Gross Output (GO),
7. Employment (EMP)
8. Hours worked (HEMP)
9. Labour productivity per employed person (PRODEMP) and per hour worked (PRODHEMP)
10. Government budget allocations for R&D (GBARD) for the period 2006-2015.
11. Government budget allocations for ICT R&D (ICT GBARD) for the period 2006-2015.

The data is organised in four blocks, according to economic activity: ICT sector (for both comprehensive and operational definitions), MC sector, RS sector and additional economic sectors:

1a. The comprehensive definition of the ICT sector (Table 1) is in line with the OECD's definition (2007) and encompasses the following industries of the NACE-Rev.2 classification:

- five ICT manufacturing sectors: 261 (i.e. 2611 and 2612), 262, 263, 264 and 268;

¹ Available at: <http://ec.europa.eu/eurostat/documents/3859598/5902521/KS-RA-07-015-EN.PDF>

² Please refer to the following sections for information about the nowcasted dataset covering year 2015 and 2016.

³ According to latest OECD definition (2007): <http://www.oecd.org/science/scienceandtechnologypolicy/38217340.pdf>

- two ICT trade sectors: 4651 and 4652
- five ICT services sectors: 582 (i.e. 5821, 5822, 5823, 5824, 5825, 5826, 5827, 5828, and 5829), 61 (i.e. 611, 612, 613, and 619), 62 (i.e. 6201, 6202, 6203, and 6209), 631 (i.e. 6311 and 6312) and 951 (i.e. 9511 and 9512).

1b. The operational definition of the ICT sector (Table 2) provides information to maintain the comparability of countries over longer periods in cases where insufficient information is available to estimate the ICT subsectors of the comprehensive definition. This definition distinguishes between:

- ICT manufacturing, without Manufacture of magnetic and optical media (268);
- ICT services without Trade services (465), encompassing two sub-sectors only: Telecommunication (61), and the aggregate for Computer and related activities (5820, 62, 631, 951).

2. The Media and content sector (Table 3) is defined according to the OECD’s definition (2007).

3. The third block encompasses the Retail sale via mail order houses or via Internet sector (4791).

4. The fourth block includes data for selected industries (Table 4) which are meaningful both for comparison with the ICT sector and for comparing EU to the other major economies.

PREDICT 2017 extends the database elaborated in 2016 (PREDICT 2016), while maintaining the methodology and procedures developed previously with some changes (documented in this report). The correspondence tables between NACE-Rev.2 and the national classifications of activities are also the same as in the previous edition (Annex II: Tables of Correspondence).

Table 1 The comprehensive definition of the ICT sector (based on NACE-Rev.2)

NACE-Rev.2.	Description
261-264, 268, 465, 582, 61, 62, 631, 951	A. ICT Total [A=B+C]
261-264, 268	B. ICT manufacturing industries [B=1 to 5]
261	[1] Manufacture of electronic components and boards
2611	[1.1] Manufacture of electronic components
2612	[1.2] Manufacture of loaded electronic boards
262	[2] Manufacture of computers and peripheral equipment
263	[3] Manufacture of communication equipment
264	[4] Manufacture of consumer electronics
268	[5] Manufacture of magnetic and optical media
465, 582, 61, 62, 631, 951	SER. ICT total services [SER=TW+C]
465	<i>TW. ICT trade industries [TW=6+7]</i>
4651	[6] Wholesale of computers, computer peripheral equipment and software
4652	[7] Wholesale of electronic and telecommunications equipment and parts
582, 61, 62, 631, 951	C. ICT services industries [C=8+9]
61	[8] Telecommunications
611	[8.1] Wired telecommunications activities
612	[8.2] Wireless telecommunications activities
613	[8.3] Satellite telecommunications activities
619	[8.4] Other telecommunications activities
582, 62, 631, 951	[9] Computer and related activities [9=10+11+12+13]
582	[10] Software publishing
5821	[10.1] Publishing of computer games
5829	[10.2] Other software publishing
62	[11] Computer programming, consultancy and related activities
6201	[11.1] Computer programming activities
6202-6203	[11.2] Computer consultancy and computer facilities management activities
6202	[11.2.1] Computer consultancy activities
6203	[11.2.2] Computer facilities management activities
6209	[11.3] Other information technology and computer service activities
631	[12] Data processing, hosting and related activities; web portals
6311	[12.1] Data processing, hosting and related activities
6312	[12.2] Web portals
951	[13] Repair of computers and communication equipment
9511	[13.1] Repair of computers and peripheral equipment
9512	[13.2] Repair of communication equipment

Source: Own elaboration based on OECD (2007).

Table 2 The operational definition of the ICT sector (based on NACE-Rev.2)

NACE-Rev.2.	Description
261-264, 582, 61, 62, 631, 951	A'. ICT Total (operational) [A'=B'+C]
261-264	B'. ICT manufacturing industries (operational) [B'=1 to 4]
261	[1] Manufacture of electronic components and boards
262	[2] Manufacture of computers and peripheral equipment
263	[3] Manufacture of communication equipment
264	[4] Manufacture of consumer electronics
582, 61, 62, 631, 951	C. ICT services industries (operational) [C=8+9]
61	[8] Telecommunications
582, 62, 631, 951	[9] Computer and related activities [9=10+11+12+13]

Source: Own elaboration.

Table 3 MC sector disaggregation (based on NACE-Rev.2)

NACE-Rev.2.	Description
581, 59, 60, 639	E. MC sector [E=F+G+H]
581	F. Publishing of books, periodicals and other publishing activities [F=14 to 16]
5811-5812	[14] Book publishing; Publishing of directories and mailing lists
5811	[14.1] Book publishing
5812	[14.2] Publishing of directories and mailing lists
5813-5814	[15] Publishing of newspapers, journals and periodicals
5813	[15.1] Publishing of newspapers
5814	[15.2] Publishing of journals and periodicals
5819	[16] Other publishing activities
59-60	G. Audiovisual and broadcasting activities [G=17+18]
59	[17] Motion picture, video and television programme production, sound recording and music publishing activities
591	[17.1] Motion picture, video and television programme activities
5911	[17.1.1] Motion picture, video and television programme production activities
5912	[17.1.2] Motion picture, video and television programme post-production activities
5913	[17.1.3] Motion picture, video and television programme distribution activities
5914	[17.1.4] Motion picture projection activities
592	[17.2] Sound recording and music publishing activities
60	[18] Programming and broadcasting activities
601	[18.1] Radio broadcasting
602	[18.2] Television programming and broadcasting activities
639	H. Other information service activities [H=19+20]
6391	[19] News agency activities
6399	[20] Other information service activities n.e.c.

Source: Own elaboration based on OECD (2007).

Table 4 Additional sectors (based on NACE-Rev.2)

NACE-Rev.2.	Description
10-33	Manufacturing
20-21	Manufacture of chemicals and chemical products; Manufacture of pharmaceuticals, medicinal chemical and botanical products
20	Manufacture of chemicals and chemical products
21	Manufacture of pharmaceuticals, medicinal chemical and botanical products
26	Manufacture of computer, electronic and optical products
27-28	Manufacture of machinery and equipment
29-30	Manufacture of transport equipment
29	Manufacture of motor vehicles, trailers and semi-trailers
30	Manufacture of other transport equipment
303	Manufacture of air and spacecraft and related machinery
45-47	Wholesale and retail trade, repair of motor vehicles and motorcycles
49-99	Services, except trade
49-53	Transportation and storage
58-63	Information and communication
64-66	Financial and insurance activities
69-82	Professional, scientific, technical, administration and support service activities
69-75	Professional, scientific and technical activities
85	Education
86-88	Human health and social work activities

Source: Own elaboration.

2.1 The backward reconstruction of time series

From a technical point of view, producing data to reconstruct the time series backwards employs a two-step strategy:

1. Initially, data from Eurostat National Accounts are used as benchmark for Value Added and Employment, while the Eurostat R&D survey is used for BERD, PERD and RERD. In particular, the industries provided by the National Accounts (NA) aggregates by industry (up to NACE A*64)⁴ are used as benchmarks to disaggregate both Value Added and Employment, and to comply with the OECD (2007) definitions of the ICT and Media and Content sectors. Table 5 shows the available information which is used to estimate both the MC (green cells) and the ICT services sectors (red cells). As reported in the first column of the table, the NA (ESA 2010) covers the period 1995-2014 and the industries available for benchmarking are NACE 58, 59-60, 61, 62-63, 95.
2. Then alternative data sources are employed to disentangle the NACE codes into the industries to fulfil in PREDICT. Specifically, the Structural Business Statistics (SBS) are considered as for the NACE-Rev.2 from 2008-2014, while data from EU KLEMS and from the SBS (NACE Rev. 1.1) is used for the period 1995-2007. Table 5 shows the industry classification available in each of the alternative data sources. The procedure at this stage consisted of breaking down NA A*64 aggregates using the alternative data sources available. Since NA data are

⁴ <https://data.europa.eu/euodp/en/data/dataset/CL1mabTDvnuSIpbVXjwV7A>

available for the period 1995-2014, the same strategy adopted for 2008-2014 was followed for the years 1995-2005, only using the above mentioned specific ancillary sources.

Table 5 Data used to estimate the ICT services and the MC sector

a. Macroeconomic variables: value added and employment

Benchmark NACE Rev. 2	Auxiliary sources			
	NACE Rev. 2		NACE Rev. 1.1	
NA (1995-2014)	SBS (2008-2014)	SBS (2005-2007)	NA/EU KLEMS (1995-2007) ¹	EU KLEMS/SBS (1995-2007) ^{1,2}
A*64	Codes	Codes	Codes	Codes
58	581	58	221	221
	582		72	7221
59-60	59-60	59-60	92	92
61	61	61	64	642
62-63	62	62	72	721, 7222, 726
	631	63	72	723, 724
	639		92	92
95	951	95	72	725
	952		52	527

Agregate codes

	NACE Rev. 2		NACE Rev. 1.1	
Computer and related activities	582, 61, 62, 631, 951	582, 61, 62, 631, 951	72	72

b. R&D variables: BERD, PERD and RERD

Individual codes

Benchmark	Auxiliary sources		
	NACE Rev.2		NACE Rev.1.1
R&D Statistics 2005-2014	SBS (2008-2014)	SBS (2005-2007)	R&D Statistics 1995-2010
Codes	Codes	Codes	Codes
581	581	58	22
582	582		722
59	59-60	59-60	75-99
60			
61	61	61	642
62	62	62	72
631	631	63	72
639	639		72
951	951	95	52

Agregate codes

	NACE Rev. 2	NACE Rev. 1.1
5820, 62, 631, 951		72
85-87		80-85 (ex. 852)
582, 61, 62, 631, 951		72, 642

Notes:

Cells show the NACE codes available for each corresponding data sources. MC sector industries marked in green and ICT industries in red.

Additional sources of official data (e.g., OECD, National Statistical Offices, EU KLEMS) are employed whenever Eurostat A*64 has missing values. These additional sources of data are directly plugged into the database, or used in the imputations of the following step. Standard imputation methods (e.g., the calculation of difference or shares in the available data, data interpolation, etc.) are employed in cases where no alternative sources of information are available. In some cases, "linking coefficients" corresponding to a more aggregated industry are used –as the only way– to maintain the official correspondence between NACE-Rev 1.1 and NACE-Rev.2.

In general, a distinctive trait of the imputation approach developed for the PREDICT project is that each missing value is considered as a separate case, and no general rules are defined for all the missing values or for groups of missing values. The best imputation strategy is decided for each individual case on the basis of the information available or of the series characteristics (e.g., whether the series are stationary or have a trend, whether or not the percentage structure is stable over time, etc.).

Another key aspect of the procedure relates to how the change from NACE-Rev. 1.1 to NACE-Rev.2 is dealt with. Since there are no official tables for the correspondence between NACE-Rev.2 and NACE Rev. 1.1, Mas et al. (2012)⁵ developed a "transition methodology" in order to produce homogeneous series for the PREDICT variables and industries. According to this approach, for each (sub-) sector, variable and country, a linking coefficient is calculated as the ratio between its values in the NACE-Rev.2 and in the NACE-Rev. 1.1 of 2008 (the linking year). Then the linking coefficient for 2008 is multiplied to each individual item of data for the years to back-cast, assuming that the value of the sector under NACE Rev. 1.1 is always a proportion of the value of the sector under NACE-Rev.2, and that this proportion remains constant over time.

The methodology is the same for BERD, PERD and RERD. However, these indicators differ as regards the data sources used as benchmarks, the available industry disaggregation, and the alternative information used. This information is reported in Table 5.

2.2 The Media and Content Sector

This section explains why the MC sector is considered relevant and consequently has been included in the current release of PREDICT. The MC sector is defined as "industries that are engaged in the production, publishing and/or the electronic distribution of content products" (OECD, 2011). This definition relies on international standards, particularly on previous work done by the OECD Working Party on Indicators for the Information Society (OECD, 2007).

Table 3 identifies and details the MC sectors from the technical perspective of the industrial classification. It also highlights how these industries carry out a number of heterogeneous economic activities primarily linked to the creation and dissemination of information and cultural products. These industries engage in video and TV production, programming, distribution, broadcasting, and a wealth of other information services. Another distinctive and common feature of these activities is their level of interconnectedness.

These activities are becoming increasingly intertwined - both with each other, and with the ICT sector which provides most of the means for disseminating MC products. Concurrently, rapid changes have occurred in the way these industries work, in their business models for production and distribution, and in their strategies for interaction with key competitors and for the achievement of their targets. From a policy perspective, these circumstances have given rise to a well-founded and growing interest in collecting and analysing information about these flourishing sectors of the economy and their close relationship to the ICT sectors.

⁵ Mas, M., J.C. Robledo and J. Pérez (2012). "ICT Sector definition transition from NACE Rev. 1.1 to NACE Rev. 2: A methodological note". JRC Technical Reports, Luxembourg. European Commission, 27 pp.

As a consequence, the PREDICT project from 2017 includes information about the MC sector at 4-digit level. The approach used to produce MC sector data is entirely consistent with the general statistical procedure employed to produce ICT data for the PREDICT project and reports. Therefore the data for the MC sectors can be integrated within the overall PREDICT framework.

3 Now-casting 2015 and 2016

Now-casted data have been included in the PREDICT 2017 dataset because the timely availability of figures about key indicators is important for policy support. For this reason an ad-hoc now-casting methodology was developed in the context of PREDICT in order to estimate figures for the following variables for 2015 and 2016:

1. Business R&D Expenditure (BERD);
2. R&D personnel (PERD);
3. R&D researchers (RERD);
4. Gross Value Added (GVA);
5. Employment (EMP)
6. Labour productivity (per employed person) (PRODEMP)

Now-casted data are available for: the European Union, the European Member States, Australia, Canada, Japan, South Korea, Taiwan and the US.

A distinctive characteristic of PREDICT is that it provides fine-grained disaggregation of data as regards industrial classifications (i.e. up to 4 digit level) in order to detail the ICT, MC and RS sectors accurately. Now-casted figures for 2015 and 2016 are provided for a reduced group of the PREDICT sectors because the information needed to now-cast more disaggregated sectors is not available. Therefore the industries with now-casted data are:

1. The total ICT sector;
2. The ICT manufacturing sector;
3. The ICT services sector;
4. The Telecommunications (IT) sector;
5. The Computer and related activities (IC) sector;
6. The Media and content (MC) sector;
7. The Retail sale (RS) sector.

Moreover, now-casted figures are produced, according to the operational definition of the ICT industries, to have a direct comparability between EU and non-EU economies. As explained before, the operational definition does not encompass the industries of ICT trade (NACE 465) or of Manufacture of magnetic and optical media (NACE 268).

Now-casted estimates are produced by means of times series methods which take direct advantage of the longer series of indicators obtained with the backward reconstruction. Two different now-casting approaches are envisaged for two distinct groups of indicators:

1. A general time-series approach is employed to now-cast GVA, Employment, and BERD (Labour productivity is then computed as the ratio of the now-casted GVA over EMP);
2. "Transfer rates" calculated with now-casted BERD serve to now-cast PERD and RERD.

The time-series approach to now-casting GVA, Employment, and BERD employs the extended series of indicators which allows us to estimate the general model for each country separately. Specifically, for each industry l and country c , the model can be expressed as:

$$(1) \quad Y_{clt} = \alpha + \delta_{cl} X_{clt} + \varepsilon_{clt}$$

where Y_{clt} is one of the variables to now-cast (i.e. GVA, Employment, and BERD) for country c , at time t , and industry l . X_{clt} is a matrix of predictors for a given country and industry; and ε_{clt} is white noise. Since the PREDICT variables have marked trends in most cases, the model is actually estimated in first differences (noted by D.):

$$(2) \quad D.Y_{ct} = \alpha + \delta_{ct} D.X_{ct} + \varepsilon_{ct}$$

Alternative definitions of the explanatory variables, and autoregressive terms ($AR(1)$) if needed, are included if the noise exhibits first-order correlation⁶. All countries share a common set of predictors, on which information is available for both the estimation period (i.e. 1995 to 2014) and the years to now-cast (i.e. 2015 and 2016).

Targeting precise industries like the ICT sector reduces the bundle of available predictors. More specifically, this choice is limited to the value added and employment of the closest parent industry of the PREDICT sectors. The Gross fixed capital formation in intellectual property is used for BERD since no other variables could proxy the R&D intensity at the targeted industry level. Table 6 outlines the choice of predictors by sector.

Finally, equation (2) is estimated individually for the European Union, EU Member States, and for the non-EU countries. By recapping, the now-casting strategy consists of estimating a linear regression for each country, variable and sector for the period 1995 (or first year available) to 2014. The dependent variable is the first difference of the GVA, Employment, or BERD, while the predictors are the first differences of GVA, Employment, and Gross fixed capital formation in intellectual property in the case of BERD.

Table 6 Explanatory variables by estimated sector. Annualized predictors from the Quarterly National Accounts

Estimated sector	Industry disaggregation of the predictors
ICT Sector	NACE C (Manufacturing) + J (Information and communication)+ Intellectual Property (only for BERD) Total economy
ICT manufacturing sector	NACE C (Manufacturing) + Intellectual Property (only for BERD) Total economy
ICT services sector	NACE J (Information and communication)+ Intellectual Property (only for BERD) Total economy
Telecommunication s sector	NACE J (Information and communication)+ Intellectual Property (only for BERD) Total economy
Computer and related activities sector	NACE J (Information and communication)+ Intellectual Property (only for BERD) Total economy
Media and content sector	NACE J (Information and communication)+ Intellectual Property (only for BERD) Total economy
Retail sale sector	NACE G_I (Wholesale and retail trade, transport, accommodation and food service activities) for the EU countries and G for the Non-EU Countries + Intellectual Property (only for BERD) Total economy

Note: The explanatory variables used for the estimation of each sector are the same for GVA, EMP, BERD. Additionally, Gross fixed capital formation in intellectual property is added for the estimation of BERD.

Sources of NA data: Eurostat for EU countries, and the OECD and the National Statistics Offices for non-EU countries.

⁶ Dummy variables are added to the model to control for the years in which the dependent variable had sharp changes.

PERD and RERD are now-casted by means of transfer rates calculated for each year up to 2014, industry and country in the following way:

$$(3) \quad \text{Transfer Rate}^{\text{PERD}} = \frac{\text{PERD}}{\text{BERD}}$$

$$(4) \quad \text{Transfer Rate}^{\text{RERD}} = \frac{\text{RERD}}{\text{BERD}}$$

Afterwards, the values of 2015 and 2016 are estimated in a three-step estimation procedure⁷:

1. for each country and industry the following regression is run with data for 1995-2014:
 1. (5) $\text{Transfer Rate}^{\text{PERD or RERD}} = \alpha + \delta \text{Trend} + \varepsilon$
2. the parameters of equation (5) serve to calculate the transfer rate for years 2015 and 2016;
3. to finally now-cast PERD and RERD, the transfer rates of 2015 and 2016 with the now-casted BERD are plugged together into the formulas (3) and (4).

The advantage of this procedure is that it estimates the transfer rates of years 2015 and 2016 by accounting for the previous evolution of the dependent variables. If the transfer rate has no trend, the estimated parameter (i.e. δ) is 0, and the estimated transfer rate is just equal to the average value of the transfer rates observed previously.

⁷ The only exception of this procedure is in the Retail sale sector. The transfer rates are quite volatile, and the estimated transfer rates from a trend regression yield frequently negative values. Therefore, we opted to use in the Retail sale sector the transfer rate of the last available year.

4 Estimation of ICT GBARD

The Digital Single Market aims to increase Member States' annual public spending on ICT research and development. However, monitoring the evolution of public funding of ICT R&D is not straightforward as there are no statistics readily available. The approach followed by PREDICT is to estimate that part of the public budget which addresses ICT R&D. Stančik (2012) and Stančik and Rohman (2014) developed a methodology to disentangle which part of the Government budget allocations for R&D (GBARD) finances ICT R&D expenditure (ICT GBARD). GBARD is a measure of the government expenditure on R&D based on budgetary information following the guidelines of the Frascati Manual (OECD, 2002). GBARD data is published according to the Nomenclature for the analysis and comparison of scientific programmes and budgets (NABS) by socio-economic objectives (Eurostat, 1994, 2008).

Based on the experience acquired in the application of this methodology in previous releases of the database, PREDICT 2017 goes one step further by implementing technical improvements to the methods described in the documents mentioned above. The scope of the methodology has been broadened, by estimating GBARD by NACE⁸ industries (Mas, Benages, Fernández de Guevara and Hernández (2016)). The improvements include the estimation of missing NABS chapters, the revision of the NABS-NACE correspondence and a change to the smoothing technique applied to the series.

PREDICT provides data for GBARD and ICT GBARD for the period 2006-2015. This new methodology departs in several ways from the one applied in previous years, leading to a new series which is not fully comparable with the data published in the past. The changes and refinements implemented aimed at improving the quality of the estimations on this difficult to apprehend topic of public funding in ICT R&D.

4.1 Estimation of GBARD and ICT GBARD by NACE sectors

PREDICT uses the methodology elaborated by Mas et al. (2016) to estimate GBARD by industry. This approach builds on Stančik (2012). An overview of the procedure follows:

- 1 From GBARD by NABS to GBARD by NACE: Starting from GBARD by NABS socio-economic objectives, GBARD by NACE industries is estimated assuming that the distribution of GBARD expenditure by industry is similar to the distribution of labour costs of the most qualified employees, i.e. those more likely to perform R&D activities in a particular industry.
- 2 From GBARD by NACE to ICT GBARD by NACE: GBARD by industry is split into ICT and non-ICT assets, on the assumption that public funding devoted to ICT R&D is proportional to labour costs of highly educated employees in ICT occupations.

A more detailed description of the procedure follows:

- 1 From GBARD by NABS to GBARD by NACE

The starting point of the new methodology is the GBARD data published by NABS chapters. GBARD data is available on the Eurostat website for the most recent classification by NABS 2007 socio-economic objectives (Table 7) from 2004 to 2014.

⁸ Statistical classification of economic activities in the European Community

Table 7 NABS 2007 chapters

1	Exploration and exploitation of the earth
2	Environment
3	Exploration and exploitation of space
4	Transport, telecommunication and other infrastructures
5	Energy
6	Industrial production and technology
7	Health
8	Agriculture
9	Education
10	Culture, recreation, religion and mass media
11	Political and social systems, structures and processes
12	General advancement of knowledge: R&D financed from General University Funds (GUF)
13	General advancement of knowledge: R&D financed from other sources than GUF
14	Defense

Source: Eurostat (2008)

In order to break down NABS GBARD by NACE industries, two elements are required: 1) a bilateral correspondence between NABS chapters and NACE industries; and 2) weights to distribute the GBARD of each NABS chapter among the different NACE industries, since each NABS chapter generally corresponds to more than one industry.

For the computation of the NABS weights (the weights of NACE sectors in each NABS chapter) to distribute GBARD by NABS into GBARD by NACE, Stančik and Rohman (2014) use a proxy. This consists of labour costs of employees with higher education (ISCED 5-6) per NACE sector over total labour costs of employees with ISCED 5-6 in all NACE sectors -labour costs are computed as salaries times hours worked. This choice of the proxy variable assumes that the distribution of GBARD expenditure by industry is similar to the distribution of the labour costs of the most qualified employees, i.e. those more likely to perform R&D. The data sources used to compute the weights are hours worked by employees from the Labour Force Survey (LFS) and hourly wages of employees from the Structure of Earnings Survey (SES 2006, 2010 and 2014).

Figure 1 illustrates for NABS 1 the procedure to break down GBARD NABS chapters by industry using NACE-NABS correspondences and the labour costs as weights. According to the equivalence, NABS 1 has to be broken down into four different NACE Rev. 2 industries (011, 122, 221, 325), see Figure 3a. To do this, the weights are calculated from the percentage distribution of total labour costs in these four industries (Figure 3b). These labour cost weights are then applied to NABS 1 GBARD to estimate GBARD in terms of NACE.

Since several NACE industries may be assigned to more than one NABS chapter, an additional step is taken to split NACE labour costs among the NABS affected. This is done by using the GBARD weight in the NABS chapters involved to assign the labour costs of each NACE industry to the corresponding NABS chapters for each country and year. This way of assigning NACE industries in several NABS chapters deviates from the baseline methodology proposed in Stančik (2012).

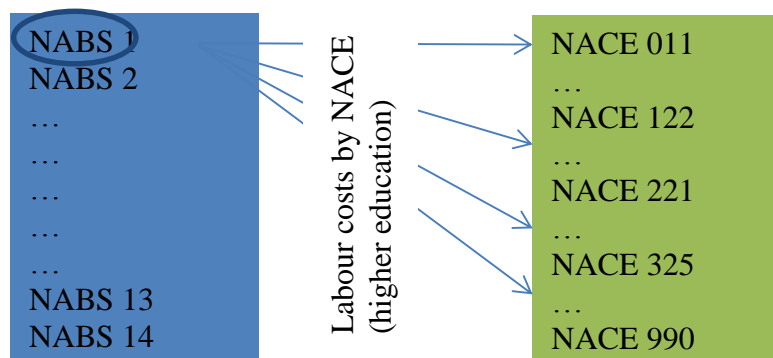
The weights to disentangle NABS GBARD by industry are computed considering all NABS chapters where the NACE sector is present according to the NACE-NABS correspondence. This weight will be used to estimate GBARD figures by industry for each country and year according to equation [1].

$$GBARD_k = \sum_{i=1}^{14} GBARD_j * \left[\frac{\text{Labour costs}_{j,k}}{\sum_k \text{Labour costs}_{j,k}} \right] \quad [1]$$

where j=NABS chapter, k= NACE industry, and Labour costs = hours worked multiplied by hourly wages for employees with higher education.

Figure 1: Example of NABS 1- NACE correspondences and estimation of weights through labour costs

a) NABS 1- NACE Rev. 2 correspondence



b) Example: NABS 1 – NACE Rev. 2 correspondence and estimation of weights through labour costs

NABS codes	NACE codes	Labour costs	Weights
NABS 1	NACE 011	100	15%
	NACE 122	200	31%
	NACE 221	250	38%
	NACE 325	100	15%
	Total NACEs assigned to NABS	650	100%

Source: Stančik (2012) and Stančik and Rohman (2014).

Given that Labour Force Survey (LFS) data and Structure of Earnings Survey (SES) data are classified following NACE Rev. 1.1 for the period 2006-2007 and NACE Rev. 2 for the period 2008-onwards, the application of the methodology results in GBARD data by two different NACE classifications. In order to harmonize the data throughout the whole period covered in the database, the correspondence between NACE Rev. 1.1 and Rev. 2⁹ is used to give a final NACE classification of 2-digit NACE Rev.2 industries. Despite of the use of the official correspondence, there is a break in the series in 2008. Therefore, GBARD data by NACE is smoothed. The results are smoothed following Mas et al (2016), by means of the estimation of a linear regression for the whole period with trend and

⁹ See: http://ec.europa.eu/eurostat/ramon/relation/index.cfm?TargetUrl=LST_REL&StrLanguageCode=EN&IntCurrentPage=8.

step dummies for the period affected by the new NACE Rev. 2 (2008-2015). The data for 2008-2015 is maintained, whereas the previous years are back-casted using the growth rates of the predicted series.

2 From GBARD by industries to ICT GBARD

Once GBARD is distributed into the NACE Rev. 2 industries, the next step is to split the GBARD within each industry, year and country into ICT and non-ICT assets. As in Stančik (2012), the assumption is that the part of total GBARD devoted to ICT assets is proportional to the share of labour costs for highly-educated employees in ICT occupations to total labour costs for highly-educated employees (the list of ICT occupations is presented in Table A X and Table A XI). More precisely, the ICT share of industry k is defined as:

$$\text{ICT share}_k = \frac{\text{Labour costs for employees with higher education in ICT occupations}_k}{\text{Labour costs for employees with higher education}_k} \quad [3]$$

and ICT GBARD in industry k is defined as the product of total GBARD in industry k times its ICT share.

The ICT share requires very detailed information on average salaries (LFS) and hours worked (SES) by industries, educational attainment and occupations. The results in some industries and countries are quite volatile due to lack of data and small sample sizes. Therefore, a smoothing procedure is required to get more stable series. Stančik (2012) based smoothing on the regression of the labour shares on time (years). The consequent linear prediction provides the trend values. This procedure implies that the resulting ICT GBARD for country j in year t will be updated anytime a new year is introduced in the dataset. To avoid this drawback, the new PREDICT methodology uses a double exponential smoothing, which does not require an annual update of all the data.

4.2 Estimation of missing NABS chapters

This methodology relies on a correspondence between each NABS chapter and the equivalent NACE industries. However, in some countries data are missing for one or several NABS chapters, and therefore this data has to be imputed. The data from the missing NABS chapters have been estimated based on the percentage structure of other years available for the same country. If other years are not available for the same country, we have used the structure of the most similar EU country (in terms of the percentage distribution of the NABS chapters).

Additionally, the aggregation of NABS chapters does not always coincide with the total GBARD. In these cases, the values have been re-scaled to reach the total GBARD while respecting the structure by chapters.¹⁰

¹⁰ The countries affected by these adjustment are:

BE: Missing NABS 9-11 in 2006 are estimated with their weights in 2007 and then all chapters are rescaled to NABS99.

BG: All NABS are missing in 2006. The 2007 NABS structure has been applied.

DE: NABS 9 in 2006 is distributed among NABS 9-11 according to their weight in 2007. All years are rescaled to NABS99 because of systematic inconsistencies.

GR: Missing NABS 9-11 in 2006 are estimated with their weights in 2007 and then, on a second step, all chapters are rescaled to NABS99.

ES: Year 2006 has been rescaled to NABS99.

FR: Missing NABS 10-11 in years 2007-2015 are estimated applying their EU28 weights and then all chapters are rescaled to NABS99. In 2006, NABS9 is distributed among NABS 9-11 according to their estimated weight in 2007. Then, all chapters are rescaled to NABS99.

IT: Missing NABS 9-11 in 2006 are estimated with their weights in 2007 and then all chapters are rescaled to NABS99.

LV: Missing NABS 12 is distributed among NABS 12-13 according to their weight in 2007. Also, years 2007, 2013 and 2015 have been rescaled to NABS99.

MT: All years except for 2010 have been rescaled to NABS99.

PL: Missing NABS 9-11 in 2006 are estimated with their weights in 2007 and then all chapters are rescaled to NABS99. Year 2015 has been rescaled to NABS99.

PT: Year 2006 has been rescaled to NABS99.

Finally, a bi-proportional fitting or RAS algorithm is applied to the countries affected by the above mentioned imputations, to guarantee that country aggregations coincide with Eurostat's total GBARD by country, and the aggregation of NABS by countries coincide with EU GBARD by NABS.

The methodology can also be applied to the US, given the availability of information and the correspondences between the US industry classification by NABS chapters and ICT occupations (Table A XIII and Table A XII). Regarding Japan, there is not enough information available to disaggregate GBARD by NACE or ICT GBARD by NABS or by NACE. Therefore, in the case of Japan the methodology remains unchanged with respect to the previous PREDICT releases.

4.3 Revision of the NABS-NACE (Rev 2 and Rev 1.1) correspondences and weights

Stančik's (2012) NABS-NACE correspondence is used as a starting point, although it has been revised. The revision has been based on Eurostat (1994 and 2008) [ref] which offers valuable information on which types of activities should be included in each NABS chapter. In addition, the revision of the NACE in 2008 has been taken into account. Hence, two NACE-NABS correspondence tables have been built, one for NACE Rev. 1.1 for the period 2006-2007 and another for NACE Rev. 2 for the period 2008-2015. Table A VIII and Table A IX show the correspondences used in the new PREDICT methodology.

SE: Missing NABS 9-11 in 2006 are estimated with their weights in 2007 and then all chapters are rescaled to NABS99. Years 2009-2015 have been rescaled to NABS99.

SI: Missing NABS 9-11 in 2006 are estimated with their weights in 2007 and then all chapters are rescaled to NABS99.

LT: Missing NABS 3, 9-11, 13 are estimated with their weights in 2007 and then all chapters are rescaled to NABS99. Years 2007, 2009-2010, 2012 and 2014 have been rescaled to NABS99.

UK: Year 2006 has been rescaled to NABS99.

EU28: Once all cases estimated as described above for the year 2006, the structure by NABS for the EU (calculated as aggregation of countries) used to disentangle the EU28 NABS99 by NABS.

Annex I: The Collection of Data

Variables of R&D, BERD, and Gross R&D expenditure

The European Union and the Member States

Sources

Statistics on Research and Development (SRD) from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_e_berdindr2&lang=en

Downloaded: 23-11-2016

(R&D expenditure at national and regional level. Business enterprise R&D expenditure (BERD) by economic activity (NACE-Rev.2))

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_e_berdind&lang=en

Downloaded: 18-09-2015

(R&D expenditure at national and regional level. Business enterprise R&D expenditure (BERD) by economic activity (NACE Rev. 1.1))

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_e_gerdtot&lang=en

Downloaded: 7-12-2016

(Total intramural R&D expenditure (GERD) by sectors of performance)

STructuralANalysis Database (STAN) from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=ANBERD_REV4

Downloaded: 28-11-2016

(STAN R&D expenditures by industry (ISIC Rev. 4))

http://stats.oecd.org/Index.aspx?DataSetCode=ANBERD2011_REV3

Downloaded: 18-09-2015

(STAN R&D expenditures by industry (ISIC Rev. 3.1))

Statistics on Research and Development (SRD) from National Statistical Institutes

[http://pub.stat.ee/px-](http://pub.stat.ee/px-web.2001/I_Databas/Economy/28SCIENCE._TECHNOLOGY._INNOVATION/28SCIENCE._TECHNOLOGY._INNOVATION.asp)

[web.2001/I_Databas/Economy/28SCIENCE._TECHNOLOGY._INNOVATION/28SCIENCE._TECHNOLOGY._INNOVATION.asp](http://pub.stat.ee/px-web.2001/I_Databas/Economy/28SCIENCE._TECHNOLOGY._INNOVATION/28SCIENCE._TECHNOLOGY._INNOVATION.asp)

Downloaded: 15-10-2016

(R&D in business enterprise sector in Estonia)

<http://www.statbank.dk/statbank5a/default.asp?w=1280>

Downloaded: 15-10-2016

(Research and development Statistics in Denmark)

<http://www.scb.se/en/Finding-statistics/Statistics-by-subject-area/Education-and-research/Research/Research-and-development-in-the-business-enterprise-sector/>

Downloaded: 15-10-2016

(Research and development in Sweden)

<http://statdat.statistics.sk/>

Downloaded: 15-10-2016

(Expenditures on research and development in Slovakia)

<http://www.ine.es/jaxi/menu.do?type=pcaxis&path=%2Ft14%2Fp057&file=inebase&L=0>

Downloaded: 15-10-2016

(Estadística de I+D. Sector Empresas. Resultados en I+D por rama de actividad)

Structural Business Statistics (SBS) NACE-Rev.2 from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_sca_r2&lang=en

Downloaded: 23-11-2016

(Annual enterprise statistics for special aggregates of activities)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_ind_r2&lang=en

Downloaded: 23-11-2016

(Annual detailed enterprise statistics for industry (B-E))

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_dt_r2&lang=en

Downloaded: 23-11-2016

(Annual detailed enterprise statistics for trade (G))

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_1a_se_r2&lang=en

Downloaded: 23-11-2016

(Annual detailed enterprise statistics for services (H-N and S95))

Labour Force Survey (LFS) from Eurostat

Specific request to 3-digits by highest level of education attained

Downloaded: 1-06-2016

(Employment by economic activity and level of education attained (NACE-Rev.2))

Specific request to 3-digits by highest level of education attained

Downloaded: 1-06-2016

(Employment by economic activity and level of education attained (NACE Rev. 1.1))

Purchasing power parities (PPP) from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp_ind&lang=en

Downloaded: 19-10-2016

(Purchasing power parities (PPP))

Remarks

The elaboration of the 2006-2014 BERD (and GERD) NACE-Rev.2 ICT and RS sectors database (in nominal euros and euros PPS) for the EU countries has been based on the information provided by Eurostat and OECD.

The main sources of Business Expenditure R&D data continue to be the Statistics on Research and Development (Eurostat) and STAN R&D expenditures (OECD). To distribute BERD data among ICT (and non-ICT) sectors, the methodology follows the latest OECD definition (Table 1) using data provided by country and industry from Eurostat and OECD.

The majority of the gaps in BERD sectors have been filled following these steps:

Using R&D data provided by National Statistical Institutes for Estonia, Denmark, Sweden, Slovakia and Spain.

Using data provided by industry (NACE 1.1.) from Eurostat and the correspondence table between NACE-Rev.2 and NACE Rev. 1.1. This methodology is described in Mas, Robledo and Pérez (2012)¹¹.

When a country has data for some years in Statistics on R&D, we keep either the trend of expenditure or the subsector weight over the years.

Using the percentage structure of turnover: weight of sector 465 (Wholesale of information and communication equipment) in sector G (Wholesale and retail trade; repair of motor vehicles and motorcycles; for Finland, Germany, Greece, Ireland, Luxembourg, Netherlands and Sweden); distribution of the sector 26 (Manufacture of computer, electronic and optical products) to 3-digits (for Finland, Greece, Latvia, Luxembourg and Sweden); weight of sector 631 (Data processing, hosting and related activities; web portals) in sector 63 (Information service activities; for Belgium, Finland, Greece, Ireland, Lithuania, Luxembourg, Netherlands, Romania and Sweden).

Using the United States' R&D/Employment ratio: the relation between this ratio of each NACE subsectors 611, 612, 613 and 619 with regard to sector 61 (Telecommunications) is applied to obtain the R&D/Employment ratio of European countries on these subsectors. The statistics of employment from the SBS (Eurostat) and this estimated R&D/Employment ratio are used to calculate the R&D data on subsectors for European

¹¹ ICT Sector Definition Transition from NACE Rev. 1.1 to NACE Rev. 2: A Methodological Note. JRC Technical Reports (2012). <http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=5919>. See in Annex II the correspondence tables for ICT sectors between from NACE Rev. 1.1 and NACE Rev. 2

countries. The percentage structure of this data is applied to the 61 sector data for each European country.

Using the United States' BERD/Employment ratio: the relation between this ratio of sector 4791 (Retail sale via mail order houses or via Internet) with regard to sector G (45-47, Wholesale and retail trade, repair of motor vehicles and motorcycles) is applied to obtain the BERD/Employment ratio of European countries on sector 4791. The statistics of employment (see sources on employment section) and this estimated BERD/Employment ratio are used to calculate the BERD data on sector 4791 for European countries.

Using the average weight of R&D expenditure in countries with sector 951 data (Repair of computers and communication equipment) in sector S-U (Other service activities; sample 17 countries; weight: 9.5% in 2011 and 9% in 2012, 2013 and 2014).

Greece and Luxembourg lack official data, therefore, we recommend taking the results with caution. The missing data has been estimated using some alternative methods like NACE Rev. 1.1 data and the correspondence table between NACE-Rev.2 and NACE Rev. 1.1 or the percentage structure of turnover.

Data by industry for European Union is obtained as the sum of the member countries since official data is not available.

We obtain BERD dataset in PPS by using purchasing power parities from Eurostat. GERD data expressed in PPS are provided by Eurostat for each country, and EU data is calculated as the sum of the Member countries.

In order to offer a database as complete as possible, BERD NACE-Rev.2 database (in nominal euros and euros PPS) for the EU countries has been completed back to the year 2000 and, when it has been possible, even to 1995. This elaboration is based on the information provided by Research and Development (Statistics) and STAN R&D expenditures (OECD).

To complete the database, the following procedure was followed:

OECD data (NACE-Rev.2) are used for all available years (2000-2014) and required sectors.

When option h) is not available for all or some of the sectors to be reported, information from BERD NACE Rev. 1.1 is used (Eurostat). Based on a common year between the information from BERD NACE-Rev.2 and BERD NACE Rev. 1.1, a relationship is established between these which makes it possible to estimate BERD (NACE-Rev.2) backwards.

In the case of Denmark, France and the United Kingdom, countries that do not have information under option h) or option i) by sectors, the link is established between the percentage structure of the NA Gross Fixed Capital Formation in R&D and the BERD NACE-Rev.2 of the R&D Survey. In this way, the percentage structure of BERD NACE-Rev.2 is estimated for those early years and is applied to total BERD for the entire period. Total BERD has been obtained applied option h) or i).

As has been done in all deliveries of the database, data by industry for European Union is obtained as the sum of the member countries since official data is not available.

Norway

Sources

Statistics on Research and Development (SRD) from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_e_berdindr2&lang=en

Downloaded: 23-11-2016

(R&D expenditure at national and regional level. Business enterprise R&D expenditure (BERD) by economic activity (NACE-Rev.2))

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_e_berdind&lang=en

Downloaded: 18-09-2015

(R&D expenditure at national and regional level. Business enterprise R&D expenditure (BERD) by economic activity (NACE Rev. 1.1))

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_e_gerdtot&lang=en

Downloaded: 7-12-2016

(Total intramural R&D expenditure (GERD) by sectors of performance)

STructuralANalysis Database (STAN) from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=ANBERD_REV4

Downloaded: 28-11-2016

(STAN R&D expenditures by industry (ISIC Rev. 4))

Purchasing power parities (PPP) from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp_ind&lang=en

Downloaded: 19-10-2016

(Purchasing power parities (PPP))

Remarks

The elaboration of the 2006-2014 BERD (and GERD) NACE-Rev.2 ICT and RS sector database (in nominal euros and euros PPS) for Norway has been based on the information provided by Eurostat.

The main source of Business Expenditure R&D data is Statistics on Research and Development (Eurostat). BERD data has been distributed among ICT, RS and additional sectors using data provided by industry from Eurostat. The majority of BERD sector gaps have been filled using data provided by industry (NACE Rev. 1.1.) from Eurostat and the correspondence table between NACE-Rev.2 and NACE Rev. 1.1. When data exists for some years in Statistics on R&D, we keep either the trend of expenditure or the subsector weight over the years to complete gaps.

We obtain BERD dataset in PPS using purchasing power parities coming from Eurostat. GERD data expressed in PPS are provided by Eurostat.

Norway data has been completed back to the year 2001. To achieve this, BERD NACE Rev. 1.1 has been used following the methodology described in point i).

Switzerland

Sources

Statistics on Research and Development (SRD) from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_e_berdindr2&lang=en

Downloaded: 23-11-2016

(R&D expenditure at national and regional level. Business enterprise R&D expenditure (BERD) by economic activity (NACE-Rev.2))

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_e_berdind&lang=en

Downloaded: 18-09-2015

(R&D expenditure at national and regional level. Business enterprise R&D expenditure (BERD) by economic activity (NACE Rev. 1.1))

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_e_gerdtot&lang=en

Downloaded: 7-12-2016

(Total intramural R&D expenditure (GERD) by sectors of performance)

STructuralANalysis Database (STAN) from OECD
http://stats.oecd.org/Index.aspx?DataSetCode=ANBERD_REV4

Downloaded: 28-11-2016

(STAN R&D expenditures by industry (ISIC Rev. 4))

http://stats.oecd.org/Index.aspx?DataSetCode=ANBERD2011_REV3

Downloaded: 18-09-2015

(STAN R&D expenditures by industry (ISIC Rev. 3.1))

Purchasing power parities (PPP) from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp_ind&lang=en

Downloaded: 19-10-2016

(Purchasing power parities (PPP))

Remarks

The elaboration of the 2006-2014 BERD (and GERD) NACE-Rev.2 ICT and RS sectors database (in nominal euros and euros PPS) for Switzerland has been based on the information provided by Eurostat and OECD.

The main sources of Business Expenditure R&D data are Statistics on Research and Development (Eurostat) and STAN R&D expenditures (OECD). BERD data has been distributed among the selected sectors using data provided by country and industry from Eurostat and OECD.

Statistics on R&D in Switzerland (*Rechercheetdéveloppement (R-D) dans les entreprises*) are conducted every four years. Only two years are available: 2008 and 2012. The majority of the gaps in BERD sectors have been filled using data provided by industry (NACE Rev. 1.1.) from Eurostat and the correspondence table between NACE-Rev.2 and NACE Rev. 1.1.

We obtain BERD dataset in PPS using purchasing power parities coming from Eurostat. GERD data expressed in PPS are provided by Eurostat.

Australia

Sources

Research and Experimental Development, Businesses from Australian Bureau of Statistics (ABS)

<http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/8104.02013-14?OpenDocument>

Downloaded: 14-11-2016

(Gross Expenditure on R&D and Business expenditure on R&D)

Research and Experimental Development, Higher Education Organisations, Australia

<http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/8111.02014?OpenDocument>

Downloaded: 14-11-2016

(Higher education expenditure on R&D)

Research and Experimental Development, Government and Private Non-Profit Organisations, Australia

<http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/8109.02014-15?OpenDocument>

Downloaded: 14-11-2016

(Government expenditure on R&D and Private non-profit expenditure on R&D)

Structural Analysis Database (STAN) from OECD
http://stats.oecd.org/Index.aspx?DataSetCode=ANBERD_REV4
Downloaded: 14-10-2016
(STAN R&D expenditures by industry (ISIC Rev. 4))

Structural Analysis Database (STAN) from OECD
http://stats.oecd.org/Index.aspx?DataSetCode=ANBERD2011_REV3
Downloaded: 14-10-2016
(STAN R&D expenditures by industry (ISIC Rev. 3.1))
Research and Development Statistics from OECD
http://stats.oecd.org/Index.aspx?DataSetCode=GERD_FUNDS
Downloaded: 14-11-2016
(Gross Expenditure on R&D)

Exchange rates and PPP from Eurostat
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ert_bil_eur_a&lang=en
Downloaded: 19-10-2016
(Exchange rates)
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp_ind&lang=en
Downloaded: 19-10-2016
(Purchasing power parities)

PPP from OECD
<http://stats.oecd.org/Index.aspx?DataSetCode=PPPGDP>
Downloaded: 19-10-2016
(PPPs: national currency per US dollar)

Remarks

The elaboration of the BERD database for Australia has been mainly based on the information provided by OECD, as it has already published NACE-Rev.2 data (ISIC Rev. 4).

For industries not disaggregated in the OECD database, the information provided by Australian Bureau of Statistics (ABS) in the publication "Research and Experimental Development, Businesses" has been used, with the correspondence tables between ANZSIC 2006 and NACE-Rev.2¹². In the case of some industries, also the information from STAN ISIC Rev. 3 database has been used in order to estimate the period between 1995 and 2004.

There is no available information on 2012 BERD and GERD for Australia, as the frequency of the "Survey of Research and Experimental Development (R&D), Businesses" has changed from annual to biennial, and 2012 is the first year without data. This is the reason why, in the case of 2012, the ABS statistics on Government and private non-profit and higher education R&D expenditure have been used as a basis to estimate BERD and GERD evolution, combined with the information of 2013. This national information has been completed with the OECD databases on R&D variables. In order to obtain the required sectoral disaggregation, structures and average growth rates from previous and next years have been used. 2014 figures are also not available, as the Australian Bureau of Statistics has not published it yet.

For the period 1995-2004, the available information is more limited, as national R&D surveys only offer information by industries at two-digit level (following ANZSIC 1993¹³).

¹² <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/1292.0.55.0052008?OpenDocument>. Also, the Ivie has elaborated correspondence tables for ICT sectors between NACE Rev. 2 and ANZSIC 2006 (see Annex II).

¹³ The correspondence between ANZSIC 2006 and ANZSIC 1993 is available at: [http://www.abs.gov.au/ausstats/abs@.nsf/second+level+view?ReadForm&prodno=1292.0&viewtitle=Australian%20and%20New%20Zealand%20Standard%20Industrial%20Classification%20\(ANZSIC\)~2006%20\(R](http://www.abs.gov.au/ausstats/abs@.nsf/second+level+view?ReadForm&prodno=1292.0&viewtitle=Australian%20and%20New%20Zealand%20Standard%20Industrial%20Classification%20(ANZSIC)~2006%20(R)

Because of that, some industries have been estimated applying the growth rates of a more aggregated sector in the statistic. In addition, total BERD does not include NACE-Rev.2 sector 01-03 (Agriculture, forestry and fishing) for the period 1995-2004, as this sector was not included in Australian R&D Surveys for those years, nor does OECD publish this sector's figures previous to 2005.

ICT sector NACE 261 (Manufacture of electronic components and boards) includes ICT sector NACE 264 (Manufacture of consumer electronics) and 268 (Manufacture of magnetic and optical media) in Australia, as there is not enough information to separate these sectors. ICT subsector 612 (Wireless telecommunications activities) includes ICT subsector NACE 613 (Satellite telecommunications activities), as these two industries are defined as a single industry in ANSZIC. In addition, NACE 4791 (Retail sale via mail order houses or via Internet) includes Other retail sale not in stores, stalls or markets (NACE class 4799), as there is not enough information to separate these activities.

ICT and MC sector database does not include information at 4-digit NACE level in the case of Australia, except for sector 61 (Telecommunications), 59 (Motion picture, video and television programme production, sound recording and music publishing activities) and 581 (Publishing of books, periodicals and other publishing activities), but only for some of the most recent years.

We obtain BERD in euros and PPS using exchange rates and purchasing power parities coming from OECD and Eurostat.

Brazil

Sources

PINTEC, Survey of Technological Innovation from Instituto Brasileiro de Geografia e Estatística (IBGE)

<http://www.ibge.gov.br/home/estatistica/economia/industria/pintec/2011/default.shtm>

Downloaded: 14-10-2016

Science, Technology and Innovation Data from UNESCO Institute for Statistics (UIS)

<http://data.uis.unesco.org/Index.aspx?queryid=115>

Downloaded: 14-10-2016

Annual Survey of Industry from IBGE

http://www.ibge.gov.br/home/estatistica/economia/industria/pia/empresas/2014/default_empresa.shtm

Downloaded: 17-10-2016

Exchange rates and PPP from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ert_bil_eur_a&lang=en

Downloaded: 19-10-2016

(Exchange rates)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp_ind&lang=en

Downloaded: 19-10-2016

(Purchasing power parities)

PPP from OECD

<http://stats.oecd.org/Index.aspx?DataSetCode=PPPGDP>

Downloaded: 19-10-2016

(PPPs: national currency per US dollar)

Remarks

The elaboration of the BERD database for Brazil has been based on the information provided by IBGE in the Survey of Technological Innovation (PINTEC). We have used PINTEC data by industry and correspondences between CNAE 2/CNAE 1 and NACE-Rev.2 to distribute R&D expenditure among ICT, RS and selected non-ICT sectors¹⁴. However, PINTEC survey is only available for 2000, 2003, 2005, 2008 and 2011, as it is only conducted every two/three years.

Gross value of industrial production from Industrial Survey (IBGE) has been also used, in order to distribute the R&D expenditures between ICT Sector NACE 263 (Manufacture of communication equipment), 264 (Manufacture of consumer electronics) and 268 (Manufacture of magnetic and optical media). It has also been used to estimate NACE 303 (Manufacture of air and spacecraft and related machinery).

ICT sector NACE 62 (Computer programming, consultancy and related activities) includes ICT sector NACE 582 (Software publishing). In addition, for Brazil there is no information for the MC sector (NACE 581, 59, 60 and 639), the ICT trade sector (NACE 465) and for one ICT services sector: 951 (Repair of computers and communication equipment). Also, there is no available information on BERD at 4-digits NACE and ICT services sector's data is only available for 2008 onwards. PINTEC 2000 and 2003 do not include information on services sectors.

Moreover, Brazil's dataset does not contain information for RS sector (NACE 4791) and macro-sectors NACE 45 (Wholesale and retail trade and repair of motor vehicles and motorcycles), 85 (Education) and the aggregations 49-99 (Services, except trade), 45-47 (Wholesale and retail trade, repair of motor vehicles and motorcycles), 49-53 (Transportation and storage), 58-63 (Information and communication), 64-66 (Financial and insurance activities), 69-82 (Professional, scientific, technical, administration and support service activities), 69-75 (Professional, scientific and technical activities) and 86-88 (Human health and social work activities).

Data for GERD come from UNESCO-UIS database.

We obtain BERD in euros and PPS using exchange rates and purchasing power parities coming from OECD and Eurostat.

Canada

Sources

Science and Technology Indicators from Statistics Canada

<http://www5.statcan.gc.ca/subject-sujet/subtheme-soustheme.action?pid=193&id=3212&lang=eng&more=0>

Downloaded: 26-10-2016

NA from Statistics Canada (Input-Output Structure of the Canadian Economy in Current Prices)

<http://www5.statcan.gc.ca/cansim/a33?RT=TABLE&themeID=311&spMode=tables&lang=eng>

Downloaded: 26-10-2016

Annual Wholesale Trade Survey, from Statistics Canada

<http://www5.statcan.gc.ca/cansim/pick-choisir?lang=eng&p2=33&id=0810014>

Downloaded: 26-10-2016

¹⁴ The correspondence between CNAE 2 and ISIC Rev. 4 is available at: <http://www.ibge.gov.br/home/estatistica/economia/classificacoes/cnae2.0/defaulttab.shtm>. Ivie has also elaborated a correspondence table for ICT, MC and RS sectors between NACE Rev. 2 and CNAE 2 (see Annex II).

Annual Non-Store Retail Survey

<http://www5.statcan.gc.ca/subject-sujet/subtheme-soustheme.action?pid=60000&id=60001&lang=eng&more=0>

Downloaded: 03-03-2016

STructural ANalysis Database (STAN) from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=ANBERD_REV4

Downloaded: 14-10-2015

(R&D expenditures by industry (ISIC Rev. 4))

Research and Development Statistics from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=BERD_INDUSTRY

Downloaded: 14-10-2015

(R&D expenditures by industry (ISIC Rev. 3.1 and ISIC Rev. 4))

http://stats.oecd.org/Index.aspx?DataSetCode=GERD_FUNDS

Downloaded: 25-10-2016

(Gross expenditure on R&D)

Exchange rates and PPP from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ert_bil_eur_a&lang=en

Downloaded: 19-10-2016

(Exchange rates)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp_ind&lang=en

Downloaded: 19-10-2016

(Purchasing power parities)

PPP from OECD

<http://stats.oecd.org/Index.aspx?DataSetCode=PPPGDP>

Downloaded: 19-10-2016

(PPPs: national currency per US dollar)

Remarks

The elaboration of the database for Canada has been based on the information provided by OECD as it publishes ISIC Rev. 4 data for this country. The R&D expenditures have been distributed among ICT, MC, RS and the other selected sectors, using the correspondence tables between ISIC Rev. 4 and NACE-Rev.2.

In some years it has been necessary to use additional information to estimate specific sectors. In these cases, information provided by Statistics Canada in its key socioeconomic database CANSIM, Science and Technology Indicators has been used. R&D expenditures have been distributed among sectors using the correspondence tables between NAICS and ISIC Rev. 4¹⁵.

In the case of some sectors, additional sources and variables need to be used:

- Total Operating Revenue from Annual Retail Non-Store Survey (Statistics Canada) has been used to estimate sector NACE 4791 (Retail sale via mail order houses or via Internet).
- Gross Domestic Product from National Accounts (Statistics Canada) has been used, especially in the initial years of the database, to estimate ICT sectors NACE 61 (Telecommunications) and NACE 631 (Data processing, hosting and related activities; web portals), and the NACE sections M-N (Professional, scientific, technical,

¹⁵ The correspondence between NAICS and ISIC Rev. 4 is available at: <http://www.statcan.gc.ca/concepts/concordances-classifications-eng.htm>. Ivie has also elaborated a correspondence table for ICT, MC and RS sectors between NACE Rev. 2 and NAICS (see Annex II).

administration and support service activities) and M (Professional and scientific activities).

- BERD/employment ratios have been used to estimate the disaggregation of NACE sector 61, applying the ratios' structures of the US, as in the case of the European countries.

Canada dataset does not contain information for one ICT services sector (951, Repair of computers and communication equipment). Also, ICT sectors at 4-digits are not available, as no information is published at that level of detail. The same happens in the case of MC sector, in which only sectors at two/three digits are available.

We obtain BERD in euros and PPS using exchange rates and purchasing power parities from OECD and Eurostat.

China

Sources

China Statistical Yearbook on Science and Technology from National Bureau of Statistics of China

<http://www.stats.gov.cn/english/Statisticaldata/AnnualData/>

Downloaded: 10-11-2016

The Second R&D Resources Inventory Survey Compilation 2009 from National Bureau of Statistics of China

Information provided by Gao Changlin, Li Xiuquan and Xuan Zhaohui, from Chinese Academy of Science and Technology for Development (CASTED)

China National Expenditures on Science and Technology Statistics from National Bureau of Statistics of China

<http://data.stats.gov.cn/english/>

Downloaded: 16-11-2016

Statistics on Education, Science and Technology in High-tech Industry by Industrial Sector from China Statistical Yearbook, compiled by National Bureau of Statistics of China

<http://www.stats.gov.cn/english/Statisticaldata/AnnualData/>

Downloaded: 10-11-2016

STructural ANalysis Database (STAN) from OECD

<http://stats.oecd.org/Index.aspx?DataSetCode=STANI4>

Downloaded: 14-10-2016

(STAN R&D expenditures by industry (ISIC Rev. 4))

http://stats.oecd.org/Index.aspx?DataSetCode=ANBERD2011_REV3

Downloaded: 14-10-2016

(STAN R&D expenditures by industry (ISIC Rev. 3.1.))

Research and Development Statistics from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=GERD_FUNDS

Downloaded: 10-11-2016

(Gross expenditure on R&D)

Exchange rates and PPP from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ert_bil_eur_a&lang=en

Downloaded: 19-10-2016

(Exchange rates)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp_ind&lang=en

Downloaded: 19-10-2016

(Purchasing power parities)

PPP from OECD

<http://stats.oecd.org/Index.aspx?DataSetCode=PPPGDP>

Downloaded: 19-10-2016

(PPPs: national currency per US dollar)

Remarks

The elaboration of BERD and GERD database for China has been based on the information provided by OECD as it has already published ISIC Rev. 4 data. However, data are only available for the years 2000 and 2008-2014. In addition, the disaggregation of services sectors is only available for one year: 2009.

Taking all these restrictions into account, when possible the R&D expenditures have been distributed among ICT, MC, and the other selected sectors, using the correspondence tables between ISIC Rev. 4 and NACE-Rev.2.

In some years it has been necessary to use additional information to estimate specific sectors, especially in the case of services. In these cases, information provided by the National Bureau of Statistics of China in The Second R&D Resources Inventory Survey Compilation, China Statistical Yearbook, China Statistical Yearbook on Science and Technology and National Expenditures on Science and Technology Statistics has been used. However, the correspondence between NACE-Rev.2 and China classification of activities is approximate, as it is based on the correspondences between Chinese industry classification and ISIC Rev. 3 (NACE Rev. 1.1)¹⁶. Information of South Korea's BERD structure has also been used to split some services industries (NACE sectors 58, Publishing activities, 59-60, Motion picture, video, television programme production; programming and broadcasting activities, and 63, Information service activities). Therefore, we recommend taking the results with caution. When necessary, R&D expenditure has also been distributed among sectors, using structures from next/previous years.

China dataset does not contain information for ICT trade sector, ICT sectors 268 (Manufacture of magnetic and optical media) and 951 (Repair of computers and communication equipment) and Retail sale via mail order houses or via Internet sector (NACE 4791). Also, the disaggregation at 3-4-digits of ICT sectors 261, 582, 61, 62 and 631 is not available, as there is no information with such industry detail. The same happens with MC sectors at 3-4 digits. Data are only available for the period 2000-2014, but for some ICT and the MC sectors the initial year is 2006.

We obtain BERD in euros and PPS using exchange rates and purchasing power parities coming from OECD and Eurostat.

India

Sources

Research and Development Statistics from National Science and Technology Management Information System (NSTMIS), Department of Science and Technology, Government of India

<http://www.nstmis-dst.org/Publication.aspx>

Downloaded: 20-10-2015

¹⁶ The correspondence between Chinese SIC and ISIC Rev. 3 is available at: http://www.stats.gov.cn/tjbz/t20040210_402369833.htm

Annual Survey of Industries from MOSPI

<https://data.gov.in/catalog/annual-survey-industries-1>

Downloaded: 24-10-2016

Science, Technology and Innovation Data from UNESCO Institute for Statistics (UIS)

http://data.uis.unesco.org/Index.aspx?DataSetCode=SCN_DS

Downloaded: 14-10-2016

Exchange rates and PPP from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ert_bil_eur_a&lang=en

Downloaded: 19-10-2016

(Exchange rates)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp_ind&lang=en

Downloaded: 19-10-2016

(Purchasing power parities)

PPP from OECD

<http://stats.oecd.org/Index.aspx?DataSetCode=PPPGDP>

Downloaded: 19-10-2016

(PPPs: national currency per US dollar)

Remarks

The elaboration of BERD and GERD database for India has been estimated using the information provided by the National Science and Technology Management Information System (NSTMIS) in the Research and Development Statistics and the R&D UIS database.

India dataset has been obtained using approximate correspondences between the classification of activities used in the Research and Development Statistics of India and NACE Rev. 1.1. Therefore, results for India must be taken with caution.

In order to distribute R&D expenditure between some manufacturing subsectors we have used the output structure from the Annual Survey of Industries (ASI).

Due to the scarce available information for services sectors, some assumptions need to be done in order to obtain an estimate of BERD figures. Because of that, in order to estimate ICT and MC services, and also some additional macro-sectors, the structure from the most similar country in the sample according to BERD by industry (United Kingdom) has been used. In these cases, BERD intensities from this country have been re-adjusted to total BERD intensity of India and then applied to India's GVA data.

In addition, the sectoral distribution of 2011 and 2012 has been estimated by using information on previous years' structures, as the last national R&D survey in the case of India offers information by sector to 2010.

India dataset covers the years between 2002 and 2012 and does not contain information for the ICT trade industries (NACE-Rev.2 465) and NACE sector 4791 (Retail sale via mail order houses or via Internet). Also, the disaggregation of ICT and MC subsectors at 3 or 4-digits is not available for this country.

We obtain BERD in euros and PPS using exchange rates and purchasing power parities coming from OECD and Eurostat.

Japan

Sources

Annual Survey of Research and Development from Japan's Ministry of Internal Affairs and Communication (MIC)

<https://www.e-stat.go.jp/SG1/estat/GL02100104.do?gaid=GL02100102&toacd=00200543>

Downloaded: 02-11-2016
SStructural Analysis Database (STAN) from OECD
http://stats.oecd.org/Index.aspx?DataSetCode=ANBERD_REV4
Downloaded: 14-10-2016
(STAN R&D expenditures by industry (ISIC Rev. 4))

Research and Development Statistics from OECD
http://stats.oecd.org/Index.aspx?DataSetCode=BERD_INDUSTRY
Downloaded: 14-10-2015
(R&D expenditures by industry (ISIC Rev. 3.1 and ISIC Rev. 4))
http://stats.oecd.org/Index.aspx?DataSetCode=GERD_FUNDS
Downloaded: 25-10-2016
(Gross expenditure on R&D)

Exchange rates and PPP from Eurostat
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ert_bil_eur_a&lang=en
Downloaded: 19-10-2016
(Exchange rates)
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp_ind&lang=en
Downloaded: 19-10-2016
(Purchasing power parities)

PPP from OECD
<http://stats.oecd.org/Index.aspx?DataSetCode=PPPGDP>
Downloaded: 19-10-2016
(PPPs: national currency per US dollar)

Remarks

The elaboration of BERD and GERD database for Japan has been based on the information provided by OECD as it has already published ISIC Rev. 4 data.

In some years it has been necessary to use additional information to estimate specific ICT subsectors, such as 261 (Manufacture of electronic components and boards), 264 (Manufacture of consumer electronics), 268 (Manufacture of magnetic and optical media) and 631 (Data processing, hosting and related activities; web portals). In order to estimate these ICT sectors, data from Japan's Annual Survey of Research and Development has been used, as this survey presents a higher sectoral disaggregation. The structure from this survey is applied to OECD aggregated data. The same procedure has been used to estimate some MC sectors, such as 59 (Motion picture, video and television programme production, sound recording and music publishing activities) and 60 (Programming and broadcasting activities).

In order to fill the blanks of the industries not included separately in Japan's Annual Survey of Research and Development, the percentage structure from the previous/next years has been applied.

Japan dataset does not contain information for sectors NACE 4791 (Retail sale via mail order houses or via Internet), 85 (Education), 86-88 (Human health and social work activities) and one ICT industry: 951 (Repair of computers and communication equipment). In addition, ICT sector 62 (Computer programming, consultancy and related activities) includes ICT sector 582 (Software publishing) and it is not possible to estimate the disaggregation of some ICT and MC sectors in 3-4-digits NACE, as there is not enough available information to do that.

We obtain BERD in euros and PPS using exchange rates and purchasing power parities from OECD and Eurostat.

South Korea

Sources

Survey of Business activities from Statistics South Korea

http://kosis.kr/eng/statisticsList/statisticsList_01List.jsp?vwcd=MT_ETITLE&parentId=K

Downloaded: 17-02-2014

STructural ANalysis Database (STAN) from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=ANBERD_REV4

Downloaded: 14-10-2016

(STAN R&D expenditures by industry (ISIC Rev. 4))

http://stats.oecd.org/Index.aspx?DataSetCode=ANBERD2011_REV3

Downloaded: 14-10-2016

(STAN R&D expenditures by industry (ISIC Rev. 3))

Research and Development Statistics from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=BERD_INDUSTRY_ISIC4

Downloaded: 14-10-2016

(Business R&D expenditure by industry (ISIC Rev. 4))

http://stats.oecd.org/Index.aspx?DataSetCode=GERD_FUNDS

Downloaded: 01-12-2016

(Gross expenditure on R&D)

Exchange rates and PPP from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ert_bil_eur_a&lang=en

Downloaded: 19-10-2016

(Exchange rates)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp_ind&lang=en

Downloaded: 19-10-2016

(Purchasing power parities)

PPP from OECD

<http://stats.oecd.org/Index.aspx?DataSetCode=PPPGDP>

Downloaded: 19-10-2016

(PPPs: national currency per US dollar)

Remarks

The elaboration of the BERD and GERD database for South Korea has been based on the information provided by OECD as it has already published ISIC Rev. 4 data (NACE-Rev.2). Also, information on R&D costs from Survey of Business activities from Statistics South Korea was used when necessary. However, for the majority of 3-4 digits sectors (ICT and MC) there is no available information before 2004. Because of that, from this year backwards BERD figures have been estimated applying average growth rates of the following years or/and average percentage structures.

In addition, in order to obtain an estimation of RS sector (NACE 4791, Retail sale via mail order houses or via Internet), US BERD/employment ratios have been used to adjust data coming from OECD database. Thus, the results must be taken with caution.

South Korea dataset does not contain information for the ICT trade sector (NACE 465) and the disaggregation at 3-4 digits of the ICT sectors 261, 582, 61, 62 and 951 and the MC sectors 581, 59, 60 and 639 is not available. In addition, there is no information for the NACE-Rev.2 sectors 69-82 (Professional, scientific, technical, administration and support service activities), 69-75 (Professional, scientific and technical activities), 85 (Education) and 86-88 (Human health and social work activities).

We obtain BERD in euros and PPS using exchange rates and purchasing power parities coming from OECD and Eurostat.

Russia

Sources

Russian Science and Technology at a Glance from Russian Centre for Science Research and Statistics (CSRS)

<http://www.csrs.ru/english/statis/default.htm>

Downloaded: 10-07-2013

R&D data from Rosstat (Russian Federal State Statistics Service)
Information provided by Galina Lyubova (Department of Foreign Statistics and International Cooperation from Rosstat)

Online database:

http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/science_and_innovations/science/#

Downloaded: 09-12-2016

SDBS Structural Business Statistics (ISIC Rev. 3) from OECD

https://stats.oecd.org/Index.aspx?DataSetCode=SSIS_BSC#

Downloaded: 01-12-2016

(Turnover by industry (ISIC Rev. 3))

STructural ANalysis Database (STAN) from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=ANBERD2011_REV3

Downloaded: 14-10-2016

(STAN R&D expenditures by industry (ISIC Rev. 3))

Research and Development Statistics from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=GERD_FUNDS

Downloaded: 01-12-2016

(Total intramural R&D expenditure (GERD) by sectors of performance and source of funds)

Exchange rates and PPP from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ert_bil_eur_a&lang=en

Downloaded: 19-10-2016

(Exchange rates)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp_ind&lang=en

Downloaded: 19-10-2016

(Purchasing power parities)

PPP from OECD

<http://stats.oecd.org/Index.aspx?DataSetCode=PPPGDP>

Downloaded: 19-10-2016

(PPPs: national currency per US dollar)

Remarks

The elaboration of the BERD and GERD database for Russia has been based on the information by industry provided by ANBERD database (elaborated by the OECD). However, in the case of Russia this database still follows the industry classification ISIC Rev. 3.1. Thus, R&D expenditures have been distributed among ICT, MC, RS and the additional selected sectors, using approximate correspondences between ISIC Rev. 4 and ISIC Rev. 3.1. In addition, this database does not offer information for the years 2010-2014. In order to complete these years and to estimate some sectors, information provided by the publication *Russian Science and Technology at a Glance* (CSRS) and by Rosstat in its online database. Also, information provided directly to the Ivie by Rosstat is used to estimate some ICT subsectors.

As national data also follows ISIC Rev. 3.1, these figures have been re-adjusted to OECD total or more aggregated business R&D figures. In addition, some assumptions need to be done in order to estimate some ICT and MC sectors. In these cases, different methods have been applied: estimates based on maintaining the sectoral structures from next/previous years, estimates based on average growth rates, etc. Also, additional information coming from OECD SDBS Structural Business Statistics has been used to split some problematic industries (especially in the case of MC subsectors). In these cases, turnover structure is used to split R&D expenditure figures.

Russia dataset does not contain information for sectors NACE 69-82 (Professional, scientific, technical, administration and support service activities) and 69-75 (Professional, scientific and technical activities) and ICT sectors 2611 (Manufacture of electronic components), 2612 (Manufacture of loaded electronic boards), 268 (Manufacture of magnetic and optical media), 4652 (Wholesale of electronic and telecommunications equipment and parts), 611 (Wired telecommunications activities), 612 (Wireless telecommunications activities), 613 (Satellite telecommunications activities), 619 (Other telecommunications activities) and 951 (Repair of computers and communication equipment) and its disaggregation at 4-digits NACE. In addition, sector 62 (Computer programming, consultancy and related activities) includes ICT sectors 582 (Software publishing) and 631 (Data processing, hosting and related activities; web portals), which disaggregation at 4 digits are neither available nor MC subsectors at 3-4 digits.

Sector NACE 4791 (Retail sale via mail order houses or via Internet) is also not available in the case of Russia.

We obtain BERD in euros and PPS using exchange rates and purchasing power parities coming from OECD and Eurostat.

Taiwan

Sources

National Science and Technology Survey from Taiwan's Ministry of Science and Technology

<https://ap0512.most.gov.tw/WAS2/English/AsTechnologyEStatisticsList.aspx>

Downloaded: 29-11-2016

Census Statistics from National Statistics of Taiwan

<http://eng.stat.gov.tw/lp.asp?ctNode=1624&CtUnit=774&BaseDSD=7&mp=5>

Downloaded: 07-10-2015

Labour Force Statistics (Manpower Survey): Employed persons, by mid-category of industries and class of workers, 2004-2013

Information provided by Teresa Chang (Directorate General of Budget, Accounting and Statistics (DGBAS) of Executive Yuan, Taiwan)

STructural ANalysis Database (STAN) from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=ANBERD_REV4

Downloaded: 14-10-2016

(STAN R&D expenditures by industry (ISIC Rev. 4))

Research and Development Statistics from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=BERD_INDUSTRY_ISIC4

Downloaded: 14-10-2016

(R&D expenditures by industry (ISIC Rev. 4))

http://stats.oecd.org/Index.aspx?DataSetCode=GERD_FUNDS

Downloaded: 14-10-2016

(Gross expenditure on R&D)

Exchange rates and PPP from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ert_bil_eur_a&lang=en

Downloaded: 19-10-2016

(Exchange rates)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp_ind&lang=en

Downloaded: 19-10-2016

(Purchasing power parities)

PPP from OECD

<http://stats.oecd.org/Index.aspx?DataSetCode=PPPGDP>

Downloaded: 19-10-2016

(PPPs: national currency per US dollar)

Remarks

The elaboration of BERD and GERD database for Taiwan has been based on the information by industry provided by OECD as it has already published ISIC Rev. 4 data. The R&D expenditures have been distributed among ICT, MC, RS and non-ICT selected sectors, using the correspondence table between ISIC Rev. 4 and NACE-Rev.2. Also, information from the National Science and Technology Survey from Taiwan's Ministry of Science and Technology has been used to complete some industries not covered by the OECD dataset.

However, the information available in these two datasets does not cover the years 1995, 1996 and 1997. Thus, the figures corresponding to these years in PREDICT dataset have been estimated using average growth rates of the following years and/or sectoral structures from the next years.

In the case of RS sector (NACE 4791, Retail sale via mail order houses or via Internet), US BERD/employment ratios have been used to adjust Taiwan data, as in the case of the European countries.

Taiwan dataset does not contain information for sector NACE 303 (Manufacture of air and spacecraft and related machinery) and NACE section P (Education) is only available since 2009. It also does not contain data for ICT subsectors 2611 (Manufacture of electronic components), 2612 (Manufacture of loaded electronic boards), 4651 (Wholesale of computers, computer peripheral equipment and software), 4652 (Wholesale of electronic and telecommunications equipment and parts), 5821 (Publishing of computer games), 5829 (Other software publishing), 611 (Wired telecommunications activities), 612 (Wireless telecommunications activities), 613 (Satellite telecommunications activities), 619 (Other telecommunications activities), 6201 (Computer programming activities), 6202 (Computer consultancy activities), 6203 (Computer facilities management activities), 6209 (Other information technology and computer service activities), 6311 (Data processing, hosting and related activities), 6312 (Web portals), 9511 (Repair of computers and peripheral equipment) and 9512 (Repair of communication equipment). The MC sub-sectors 5811 (Book publishing), 5812 (Publishing of directories and mailing lists), 5813 (Publishing of newspapers), 5814 (Publishing of journals and periodicals), 5819 (Other publishing activities), 591 (Motion picture, video and television programme activities) and its subsectors, 592 (Sound recording and music publishing activities), 601 (Radio broadcasting), 602 (Television programming and broadcasting activities), 6391 (News agency activities) and 6399 (Other information service activities n.e.c.).

We obtain BERD in euros and PPS using exchange rates and purchasing power parities coming from OECD and Eurostat.

United States

Sources

Business R&D and Innovation Survey (BRDIS) from National Science Foundation and United States Census Bureau

<https://www.nsf.gov/statistics/srvyindustry/#tabs-2>

Downloaded: 24-11-2016

Information provided by Raymond M. Wolfe (Economist & Senior Analyst of National Science Foundation's National Center for Science and Engineering Statistics (NCSES))

Science and Engineering Indicators from National Science Foundation and United States Census Bureau

<https://www.nsf.gov/statistics/2016/nsb20161/#/>

Downloaded: 24-11-2016

Survey of Industrial Research and Development (SIRD) from National Science Foundation

<http://www.nsf.gov/statistics/industry/>

Downloaded: 22-11-2016

STructural ANalysis Database (STAN) from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=ANBERD_REV4

Downloaded: 14-10-2016

(STAN R&D expenditures by industry (ISIC Rev. 4))

http://stats.oecd.org/Index.aspx?DataSetCode=ANBERD2011_REV3

Downloaded: 14-10-2016

(STAN R&D expenditures by industry (ISIC Rev. 3))

Research and Development Statistics from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=GERD_FUNDS

Downloaded: 22-11-2016

(Gross expenditure on R&D)

Exchange rates and PPP from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ert_bil_eur_a&lang=en

Downloaded: 19-10-2016

(Exchange rates)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp_ind&lang=en

Downloaded: 19-10-2016

(Purchasing power parities)

PPP from OECD

<http://stats.oecd.org/Index.aspx?DataSetCode=PPPGDP>

Downloaded: 19-10-2016

(PPPs: national currency per US dollar)

Remarks

The elaboration of the BERD database for the United States has been based mainly on the information provided by OECD in the STAN database. As this source does not include information for the US in 2014, data for this year come directly from Business R&D and Innovation Survey (BRDIS) (National Science Foundation and United States Census Bureau).

In order to complete the distribution by industry, information coming from Business R&D and Innovation Survey (BRDIS) and from the publication Science and Engineering Indicators (National Science Foundation and United States Census Bureau) has also been used, especially for the ICT subsectors, the RS sector and the MC sector/subsectors. The

R&D expenditures have been distributed among ICT, RS, MC and selected macro-sectors, using the correspondence tables between NAICS and NACE-Rev.2¹⁷. As this year PREDICT database covers also the period 1995 to 2005, additional correspondences need to be used in order to take into account the different revisions of the NAICS¹⁸ (1997, 2002, 2007 and 2012) and also the previous classification, SIC (Standard Industrial Classification) 1987, that was used in the initial years of the database.

2008 onwards BRDIS data offer a greater industrial disaggregation. For this reason these years' structure has been used to distribute R&D expenditures in other years, especially among certain ICT and MC subsectors. For the initial years (1995-1999), when no information about a particular sector/subsector is available, the growth rates of the closer "parent" aggregated sector has been applied. Then, these figures are re-adjusted to sum up official aggregates coming from STAN database or BRDIS.

United States dataset does not contain information for ICT trade industries (NACE 465, 4651 and 4652) and one ICT services sector: 951 (Repair of computers and communication equipment). It also does not offer the disaggregation at 4-digits of ICT and MC sectors, as there is no available information with such detail. This information (4-digits) is only available for NACE sector 61 (Telecommunications) since 2000.

Sector 85 (Education) is also not available (except for 2008).

Time series are expected to be comparable between 2007 and 2008 although some of them may have suffered a break, due to the transition from SIRD to the new BRDIS. The same problem could appear in 1999, as it was the transition year from SIC to NAICS.

We obtain BERD in euros and PPS using exchange rates and purchasing power parities coming from OECD and Eurostat.

R&D Personnel

The European Union and the Member States

Sources

Statistics on Research and Development (SRD) from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_p_bempoccr2&lang=en

Downloaded: 1-12-2016

(R&D personnel at national and regional level. Total R&D personnel and researchers in business sector by economic activity and sex (NACE-Rev.2))

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_p_bempocc&lang=en

Downloaded: 18-09-2015

(R&D personnel at national and regional level. Total R&D personnel and researchers in business sector by economic activity and sex (NACE Rev. 1.1))

Labour Force Survey (LFS) from Eurostat

Specific request to 3-digits by highest level of education attained

Downloaded: 1-06-2016

(Employment by economic activity and level of education attained (NACE-Rev.2))

Specific request to 3-digits by highest level of education attained

Downloaded: 1-06-2016

(Employment by economic activity and level of education attained (NACE Rev. 1.1))

Statistics on Research and Development (SRD) from National Statistical Institutes

¹⁷ The correspondences between different versions of US NAICS and ISIC Rev. 4 are available at <http://www.census.gov/eos/www/naics/concordances/concordances.html>. Ivie has also elaborated a correspondence table for ICT, MC and RS sectors (see Annex II)

¹⁸ These correspondences are available at: <http://www.census.gov/eos/www/naics/concordances/concordances.html>.

[http://pub.stat.ee/px-web.2001/I_Databas/Economy/28SCIENCE. TECHNOLOGY. INNOVATION/28SCIENCE. T ECHNOLOGY. INNOVATION.asp](http://pub.stat.ee/px-web.2001/I_Databas/Economy/28SCIENCE_TECHNOLOGY_INNOVATION/28SCIENCE_TECHNOLOGY_INNOVATION.asp)

Downloaded: 15-10-2016

(R&D in business enterprise sector in Estonia)

<http://www.statbank.dk/statbank5a/default.asp?w=1280>

Downloaded: 15-10-2016

(Research and development Statistics in Denmark)

http://www.scb.se/en_/Finding-statistics/Statistics-by-subject-area/Education-and-research/Research/Research-and-development-in-the-business-enterprise-sector/

Downloaded: 15-10-2016

(Research and development in Sweden)

<http://statdat.statistics.sk/>

Downloaded: 15-10-2016

(Expenditures on research and development in Slovakia)

<http://www.ine.es/jaxi/menu.do?type=pcaxis&path=%2Ft14%2Fp057&file=inebase&L=0>

Downloaded: 15-10-2016

(Estadística de I+D. Sector Empresas. Resultados en I+D por rama de actividad)

Remarks

The elaboration of the 2006-2014 R&D Personnel NACE-Rev.2 ICT and RS sector database (in full-time equivalent) for the EU countries has been based on the information provided by Eurostat.

The main source of R&D Personnel data is Statistics on Research and Development (Eurostat). To distribute this data among ICT sectors, the methodology follows the latest OECD definition (Table 1), RS and other selected sectors using data provided by country and industry from Eurostat.

The majority of the gaps in the sectors have been completed following these steps:

Using R&D data provided by National Statistical Institutes for Estonia, Denmark, Sweden, Slovakia and Spain.

Using data provided by industry (NACE Rev. 1.1.) from Eurostat and the correspondence table between NACE-Rev.2 and NACE Rev. 1.1 (Mas, Robledo and Pérez 2012)¹⁹.

When a country has data for some years in Statistics on R&D, we keep either the trend of expenditure or the subsector weight over the years.

Using the percentage structure of Highly Qualified Employment (Labour Force Statistics from Eurostat): weight of the sector 465 (Wholesale of information and communication equipment) in sector G (Wholesale and retail trade; repair of motor vehicles and motorcycles; for Finland, Germany, Greece, Ireland, Luxembourg, Netherlands and Sweden); distribution of sector 26 (Manufacture of computer, electronic and optical products) to 3-digits (for Finland, Greece, Latvia, Luxembourg and Sweden); weight of the sector 631 (Data processing, hosting and related activities; web portals) in sector 63 (Information service activities; for Belgium, Finland, France, Greece, Ireland, Luxembourg, Romania and Sweden).

Using the percentage structure of Highly Qualified Employment (Labour Force Statistics from Eurostat): the weight of the subsectors 611, 612, 613 and 619 in sector 61 (Telecommunications) is applied to R&D data on sector 61 for each European countries.

Using the United States' RERD/BERD ratio: the relation between this ratio for sector 4791 (Retail sale via mail order houses or via Internet) with regard to sector G (45-47, Wholesale and retail trade, repair of motor vehicles and motorcycles) is applied to obtain

¹⁹ ICT Sector Definition Transition from NACE Rev. 1.1 to NACE Rev. 2: A Methodological Note. JRC Technical Reports (2012). <http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=5919>. See in Annex II the correspondence tables for ICT sectors between from NACE Rev. 1.1 and NACE Rev. 2

the RERD/BERD ratio of European countries on sector 4791. The BERD data of European countries and this estimated RERD/BERD ratio are used to calculate RERD data on sector 4791.

To estimate PERD data, the PERD/RERD ratio for each one European countries on sector G* [G (45-47, Wholesale and retail trade, repair of motor vehicles and motorcycles) – 465 (Wholesale of information and communication equipment)] is used. The PERD data is obtained by applying this ratio to RERD data.

Using the average weight of R&D personnel and researchers in countries with data of the ratio of sector 951/sector S-U (Repair of computers and communication equipment/Other service activities; sample 17 countries; weight: 14% in 2009, 17% in 2010, 14% in 2011 and 16% in 2012).

Greece and Luxembourg lack official data, therefore, we recommend taking the results with caution. The missing data has been estimated using some alternative methods like NACE Rev. 1.1 data and the correspondence table between NACE-Rev.2 and NACE Rev. 1.1 or percentage structure of Highly Qualified employment.

Data by industry for European Union is obtained as the sum of the member countries since official data is not available.

In the same way as the BERD, in this deliverable the R&D Personnel NACE-Rev.2 database (in full-time equivalent) for the EU countries is extended back to the year 2000 and even, where possible, until 1995.

For this purpose, the information provided by Eurostat about PERD NACE Rev. 1.1 has been used. As in the case of the BERD, the starting point is a common year between the data under the NACE-Rev.2 and NACE Rev. 1.1 classification, establishing a relationship between them. This relationship allows the PERD NACE-Rev.2 data to be estimated for the first years of the series.

In the case of Denmark, France and the United Kingdom, in those common years a relationship is established between the percentage structures of PERD NACE-Rev.2 and BERD NACE-Rev.2. In this way, the percentage structure of PERD NACE-Rev.2 is estimated for those early years and is applied to total PERD for the entire period. Total PERD has been obtained applied methods like NACE Rev. 1.1 data and the correspondence table between NACE-Rev.2 and NACE Rev. 1.1

Like the other years, the European Union is the result of adding the member states.

Norway

Sources

Statistics on Research and Development (SRD) from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_p_bempoccr2&lang=en

Downloaded: 1-12-2016

(R&D personnel at national and regional level. Total R&D personnel and researchers in business sector by economic activity and sex (NACE-Rev.2))

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_p_bempocc&lang=en

Downloaded: 18-09-2015

(R&D personnel at national and regional level. Total R&D personnel and researchers in business sector by economic activity and sex (NACE Rev. 1.1))

Remarks

The elaboration of the 2006-2014 R&D Personnel NACE-Rev.2 database (in full-time equivalent) for Norway has been based on the information provided by Eurostat.

The main source of R&D Personnel data is Statistics on Research and Development (Eurostat). This data has been distributed among the selected sectors (ICT, RS and additional sectors), using data provided by country and industry from Eurostat.

The majority of the gaps in the sectors have been filled with data provided by industry (NACE 1.1.) from Eurostat and the correspondence table between NACE-Rev.2 and NACE Rev. 1.1. When data exists for some years in Statistics on R&D, we keep either the trend of expenditure or the subsector weight over the years to complete gaps.

Norway data has been completed back to the year 2001. The procedure used is the same as that used for EU countries.

Switzerland

Sources

Statistics on Research and Development (SRD) from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_p_bempoccr2&lang=en

Downloaded: 1-12-2016

(R&D personnel at national and regional level. Total R&D personnel and researchers in business sector by economic activity and sex (NACE-Rev.2))

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_p_bempocc&lang=en

Downloaded: 18-09-2015

(R&D personnel at national and regional level. Total R&D personnel and researchers in business sector by economic activity and sex (NACE Rev. 1.1))

Remarks

The elaboration of the 2006-2014 R&D Personnel NACE-Rev.2 database (in full-time equivalent) for Switzerland has been based on the information provided by Eurostat.

The main source of R&D Personnel data is Statistics on Research and Development (Eurostat). This data has been distributed among ICT (and non-ICT) sectors, according to the latest OECD definition (Table 1) using data provided by country and industry from Eurostat. The same has been done to obtain RS sector.

Statistics on R&D in Switzerland (*Rechercheetdéveloppement (R-D) dans les entreprises*) is conducted every four years. Only two years are available: 2008 and 2012. The majority of the gaps in PERD sectors have been filled using data provided by industry (NACE 1.1.) from Eurostat and the correspondence table between NACE-Rev.2 and NACE Rev. 1.1.

Australia

Sources

Research and Experimental Development, Businesses from Australian Bureau of Statistics (ABS)

<http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/8104.02013-14?OpenDocument>

Downloaded: 14-11-2016

(R&D personnel)

Research and Experimental Development, Higher Education Organisations, Australia

<http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/8111.02014?OpenDocument>

Downloaded: 14-11-2016

(Higher education R&D personnel)

Research and Experimental Development, Government and Private Non-Profit Organisations, Australia

<http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/8109.02014-15?OpenDocument>

Downloaded: 14-11-2016

(Government R&D personnel and Private non-profit R&D personnel)

Research and Development Statistics from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_INDUSTRY_ISIC4

Downloaded: 14-10-2016

(R&D personnel (ISIC Rev. 4))

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_INDUSTRY

Downloaded: 14-10-2016

(R&D personnel (ISIC Rev. 3.1))

Remarks

The elaboration of the database for Australia has been based on the information provided by OECD, as it has already published NACE-Rev.2 data (ISIC Rev. 4) for the years 2006 to 2013. For the previous years included in PREDICT database, OECD data following ISIC Rev. 3.1 and data coming from national sources (Australian Bureau of Statistics) have been taken as a basis for the estimation.

For industries not disaggregated in the ISIC Rev. 4 OECD database, the information provided by Australian Bureau of Statistics has been used, distributing R&D personnel among sectors using the correspondence tables between ANZSIC 2006 and NACE-Rev.2²⁰. When necessary, methods such as interpolation have been used in the case of some industries to complete the database.

The previous years have been completed with information coming from OECD ISIC Rev. 3.1 R&D database and the "Survey of Research and Experimental Development (R&D), Businesses" published by ABS. In this case, the available information is more limited, as national R&D surveys only offer information by industries at two-digit level (following ANZSIC 1993²¹). Because of that, some industries have been estimated applying the growth rates of a more aggregated sector in the statistic. In other cases, averages of BERD/PERD ratios have been used to estimate R&D personnel, as the availability of information in terms of BERD is more comprehensive. In addition, total PERD does not include NACE-Rev.2 sector 01-03 (Agriculture, forestry and fishing) for the period 1995-2004, as this sector was not included in Australian R&D Surveys those years and OECD does not publish this sector's figures previous to 2005.

There is no available data for 2012 in the case of Australia, as the frequency of the "Survey of Research and Experimental Development (R&D), Businesses" has changed from annual to biennial, and 2012 is the first year without information. This is the reason why, in the case of 2012, the ABS statistics on Government and private non-profit and higher education R&D expenditure have been used in combination with 2013 official R&D personnel figures to estimate business R&D personnel evolution. This information has been completed with the one offered by OECD databases on R&D variables. In order to obtain the required sectoral disaggregation, structures and average growth rates from previous years have been used. 2014 figures are neither available, as the Australian Bureau of Statistics has not published it yet.

²⁰ <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/1292.0.55.0052008?OpenDocument>. Also, the Ivie has elaborated correspondence tables for ICT and RS sectors between NACE Rev. 2 and ANZSIC 2006 (see Annex II).

²¹ The correspondence between ANZSIC 2006 and ANZSIC 1993 is available at: [http://www.abs.gov.au/ausstats/abs@.nsf/second+level+view?ReadForm&prodno=1292.0&viewtitle=Australian%20and%20New%20Zealand%20Standard%20Industrial%20Classification%20\(ANZSIC\)~2006%20\(R%20revision%202.0\)~Latest~26/06/2013&tablename=Related%20Products&prodno=1292.0&issue=2006%20\(R%20revision%202.0\)&num=&view=&](http://www.abs.gov.au/ausstats/abs@.nsf/second+level+view?ReadForm&prodno=1292.0&viewtitle=Australian%20and%20New%20Zealand%20Standard%20Industrial%20Classification%20(ANZSIC)~2006%20(R%20revision%202.0)~Latest~26/06/2013&tablename=Related%20Products&prodno=1292.0&issue=2006%20(R%20revision%202.0)&num=&view=&)

ICT sector NACE 261 (Manufacture of electronic components and boards) includes ICT sector NACE 264 (Manufacture of consumer electronics) and 268 (Manufacture of magnetic and optical media) in Australia, as there is not enough information to separate these sectors. ICT subsector 612 (Wireless telecommunications activities) includes ICT subsector NACE 613 (Satellite telecommunications activities), as these two industries are defined as a single industry in ANSZIC. In addition, NACE 4791 (Retail sale via mail order houses or via Internet) includes Other retail sale not in stores, stalls or markets (NACE class 4799), as there is not enough information to separate these activities.

ICT and MC sector database does not include information at 4-digits NACE level in the case of Australia, except for sector 61 (Telecommunications), 59 (Motion picture, video and television programme production, sound recording and music publishing activities) and 581 (Publishing of books, periodicals and other publishing activities), but only for some of the most recent years.

Brazil

Sources

PINTEC, Survey of Technological Innovation from Instituto Brasileiro de Geografia e Estatística (IBGE)

<http://www.ibge.gov.br/home/estatistica/economia/industria/pintec/2011/default.shtm>

Downloaded: 14-10-2016

Science, Technology and Innovation Data from UNESCO Institute for Statistics (UIS)

<http://data.uis.unesco.org/Index.aspx?queryid=115>

Downloaded: 14-10-2016

Annual Survey of Industry from IBGE

http://www.ibge.gov.br/home/estatistica/economia/industria/pia/empresas/2014/default_empresa.shtm

Downloaded: 17-10-2016

Remarks

The elaboration of the R&D personnel database for Brazil has been based on the information provided by IBGE, in the Survey of Technological Innovation (PINTEC 2000, 2003, 2005, 2008 and 2011). We have used PINTEC data by industry and correspondences between CNAE 2/CNAE 1 and NACE-Rev.2 to distribute R&D personnel among sectors²². However, PINTEC survey is only available for 2000, 2003, 2005, 2008 and 2011, as it is only conducted every two/three years.

The distribution of Wages from Industrial Survey (IBGE) has been also used to assign the R&D personnel between ICT Sector NACE 263 (Manufacture of communication equipment), 264 (Manufacture of consumer electronics) and 268 (Manufacture of magnetic and optical media). It has also been used to estimate NACE 303 (Manufacture of air and spacecraft and related machinery).

ICT sector NACE 62 (computer programming, consultancy and related activities) includes ICT sector NACE 582 (Software publishing). In addition, for Brazil there is no information for the MC sector (NACE 581, 59, 60 and 639), the ICT trade sector (NACE 465) and one ICT services sector: Repair of computers and communication equipment (NACE 951). Neither for ICT subsectors (3-4-digits level). Total ICT services sector is only available for 2008 onwards. PINTEC 2000 and 2003 do not include information on services sectors.

Moreover, Brazil's dataset does not contain information for RS sector (NACE 4791) and macro-sectors 85 (Education), 49-99 (Services, except trade), 45-47 (Wholesale and retail trade, repair of motor vehicles and motorcycles), 49-53 (Transportation and

²² See Annex II and the correspondence between CNAE 2 and ISIC Rev. 4 at: <http://www.ibge.gov.br/home/estatistica/economia/classificacoes/cnae2.0/defaulttab.shtm>.

storage), 58-63 (Information and communication), 64-66 (Financial and insurance activities), 69-82 (Professional, scientific, technical, administration and support service activities), 69-75 (Professional, scientific and technical activities) and 86-88 (Human health and social work activities).

Canada

Sources

Science and Technology Indicators from Statistics Canada

<http://www5.statcan.gc.ca/subject-sujet/subtheme-soustheme.action?pid=193&id=3212&lang=eng&more=0>

Downloaded: 26-10-2016

Research and Development Statistics from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_INDUSTRY_ISIC4

Downloaded: 14-10-2016

(R&D personnel by industry (ISIC Rev. 4))

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_INDUSTRY

Downloaded: 14-10-2016

(R&D personnel (ISIC Rev. 3.1))

Survey of Employment, Payrolls and Hours from Statistics Canada

<http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=2810047&paSer=&pattern=&stByVal=1&p1=1&p2=35&tabMode=dataTable&csid=>

Downloaded: 03-03-2016

Labour Productivity Accounts from Statistics Canada

<http://www5.statcan.gc.ca/subject-sujet/subtheme-soustheme.action?pid=3764&id=3355&lang=eng&more=0>

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Remarks

The elaboration of the database for Canada has been based on the information provided by Statistics Canada in its key socioeconomic database CANSIM, Science and Technology Indicators, and by OECD, as it also offers NACE-Rev.2 (ISIC Rev. 4) data.

The R&D personnel have been distributed among sectors using the correspondence tables between ISIC Rev. 4/NAICS and NACE-Rev.2, as in the case of BERD. In order to estimate the figures for some sectors, additional sources and variables need to be used. For instance, total Employment from Survey of Employment, Payrolls and Hours and Labour Productivity Accounts (Statistics Canada) has been used to estimate RS sector (NACE 4791), the NACE Section M (Professional and Scientific activities) and some ICT and MC industries (NACE 581, 582, 59, 60, 61 and 639) .

PERD ratios over BERD/PERD from the US have also been used to split ICT sector 61 (Telecommunications) into its subsectors at 3 digits (NACE 611, 612, 613 and 619).

Canada dataset does not contain information for one ICT services sector (951, Repair of computers and communication equipment) and for ICT subsectors at 4-digits, as there is no statistical source with this level of detail. The same happens in the case of the MC sector, with data on sectors only available at 2/3 digits.

China

Sources

China Statistical Yearbook on Science and Technology from National Bureau of Statistics of China

<http://www.stats.gov.cn/english/Statisticaldata/AnnualData/>

Downloaded: 10-11-2016

The Second R&D Resources Inventory Survey Compilation 2009 from National Bureau of Statistics of China

Information provided by Gao Changlin, Li Xiuquan and Xuan Zhaohui, from Chinese Academy of Science and Technology for Development (CASTED)

China National Expenditures on Science and Technology Statistics from National Bureau of Statistics of China

<http://data.stats.gov.cn/english/>

Downloaded: 16-11-2016

Statistics on Education, Science and Technology in High-tech Industry by Industrial Sector from China Statistical Yearbook, compiled by National Bureau of Statistics of China

<http://www.stats.gov.cn/english/Statisticaldata/AnnualData/>

Downloaded: 10-11-2016

Research and Development Statistics from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_INDUSTRY_ISIC4

Downloaded: 14-10-2016

(R&D personnel by industry (ISIC Rev. 4))

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_INDUSTRY

Downloaded: 14-10-2016

(R&D personnel (ISIC Rev. 3.1))

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_OCCUP

Downloaded: 01-12-2016

(R&D personnel (ISIC Rev. 3.1))

Remarks

The elaboration of the R&D personnel database for China has been based on the information provided by the OECD, as in 2015 it has published for the first time NACE-Rev.2 data for China. However, data are only available for the period 2008-2014 and the disaggregation of services sectors is only available for one year: 2009.

This information has been complemented with data provided by the National Bureau of Statistics of China in The Second R&D Resources Inventory Survey Compilation and the China Statistical Yearbook on Science and Technology. However, the correspondence between NACE-Rev.2 and China classification of activities is approximate, as it is based on the correspondences between Chinese industry classification and ISIC Rev. 3 (NACE Rev. 1.1)²³.

When necessary, structures from next/previous years and average growth rates from next/previous selected periods have been used to estimate figures for some industries or years. In the case of some industries, BERD/PERD ratios of a higher aggregated sector have been used to estimate R&D personnel figures. Therefore, we recommend taking the results with caution, especially the more disaggregated data and the services sectors' figures.

China R&D personnel dataset only offers information for the period 2005-2014 (only figures for ICT manufacturing and NACE sector 21 are available since 2001) and it does

²³ The correspondence between Chinese SIC and ISIC Rev. 3 is available at: http://www.stats.gov.cn/tjbz/t20040210_402369833.htm

not contain information for ICT trade sector, ICT sectors 268 (Manufacture of magnetic and optical media) and 951 (Repair of computers and communication equipment), RS sector (NACE 4791) and NACE sectors 45-47 (Wholesale and retail trade, repair of motor vehicles and motorcycles) and 85 (Education). ICT and MC subsectors at 3-4 digits are neither available.

India

Sources

Research and Development Statistics from National Science and Technology Management Information System (NSTMIS), Department of Science and Technology, Government of India

<http://www.nstmis-dst.org/Publication.aspx>

Downloaded: 20-10-2015

Science, Technology and Innovation Data from UNESCO Institute for Statistics (UIS)

http://data.uis.unesco.org/Index.aspx?DataSetCode=SCN_DS

Downloaded: 14-10-2016

Annual Survey of Industries from MOSPI

<https://data.gov.in/catalog/annual-survey-industries-1>

Downloaded: 24-10-2016

Remarks

Official data for R&D personnel by industry are not available. Only the total amount of R&D personnel is available in national sources, but not for all the years. Thus, data for 1995, 1997, 1999, 2001-2004 and 2006-2009 are estimations made by interpolating official BERD/R&D Personnel ratios referred to in the closest available years. 2011 and 2012 data are also estimated using BERD/R&D Personnel ratio from 2010. Data for 2013 and 2014 are not yet available.

To estimate R&D personnel by industry, additional assumptions are required. PERD/BERD ratios by industry from the most similar country in the sample according to BERD structure (United Kingdom) have been selected. These ratios have been adjusted so that they replicate India's total PERD/BERD ratio, which is readily available. However, we recommend taking the results with caution.

In the case of some macro-sectors, India's BERD structure has been applied to estimate PERD figures for these industries.

India's R&D personnel dataset does not contain information for ICT trade sector, RS sector and the disaggregated ICT and MC subsectors at 3-4 digits. In addition data only cover the years between 2002 and 2012. In the case of ICT and MC services data are available from 2005.

Japan

Sources

Annual Survey of Research and Development from Japan's Ministry of Internal Affairs and Communication (MIC)

<https://www.e-stat.go.jp/SG1/estat/GL02100104.do?gaid=GL02100102&toacd=00200543>

Downloaded: 02-11-2016

Research and Development Statistics from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_INDUSTRY_ISIC4

Downloaded: 14-10-2016

(R&D personnel (ISIC Rev. 4))

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_INDUSTRY

Downloaded: 14-10-2016

(R&D personnel (ISIC Rev. 3.1))

Remarks

The elaboration of the R&D personnel database for Japan has been based on the information provided by OECD, as it has published PERD figures for Japan following ISIC Rev. 4 (NACE-Rev.2) from 2005 onwards. In addition, OECD also publishes these figures following ISIC Rev. 3.1 since 1995, which are sometimes used to complete the updated NACE-Rev.2 series.

This information has been combined with data coming from the Annual Survey of Research and Development from Japan's Ministry of Internal Affairs and Communication (MIC), especially when a high sectoral disaggregation is required, as this national source offers a higher level of industry detail. In order to do that, the correspondence tables between JSIC and NACE-Rev.2 elaborated by Ivie for ICT and RS industries have been used. For non-ICT industries, the official correspondence table between JSIC and NACE-Rev.2 has been used²⁴.

Although the Annual Survey of Research and Development from Japan offers a great industry disaggregation for recent years (from 2007 onwards), that allows to complete the information for almost all the sectors requested, it doesn't have the same detail for the other years. For these, when necessary, the structure of the most recent years has been applied to estimate some problematic industries.

Japan dataset does not contain information for RS sector (NACE 4791), one ICT services sector: 951 (Repair of computers and communication equipment), and the macro-sectors 85 (Education) and 86-88 (Human health and social work activities) and.

In addition, ICT sector 62 (Computer programming, consultancy and related activities) includes ICT sector 582 (Software publishing). The disaggregation at 3-4-digits NACE of ICT and MC sectors is not available.

South Korea

Sources

Survey of Business activities from Statistics South Korea

http://kosis.kr/eng/statisticsList/statisticsList_01List.jsp?vwcd=MT_ETITLE&parentId=K

Downloaded: 17-02-2014

Research and Development Statistics from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_INDUSTRY_ISIC4

Downloaded: 14-10-2016

(R&D personnel (ISIC Rev. 4))

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_INDUSTRY

Downloaded: 14-10-2016

(R&D personnel (ISIC Rev. 3.1))

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_OCCUP

Downloaded: 01-12-2016

(R&D personnel by sector of employment and occupation)

²⁴ The correspondences between JIP codes, JSIC, ISIC Rev. 3 and ISIC Rev. 4 are available at:
http://www.rieti.go.jp/en/database/d05_data/03-6.pdf
http://www.euklems.net/data/nace2/JPN_Sources_12i.pdf
<http://www.stat.go.jp/english/index/seido/sangyo/index07.htm>

Remarks

The elaboration of the PERD database for South Korea has been based on the information provided by the Research and Development Statistics from OECD. In 2015 OECD has published data on R&D personnel following NACE-Rev.2 (ISIC Rev. 4) for the first time. Therefore, this information has been taken as the main basis for the construction of South Korea dataset, although it only covers the years 2005-2014. The remaining years included in PREDICT database have been estimated using the ISIC Rev. 3 PERD database from the OECD (ANBERD), which covers the period 1996-2014, and the correspondences between ISIC Rev. 3 and ISIC Rev. 4/NACE-Rev.2²⁵.

In the case of some sectors, average growth rates from the following years or average structures from other years have been used in order to obtain an estimation, especially some ICT and MC subsectors. BERD/PERD ratios have been applied as well in some cases. In addition, as the information on R&D researchers is more comprehensive, PERD/RERD ratios have been used to estimate some industries.

In order to estimate RS sector, PERD ratios over BERD/RERD from the US have also been used, as there is no available information on this sector for South Korea. Therefore, these figures should be taken with caution.

South Korea dataset does not contain information for the ICT trade sector (NACE 465) and ICT/MC subsectors at 3-4-digits level of NACE-Rev.2.

Russia

Sources

Russian Science and Technology at a Glance from Russian Centre for Science Research and Statistics (CSRS)

<http://www.csrs.ru/english/statis/default.htm>

<http://www.st-gaterus.eu/en/672.php>

Downloaded: 10-07-2013

R&D data from Rosstat (Russian Federal State Statistics Service)

Information provided by Galina Lyubova (Department of Foreign Statistics and International Cooperation from Rosstat)

Research and Development Statistics from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_OCCUP

Downloaded: 01-12-2016

(R&D personnel by sector of employment and occupation)

Remarks

The elaboration of the ICT sector database for Russia has been based on the information by industry provided by the publication *Russian Science and Technology at a Glance* (CSRS) and by Rosstat, as OECD ANBERD database does not publish information on business R&D personnel by industry for Russia.

However, and taking into account that BERD figures are based on OECD data, it has been decided to maintain the total R&D personnel figures from ANBERD database and distribute them among ICT, RS and the additional selected sectors, using national sources and approximate correspondences between ISIC Rev. 4 and the classification of industries of Russian statistics, which have a direct correspondence with ISIC Rev. 3.1.

²⁵ See Mas, Robledo and Pérez (2012).

In addition, some assumptions need to be done to estimate business R&D personnel by industry, as the available information by industry refers to total R&D personnel (business, government, higher education plus private non-profit sectors). For this reason, national data have been re-adjusted to OECD total business R&D figures.

Russian dataset does not contain information by industry for the years 1995-2003 and sectors NACE 4791 (RS sector, Retail sale via mail order houses or via Internet), 27-28 (Manufacture of machinery and equipment), 303 (Manufacture of air and spacecraft and related machinery), 45-47 (Wholesale and retail trade, repair of motor vehicles and motorcycles), 49-53 (Transportation and storage), 58-63 (Information and communication), 64-66 (Financial and insurance activities), 69-82 (Professional, scientific, technical, administration and support service activities), 69-75 (Professional, scientific and technical activities) are not available.

MC sectors are not available. Regarding ICT industries, sectors 268 (Manufacture of magnetic and optical media), 4652 (Wholesale of electronic and telecommunications equipment and parts), 951 (Repair of computers and communication equipment) and the disaggregation between 582 (Software publishing), 62 (Computer programming, consultancy and related activities) and 631 (Data processing, hosting and related activities; web portals) are also not available.

Also, the disaggregation at 4-digits of ICT sector NACE 261 (Manufacture of electronic components and boards) and at 3 digits of ICT sector NACE 61 (Telecommunications) is not available.

Taiwan

Sources

National Science and Technology Survey from Taiwan's Ministry of Science and Technology

<https://ap0512.most.gov.tw/WAS2/English/AsTechnologyEStatisticsList.aspx>

Downloaded: 29-11-2016

Research and Development Statistics from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_INDUSTRY_ISIC4

Downloaded: 14-10-2016

(R&D personnel (ISIC Rev. 4))

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_INDUSTRY

Downloaded: 14-10-2016

(R&D personnel (ISIC Rev. 3.1))

Remarks

The elaboration of the database for Taiwan has been based on the information by industry provided by OECD and Taiwan's National Science Council in the National Science and Technology Survey. These two sources have been complementary to elaborate Taiwan's R&D Personnel dataset.

However, the information available in these two datasets does not cover the years 1995, 1996 and 1997. Thus, the figures corresponding to these years in PREDICT dataset have been estimated using average growth rates of the following years and/or sectoral structures from the next years. In addition, blanks appear in some ICT and MC subsectors from 2005 backwards. In these cases, average growth rates and/or sectoral structures of the following years and BERD/PERD ratios have been also applied.

In order to estimate RS sector, additional assumptions need to be done. In this case PERD ratios over BERD and RERD from the US have been applied to Taiwan's data to

obtain an estimation of the RS sector. Therefore, we recommend taking the results with caution.

Taiwan dataset does not contain information for sector 303 (Manufacture of air and spacecraft and related machinery) and NACE Section P (Education) is only available for the period 2009-2014. Neither does it contain data for ICT subsectors 2611 (Manufacture of electronic components), 2612 (Manufacture of loaded electronic boards), 4651 (Wholesale of computers, computer peripheral equipment and software), 4652 (Wholesale of electronic and telecommunications equipment and parts), 5821 (Publishing of computer games), 5829 (Other software publishing), 611 (Wired telecommunications activities), 612 (Wireless telecommunications activities), 613 (Satellite telecommunications activities), 619 (Other telecommunications activities), 6201 (Computer programming activities), 6202 (Computer consultancy activities), 6203 (Computer facilities management activities), 6209 (Other information technology and computer service activities), 6311 (Data processing, hosting and related activities), 6312 (Web portals), 9511 (Repair of computers and peripheral equipment) and 9512 (Repair of communication equipment). The MC sub-sectors 5811 (Book publishing), 5812 (Publishing of directories and mailing lists), 5813 (Publishing of newspapers), 5814 (Publishing of journals and periodicals), 5819 (Other publishing activities), 591 (Motion picture, video and television programme activities) and its subsectors, 592 (Sound recording and music publishing activities), 601 (Radio broadcasting), 602 (Television programming and broadcasting activities), 6391 (News agency activities) and 6399 (Other information service activities n.e.c.).

United States

In the case of United States, there are no available data for this variable, as the main national sources for R&D variables (SIRD and BRDIS) do not offer information on R&D personnel. US R&D Surveys include only information on "R&D scientists and engineers", which definition is more similar to R&D researchers. Neither OECD nor Eurostat R&D Statistics provide information on this variable for the US.

R&D Researchers

The European Union and the Member States

Sources

Statistics on Research and Development (SRD) from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_p_bempoccr2&lang=en

Downloaded: 1-12-2016

(R&D personnel at national and regional level. Total R&D personnel and researchers in business sector by economic activity and sex (NACE-Rev.2))

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_p_bempoccc&lang=en

Downloaded: 18-09-2015

(R&D personnel at national and regional level. Total R&D personnel and researchers in business sector by economic activity and sex (NACE Rev. 1.1))

Labour Force Survey (LFS) from Eurostat

Specific request to 3-digits by highest level of education attained

Downloaded: 1-06-2016

(Employment by economic activity and level of education attained (NACE-Rev.2))

Specific request to 3-digits by highest level of education attained

Downloaded: 1-06-2016

(Employment by economic activity and level of education attained (NACE Rev. 1.1))

Statistics on Research and Development (SRD) from National Statistical Institutes

[http://pub.stat.ee/px-](http://pub.stat.ee/px-web.2001/I_Databas/Economy/28SCIENCE_TECHNOLOGY_INNOVATION/28SCIENCE_TECHNOLOGY_INNOVATION.asp)

[web.2001/I_Databas/Economy/28SCIENCE_TECHNOLOGY_INNOVATION/28SCIENCE_TECHNOLOGY_INNOVATION.asp](http://pub.stat.ee/px-web.2001/I_Databas/Economy/28SCIENCE_TECHNOLOGY_INNOVATION/28SCIENCE_TECHNOLOGY_INNOVATION.asp)

Downloaded: 15-10-2016

(R&D in business enterprise sector in Estonia)

<http://www.statbank.dk/statbank5a/default.asp?w=1280>

Downloaded: 15-10-2016

(Research and development Statistics in Denmark)

[http://www.scb.se/en /Finding-statistics/Statistics-by-subject-area/Education-and-research/Research/Research-and-development-in-the-business-enterprise-sector/](http://www.scb.se/en/Finding-statistics/Statistics-by-subject-area/Education-and-research/Research/Research-and-development-in-the-business-enterprise-sector/)

Downloaded: 15-10-2016

(Research and development in Sweden)

<http://statdat.statistics.sk/>

Downloaded: 15-10-2016

(Expenditures on research and development in Slovakia)

<http://www.ine.es/jaxi/menu.do?type=pcaxis&path=%2Ft14%2Fp057&file=inebase&L=0>

Downloaded: 15-10-2016

(Estadística de I+D. Sector Empresas. Resultados en I+D por rama de actividad)

Remarks

The methodology is the same as for R&D Personnel.

Norway

Sources

Statistics on Research and Development (SRD) from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_p_bempoccr2&lang=en

Downloaded: 1-12-2016

(R&D personnel at national and regional level. Total R&D personnel and researchers in business sector by economic activity and sex (NACE-Rev.2))

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_p_bempocc&lang=en

Downloaded: 18-09-2015

(R&D personnel at national and regional level. Total R&D personnel and researchers in business sector by economic activity and sex (NACE Rev. 1.1))

Remarks

The methodology is the same as for R&D Personnel.

Switzerland

Sources

Statistics on Research and Development (SRD) from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_p_bempoccr2&lang=en

Downloaded: 1-12-2016

(R&D personnel at national and regional level. Total R&D personnel and researchers in business sector by economic activity and sex (NACE-Rev.2))

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_p_bempocc&lang=en

Downloaded: 18-09-2015

(R&D personnel at national and regional level. Total R&D personnel and researchers in business sector by economic activity and sex (NACE Rev. 1.1))

Remarks

The methodology is the same as for R&D Personnel.

Australia

Sources

Research and Experimental Development, Businesses from Australian Bureau of Statistics (ABS)

<http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/8104.02013-14?OpenDocument>

Downloaded: 14-11-2016

(R&D researchers)

Research and Experimental Development, Higher Education Organisations, Australia

<http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/8111.02014?OpenDocument>

Downloaded: 14-11-2016

(Higher education R&D researchers)

Research and Experimental Development, Government and Private Non-Profit Organisations, Australia

<http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/8109.02014-15?OpenDocument>

Downloaded: 14-11-2016

(Government R&D researchers and Private non-profit R&D researchers)

Research and Development Statistics from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_INDUSTRY_ISIC4

Downloaded: 14-10-2016

(R&D researchers (ISIC Rev. 4))

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_INDUSTRY

Downloaded: 14-10-2016

(R&D researchers (ISIC Rev. 3.1))

Remarks

The elaboration of the database for Australia has been based on the information provided by OECD, as in 2015 it has already published NACE-Rev.2 data (ISIC Rev. 4) for the years 2006 to 2013. For the previous years included in PREDICT database, OECD data following ISIC Rev. 3.1 and data from national sources (Australian Bureau of Statistics) have been taken as a basis for the estimation.

For industries not disaggregated in the OECD database, the information provided by Australian Bureau of Statistics (ABS) in the publication *Research and Experimental Development, Businesses* has been used, applying the correspondence tables between ANSZIC 2006 and NACE-Rev.2²⁶. Methods such as interpolation have also been used in the case of some industries to complete the database. However, the industry disaggregation in the case of Researchers is not enough to cover all the individual industries in the database, so additional assumptions must be done. In these cases, R&D personnel's structure has been applied to Researchers in order to achieve the industry disaggregation that is needed (see Remarks from R&D Personnel Section for more details).

Data for the period 1995-2005 (not available in the last update of the OECD database) have been estimated with information from OECD ISIC Rev. 3.1 R&D database and the "Survey of Research and Experimental Development (R&D), Businesses" published by ABS. In this case, the available information is more limited, as national R&D surveys only offer information by industries at two-digit level (and following ANSZIC 1993). Because of that, some industries have been estimated applying the growth rates of a more aggregated sector in the statistic. In other cases, BERD/RERD ratios or RERD/PERD ratios have been used to estimate the amount of R&D researchers, as the availability of information in terms of BERD and PERD is more comprehensive. In addition, total RERD does not include NACE-Rev.2 sector 01-03 (Agriculture, forestry and fishing) for the period 1995-2004, as this sector was not included in Australian R&D Surveys those years and OECD does not publish this sector's figures previous to 2005.

In addition, there is no available data for 2012 on business researchers, as the frequency of the "Survey of Research and Experimental Development (R&D), Businesses" has changed from annual to biennial, and this year is the first one without survey. This is the reason why, in the case of 2012, data from 2013 and the ABS statistics on Government and private non-profit and higher education R&D human resources of 2012 have been used as a basis to estimate business R&D researchers' figures. In order to obtain the required sectoral disaggregation, structures and average growth rates from previous/next years have been used. 2014 figures are neither available, as the Australian Bureau of Statistics has not published it yet.

ICT sector NACE 261 (Manufacture of electronic components and boards) includes ICT sector NACE 264 (Manufacture of consumer electronics) and 268 (Manufacture of magnetic and optical media) for Australia, as there is not enough information to separate these sectors. ICT subsector 612 (Wireless telecommunications activities) includes ICT subsector NACE 613 (Satellite telecommunications activities), as these two industries are defined as a single industry in ANSZIC. In addition, NACE 4791 (Retail sale via mail order houses or via Internet) includes Other retail sale not in stores, stalls or markets (NACE class 4799), as there is not enough information to separate these activities.

ICT and MC sector database does not include information at 4-digits NACE level in the case of Australia, except for sector 61 (Telecommunications), but only for the period 2000-2013.

²⁶ <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/1292.0.55.0052008?OpenDocument>. Also, the Ivie has elaborated correspondence tables for ICT sectors between NACE Rev. 2 and ANZIC 2006 (see Annex II).

Brazil

Sources

PINTEC, Survey of Technological Innovation from Instituto Brasileiro de Geografia e Estatística (IBGE)

<http://www.ibge.gov.br/home/estatistica/economia/industria/pintec/2011/default.shtm>

Downloaded: 14-10-2016

Science, Technology and Innovation Data from UNESCO Institute for Statistics (UIS)

<http://data.uis.unesco.org/Index.aspx?queryid=115>

Downloaded: 14-10-2016

Annual Survey of Industry from IBGE

http://www.ibge.gov.br/home/estatistica/economia/industria/pia/empresas/2014/default_empresa.shtm

Downloaded: 17-10-2016

Remarks

The elaboration of the R&D researchers' database for Brazil has been based on the information provided by IBGE, in the Survey of Technological Innovation (PINTEC). However, data on researchers are only available in PINTEC 2011 (this variable was not included in the previous editions of this survey).

We have used PINTEC data by industry and correspondences between CNAE 2 and NACE-Rev.2 to distribute researchers among ICT, MC, RS and the additional sectors²⁷. The distribution of Wages from Industrial Survey (IBGE) has been also used to assign the R&D researchers between ICT Sector NACE 263 (Manufacture of communication equipment), 264 (Manufacture of consumer electronics) and 268 (Manufacture of magnetic and optical media). It has also been used to estimate NACE 303 (Manufacture of air and spacecraft and related machinery).

In the case of Brazil, ICT sector NACE 62 (computer programming, consultancy and related activities) includes ICT sector NACE 582 (Software publishing). In addition, there is no information for the MC sector (NACE 581, 59, 60 and 639), the ICT trade sector (NACE 465) and one ICT services sector: Repair of computers and communication equipment (NACE 951). Neither for ICT subsectors (3-4-digits level). Moreover, Brazil's dataset does not contain information for macro-sectors, 85 (Education) and the aggregations 49-99 (Services, except trade), 45-47 (Wholesale and retail trade, repair of motor vehicles and motorcycles), 49-53 (Transportation and storage), 58-63 (Information and communication), 64-66 (Financial and insurance activities), 69-82 (Professional, scientific, technical, administration and support service activities), 69-75 (Professional, scientific and technical activities) and 86-88 (Human health and social work activities).

²⁷ See Annex II and the correspondence between CNAE 2 and ISIC Rev. 4 at:
<http://www.ibge.gov.br/home/estatistica/economia/classificacoes/cnae2.0/defaulttab.shtm>.

Canada

Sources

Science and Technology Indicators from Statistics Canada

<http://www5.statcan.gc.ca/subject-sujet/subtheme-soustheme.action?pid=193&id=3212&lang=eng&more=0>

Downloaded: 26-10-2016

Research and Development Statistics from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_INDUSTRY_ISIC4

Downloaded: 14-10-2016

(R&D researchers by industry (ISIC Rev. 4))

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_INDUSTRY

Downloaded: 14-10-2016

(R&D researchers by industry (ISIC Rev. 3.1))

Survey of Employment, Payrolls and Hours from Statistics Canada

<http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=2810047&paSer=&pattern=&stByVal=1&p1=1&p2=35&tabMode=dataTable&csid=>

Downloaded: 03-03-2016

Labour Productivity Accounts from Statistics Canada

<http://www5.statcan.gc.ca/subject-sujet/subtheme-soustheme.action?pid=3764&id=3355&lang=eng&more=0>

Downloaded: 03-03-2016

Remarks

The elaboration of the database for Canada has been based mainly on the information provided by OECD since it has already published information on researchers following NACE-Rev.2 for Canada. This information has been complemented by the one provided by Statistics Canada in its key socioeconomic database CANSIM, Science and Technology Indicators.

The R&D researchers have been distributed among sectors using the correspondence tables between ISIC Rev. 4/NAICS and NACE-Rev.2, as in the case of BERD and PERD. In order to estimate the figures for some sectors, additional sources and variables need to be used. For instance, total Employment from Survey of Employment, Payrolls and Hours and Labour Productivity Accounts (Statistics Canada) has been used to estimate RS sector (NACE 4791), the NACE Section M (Professional and Scientific activities) and some ICT and MC industries (NACE 581, 582, 59, 60, 61 and 639) .

Methods such as interpolation have been used in the case of some industries to complete the database. However, the available industry disaggregation in the case of Researchers is not enough to cover all the individual industries in the database. To estimate these problematic sectors, total R&D personnel's structure has been applied to Researchers in some cases in order to achieve the industry disaggregation that is needed (see Remarks from R&D Personnel Section).

Canada dataset does not contain information for one ICT services sector (951, Repair of computers and communication equipment) and for ICT and MC subsectors at 4-digits, as there is no statistical source with this level of detail.

China

Sources

China Statistical Yearbook on Science and Technology from National Bureau of Statistics of China

<http://www.stats.gov.cn/english/Statisticaldata/AnnualData/>

Downloaded: 10-11-2016

The Second R&D Resources Inventory Survey Compilation 2009 from National Bureau of Statistics of China

Information provided by Gao Changlin, Li Xiuquan and Xuan Zhaohui, from Chinese Academy of Science and Technology for Development (CASTED)

China National Expenditures on Science and Technology Statistics from National Bureau of Statistics of China

<http://data.stats.gov.cn/english/>

Downloaded: 16-11-2016

Statistics on Education, Science and Technology in High-tech Industry by Industrial Sector from China Statistical Yearbook, compiled by National Bureau of Statistics of China

<http://www.stats.gov.cn/english/Statisticaldata/AnnualData/>

Downloaded: 10-11-2016

Research and Development Statistics from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_INDUSTRY_ISIC4

Downloaded: 14-10-2016

(R&D personnel by industry (ISIC Rev. 4))

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_INDUSTRY

Downloaded: 14-10-2016

(R&D personnel (ISIC Rev. 3.1))

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_OCCUP

Downloaded: 01-12-2016

(R&D personnel (ISIC Rev. 3.1))

Remarks

The elaboration of the researchers' database for China has been based on the information provided by the OECD, as in 2015 it has published for the first time NACE-Rev.2 data for China. However, data are only available for the period 2008-2014 and the disaggregation of services sectors is only available for one year: 2009.

This information has been complemented when necessary with the data provided by the National Bureau of Statistics of China in The Second R&D Resources Inventory Survey Compilation, China Statistical Yearbook on Science and Technology and China Statistical Yearbook (Education, Science and Technology Section). However, the correspondence between NACE-Rev.2 and China classification of activities is approximate, as it is based on the correspondences between Chinese industry classification and ISIC Rev. 3 (NACE Rev. 1.1), as in the case of total R&D personnel. Therefore, we recommend taking the results with caution. RERD/PERD ratios have also been used to estimate data for some ICT, MC and services sectors.

Generally, data by industries from National Bureau of Statistics of China (China Statistical Yearbook and China Statistical Yearbook on Science and Technology) have been used to disaggregate Researchers' total figures coming from OECD. When necessary, structures from next/previous years or total R&D personnel's structures have been used.

China dataset does not contain information for ICT trade sector and ICT sectors 268 (Manufacture of magnetic and optical media) and 951 (Repair of computers and communication equipment). Also, data for RS sector (NACE 4791), NACE sectors 45-47

(Wholesale and retail trade, repair of motor vehicles and motorcycles) and 85 (Education) are not available, as well as the 3-4 digits ICT and MC sectors. RERD figures are only available for the period 2005-2014 in the case of China.

India

Sources

Research and Development Statistics from National Science and Technology Management Information System (NSTMIS), Department of Science and Technology, Government of India

<http://www.nstmis-dst.org/Publication.aspx>

Downloaded: 20-10-2015

Science, Technology and Innovation Data from UNESCO Institute for Statistics (UIS)

http://data.uis.unesco.org/Index.aspx?DataSetCode=SCN_DS

Downloaded: 14-10-2016

Annual Survey of Industries from MOSPI

<https://data.gov.in/catalog/annual-survey-industries-1>

Downloaded: 24-10-2016

Remarks

Official data for R&D researchers by industry are not available. Only the total amount of researchers is available in the national source, but not for all the years. In the case of the non-available years, data are estimated by interpolating Researchers/R&D Personnel ratios referred to in the closest available years. The data for 2011 and 2012 have also been estimated using Researchers/R&D Personnel ratio from 2010. Data for 2013 and 2014 are not yet available.

To estimate R&D researchers by industry, additional assumptions are required. RERD/PERD ratios by industry from the most similar country in the sample according to BERD structure (United Kingdom) have been selected. These ratios have been adjusted so that they replicate India's total RERD/PERD ratio, which is readily available. However, we recommend taking the results with caution.

India's R&D researchers' dataset does not contain information for ICT trade sector (NACE 465) and RS sector (NACE 4791). The disaggregation of ICT and MC sectors 261, 582, 61, 62, 631, 95, 581, 59-60 and 639 is not available, and in the case of India, there is no statistical R&D source that offers this industry detail. Data by industry are only available for the years 2002-2012.

Japan

Sources

Annual Survey of Research and Development from Japan's Ministry of Internal Affairs and Communication (MIC)

<https://www.e-stat.go.jp/SG1/estat/GL02100104.do?gaid=GL02100102&toctd=00200543>

Downloaded: 02-11-2016

Research and Development Statistics from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_INDUSTRY_ISIC4

Downloaded: 14-10-2016

(R&D researchers (ISIC Rev. 4))

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_INDUSTRY

Downloaded: 14-10-2016
(R&D researchers (ISIC Rev. 3.1))

Remarks

The elaboration of the Researchers' data for Japan has been based on the information provided by OECD, as this year it publishes researchers' figures for Japan following ISIC Rev. 4 (NACE-Rev.2) from 2005 onwards. In addition, OECD also publishes these figures following ISIC Rev. 3.1 since 1995.

This information has been combined with data from the Annual Survey of Research and Development (Japan's Ministry of Internal Affairs and Communication, MIC), especially when a high sectoral disaggregation is required, as this national source offers a higher level of industry detail, especially since 2007. Using this information, researchers have been distributed among ICT, RS, MC and the other selected sectors using the correspondence tables between JSIC and NACE-Rev.2²⁸ when the OECD database has a gap. In some cases, Research and Development Statistics from OECD by industry following ISIC Rev. 3 have been also used to estimate the incomplete series, especially in the case of the initial years of the database.

Although the Annual Survey of Research and Development from Japan offers a great industry disaggregation for recent years (from 2007 onwards), that allows to complete the information for almost all the sectors requested, it doesn't have the same detail for the other years. For these, when necessary, the structure of the most recent years has been applied to estimate some problematic industries.

Japan's dataset does not contain information for sectors NACE 85 (Education) and 86-88 (Human health and social work activities), the RS sector (NACE 4791, Retail sale via mail order houses or via Internet) and one ICT services sector: 951 (Repair of computers and communication equipment). In addition, ICT sector 62 (Computer programming, consultancy and related activities) includes ICT sector 582 (Software publishing) and the disaggregation of ICT and MC subsectors at 3-4-digits is not available, as there is no information at that level of detail.

South Korea

Sources

Survey of Business activities from Statistics South Korea
http://kosis.kr/eng/statisticsList/statisticsList_01List.jsp?vwcd=MT_ETITLE&parentId=K
Downloaded: 17-02-2014

Research and Development Statistics from OECD
http://stats.oecd.org/Index.aspx?DataSetCode=PERS_INDUSTRY_ISIC4

Downloaded: 14-10-2016

(R&D researchers (ISIC Rev. 4))

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_INDUSTRY

Downloaded: 14-10-2016

(R&D researchers (ISIC Rev. 3.1))

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_OCCUP

Downloaded: 01-12-2016

(R&D personnel by sector of employment and occupation)

²⁸ The correspondences between JIP codes, JSIC, ISIC Rev. 3 and ISIC Rev. 4 are available at:
http://www.rieti.go.jp/en/database/d05_data/03-6.pdf
http://www.euklems.net/data/nace2/JPN_Sources_12i.pdf
<http://www.stat.go.jp/english/index/seido/sangyo/index07.htm>
Ivie has also elaborated a correspondence table for ICT and RS sectors (see Annex II).

Remarks

The elaboration of the Researchers' database for South Korea has been based on the information provided by Research and Development Statistics from OECD. In 2015 OECD has published data on R&D researchers following ISIC Rev. 4 (NACE-Rev.2) for the first time. Therefore, this information has been taken as the main basis for the construction of South Korea dataset, although some missing data have been estimated using OECD databases with the classification ISIC Rev. 3.1/NACE Rev. 1.1 and the correspondence between this classification and ISIC Re. 4 (NACE-Rev.2)²⁹.

In the case of some sectors, average growth rates from the following years or average structures from other years have been used in order to obtain RERD figures, especially some ICT and MC subsectors. BERD/RERD ratios have been applied as well in some cases.

In the case of the RS sector, the estimation relies on the calculation of Researchers/BERD ratios in the US and its adjustment to the R&D researchers' figures and structure of South Korea.

South Korea's dataset does not contain information for the ICT trade sector (NACE 465) and the disaggregation at 3-4-digits NACE of ICT and MC sectors is not available. Also, some additional service sectors are not available from 1995 to 1999.

Russia

Sources

Russian Science and Technology at a Glance from Russian Centre for Science Research and Statistics (CSRS)

<http://www.csrs.ru/english/statis/default.htm>

<http://www.st-gaterus.eu/en/672.php>

Downloaded: 10-07-2013

R&D data from Rosstat (Russian Federal State Statistics Service)

Information provided by Galina Lyubova (Department of Foreign Statistics and International Cooperation from Rosstat)

Research and Development Statistics from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_OCCUP

Downloaded: 01-12-2016

(R&D personnel by sector of employment and occupation)

Remarks

The elaboration of the researchers' database for Russia has been based on the information by industry provided by the publication *Russian Science and Technology at a Glance* (CSRS) and by Rosstat, as OECD ANBERD database does not publish information on researchers by industry for Russia.

However, and taking into account that BERD figures are based on OECD data, it has been decided to maintain the total researchers figures from ANBERD database and to use national information to estimate the disaggregation by industries of these figures. In addition, total researchers' figures from ANBERD cover the period 1995-2014, whereas national data are only available for the most recent years.

Researchers have been distributed among PREDICT selected sectors, using approximate correspondences between ISIC Rev. 4 and ISIC Rev. 3.1, which have a direct

²⁹ See Mas, Robledo and Pérez (2012).

correspondence with the classification of industries of Russian R&D statistics. In addition, some assumptions need to be done to estimate business R&D researchers by industry, as the available information by industry refers to total researchers, including researchers that do not work in the business sector. For this reason, national data have been re-adjusted to OECD total business R&D figures. In addition, RERD/PERD ratios have been used as well in order to estimate data for some years/industries.

Russian dataset does not contain information by industry for the years 1995-2003 and sectors NACE 4791 (Retail sale via mail order houses or via Internet), 27-28 (Manufacture of machinery and equipment), 303 (Manufacture of air and spacecraft and related machinery), 45-47 (Wholesale and retail trade, repair of motor vehicles and motorcycles), 49-53 (Transportation and storage), 58-63 (Information and communication), 64-66 (Financial and insurance activities), 69-82 (Professional, scientific, technical, administration and support service activities), 69-75 (Professional, scientific and technical activities) are not available.

MC sectors are not available and regarding ICT industries, sectors 268 (Manufacture of magnetic and optical media), 4652 (Wholesale of electronic and telecommunications equipment and parts), 951 (Repair of computers and communication equipment) and the disaggregation between 582 (Software publishing), 62 (Computer programming, consultancy and related activities) and 631 (Data processing, hosting and related activities; web portals) are also not available.

Also, the disaggregation at 4-digits of ICT sector NACE 261 (Manufacture of electronic components and boards) and at 3 digits of ICT sector NACE 61 (Telecommunications) is not available.

Taiwan

Sources

National Science and Technology Survey from Taiwan's Ministry of Science and Technology

<https://ap0512.most.gov.tw/WAS2/English/AsTechnologyEStatisticsList.aspx>

Downloaded: 29-11-2016

Research and Development Statistics from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_INDUSTRY_ISIC4

Downloaded: 14-10-2016

(R&D researchers (ISIC Rev. 4))

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_INDUSTRY

Downloaded: 14-10-2016

(R&D researchers (ISIC Rev. 3.1))

Remarks

The elaboration of the researchers' database for Taiwan has been based on the information by industry provided by OECD and by Taiwan's Ministry of Science and Technology in the National Science and Technology Survey. These two sources have been complementary to elaborate Taiwan's R&D researchers' dataset.

However, the information available in these two datasets does not cover the years 1995, 1996 and 1997. Thus, the number of researchers corresponding to these years in PREDICT dataset have been estimated using average growth rates of the following years and/or sectoral structures from the next years. In addition, blanks appear in some ICT and MC subsectors from 2005 backwards. In these cases, average growth rates and sectoral structures of the following years and BERD/RERD or RERD/PERD ratios have been also applied.

In order to estimate RS sector, additional assumptions need to be done. In this case BERD/Researchers ratios from the US have been re-adjusted and applied to Taiwan's data to obtain an estimation of the RS sector. Therefore, we recommend taking the results with caution.

Taiwan dataset does not contain information for sector 303 (Manufacture of air and spacecraft and related machinery) and NACE Section P (Education) in the initial years of the period (1995-2008). Neither does it contain data for ICT subsectors 2611 (Manufacture of electronic components), 2612 (Manufacture of loaded electronic boards), 4651 (Wholesale of computers, computer peripheral equipment and software), 4652 (Wholesale of electronic and telecommunications equipment and parts), 5821 (Publishing of computer games), 5829 (Other software publishing), 611 (Wired telecommunications activities), 612 (Wireless telecommunications activities), 613 (Satellite telecommunications activities), 619 (Other telecommunications activities), 6201 (Computer programming activities), 6202 (Computer consultancy activities), 6203 (Computer facilities management activities), 6209 (Other information technology and computer service activities), 6311 (Data processing, hosting and related activities), 6312 (Web portals), 9511 (Repair of computers and peripheral equipment) and 9512 (Repair of communication equipment), nor for MC sub-sectors 5811 (Book publishing), 5812 (Publishing of directories and mailing lists), 5813 (Publishing of newspapers), 5814 (Publishing of journals and periodicals), 5819 (Other publishing activities), 591 (Motion picture, video and television programme activities) and its subsectors, 592 (Sound recording and music publishing activities), 601 (Radio broadcasting), 602 (Television programming and broadcasting activities), 6391 (News agency activities) and 6399 (Other information service activities n.e.c.).

United States

Sources

Business R&D and Innovation Survey (BRDIS) from National Science Foundation and United States Census Bureau

<https://www.nsf.gov/statistics/srvyindustry/#tabs-2>

Downloaded: 24-11-2016

Information provided by Raymond M. Wolfe (Economist & Senior Analyst of National Science Foundation's National Center for Science and Engineering Statistics (NCSES)) Science and Engineering Indicators from National Science Foundation and United States Census Bureau

<https://www.nsf.gov/statistics/2016/nsb20161/#/>

Downloaded: 24-11-2016

Survey of Industrial Research and Development (SIRD) from National Science Foundation

<http://www.nsf.gov/statistics/industry/>

Downloaded: 22-11-2016

Research and Development Statistics from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_INDUSTRY

Downloaded: 14-11-2016

(R&D researchers (ISIC Rev. 3.1))

http://stats.oecd.org/Index.aspx?DataSetCode=PERS_OCCUP

Downloaded: 26-11-2016

(R&D personnel by sector of employment and occupation. Researchers in Business sector)

Remarks

The elaboration of the researchers' database for the United States has been based on the information provided by the National Science Foundation and the United States Census Bureau in its Business R&D and Innovation Survey (BRDIS) (National Science Foundation and United States Census Bureau), conducted since 2008 and its predecessor, Survey of Industrial Research and Development (National Science Foundation). Researchers' figures have been distributed among ICT, RS, MC and selected macro-sectors, using the correspondence tables between NAICS and NACE-Rev.2³⁰ (and taking into account the different revisions of the NAICS (1997, 2002, 2007 and 2012) and also the previous classification, SIC (Standard Industrial Classification) 1987, that was used in the initial years of the database, from 1995 to 1998).

However, although statistics from BRDIS and SIRD are generally comparable and the definitions used in both are very similar, this is not the case of R&D employment figures. For them, a discontinuity (a drop in the amount of R&D researchers) appears between the two surveys, although there is not a definite evidence of the potential reason. According to the National Science Foundation, the discontinuity has much more to do with the way companies responded to the SIRD (survey conducted up to 2007), than with changes in the way the data are collected in the new and current survey (BRDIS). Given the drop in the number of FTE scientists and engineers between the last (2007) cycle of SIRD and the first (2008) cycle of BRDIS, it is suspected that SIRD respondents, although instructed to do otherwise, reported headcounts for this item. NSF and Census are working with this issue and do not have a definite answer yet.

When necessary, different methods such as interpolation have been used in the case of some industries to complete the database. In order to split some sector into its subsectors, other assumptions need to be done, as the use of previous/next years' structure, the use of BERD/Researchers ratio of a higher sectoral aggregated, the use of BERD structure, etc. Also information coming from OECD Research and Development Statistics has been used to fill some blanks in the database, although this database is still classified following ISIC Rev. 3.

For the initial years (1995-1998), as the survey results offer less industry detail, the growth rates of a higher sectoral aggregated is sometimes applied to estimate some non-available industries. This estimate is then re-adjusted to the official totals.

In 2015 both, OECD and Eurostat, have changed their policy with respect to the previous years, now publishing in their R&D databases for the first time the researchers' figures from SIRD and BRDIS without any adjustment to correct this break in the series. Hence, it was decided to follow its criteria also in the elaboration of PREDICT 2016 database. Consequently, the US researchers' dataset is complete in PREDICT 2016 database, but it must be taken into account that there is a series break in 2008.

Sector NACE 85 (Education) is not available in the US dataset. Also, ICT trade sector (NACE 4651-4652), Repair of computers and communication equipment (NACE 951) and the disaggregation into its 3-4-digits subsectors of the ICT and MC industries (except in the case of Telecommunications, NACE 61) are not available.

³⁰ The correspondences between different versions of US NAICS and ISIC Rev. 4 are available at <http://www.census.gov/eos/www/naics/concordances/concordances.html>. Ivie has also elaborated a correspondence table for ICT, MC and RS sectors (see Annex II)

Public Funding of ICT R&D

The European Union and the Member States

Sources

Government budget allocations for R&D (GBARD) from Eurostat
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=qba_nabsfin07&lang=en
Downloaded: 30-09-2016 (data last updated by Eurostat: 29-09-2016).

Science and technology – Research and development data - Total GBARD by NABS 2007 socio-economic objectives

Tailor-made extractions from the Labour Force Survey (LFS) microdata from Eurostat
Received: 12-09-2016

Hours worked by NACE sub-sector and ICT versus non-ICT occupations by country, for higher educated employees

Tailor-made extractions from the Structure of Earnings Survey (SES) microdata from Eurostat
Received: 26-09-2016 for the years 2006 and 2010
Received: 20-10-2016 for the year 2014

Mean hourly wages by NACE sub-sector and ICT versus non-ICT occupations by country, for higher educated employees; and mean hourly wages for ICT versus non-ICT occupations by country for higher educated employees

United States

Public Funding of ICT R&D by NABS chapters in the United States is estimated by applying a procedure similar to that of the European Union. The main difference is that the procedure has to be slightly modified due to the need of using correspondences between the industry and occupation classifications used in the US and those of the EU. Namely, the US Census Industrial Classification (CIC) is used. ICT occupations are identified on the Mid-Pacific Information and Communication Technologies Center (MPICT) definition following the Standard Occupation Classification (SOC). All US employment data (hours worked, mean hourly wages) comes from the Current Population Survey. The CIC-NABS correspondence table is defined in Table A XIII and the ICT occupations following the SOC classification are defined in Table A XII.

Sources

Government budget allocations for R&D (GBARD) from Eurostat
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=qba_nabsfin07&lang=en
Downloaded: 30-09-2016 (data last updated by Eurostat: 29-09-2016).

Science and technology – Research and development data - Total GBARD by NABS 2007 socio-economic objectives

Current Population Survey (CPS) from the Bureau of Labor Statistics (BLS) and the US Census Bureau
<http://dataferrett.census.gov/>
Downloaded: 24-11-2016

Mean hourly wages and hours worked by CIC industrial classification and SOC occupational classification, for higher educated workers

Japan

In order to estimate Public Funding of ICT R&D in Japan, the methodology developed for the EU and for the US is taken as reference, but the availability of data does not allow to calculate ICT GBARD with the level of disaggregation required. It is not possible to calculate the disaggregation by industries or by NABS chapters. Therefore, the methodology followed is not as homogeneous with the one followed for the EU countries and the US and it does not allow to estimate ICT GBARD by NABS chapters.

Japanese data comes from the Basic Survey on Wage Structure. The survey aims at obtaining a clear picture of the wage structure of employees in major industries i.e., wage distribution by type of employment, type of work, occupation, sex, age, school career, length of service and occupational career, etc. The survey is conducted every year and investigates the salary referred to June. The average salary for June (instead of the average of hourly wages) is totalized, and working hours are totalled collectively. However, data on earnings by occupation and school career is not available, as well as data on earnings by industries and occupation.

Available data to calculate the ICT R&D employment shares relies on average monthly wages and number of employees by occupation (with a 129 occupation disaggregation) and average monthly wages by school career (tertiary education: graduates of higher professional schools or junior colleges and graduates of universities). The ICT occupations chosen from the 129 occupation classification are: system engineer, programmer and computer operator.

The ICT R&D employment shares are applied to Eurostat's data of GBARD for Japan.

$$ICT_R\&D_emp_share_t = \frac{\sum_{k:ICT\ occupations} employees_t * monthly_wages_t}{\sum_{k:tertiary\ edu} employees_t * monthly_wages_t}$$

Sources

Government budget allocations for R&D (GBARD) from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=qba_nabsfin07&lang=en

Downloaded: 30-09-2016 (data last updated by Eurostat: 29-09-2016).

Science and technology – Research and development data - Total GBARD by NABS 2007 socio-economic objectives

Basic Survey on Wage Structure from the Ministry of Health, Labour and Welfare (Japan)

<http://www.mhlw.go.jp/english/database/db-l/ordinary.html>

Downloaded: 29-11-2016

Data by school career

<http://www.e->

[stat.go.jp/SG1/estat/GL08020101.do?_toGL08020101_&tstatCode=000001011429&requestSender=dsearch](http://www.e-stat.go.jp/SG1/estat/GL08020101.do?_toGL08020101_&tstatCode=000001011429&requestSender=dsearch)

Downloaded: 29-11-2016

Data by detailed occupation

Macroeconomic Variables: Gross Value Added, Gross Domestic Product and Gross Output

The European Union and the Member States

Sources

National Accounts (NA) ESA 2010 NACE-Rev.2 from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_gdp&lang=en

Downloaded: 17-10-2016

(GDP and main components (output, expenditure and income))

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_a10&lang=en

Downloaded: 14-10-2016

(Gross value added and income by A*10 industry breakdowns)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_a64&lang=en

Downloaded: 14-10-2016

(National Accounts aggregates by industry (up to NACE A*64))

National Accounts (NA) ESA 1995 NACE-Rev.2 from Eurostat

http://epp.eurostat.ec.europa.eu/portal/page/portal/national_accounts/data/database

Downloaded: 07-06-2016

(National Accounts by 10 branches – employment data)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace21_e&lang=en

Downloaded: 07-06-2016

(National Accounts by 21 branches - employment data)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace31_e&lang=en

Downloaded: 07-06-2016

(National Accounts by 38 branches - employment data)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace64_e&lang=en

Downloaded: 07-06-2016

(National Accounts by 64 branches - employment data)

National Accounts (NA) ESA 1995 NACE Rev 1.1 from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace06_c&lang=en

Downloaded: 06-11-2015

(National Accounts by 6 branches - aggregates at current prices)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace31_c&lang=en

Downloaded: 06-11-2015

(National Accounts by 31 branches - aggregates at current prices)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace38_c&lang=en

Downloaded: 06-11-2015

(National Accounts by 60 branches - aggregates at current prices)

ESA 2010 Input-Output tables

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=naio_10_cp1610&lang=en

Downloaded: 07-12-2016

ESA 1995 Input-Output tables

<http://ec.europa.eu/eurostat/web/esa-supply-use-input-tables/data/workbooks>

Downloaded: 06-11-2015

Structural Business Statistics (SBS) NACE-Rev.2 from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_sca_r2&lang=en

Downloaded: 26-09-2016

(Annual enterprise statistics for special aggregates of activities)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_ind_r2&lang=en

Downloaded: 26-09-2016

(Annual detailed enterprise statistics for industry (B-E))
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_dt_r2&lang=en
Downloaded: 26-09-2016

(Annual detailed enterprise statistics for trade (G))
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_1a_se_r2&lang=en
Downloaded: 26-09-2016

(Annual detailed enterprise statistics for services (H-N and S95))

Structural Business Statistics (SBS) NACE Rev 1.1 from Eurostat
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_2a_dade&lang=en
Downloaded: 11-11-2015

(Annual detailed enterprise statistics on manufacturing subsections DA-DE and total manufacturing)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_2a_dfdn&lang=en
Downloaded: 11-11-2015

(Annual detailed enterprise statistics on manufacturing subsections DF-DN and total manufacturing)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_3b_tr&lang=en
Downloaded: 11-11-2015

(Annual detailed enterprise statistics on trade)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_1a_se&lang=en
Downloaded: 11-11-2015

(Annual detailed enterprise statistics on services (H-K))

STructural ANalysis Database (STAN) ISIC Rev. 3.1 from OECD
<http://stats.oecd.org/Index.aspx?DataSetCode=STAN08BIS>
Downloaded: 11-11-2015

EU KLEMS Growth and Productivity Accounts ISIC Rev. 3
<http://www.euklems.net/index.html>

Downloaded: 11-11-2014

(March 2008 Release)

(November 2009 Release, updated March 2011)

World Input-Output Database ISIC Rev. 3 (WIOD)
http://www.wiod.org/new_site/database/niots.htm

Downloaded: 15-10-2015

(National Input-Output Tables, Released November 2013)

http://www.wiod.org/new_site/database/seas.htm

Downloaded: 15-10-2015

(Socio Economic Accounts, Released July 2014)

Exchange rates and PPP from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=naio_10_cp1610&lang=en
Downloaded: 19-10-2016

(Conversion factors for euro fixed series into euro/ECU)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ert_bil_eur_a&lang=en
Downloaded: 19-10-2016

(Exchange rates)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp_ind&lang=en
Downloaded: 19-10-2016

(Purchasing power parities)

Remarks

The main source of the GVA, GDP and GO NACE-Rev.2 dataset in nominal euros for the EU countries is NA from Eurostat, compiled according to the new European System of National and Regional Accounts (ESA 2010). The ESA 2010 is based on the concepts of

the 2008 SNA ('System of National Accounts 2008', Commission of the European Communities-Eurostat, International Monetary Fund, OECD, United Nations and World Bank, 2009), which provides guidelines on national accounting for all countries throughout the world. Nevertheless, it incorporates certain differences, particularly in its presentation, which is more in line with its specific use within the Union.

According to the OECD definitions, the ICT and MC sectors are defined on the basis of the NACE-Rev.2 nomenclature up to 4-digit level. Something similar occurs with Retail sale via order houses or via Internet (RS sector), excluded from the OECD definition.

The sectorial breakdown in both Eurostat and National Statistical Office (NSO) are limited to 2-digit or division level (A*10, A*21, A*38, A*64 classifications) and is not available for the first years of the period 1995-2014 for Poland, Latvia, Bulgaria and European Union, especially before 2000.

This NA disaggregation is not detailed enough to obtain the complete 4-digit datasets for the period 1995-2014. In the case of ICT sectors, direct NA information is only provided by Eurostat for sector NACE 61 (telecommunications) for all the European countries, with the exception of Malta for the entire period and Bulgaria, Latvia, Poland and EU for the first years of the period. In the case of MC sectors, only sector NACE 59-60 (audiovisual and broadcasting activities) is available in NA, with the same country exceptions as in ICT sectors.

Therefore, many additional sources of data are needed. These sources will be used to split national accounts official data up to the 4-digit level required. Hence, data included in the dataset will be coherent with the NA official statistics. The alternative data sources will be used according to a hierarchy that prioritise Eurostat, other official statistical offices and the OECD over other data.

The GVA NA data has been distributed among ICT sectors, according to the comprehensive and operational ICT sector definition, MC sectors, Retail sale via order houses or via Internet, the selected economic activities (additional sectors) and the rest of industries using GVA or production data (when the first is not available) from NSO of individual countries, previous NA ESA 1995, input-output tables, SBS statistics, EU KLEMS database, WIOD database and correspondence tables between NACE Rev 1.1 and NACE-Rev.2 and the methodology described in Mas, Robledo y Pérez (2012)³¹. The GO final dataset applies the same procedure and sources.

The majority of GO and GVA sector gaps in each Member State, especially before 2000, have been filled using percentage structure corresponding to the previous/following years, other variables (turnover), European averages and ratio GVA/GO, Turnover/GO (GVA) or growth rates of a more aggregated sector in the statistic. Croatia, Greece, Luxembourg, Malta, Bulgaria, Poland and Latvia lack official information for some industries, therefore, we recommend taking the results with caution.

In the case of GO, data by industry for European Union for the period 1995-2003 is obtained as the sum of the member countries since official data is not available.

We obtain GVA and GO dataset in PPS using purchasing power parities from Eurostat.

Additionally, we provide price indexes (implicit deflators) for GDP and GVA industries using the same sources listed above. These deflators are derived as a ratio of current price to volume series and give indication of underlying price changes. The ten deflators obtained are: GDP deflator for total economy and nine for the following NACE-Rev.2 industries: division 26 for each ICT manufacturing sector, Section C for total manufacturing and each Non-ICT manufacturing sector, division 46 for each ICT trade sector, division 47 for RS sector, Section G for total trade sector and each Non-ICT trade/RS sector, division 61 for telecommunications sector, Section J (except 61) deflator

³¹ ICT Sector Definition Transition from NACE Rev. 1.1 to NACE Rev. 2: A Methodological Note. JRC Technical Reports (2012). <http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=5919>. See in Annex II the correspondence table between NACE Rev. 1.1 and NACE Rev. 2

for each ICT services sector (except telecommunications) and MC sector, Section J for total information and communications sector, Sections H-U for total services (except trade) each Non-ICT services sector. For countries with no available data for any of them the "harmonized procedure" described in Schreyer and Dupont (2006) has been applied.

Norway

Sources

National Accounts (NA) ESA 2010 NACE-Rev.2 from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_gdp&lang=en

Downloaded: 17-10-2016

(GDP and main components (output, expenditure and income))

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_a10&lang=en

Downloaded: 14-10-2016

(Gross value added and income by A*10 industry breakdowns)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_a64&lang=en

Downloaded: 14-10-2016

(National Accounts aggregates by industry (up to NACE A*64))

National Accounts (NA) ESA 1995 NACE-Rev.2 from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_gdp_c&lang=en

Downloaded: 09-06-2016

(GDP and main components - Current prices)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace10_c&lang=en

Downloaded: 09-06-2016

(National Accounts by 10 branches - aggregates at current prices)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace21_c&lang=en

Downloaded: 09-06-2016

(National Accounts by 21 branches - aggregates at current prices)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace38_c&lang=en

Downloaded: 09-06-2016

(National Accounts by 38 branches - aggregates at current prices)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace64_c&lang=en

Downloaded: 09-06-2016

(National Accounts by 64 branches - aggregates at current prices)

National Accounts (NA) ESA 1995 NACE Rev 1.1 from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace06_c&lang=en

Downloaded: 06-11-2015

(National Accounts by 6 branches - aggregates at current prices)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace31_c&lang=en

Downloaded: 06-11-2015

(National Accounts by 31 branches - aggregates at current prices)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace38_c&lang=en

Downloaded: 06-11-2015

(National Accounts by 60 branches - aggregates at current prices)

Structural Business Statistics (SBS) NACE-Rev.2 from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_sca_r2&lang=en

Downloaded: 26-09-2016

(Annual enterprise statistics for special aggregates of activities)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_ind_r2&lang=en

Downloaded: 26-09-2016

(Annual detailed enterprise statistics for industry (B-E))

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_dt_r2&lang=en

Downloaded: 26-09-2016

(Annual detailed enterprise statistics for trade (G))

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_1a_se_r2&lang=en

Downloaded: 26-09-2016

(Annual detailed enterprise statistics for services (H-N and S95))

Structural Business Statistics (SBS) NACE Rev 1.1 from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_2a_dade&lang=en

Downloaded: 11-11-2015

(Annual detailed enterprise statistics on manufacturing subsections DA-DE and total manufacturing)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_2a_dfdn&lang=en

Downloaded: 11-11-2015

(Annual detailed enterprise statistics on manufacturing subsections DF-DN and total manufacturing)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_3b_tr&lang=en

Downloaded: 11-11-2015

(Annual detailed enterprise statistics on trade)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_1a_se&lang=en

Downloaded: 11-11-2015

(Annual detailed enterprise statistics on services (H-K))

Structural Analysis Database (STAN) ISIC Rev. 3.1 from OECD

<http://stats.oecd.org/Index.aspx?DataSetCode=STAN08BIS>

Downloaded: 11-11-2015

Exchange rates and PPP from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ert_bil_eur_a&lang=en

Downloaded: 19-10-2016

(Exchange rates)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp_ind&lang=en

Downloaded: 19-10-2016

(Purchasing power parities)

Remarks

The main source of the GVA, GDP and GO NACE-Rev.2 dataset in nominal euros for Norway is NA from Eurostat and Statistics Norway, compiled according to ESA 2010, based on the concepts of the 2008 SNA ('System of National Accounts 2008', Commission of the European Communities-Eurostat, International Monetary Fund, OECD, United Nations and World Bank, 2009), which provides guidelines on national accounting for all countries throughout the world.

According to the OECD definitions, ICT and MC sectors are defined on the basis of the NACE-Rev.2 nomenclature up to 4-digit level. Something similar occurs with RS sector, excluded from the OECD definition. In the case of GVA, the sectorial breakdown in both Eurostat and Statistics Norway are limited to 2-digit or division level (A*10, A*21, A*38, A*64 classifications).

This disaggregation is not detailed enough to obtain the complete 4-digit datasets for the period 1995-2014. In the case of ICT sectors, direct NA information is only provided by Eurostat for sector NACE 61 (telecommunications). In the case of MC sectors, only sector NACE 59-60 (audiovisual and broadcasting activities) is available in NA.

Therefore, many additional sources of data are needed to estimate each variable. These sources will be used to split national accounts official data up to the 4-digit level required. Hence, data included in the dataset will be coherent with the NA official statistics. The alternative data sources will be used according to a hierarchy that prioritise Eurostat, NSO and the OECD over other data.

The NA data has been distributed among ICT sectors according to the comprehensive and operational ICT sector definition, MC sectors, Retail sale via order houses or via Internet, the selected economic activities (additional sectors) and the rest of industries using Statistics Norway NA, previous NA ESA 1995, SBS statistics and correspondence tables between NACE Rev 1.1 and NACE-Rev.2 and the methodology described in Mas, Robledo y Pérez (2012).

The majority of sector gaps have been filled using percentage structure corresponding to the previous/following years or growth rates of a more aggregated sector in the statistic.

We obtain GVA and GO datasets in PPS using purchasing power parities from Eurostat.

Additionally, we provide price indexes (implicit deflators) for GDP and GVA industries using the same sources listed above. These deflators are derived as a ratio of current price to volume series and give indication of underlying price changes. The ten deflators obtained are: GDP deflator for total economy and nine for the following NACE-Rev.2 industries: division 26 for each ICT manufacturing sector, Section C for total manufacturing and each Non-ICT manufacturing sector, division 46 for each ICT trade sector, division 47 for RS sector, Section G for total trade sector and each Non-ICT trade/RS sector, division 61 for telecommunications sector, Section J (except 61) deflator for each ICT services sector (except telecommunications) and MC sector, Section J for total information and communications sector, Sections H-U for total services (except trade) each Non-ICT services sector. In case no information is available for any of them, the "harmonized procedure" described in Schreyer and Dupont (2006) has been applied.

Switzerland

Sources

National Accounts (NA) ESA 2010 NACE-Rev.2 from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_gdp&lang=en

Downloaded: 17-10-2016

(GDP and main components (output, expenditure and income))

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_a10&lang=en

Downloaded: 14-10-2016

(Gross value added and income by A*10 industry breakdowns)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_a64&lang=en

Downloaded: 14-10-2016

(National Accounts aggregates by industry (up to NACE A*64))

National Accounts (NA) ESA 1995 NACE-Rev.2 from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_gdp_c&lang=en

Downloaded: 09-06-2016

(GDP and main components - Current prices)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace10_c&lang=en

Downloaded: 09-06-2016

(National Accounts by 10 branches - aggregates at current prices)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace21_c&lang=en

Downloaded: 09-06-2016

(National Accounts by 21 branches - aggregates at current prices)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace38_c&lang=en

Downloaded: 09-06-2016

(National Accounts by 38 branches - aggregates at current prices)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace64_c&lang=en

Downloaded: 09-06-2016

(National Accounts by 64 branches - aggregates at current prices)

National Accounts (NA) ESA 1995 NACE Rev 1.1 from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace06_c&lang=en

Downloaded: 06-11-2015
(National Accounts by 6 branches - aggregates at current prices)
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace31_c&lang=en

Downloaded: 06-11-2015
(National Accounts by 31 branches - aggregates at current prices)
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace38_c&lang=en

Downloaded: 06-11-2015
(National Accounts by 60 branches - aggregates at current prices)

Structural Business Statistics (SBS) NACE-Rev.2 from Eurostat
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_sca_r2&lang=en
Downloaded: 26-09-2016

(Annual enterprise statistics for special aggregates of activities)
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_ind_r2&lang=en
Downloaded: 26-09-2016

(Annual detailed enterprise statistics for industry (B-E))
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_dt_r2&lang=en
Downloaded: 26-09-2016

(Annual detailed enterprise statistics for trade (G))
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_1a_se_r2&lang=en
Downloaded: 26-09-2016

(Annual detailed enterprise statistics for services (H-N and S95))

Structural Business Statistics (SBS) NACE Rev 1.1 from Eurostat
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_2a_dade&lang=en
Downloaded: 11-11-2015

(Annual detailed enterprise statistics on manufacturing subsections DA-DE and total manufacturing)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_2a_dfdn&lang=en
Downloaded: 11-11-2015

(Annual detailed enterprise statistics on manufacturing subsections DF-DN and total manufacturing)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_3b_tr&lang=en
Downloaded: 11-11-2015

(Annual detailed enterprise statistics on trade)
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_1a_se&lang=en

Downloaded: 11-11-2015
(Annual detailed enterprise statistics on services (H-K))

STructural ANalysis Database (STAN) ISIC Rev. 3.1 from OECD
<http://stats.oecd.org/Index.aspx?DataSetCode=STAN08BIS>

Downloaded: 11-11-2015

Exchange rates and PPP from Eurostat
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ert_bil_eur_a&lang=en
Downloaded: 19-10-2016

(Exchange rates)
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp_ind&lang=en
Downloaded: 19-10-2016

(Purchasing power parities)

Remarks

The main source of the GVA (and GDP) and GO NACE-Rev.2 dataset in nominal euros for Switzerland is NA from Eurostat and Bundesamt für Statistik (BFS), compiled according to ESA 2010, based on the concepts of the 2008 SNA ('System of National Accounts 2008', Commission of the European Communities-Eurostat, International Monetary Fund,

OECD, United Nations and World Bank, 2009), which provides guidelines on national accounting for all countries throughout the world.

According to the OECD definitions, the ICT and MC sectors are defined on the basis of the NACE-Rev.2 nomenclature up to 4-digit level. Something similar occurs with RS sector, excluded from the OECD definition. In the case of GVA, the sectorial breakdown in both Eurostat and NSO are limited to 2-digit or division level (A*10, A*21, A*38, A*64 classifications).

This disaggregation is not detailed enough to obtain the complete 4-digit datasets for the period 1995-2014. In the case of ICT sectors, direct NA information is only provided for sector NACE 61 (telecommunications) and sector NACE 59-60 (audiovisual and broadcasting activities) in the case of MC sectors. Therefore, many additional sources of data are needed to estimate 4-digit dataset. These sources will be used to split national accounts official data up to the 4-digit level required. Hence, data included in the dataset will be coherent with the NA official statistics. The alternative data sources will be used according to a hierarchy that prioritise Eurostat, BFS and the OECD over other data.

The NA data has been distributed among ICT sectors, according to the comprehensive and operational ICT sector definition, MC sectors, Retail sale via order houses or via Internet, the selected economic activities (additional sectors) and the rest of industries using previous ESA 1995, SBS statistics and correspondence tables between NACE Rev 1.1 and NACE-Rev.2 and the methodology described in Mas, Robledo y Pérez (2012).

The majority of sector gaps have been filled using percentage structure corresponding to the previous/following years or growth rates of a more aggregated sector in the statistic.

We obtain GVA and GO datasets in PPS using purchasing power parities coming from Eurostat.

Additionally, we provide price indexes (implicit deflators) for GDP and GVA industries using the same sources listed above. These deflators are derived as a ratio of current price to volume series and give indication of underlying price changes. The ten deflators obtained are: GDP deflator for total economy and nine for the following NACE-Rev.2 industries: division 26 for each ICT manufacturing sector, Section C for total manufacturing and each Non-ICT manufacturing sector, division 46 for each ICT trade sector, division 47 for RS sector, Section G for total trade sector and each Non-ICT trade/RS sector, division 61 for telecommunications sector, Section J (except 61) deflator for each ICT services sector (except telecommunications) and MC sector, Section J for total information and communications sector, Sections H-U for total services (except trade) each Non-ICT services sector. In case no information is available for any of them, the "harmonized procedure" described in Schreyer and Dupont (2006) has been applied.

Australia

Sources

NA from Australian Bureau of Statistics (ABS)

<http://www.abs.gov.au/AUSSTATS/abs@.nsf/allprimarymainfeatures/110953FFA28D4E52CA2572110002FF03?opendocument>

Downloaded: 26-10-2016

Australian Industry from ABS

<http://www.abs.gov.au/AUSSTATS/abs@.nsf/allprimarymainfeatures/48791677FF5B2814CA256A1D0001FEC0?opendocument>

Downloaded: 26-10-2016

Experimental Estimates for the Manufacturing Industry from ABS

<http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/8159.02009-10?OpenDocument>

Downloaded: 26-10-2016

Information and Communication Technology from ABS

<http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/8126.02006-07?OpenDocument>

Downloaded: 05-10-2015

Information Media and Telecommunications Services

<http://www.abs.gov.au/ausstats/abs@.nsf/mf/8681.0>

Downloaded: 20-10-2015

Retail and Wholesale Industries

<http://www.abs.gov.au/ausstats/abs@.nsf/mf/8622.0>

Downloaded: 20-10-2015

EU KLEMS Growth and Productivity Accounts ISIC Rev. 3

<http://www.euklems.net/index.html>

Downloaded: 11-11-2014

(March 2008 Release)

(November 2009 Release, updated March 2011)

Exchange rates and PPP from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ert_bil_eur_a&lang=en

Downloaded: 19-10-2016

(Exchange rates)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp_ind&lang=en

Downloaded: 19-10-2016

(Purchasing power parities)

PPP from OECD

<http://stats.oecd.org/Index.aspx?DataSetCode=PPPGDP>

Downloaded: 19-10-2016

(PPPs: national currency per US dollar)

Remarks

The main source of the GVA (including GDP) and GO NACE-Rev.2 datasets (in national currency) for Australia is ABS. As from December 2009, national accounts estimates are compiled according to the 2008 SNA ('System of National Accounts 2008', Commission of the European Communities-Eurostat, International Monetary Fund, OECD, United Nations and World Bank, 2009).

GVA NA information from ABS is available at ANZSIC division level (the broadest level) for all the period 1995-2014, but only since 2006 in the case of GO. The final GO dataset has been complete using EU KLEMS database. These datasets have been distributed among ICT sector, MC sector, RS sector and the rest of industries using data from Input-Output tables, Australian Industry Statistics, Experimental Estimates for the Manufacturing Industry, Information and Communication Technology Statistics, Information Media and Telecommunications Services Statistics, Retail and Wholesale Industries Statistics, provided by ABS, EU KLEMS database and correspondence tables between ANZSIC 2006 and NACE-Rev.2³².

The majority of sector gaps have been filled using percentage structure corresponding to the previous/following years or growth rates of a more aggregated sector in the statistic.

³² The correspondence between ANZSIC 2006 and ISIC Rev. 4 is available at: <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/1292.0.55.0052008?OpenDocument>. Ivie has also elaborated correspondence tables (see Annex II).

In Australia datasets, Manufacturing (divisions 10-33) excludes part of Repair and installation of machinery and equipment (division 33); Group 261 (manufacture of electronic components and boards) includes Manufacture of consumer electronics (group 264) and Manufacture of magnetic and optical media (group 268); Services, except trade (divisions 49-99) include part of Repair and installation of machinery and equipment (division 33); Repair of computers and communication equipment (group 951) include part of Repair and installation of machinery and equipment (division 33), Retail sale via mail order houses or via Internet (RS sector, class 4791), includes Other retail sale not in stores, stalls or markets (class 4799), Group 639 (Other information service activities) include Library and archives activities (class 9101).

We obtain NACE-Rev.2 datasets for GO and GVA in euros and PPS using exchange rates and purchasing power parities respectively from OECD and Eurostat.

Additionally, we provide price indexes (implicit deflators) for GDP and GVA industries using the same sources listed above. These deflators are derived as a ratio of current price to volume series and give indication of underlying price changes. The ten deflators obtained are: GDP deflator for total economy and nine for the following NACE-Rev.2 industries: division 26 for each ICT manufacturing sector, Section C for total manufacturing and each Non-ICT manufacturing sector, division 46 for each ICT trade sector, division 47 for RS sector, Section G for total trade sector and each Non-ICT trade/RS sector, division 61 for telecommunications sector, Section J (except 61) deflator for each ICT services sector (except telecommunications) and MC sector, Section J for total information and communications sector, Sections H-U for total services (except trade) each Non-ICT services sector. In case no information is available for any of them, the "harmonized procedure" described in Schreyer and Dupont (2006) has been applied.

Brazil

Sources

Annual National Accounts from Instituto Brasileiro de Geografia e Estatística (IBGE)
<http://www.ibge.gov.br/home/estatistica/economia/contasnacionais/2014/default.shtm>
Downloaded: 08-11-2016

Quarterly National Accounts from Instituto Brasileiro de Geografia e Estatística (IBGE)
<http://www.ibge.gov.br/english/estatistica/indicadores/pib/defaultcnt.shtm>
Downloaded: 08-11-2016

Annual Survey of Industry from IBGE
<http://www.ibge.gov.br/home/estatistica/pesquisas/pesquisas.php>
Downloaded: 08-11-2016

Annual Survey of Trade from IBGE
<http://www.ibge.gov.br/home/estatistica/pesquisas/pesquisas.php>
Downloaded: 08-11-2016

Annual Survey of Services from IBGE
<http://www.ibge.gov.br/home/estatistica/pesquisas/pesquisas.php>
Downloaded: 08-11-2016

World Input-Output Database ISIC Rev. 3 (WIOD)
http://www.wiod.org/new_site/database/niots.htm
Downloaded: 15-10-2015
(National Input-Output Tables, Released November 2013)
http://www.wiod.org/new_site/database/seas.htm
Downloaded: 15-10-2015

(Socio Economic Accounts, Released July 2014)

Exchange rates and PPP from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ert_bil_eur_a&lang=en

Downloaded: 19-10-2016

(Exchange rates)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp_ind&lang=en

Downloaded: 19-10-2016

(Purchasing power parities)

PPP from OECD

<http://stats.oecd.org/Index.aspx?DataSetCode=PPPGDP>

Downloaded: 19-10-2016

(PPPs: national currency per US dollar)

Remarks

The elaboration of the NACE-Rev.2 database for GVA and GO has been based on the NA (annual and quarterly) information published by IBGE in national currency. As from March 2015, national accounts estimates are compiled according to the 2008 SNA ('System of National Accounts 2008', Commission of the European Communities-Eurostat, International Monetary Fund, OECD, United Nations and World Bank, 2009).

The SNA 2008 National Accounts (CNAE 2.0) data is available for the period 1995-2014 for GVA, but only for the period 2000-2014 for GO. To complete NA GO data since 1995 we use WIOD database. Finally, the complete datasets (GO and GVA) have been distributed among ICT sectors, MC sector and the rest of industries using the surveys (Industrial, Trade and Services) provided by IBGE (in CNAE 1.0 and CNAE 2.0), WIOD database and correspondence tables between CNAE 1.0, CNAE 2.0, ISIC Rev. 3.1 (NACE Rev. 1.1) and ISIC Rev. 4 (NACE-Rev.2)³³.

The majority of sector gaps have been filled using percentage structure corresponding to the previous/following years or growth rates of a more aggregated sector in the statistic.

Brazil dataset does not include Retail sale via mail order houses or via Internet sector.

We obtain NACE-Rev.2 GVA and GO in euros and PPS using exchange rates and purchasing power parities respectively from OECD and Eurostat.

Additionally, we provide price indexes (implicit deflators) for GDP and GVA industries using the same sources listed above. These deflators are derived as a ratio of current price to volume series and give indication of underlying price changes. The ten deflators obtained are: GDP deflator for total economy and nine for the following NACE-Rev.2 industries: division 26 for each ICT manufacturing sector, Section C for total manufacturing and each Non-ICT manufacturing sector, division 46 for each ICT trade sector, division 47 for RS sector, Section G for total trade sector and each Non-ICT trade/RS sector, division 61 for telecommunications sector, Section J (except 61) deflator for each ICT services sector (except telecommunications) and MC sector, Section J for total information and communications sector, Sections H-U for total services (except trade) each Non-ICT services sector. In case no information is available for any of them, the "harmonized procedure" described in Schreyer and Dupont (2006) has been applied.

³³ The correspondences between CNAE 1.0, CNAE 2.0, ISIC Rev. 3.1 and ISIC Rev. 4 are available at: <http://www.ibge.gov.br/home/estatistica/economia/classificacoes/cnae2.0/defaulttab.shtm>. Ivie has also elaborated correspondence tables (see Annex II).

Canada

Sources

NA from Statistics Canada

<http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3840038&tabMode=dataTable&srchLan=-1&p1=-1&p2=9>

<http://www5.statcan.gc.ca/cansim/a33?RT=TABLE&themeID=2745&spMode=tables&lang=eng>

Downloaded: 11-11-2016

Annual Survey of Manufactures and Logging from Statistics Canada

<http://www5.statcan.gc.ca/cansim/a05?lang=eng&id=3010006>

Downloaded: 11-11-2016

Annual Wholesale Trade Survey from Statistics Canada

<http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=0810014&paSer=&pattern=&stByVal=1&p1=1&p2=38&tabMode=dataTable&csid=>

Downloaded: 11-11-2016

World Input-Output Database ISIC Rev. 3 (WIOD)

http://www.wiod.org/new_site/database/niots.htm

Downloaded: 15-10-2015

(National Input-Output Tables, Released November 2013)

http://www.wiod.org/new_site/database/seas.htm

Downloaded: 15-10-2015

(Socio Economic Accounts, Released July 2014)

Exchange rates and PPP from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ert_bil_eur_a&lang=en

Downloaded: 19-10-2016

(Exchange rates)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp_ind&lang=en

Downloaded: 19-10-2016

(Purchasing power parities)

PPP from OECD

<http://stats.oecd.org/Index.aspx?DataSetCode=PPPGDP>

Downloaded: 19-10-2016

(PPPs: national currency per US dollar)

Remarks

The main source of the GVA (including GDP) and GO data in national currency for Canada is National Accounts from Statistics Canada (CANSIM database), since OECD has not published any NACE-Rev.2 data yet. As from 2012, NA are compiled according to the 2008 SNA ('System of National Accounts 2008', Commission of the European Communities-Eurostat, International Monetary Fund, OECD, United Nations and World Bank, 2009).

The last National Accounts data published covers the period 2007-2013. The rest of the period, 1995-2006, has been covered with previous versions of NA and WIOD database, distributed among ICT sectors, MC sector, RS sector and the rest of industries using data from previous versions of NA, Annual Survey of Manufacturing and Logging, Annual

Wholesale Trade Survey provided by Statistics Canada, WIOD database and correspondence tables between NAICS and NACE-Rev.2³⁴.

The majority of sector gaps have been filled using percentage structure corresponding to the previous/following years or growth rates of a more aggregated sector in the statistic.

In Canada datasets, Manufacturing (divisions 10-33) excludes part of Repair and installation of machinery and equipment (division 33), Manufacture of magnetic and optical media (group 268) includes Reproduction of recorded media (class 1820), Services, except trade (divisions 49-99) includes part of Repair and installation of machinery and equipment (division 33), Repair of computers and communication equipment (group 951) include part of Repair and installation of machinery and equipment (division 33) and part of Repair of personal and household goods (group 952).

We obtain NACE-Rev.2 GVA and GO datasets in euros and PPS using exchange rates and purchasing power parities respectively from OECD and Eurostat.

Additionally, we provide price indexes (implicit deflators) for GDP and GVA industries using the same sources listed above. These deflators are derived as a ratio of current price to volume series and give indication of underlying price changes. The ten deflators obtained are: GDP deflator for total economy and nine for the following NACE-Rev.2 industries: division 26 for each ICT manufacturing sector, Section C for total manufacturing and each Non-ICT manufacturing sector, division 46 for each ICT trade sector, division 47 for RS sector, Section G for total trade sector and each Non-ICT trade/RS sector, division 61 for telecommunications sector, Section J (except 61) deflator for each ICT services sector (except telecommunications) and MC sector, Section J for total information and communications sector, Sections H-U for total services (except trade) each Non-ICT services sector. In case no information is available for any of them, the "harmonized procedure" described in Schreyer and Dupont (2006) has been applied.

China

Sources

World Input-Output Database ISIC Rev. 3 (WIOD)

http://www.wiod.org/new_site/database/niots.htm

Downloaded: 15-10-2015

(National Input-Output Tables, Released November 2013)

http://www.wiod.org/new_site/database/seas.htm

Downloaded: 15-10-2015

(Socio Economic Accounts, Released July 2014)

China Industrial Productivity (CIP) Database 3.0 from Research Institute of Economy, Trade and Industry (RIETI) and Hitotsubashi University

<http://www.rieti.go.jp/en/database/CIP2015/>

Downloaded: 17-11-2016

NA from National Bureau of Statistics of China

<http://www.stats.gov.cn/english/Statisticaldata/AnnualData/>

Downloaded: 18-11-2016

Main industrial economic indicators from National Bureau of Statistics of China

<http://www.stats.gov.cn/tjsj/ndsj/2014/indexeh.htm>

Downloaded: 18-11-2015

³⁴ The correspondence between different versions of Canadian NAICS and ISIC Rev. 4 is available at: <http://www.statcan.gc.ca/concepts/concordances-classifications-eng.htm>. Ivie has also elaborated a correspondence table for ICT sectors (see Annex II).

Statistics on Production and Management in High-tech Industry by Industrial Sector from Ministry of Science and Technology of China

<http://www.stats.gov.cn/english/Statisticaldata/AnnualData/>

Downloaded: 18-11-2015

Exchange rates and PPP from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ert_bil_eur_a&lang=en

Downloaded: 19-10-2016

(Exchange rates)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp_ind&lang=en

Downloaded: 19-10-2016

(Purchasing power parities)

PPP from OECD

<http://stats.oecd.org/Index.aspx?DataSetCode=PPPGDP>

Downloaded: 19-10-2016

(PPPs: national currency per US dollar)

Remarks

The main source of the GVA, GDP and GO series since 1995 (in national currency) for China is National Bureau of Statistics of China and WIOD ISIC Rev. 3 Database. These National Accounts estimates are still compiled according to the 1993 SNA ('System of National Accounts 1993', Commission of the European Communities-Eurostat, International Monetary Fund, OECD, United Nations and World Bank, 1993).

This information has been distributed among ICT sectors, RS sector and the rest of industries for the period 1995-2014 using the Main industrial economic indicators provided by National Bureau of Statistics of China, Statistics on Production and Management in High-tech Industry by Industrial Sector from Ministry of Science and Technology of China, CIP database provided by REITI and correspondence tables between National Economic Industrial Classification (GB/T 4754-2002), ISIC Rev. 3 and ISIC Rev. 4 (NACE-Rev.2)³⁵.

The majority of sector gaps have been filled using percentage structure corresponding to the previous/following years or growth rates of a more aggregated sector in the statistic.

China's datasets do not include ICT trade, MC and RS sectors. Manufacture of chemicals and chemical products (division 20) includes Manufacture of magnetic and optical media (group 268), Wholesale and retail trade, repair of motor vehicles and motorcycles (divisions 45-47) include Repair of personal and household goods (group 952), Services, except trade (divisions 49-99) include Remediation activities and other waste management services (division 39) and Development of building projects (group 411) and exclude Repair of personal and household goods (group 952), Transportation and storage (divisions 49-53) include Travel agency and tour operator activities (group 791), Professional, scientific, technical, administration and support service activities (divisions 69-82) excludes Travel agency and tour operator activities (group 791) and Veterinary activities (division 75), Divisions 69-75 excludes Veterinary activities (division 75), Divisions 86-88 includes Veterinary activities (division 75).

We obtain NACE-Rev.2 datasets for GO and GVA in euros and PPS using exchange rates and purchasing power parities respectively coming from OECD and Eurostat.

Additionally, we provide price indexes (implicit deflators) for GDP and GVA industries using the same sources listed above. These deflators are derived as a ratio of current price to volume series and give indication of underlying price changes. The ten deflators obtained are: GDP deflator for total economy and nine for the following NACE-Rev.2 industries: Division 26 for each ICT manufacturing sector, Section C for total

³⁵ The correspondence between Chinese SIC and ISIC Rev. 3 is available at: http://www.stats.gov.cn/tjbz/t20040210_402369833.htm

manufacturing and each Non-ICT manufacturing sector, Division 46 for each ICT trade sector, Division 47 for RS sector, Section G for total trade sector and each Non-ICT trade/RS sector, Division 61 for telecommunications sector, Section J (except 61) deflator for each ICT services sector (except telecommunications) and MC sector, Section J for total information and communications sector, Sections H-U for total services (except trade) each Non-ICT services sector. In case no information is available for any of them, the "harmonized procedure" described in Schreyer and Dupont (2006) has been applied.

India

Sources

NA from Ministry of Statistics Programme Implementation (MOSPI).

http://mospiold.nic.in/Mospi_New/upload/St%2027%20Annual_estimates_current2011-12_31_8_2016.xls

http://mospiold.nic.in/Mospi_New/upload/NAS16/NAS16.html

Downloaded: 10-11-2016

World Input-Output Database ISIC Rev. 3 (WIOD)

http://www.wiod.org/new_site/database/niots.htm

Downloaded: 15-10-2015

(National Input-Output Tables, Released November 2013)

http://www.wiod.org/new_site/database/seas.htm

Downloaded: 15-10-2015

(Socio Economic Accounts, Released July 2014)

Annual Survey of Industries from MOSPI

http://mospi.nic.in/mospi_new/site/inner.aspx?status=3&menu_id=56

Downloaded: 10-11-2016

Value added & employment generation in the ICT sector in India from MOSPI

http://mospi.nic.in/mospi_new/upload/val_add ICT 21june11.pdf

Downloaded: 10-11-2016

Exchange rates and PPP from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ert_bil_eur_a&lang=en

Downloaded: 19-10-2016

(Exchange rates)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp_ind&lang=en

Downloaded: 19-10-2016

(Purchasing power parities)

PPP from OECD

<http://stats.oecd.org/Index.aspx?DataSetCode=PPPGBP>

Downloaded: 19-10-2016

(PPPs: national currency per US dollar)

Remarks

The main source of the GVA and GO data (in national currency) for India is NA from MOSPI. As from January 2015, NA estimates are compiled according to the latest recommendations of SNA 2008 ('System of National Accounts 2008', Commission of the European Communities-Eurostat, International Monetary Fund, OECD, United Nations and World Bank, 2009).

This new information only covers period 2006-2014. Prior to 2006 WIOD database has been used to extrapolate the series backwards to 1995. This information has been distributed among ICT sectors, MC sectors and the rest of selected industries using Annual Survey of Industry, Value added & employment generation in the ICT sector in India provided by MOSPI. This last source gives the 2008 National Industry Classification (NIC) codes for ICT sectors following the 2007 definition of OECD, which coincide exactly with those of NACE-Rev.2³⁶. India GVA dataset does not include ICT trade and RS sector.

We obtain NACE-Rev.2 datasets for GVA and GO in euros and PPS using exchange rates and purchasing power parities respectively coming from OECD and Eurostat.

Additionally, we provide price indexes (implicit deflators) for GDP and GVA industries using the same sources listed above. These deflators are derived as a ratio of current price to volume series and give indication of underlying price changes. The ten deflators obtained are: GDP deflator for total economy and nine for the following NACE-Rev.2 industries: division 26 for each ICT manufacturing sector, Section C for total manufacturing and each Non-ICT manufacturing sector, division 46 for each ICT trade sector, division 47 for RS sector, Section G for total trade sector and each Non-ICT trade/RS sector, division 61 for telecommunications sector, Section J (except 61) deflator for each ICT services sector (except telecommunications) and MC sector, Section J for total information and communications sector, Sections H-U for total services (except trade) each Non-ICT services sector. In case no information is available for any of them, the "harmonized procedure" described in Schreyer and Dupont (2006) has been applied.

Japan

Sources

Japan Industrial Productivity (JIP) from Research Institute of Economy, Trade and Industry (RIETI) and Hitotsubashi University

<http://www.rieti.go.jp/en/database/JIP2015/index.html>

Downloaded: 8-12-2015

NA from Economic and Social Research Institute (ESRI), Cabinet Office

http://www.esri.cao.go.jp/en/sna/data/kakuhou/files/2013/27annual_report_e.html

Downloaded: 15-07-2016

Annual manufacturing census from Economic and Industrial Policy Bureau, Ministry of Economy, Trade and Industry (METI)

<http://www.meti.go.jp/english/statistics/tyo/kougyo/index.html>

Downloaded: 14-07-2016

Survey of selected services industries from METI

<http://www.meti.go.jp/english/statistics/tyo/tokusabizi/index.html>

Downloaded: 14-10-2015

Structural Business Statistics ISIC Rev. 4 from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=SSIS_BSC_ISIC4

Downloaded: 15-07-2016

EU KLEMS Growth and Productivity Accounts ISIC Rev. 3

<http://www.euklems.net/index.html>

Downloaded: 11-11-2014

(March 2008 Release)

(November 2009 Release, updated March 2011)

³⁶ The structure of NIC 2008 is identical to the structure of ISIC Rev. 4 up to 4-digit level (class). NIC 2008 is available at: http://mospi.nic.in/Mospi_New/site/inner.aspx?status=2&menu_id=129.

Exchange rates and PPP from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ert_bil_eur_a&lang=en

Downloaded: 19-10-2016

(Exchange rates)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp_ind&lang=en

Downloaded: 19-10-2016

(Purchasing power parities)

PPP from OECD

<http://stats.oecd.org/Index.aspx?DataSetCode=PPPGDP>

Downloaded: 19-10-2016

(PPPs: national currency per US dollar)

Remarks

The main source of the GO and GVA in national currency for Japan is JIP Database provided by RIETI and Hitotsubashi University. The data contained in the JIP Database are still consistent with the 1993 SNA ('System of National Accounts 1993', Commission of the European Communities-Eurostat, International Monetary Fund, OECD, United Nations and World Bank, 1993). The JIP Database forms part of the World Input-Output Database (WIOD) project. This dataset uses its own industry classification, distinguishing 108 industries, covering the whole of the Japanese economy.

The JIP database covers the period 1995-2012 for both variables. These datasets have been distributed among ICT sector, MC sectors and the rest of industries using Annual manufacturing census provided by METI, Survey on Selected Service Industries provided by METI, Structural Business Statistics (OECD), EU KLEMS database and correspondence tables between JIP codes, Japan Standard Industrial Classification (JSIC), ISIC Rev. 3 (NACE Rev. 1) and ISIC Rev. 4 (NACE-Rev.2)³⁷. NA has been used to extrapolate the GO and value added series forwards to 2014.

The majority of sector gaps have been filled using percentage structure corresponding to the previous/following years or growth rates of a more aggregated sector in the statistic.

Japan's datasets do not include RS sector, ICT sector NACE 951 (Repair of computers and communication equipment), and NACE 62 (Computer programming, consultancy and related activities) includes ICT sector NACE 5820 (Software publishing).

We obtain NACE-Rev.2 datasets for GO and GVA in euros and PPS using exchange rates and purchasing power parities respectively coming from OECD and Eurostat.

Additionally, we provide price indexes (implicit deflators) for GDP and GVA industries using the same sources listed above. These deflators are derived as a ratio of current price to volume series and give indication of underlying price changes. The ten deflators obtained are: GDP deflator for total economy and nine for the following NACE-Rev.2 industries: division 26 for each ICT manufacturing sector, Section C for total manufacturing and each Non-ICT manufacturing sector, division 46 for each ICT trade sector, division 47 for RS sector, Section G for total trade sector and each Non-ICT trade/RS sector, division 61 for telecommunications sector, Section J (except 61) deflator for each ICT services sector (except telecommunications) and MC sector, Section J for total information and communications sector, Sections H-U for total services (except trade) each Non-ICT services sector. In case no information is available for any of them, the "harmonized procedure" described in Schreyer and Dupont (2006) has been applied.

³⁷ The correspondences between JIP codes, JSIC, ISIC Rev. 3 and ISIC Rev. 4 are available at:
http://www.rieti.go.jp/en/database/d05_data/03-6.pdf
http://www.euklems.net/data/nace2/JPN_Sources_12i.pdf
<http://www.stat.go.jp/english/index/seido/sangyo/index07.htm>
Ivie has also elaborated correspondence tables (see Annex II)

South Korea

Sources

NA from Bank of South Korea

http://ecos.bok.or.kr/flex/EasySearch_e.jsp

Downloaded: 26-07-2016

NA from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=SNA_TABLE6A

Downloaded: 23-02-2016

Structural Business Statistics ISIC Rev. 4 from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=SSIS_BSC_ISIC4

Downloaded: 27-07-2016

Mining and Manufacturing Survey from Statistics South Korea

<http://kostat.go.kr/portal/english/surveyOutlines/6/2/index.static>

Downloaded: 27-07-2016

Service Industry Survey from Statistics South Korea

<http://kostat.go.kr/portal/english/surveyOutlines/5/5/index.static>

Downloaded: 27-07-2016

Survey of Business activities from Statistics South Korea

<http://kostat.go.kr/portal/english/surveyOutlines/6/5/index.static>

Downloaded: 27-07-2016

Wholesale and Retail trade Survey from Statistics South Korea

<http://kostat.go.kr/portal/english/surveyOutlines/5/2/index.static>

Downloaded: 27-07-2016

EU KLEMS Growth and Productivity Accounts ISIC Rev. 3

<http://www.euklems.net/index.html>

Downloaded: 11-11-2014

(March 2008 Release)

(November 2009 Release, updated March 2011)

Exchange rates and PPP from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ert_bil_eur_a&lang=en

Downloaded: 19-10-2016

(Exchange rates)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp_ind&lang=en

Downloaded: 19-10-2016

(Purchasing power parities)

PPP from OECD

<http://stats.oecd.org/Index.aspx?DataSetCode=PPPGDP>

Downloaded: 19-10-2016

(PPPs: national currency per US dollar)

Remarks

The main source of the GVA and GO data (in national currency) for South Korea is NA from Bank of South Korea and NA from OECD. The NA data published by Bank of South Korea from Spring 2014 onwards is in accordance with the SNA 2010 recommendations ('System of National Accounts 2008', Commission of the European Communities-Eurostat, International Monetary Fund, OECD, United Nations and World Bank, 2009).

Additional information was needed to obtain both datasets for the period 1995-2014 distinguishing ICT sectors, MC sector, RS sector and the rest of industries: Surveys (Mining and Manufacturing, Business activities, Wholesale and Retail trade and Service Industry), provided by Statistics South Korea, NA from OECD, EU KLEMS database and correspondence tables between KSIC and NACE-Rev.2³⁸. The majority of sector gaps have been filled using percentage structure corresponding to the previous/following years or growth rates of a more aggregated sector in the statistic.

Transportation and storage (divisions 19-53) excludes postal and courier activities (division 53), because this sector is included in NACE 61 sector (Telecommunications).

We obtain NACE-Rev.2 datasets (GVA and GO) in euros and PPS using exchange rates and purchasing power parities respectively from OECD and Eurostat

Russia

Sources

National Accounts NACE Rev. 1.1 from Federal State Statistic Service of Russian Federation (Rosstat)

http://www.gks.ru/free_doc/new_site/vvp/vvp-god/tab1.htm

http://www.gks.ru/free_doc/new_site/vvp/vvp-god/tab10.htm

http://www.gks.ru/free_doc/new_site/vvp/vvp-god/tab10a.htm

http://www.gks.ru/free_doc/new_site/vvp/tab37.xls

Downloaded: 23-11-2016

Structural Business Statistics ISIC Rev. 3 from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=SSIS_BSC

Downloaded: 23-11-2016

World Input-Output Database ISIC Rev. 3 (WIOD)

http://www.wiod.org/new_site/database/niots.htm

Downloaded: 15-10-2015

(National Input-Output Tables, Released November 2013)

http://www.wiod.org/new_site/database/seas.htm

Downloaded: 15-10-2015

(Socio Economic Accounts, Released July 2014)

Exchange rates and PPP from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ert_bil_eur_a&lang=en

Downloaded: 19-10-2016

(Exchange rates)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp_ind&lang=en

Downloaded: 19-10-2016

(Purchasing power parities)

PPP from OECD

<http://stats.oecd.org/Index.aspx?DataSetCode=PPPGDP>

Downloaded: 19-10-2016

(PPPs: national currency per US dollar)

³⁸ The correspondences between KSIC and ISIC Rev. 4 are available at:

<http://www.kostat.go.kr/kssc/attach/data/data161.xls>

<http://kostat.go.kr/kssc/main/MainAction.do?method=sub&catgrp=ekssc&catid1=ekssc01>

<http://kostat.go.kr/portal/english/help/1/index.board?bmode=read&aSeq=249244&pageNo=33&rowNum=10&amSeq=&sTarget=&sTxt=>. Ivie has also elaborated correspondence tables (see Annex II)

Remarks

The main source of the GVA (and GO) by industry (in national currency) for Russia is National Accounts from Federal State Statistic Service of Russian Federation (Rosstat). The new NA estimates published in October 2016 are in accordance with the SNA 2010 recommendations ('System of National Accounts 2008', Commission of the European Communities-Eurostat, International Monetary Fund, OECD, United Nations and World Bank, 2009), but only for years 2014 and 2015. Prior to 2014 there are some breaks in time series: NA data are still compiled according to the 1993 SNA and only period 2011-2013 incorporates improvements in the estimation by industries.

NA data by industry published by Rosstat only covers period 2002-2014. WIOD database has been used to extrapolate the series (GVA and GO by industry) backward to 1995. These datasets has been distributed among ICT sectors, MC sectors, RS sector and the rest of activities using Structural Business Statistics ISIC Rev. 3 (OECD) and the correspondence table between NACE Rev. 1.1 and NACE-Rev.2.

The majority of sector gaps have been filled using percentage structure corresponding to the previous/following years or growth rates of a more aggregated sector in the statistic.

Russia datasets do not include ICT trade sector, Manufacture of chemicals and chemical products (division 20) includes Manufacture of magnetic and optical media (group 268), Manufacture of electronic components and boards (group 261) includes Manufacture of communication equipment (group 263), Computer programming, consultancy and related activities (division 62) includes Software Publishing (group 582), Services, except trade (divisions 49-99) includes Development of building projects (group 411), Transportation and storage (divisions 49-53) includes Travel agency and tour operator activities (group 791), Professional, scientific, technical, administration and support service activities (divisions 69-82) exclude Travel agency and tour operator activities (group 791) and Class 5911 include Motion picture, video and television programme post-production activities (class 5912) and Motion picture, video and television programme distribution activities (class 5913).

We obtain NACE-Rev.2 datasets for GO and GVA in euros and PPS using exchange rates and purchasing power parities respectively from OECD and Eurostat.

Additionally, we provide price indexes (implicit deflators) for GDP and GVA industries using the same sources listed above. Theses deflators are derived as a ratio of current price to volume series and give indication of underlying price changes. The ten deflators obtained are: GDP deflator for total economy and nine for the following NACE-Rev.2 industries: division 26 for each ICT manufacturing sector, Section C for total manufacturing and each Non-ICT manufacturing sector, division 46 for each ICT trade sector, division 47 for RS sector, Section G for total trade sector and each Non-ICT trade/RS sector, division 61 for telecommunications sector, Section J (except 61) deflator for each ICT services sector (except telecommunications) and MC sector, Section J for total information and communications sector, Sections H-U for total services (except trade) each Non-ICT services sector. In case no information is available for any of them, the "harmonized procedure" described in Schreyer and Dupont (2006) has been applied.

Taiwan

Sources

NA from National Statistics of Taiwan

<http://ebas1.ebas.gov.tw/pxweb/Dialog/statfile1L.asp>

Downloaded: 16-11-2016

Input-Output tables from National Statistics of Taiwan

<http://eng.stat.gov.tw/lp.asp?ctNode=1650&CtUnit=799&BaseDSD=7&MP=5>

Downloaded: 16-11-2016

Census Statistics from National Statistics of Taiwan

<http://eng.stat.gov.tw/lp.asp?ctNode=1624&CtUnit=774&BaseDSD=7&mp=5>

Downloaded: 16-11-2016

World Input-Output Database ISIC Rev. 3 (WIOD)

http://www.wiod.org/new_site/database/niots.htm

Downloaded: 15-10-2015

(National Input-Output Tables, Released November 2013)

http://www.wiod.org/new_site/database/seas.htm

Downloaded: 15-10-2015

(Socio Economic Accounts, Released July 2014)

Exchange rates and PPP from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ert_bil_eur_a&lang=en

Downloaded: 19-10-2016

(Exchange rates)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp_ind&lang=en

Downloaded: 19-10-2016

(Purchasing power parities)

PPP from OECD

<http://stats.oecd.org/Index.aspx?DataSetCode=PPPGDP>

Downloaded: 19-10-2016

(PPPs: national currency per US dollar)

Remarks

The elaboration of the NACE-Rev.2 databases for GO and GVA (including GDP) for Taiwan has been based on NA information by industry provided by National Statistics of Taiwan (Directorate of Budget, Accounting and Statistics (DGBAS) of Executive Yuan). The NA data published by DGBAS from November 2014 onwards are based on the 2008 SNA ('System of National Accounts 2008', Commission of the European Communities-Eurostat, International Monetary Fund, OECD, United Nations and World Bank, 2009).

The National Accounts data are available for the period 1995-2014, and has been distributed among ICT sectors, MC sectors, RS sector and the rest of activities using Input-Output tables, Census Statistics provided by National Statistics of Taiwan, WIOD database and correspondence tables between Standard Industrial Classification (SIC) of Taiwan and ISIC Rev. 4 (NACE-Rev.2) and between NACE Rev. 1.1 and NACE-Rev.2.

The majority of sector gaps have been filled using percentage structure corresponding to the previous/following years or growth rates of a more aggregated sector in the statistic.

Taiwan datasets (GO and GVA) do not include ICT trade sector, Services, except trade (divisions 49-99) include Development of building projects (group 411), Repair of computers and communication equipment (group 951) includes Repair of consumer electronics (class 9521). In addition, NACE 4791 (Retail sale via mail order houses or via Internet) includes Other retail sale not in stores, stalls or markets (NACE class 4799), as there is not enough information to separate these activities.

We obtain NACE-Rev.2 datasets in euros and PPS using exchange rates and purchasing power parities respectively coming from IMF and Eurostat.

Additionally, we provide price indexes (implicit deflators) for GDP and GVA industries using the same sources listed above. These deflators are derived as a ratio of current price to volume series and give indication of underlying price changes. The ten deflators obtained are: GDP deflator for total economy and nine for the following NACE-Rev.2 industries: division 26 for each ICT manufacturing sector, Section C for total manufacturing and each Non-ICT manufacturing sector, division 46 for each ICT trade

sector, division 47 for RS sector, Section G for total trade sector and each Non-ICT trade/RS sector, division 61 for telecommunications sector, Section J (except 61) deflator for each ICT services sector (except telecommunications) and MC sector, Section J for total information and communications sector, Sections H-U for total services (except trade) each Non-ICT services sector. In case no information is available for any of them, the "harmonized procedure" described in Schreyer and Dupont (2006) has been applied.

United States

Sources

NA from Bureau of Economic Analysis (BEA)

http://www.bea.gov/industry/gdpbyind_data.htm

Downloaded: 13-07-2016

NA ISIC Rev. 4 from OECD

<http://stats.oecd.org/Index.aspx?DataSetCode=STANI4>

Downloaded: 26-06-2016

Industry Productivity and Costs from Bureau of Labor Statistics (BLS)

<http://www.bls.gov/lpc/>

Downloaded: 29-06-2016

Exchange rates and PPP from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ert_bil_eur_a&lang=en

Downloaded: 19-10-2016

(Exchange rates)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp_ind&lang=en

Downloaded: 19-10-2016

(Purchasing power parities)

PPP from OECD

<http://stats.oecd.org/Index.aspx?DataSetCode=PPPGDP>

Downloaded: 19-10-2016

(PPPs: national currency per US dollar)

Remarks

The elaboration of the NACE-Rev.2 database for GO and GVA distributed among ICT, MC, RS and the rest of activities for United States have been based on NAICS NA (Gross Domestic Product by Industry) provided by BEA, compiled according to the 2008 SNA ('System of National Accounts 2008', Commission of the European Communities-Eurostat, International Monetary Fund, OECD, United Nations and World Bank, 2009), NA ISIC Rev. 4 provided by OECD and correspondence tables between NAICS and ISIC Rev. 4³⁹.

BEA has adopted the 2008 SNA in the 2013 Comprehensive Revision of the National Income and Product Accounts. The NA data published from September 2013 onwards has been based on 2008 SNA.

However, the information available in NA (Industry Economic Accounts) of the BEA, generally available at three levels of detail: sector (15 industry groups), summary (71 industry groups), and detail (389 industry groups), does not cover the years 1995, 1996 and 1997 at detail level. Thus, the figures corresponding to these years have been estimated using sectorial structures from the next years.

³⁹ The correspondences between different versions of US NAICS and ISIC Rev. 4 are available at <http://www.census.gov/eos/www/naics/concordances/concordances.html>. Ivie has also elaborated correspondence tables (see Annex II)

United States datasets (GO and GVA) does not contain information for the ICT trade sector, Manufacturing (divisions 10-33) excludes part of Repair and installation of machinery and equipment (division 33), Manufacture of magnetic and optical media (group 268) includes Reproduction of recorded media (class 1820), Services, except trade (divisions 49-99) includes part of Repair and installation of machinery and equipment (division 33), and Repair of computers and communication equipment (group 951) includes part of Repair and installation of machinery and equipment (division 33) and part of Repair of personal and household goods (group 952), Satellite telecommunications activities (group 613) include Other telecommunications activities (group 619) and Computer facilities management activities (class 6203) include Other information technology and computer service activities (class 6209). Publishing of directories and mailing lists (class 5812) include Other publishing activities (class 5819).

We obtain NACE-Rev.2 datasets in euros and PPS using exchange rates and purchasing power parities respectively coming from OECD and Eurostat.

Additionally, we provide price indexes (implicit deflators) for GDP and GVA industries using the same sources listed above. These deflators are derived as a ratio of current price to volume series and give indication of underlying price changes. The ten deflators obtained are: GDP deflator for total economy and nine for the following NACE-Rev.2 industries: division 26 for each ICT manufacturing sector, Section C for total manufacturing and each Non-ICT manufacturing sector, division 46 for each ICT trade sector, division 47 for RS sector, Section G for total trade sector and each Non-ICT trade/RS sector, division 61 for telecommunications sector, Section J (except 61) deflator for each ICT services sector (except telecommunications) and MC sector, Section J for total information and communications sector, Sections H-U for total services (except trade) each Non-ICT services sector. In case no information is available for any of them, the "harmonized procedure" described in Schreyer and Dupont (2006) has been applied.

Employment and Hours Worked

The European Union and the Member States

Sources

National Accounts (NA) ESA 2010 NACE-Rev.2 from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_a10_e&lang=en

Downloaded: 14-10-2016

(Employment by A*10 industry breakdowns)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_a64_e&lang=en

Downloaded: 14-10-2016

(National Accounts employment data by industry (up to NACE A*64))

National Accounts (NA) ESA 1995 NACE-Rev.2 from Eurostat

http://epp.eurostat.ec.europa.eu/portal/page/portal/national_accounts/data/database

Downloaded: 07-06-2016

(National Accounts by 10 branches – employment data)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace21_e&lang=en

Downloaded: 07-06-2016

(National Accounts by 21 branches - employment data)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace31_e&lang=en

Downloaded: 07-06-2016

(National Accounts by 38 branches - employment data)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace64_e&lang=en

Downloaded: 07-06-2016

(National Accounts by 64 branches - employment data)

National Accounts (NA) ESA 1995 NACE Rev. 1.1 from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace06_e&lang=en

Downloaded: 06-11-2015

(National Accounts by 6 branches - employment data)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace31_e&lang=en

Downloaded: 06-11-2015

(National Accounts by 31 branches - employment data)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace60_e&lang=en

Downloaded: 06-11-2015

(National Accounts by 60 branches - employment data)

Structural Business Statistics (SBS) NACE-Rev.2 from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_sca_r2&lang=en

Downloaded: 26-09-2016

(Annual enterprise statistics for special aggregates of activities)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_ind_r2&lang=en

Downloaded: 26-09-2016

(Annual detailed enterprise statistics for industry (B-E))

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_dt_r2&lang=en

Downloaded: 26-09-2016

(Annual detailed enterprise statistics for trade (G))

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_1a_se_r2&lang=en

Downloaded: 26-09-2016

(Annual detailed enterprise statistics for services (H-N and S95))

Structural Business Statistics (SBS) NACE Rev 1.1 from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_2a_dade&lang=en

Downloaded: 11-11-2015

(Annual detailed enterprise statistics on manufacturing subsections DA-DE and total manufacturing)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_2a_dfdn&lang=en

Downloaded: 11-11-2015

(Annual detailed enterprise statistics on manufacturing subsections DF-DN and total manufacturing)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_3b_tr&lang=en

Downloaded: 11-11-2015

(Annual detailed enterprise statistics on trade)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_1a_se&lang=en

Downloaded: 11-11-2015

(Annual detailed enterprise statistics on services (H-K))

STructural ANalysis Database (STAN) ISIC Rev. 3.1 from OECD

<http://stats.oecd.org/Index.aspx?DataSetCode=STAN08BIS>

Downloaded: 11-11-2015

EU KLEMS Growth and Productivity Accounts ISIC Rev. 3

<http://www.euklems.net/index.html>

Downloaded: 11-11-2014

(March 2008 Release)

(November 2009 Release, updated March 2011)

World Input-Output Database ISIC Rev. 3 (WIOD)

http://www.wiod.org/new_site/database/seas.htm

Downloaded: 15-10-2015

(Socio Economic Accounts, Released July 2014)

Labour Force Statistics (LFS) NACE-Rev.2 from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfsa_egana2&lang=en

Downloaded: 07-10-2016

(Employment by sex, age groups and economic activity (section level))

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfsa_egana22d&lang=en

Downloaded: 07-10-2016

(Employment by sex, age groups and detailed economic activity (division level))

Eurostat special data request

Downloaded: 26-07-2016

(Employment by economic activity (section, division and group))

(Hours worked by economic activity (section, division and group))

Labour Force Statistics (LFS) NACE Rev. 1.1 from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfsq_egana&lang=en

Downloaded: 30-11-2015

(Employment by sex, age groups and economic activity (section level))

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfsq_egana2d&lang=en

Downloaded: 30-11-2015

(Employment by sex, age groups and detailed economic activity (division level))

Eurostat special data request

Downloaded: 26-07-2016

(Employment by economic activity (section, division and group))

(Hours worked by economic activity (section, division and group))

Remarks

The main source of the employment (in persons) and hours worked NACE-Rev.2 datasets for the EU and its Members States is NA from Eurostat, compiled according to the new European System of National and Regional Accounts (ESA 2010). The ESA 2010 is based on the concepts of the 2008 SNA ('System of National Accounts 2008', Commission of

the European Communities-Eurostat, International Monetary Fund, OECD, United Nations and World Bank, 2009), which provides guidelines on national accounting for all countries throughout the world. It nevertheless incorporates certain differences, particularly in its presentation, which is more in line with its specific use within the Union.

According to the OECD definitions, the ICT and MC sectors are defined on the basis of the NACE-Rev.2 nomenclature up to 4-digit level. Something similar occurs with Retail sale via order houses or via Internet (RS sector), excluded from the OECD definition.

The employment sectorial breakdown in both Eurostat and National Statistical Office (NSO) are limited to 2-digit or division level (A*10, A*21, A*38, A*64 classifications) and is not available for the complete period 1995-2014 for Poland, Ireland, Latvia, Luxembourg, Bulgaria and European Union, especially before 2000 and for Croatia no data is available previous to 2008. In the case of hours worked the same countries plus Belgium, Estonia, Malta and Hungary lack NA data. In Hungary, the information is only available for the period 2010-2014 at A*64 classification and A*10 for the rest of the period.

This NA disaggregation is not detailed enough to obtain the complete 4-digit datasets, where possible, for the period 1995-2014. In the case of ICT sectors, direct NA information is only provided by Eurostat for sector NACE 61 (telecommunications) for all the European countries, with the exception of the countries listed above. In the case of MC sectors, only sector NACE 59-60 (audiovisual and broadcasting activities) is available in NA, with the same country exceptions as in ICT sectors.

Therefore, many additional sources of data are needed to obtain a complete database. These sources will be used to split national accounts official data up to the 4-digit level required, where possible, and extrapolate country series backwards 1995. Hence, data included in the dataset will be coherent with the NA official statistics. The alternative data sources will be used according to a hierarchy that prioritise Eurostat, other official statistical offices and the OECD over other data.

The NA Employment data for the period 1995-2014 has been distributed among ICT sectors, according to the comprehensive and operational ICT sector definition, MC sectors, Retail sale via order houses or via Internet, the selected economic activities (additional sectors) and the rest of industries using employment or jobs (employed or employee) from NSO of individual countries, previous NA ESA 1995, SBS and LFS, EU KLEMS database, WIOD database, correspondence tables between NACE Rev 1.1 and NACE-Rev.2 and the methodology described in Mas, Robledo y Pérez (2012)⁴⁰. SBS only provides number of employed person data for France since 2010. The hours worked final dataset applies the same procedure and sources used in employment. SBS only offers number of hours worked by employees for manufacturing sectors.

The majority of sector gaps in each Member State, especially before 2000, have been filled using percentage structures corresponding to the previous/following years, European averages, ratio hours worked/employment or growth rates of a more aggregated sector in the statistic. The European countries listed above lack official information for some industries, therefore, we recommend taking the results with caution.

Norway

Sources

National Accounts (NA) ESA 2010 NACE-Rev.2 from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_a10_e&lang=en

Downloaded: 14-10-2016

⁴⁰ ICT Sector Definition Transition from NACE Rev. 1.1 to NACE Rev. 2: A Methodological Note. JRC Technical Reports (2012). <http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=5919>. See in Annex II the correspondence table between NACE Rev. 1.1 and NACE Rev. 2

(Employment by A*10 industry breakdowns)
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_a64_e&lang=en
Downloaded: 14-10-2016
(National Accounts employment data by industry (up to NACE A*64))

National Accounts (NA) ESA 1995 NACE-Rev.2 from Eurostat
http://epp.eurostat.ec.europa.eu/portal/page/portal/national_accounts/data/database
Downloaded: 07-06-2016
(National Accounts by 10 branches – employment data)
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace21_e&lang=en
Downloaded: 07-06-2016
(National Accounts by 21 branches - employment data)
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace31_e&lang=en
Downloaded: 07-06-2016
(National Accounts by 38 branches - employment data)
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace64_e&lang=en
Downloaded: 07-06-2016
(National Accounts by 64 branches - employment data)

National Accounts (NA) ESA 1995 NACE Rev. 1.1 from Eurostat
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace06_e&lang=en
Downloaded: 06-11-2015
(National Accounts by 6 branches - employment data)
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace31_e&lang=en
Downloaded: 06-11-2015
(National Accounts by 31 branches - employment data)
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace60_e&lang=en
Downloaded: 06-11-2015
(National Accounts by 60 branches - employment data)

Structural Business Statistics (SBS) NACE-Rev.2 from Eurostat
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_sca_r2&lang=en
Downloaded: 26-09-2016
(Annual enterprise statistics for special aggregates of activities)
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_ind_r2&lang=en
Downloaded: 26-09-2016
(Annual detailed enterprise statistics for industry (B-E))
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_dt_r2&lang=en
Downloaded: 26-09-2016
(Annual detailed enterprise statistics for trade (G))
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_1a_se_r2&lang=en
Downloaded: 26-09-2016
(Annual detailed enterprise statistics for services (H-N and S95))

Structural Business Statistics (SBS) NACE Rev 1.1 from Eurostat
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_2a_dade&lang=en
Downloaded: 11-11-2015
(Annual detailed enterprise statistics on manufacturing subsections DA-DE and total manufacturing)
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_2a_dfdn&lang=en
Downloaded: 11-11-2015
(Annual detailed enterprise statistics on manufacturing subsections DF-DN and total manufacturing)
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_3b_tr&lang=en
Downloaded: 11-11-2015
(Annual detailed enterprise statistics on trade)
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_1a_se&lang=en

Downloaded: 11-11-2015

(Annual detailed enterprise statistics on services (H-K)
SStructural ANALysis Database (STAN) ISIC Rev. 3.1 from OECD
<http://stats.oecd.org/Index.aspx?DataSetCode=STAN08BIS>

Downloaded: 11-11-2015

Labour Force Statistics (LFS) NACE-Rev.2 from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfsa_egan2&lang=en

Downloaded: 07-10-2016

(Employment by sex, age groups and economic activity (section level))

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfsa_egan22d&lang=en

Downloaded: 07-10-2016

(Employment by sex, age groups and detailed economic activity (division level))

Eurostat special data request

Downloaded: 26-07-2016

(Employment by economic activity (section, division and group))

(Hours worked by economic activity (section, division and group))

Labour Force Statistics (LFS) NACE Rev. 1.1 from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfsq_egana&lang=en

Downloaded: 30-11-2015

(Employment by sex, age groups and economic activity (section level))

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfsq_egana2d&lang=en

Downloaded: 30-11-2015

(Employment by sex, age groups and detailed economic activity (division level))

Eurostat special data request

Downloaded: 26-07-2016

(Employment by economic activity (section, division and group))

(Hours worked by economic activity (section, division and group))

Remarks

The main source of the employment (in persons) and hours worked NACE-Rev.2 datasets for Norway is NA from Eurostat and Statistics Norway, compiled according to the new European System of National and Regional Accounts (ESA 2010). The ESA 2010 is based on the concepts of the 2008 SNA ('System of National Accounts 2008', Commission of the European Communities-Eurostat, International Monetary Fund, OECD, United Nations and World Bank, 2009), which provides guidelines on national accounting for all countries throughout the world. It nevertheless incorporates certain differences, particularly in its presentation, which is more in line with its specific use within the Union.

According to the OECD definitions, the ICT and MC sectors are defined on the basis of the NACE-Rev.2 nomenclature up to 4-digit level. Something similar occurs with Retail sale via order houses or via Internet (RS sector), excluded from the OECD definition. The sectorial breakdown in both Eurostat and Statistics Norway are limited to 2-digit or division level (A*10, A*21, A*38, A*64 classifications).

This disaggregation is not detailed enough to obtain the complete 4-digit datasets. In the case of ICT sectors, direct NA Employment information is only provided for sector NACE 61 (telecommunications). In the case of MC sectors, only sector NACE 59-60 (audiovisual and broadcasting activities) is available in NA

Therefore, many additional sources of data are needed to estimate each variable. These sources will be used to split national accounts official data up to the 4-digit level required. Hence, data included in the dataset will be coherent with the NA official statistics. The alternative data sources will be used according to a hierarchy that prioritise Eurostat, NSO, other official statistical offices and the OECD over other data.

The NA Employment data has been distributed among ICT, according to the comprehensive and operational ICT sector definition, MC sector, Retail sale via order

houses or via Internet, the selected economic activities (additional sectors) and the rest of industries using employment or jobs (employed or employee) from previous NA (ESA 1995), SBS, correspondence tables between NACE Rev 1.1 and NACE-Rev.2 and the methodology described in Mas, Robledo y Pérez (2012). In order to obtain the dataset for hours worked we have followed the procedures and sources used in employment.

The majority of sector gaps in the employment and hours worked datasets have been filled using percentage structure corresponding to the previous/following years, ratio hours worked/employment or growth rates of a more aggregated sector in the statistic.

Switzerland

Sources

National Accounts (NA) ESA 2010 NACE-Rev.2 from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_a10_e&lang=en

Downloaded: 14-10-2016

(Employment by A*10 industry breakdowns)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_a64_e&lang=en

Downloaded: 14-10-2016

(National Accounts employment data by industry (up to NACE A*64))

National Accounts (NA) ESA 1995 NACE-Rev.2 from Eurostat

http://epp.eurostat.ec.europa.eu/portal/page/portal/national_accounts/data/database

Downloaded: 07-06-2016

(National Accounts by 10 branches – employment data)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace21_e&lang=en

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(National Accounts by 21 branches - employment data)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace31_e&lang=en

Downloaded: 07-06-2016

(National Accounts by 38 branches - employment data)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace64_e&lang=en

Downloaded: 07-06-2016

(National Accounts by 64 branches - employment data)

National Accounts (NA) ESA 1995 NACE Rev. 1.1 from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace06_e&lang=en

Downloaded: 06-11-2015

(National Accounts by 6 branches - employment data)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace31_e&lang=en

Downloaded: 06-11-2015

(National Accounts by 31 branches - employment data)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace60_e&lang=en

Downloaded: 06-11-2015

(National Accounts by 60 branches - employment data)

Structural Business Statistics (SBS) NACE-Rev.2 from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_sca_r2&lang=en

Downloaded: 26-09-2016

(Annual enterprise statistics for special aggregates of activities)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_ind_r2&lang=en

Downloaded: 26-09-2016

(Annual detailed enterprise statistics for industry (B-E))

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_dt_r2&lang=en

Downloaded: 26-09-2016

(Annual detailed enterprise statistics for trade (G))

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_1a_se_r2&lang=en

Downloaded: 26-09-2016
(Annual detailed enterprise statistics for services (H-N and S95))

Structural Business Statistics (SBS) NACE Rev 1.1 from Eurostat
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_2a_dade&lang=en

Downloaded: 11-11-2015
(Annual detailed enterprise statistics on manufacturing subsections DA-DE and total manufacturing)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_2a_dfdn&lang=en

Downloaded: 11-11-2015
(Annual detailed enterprise statistics on manufacturing subsections DF-DN and total manufacturing)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_3b_tr&lang=en

Downloaded: 11-11-2015
(Annual detailed enterprise statistics on trade)

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_1a_se&lang=en

Downloaded: 11-11-2015
(Annual detailed enterprise statistics on services (H-K))

STructural ANalysis Database (STAN) ISIC Rev. 3.1 from OECD

<http://stats.oecd.org/Index.aspx?DataSetCode=STAN08BIS>

Downloaded: 11-11-2015

Labour Force Statistics (LFS) NACE-Rev.2 from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfsa_egana2&lang=en

Downloaded: 07-10-2016
(Employment by sex, age groups and economic activity (section level))

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfsa_egana22d&lang=en

Downloaded: 07-10-2016
(Employment by sex, age groups and detailed economic activity (division level))

Eurostat special data request

Downloaded: 26-07-2016
(Employment by economic activity (section, division and group))
(Hours worked by economic activity (section, division and group))

Labour Force Statistics (LFS) NACE Rev. 1.1 from Eurostat

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfsq_egana&lang=en

Downloaded: 30-11-2015
(Employment by sex, age groups and economic activity (section level))

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfsq_egana2d&lang=en

Downloaded: 30-11-2015
(Employment by sex, age groups and detailed economic activity (division level))

Eurostat special data request

Downloaded: 26-07-2016
(Employment by economic activity (section, division and group))
(Hours worked by economic activity (section, division and group))

Unternehmen. Betriebszählung from Bundesamt für Statistik (BFS) of Switzerland

<http://www.bfs.admin.ch/bfs/portal/de/index/themen/06/02/blank/data.html>

(Downloaded: 02-11-2016)
(Employment by economic activity NOGA 2008)

Arbeitsvolumenstatistik (AVOL) from BFS

<http://www.bfs.admin.ch/bfs/portal/de/index/themen/06/02/blank/data.html>

(Downloaded: 02-11-2016)
(Hours worked by economic activity NOGA 2008)

Remarks

The main source of the employment (in persons) and hours worked NACE-Rev.2 datasets for Switzerland is NA from Eurostat and Bundesamt für Statistik (BFS) of Switzerland, compiled according to the new European System of National and Regional Accounts (ESA 2010). The ESA 2010 is based on the concepts of the 2008 SNA ('System of National Accounts 2008', Commission of the European Communities-Eurostat, International Monetary Fund, OECD, United Nations and World Bank, 2009), which provides guidelines on national accounting for all countries throughout the world. It nevertheless incorporates certain differences, particularly in its presentation, which is more in line with its specific use within the Union.

According to the OECD definitions, the ICT and MC sector are defined on the basis of the NACE-Rev.2 nomenclature up to 4-digit level. Something similar occurs with Retail sale via order houses or via Internet (RS sector), excluded from the OECD definition. In the case of ESA 2010 the sectorial breakdown for employment and hours worked are limited to A*10 classification and period 2000-2014.

The ESA 2010 information is not detailed enough to obtain the complete 4-digit datasets and to cover complete period 1995-2014. Many additional sources of data are needed to estimate complete disaggregation and time period. These sources will be used to split national accounts official data up to the 4-digit level required, where possible, and extrapolate the series backwards to 1995. Hence, data included in the dataset will be coherent with the NA official statistics. The alternative data sources will be used according to a hierarchy that prioritise Eurostat, NSO, other official statistical offices and the OECD over other data.

The NA Employment data has been distributed among ICT sectors, according to the comprehensive and operational ICT sector definition, MC sectors, Retail sale via order houses or via Internet, the selected economic activities (additional sectors) and the rest of industries using employment or jobs (employed or employee) from previous ESA 1995 NA (NACE-Rev.2 and NACE Rev. 1.1), SBS from Eurostat and BFS, LFS, correspondence tables between NACE Rev 1.1 and NACE-Rev.2 and the methodology described in Mas, Robledo y Pérez (2012). In order to obtain the dataset for hours worked we have followed the procedures and sources used in employment.

The majority of sector gaps in employment and hours worked datasets have been filled using percentage structure corresponding to the previous/following years, ratio hours worked/employment and growth rates or hours worked/employment ratio of a more aggregated sector in the statistic.

Australia

Sources

NA from Australian Bureau of Statistics (ABS)

<http://www.abs.gov.au/ausstats/abs@.nsf/mf/6291.0.55.003>

Downloaded: 25-10-2016

Australian Industry from ABS

<http://www.abs.gov.au/AUSSTATS/abs@.nsf/allprimarymainfeatures/48791677FF5B2814CA256A1D0001FECD?opendocument>

Downloaded: 26-10-2015

Experimental Estimates for the Manufacturing Industry from ABS

<http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/8159.02009-10?OpenDocument>

Downloaded: 26-10-2015

Information and Communication Technology from ABS
<http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/8126.02006-07?OpenDocument>
Downloaded: 05-10-2015

Information Media and Telecommunications Services
<http://www.abs.gov.au/ausstats/abs@.nsf/mf/8681.0>
Downloaded: 20-10-2015

Retail and Wholesale Industries
<http://www.abs.gov.au/ausstats/abs@.nsf/mf/8622.0>
Downloaded: 20-10-2015

EU KLEMS Growth and Productivity Accounts ISIC Rev. 3
<http://www.euklems.net/index.html>
Downloaded: 11-11-2014
(March 2008 Release)
(November 2009 Release, updated March 2011)

Remarks

Employment (persons employed) and hours worked data for Australia are taken from ABS and OECD.

Employment data from ABS is available at ANZSIC division level (the broadest level) for all the period 1995-2014, while OECD data is available for the period 2011-2013 on a more disaggregated level (A*64 classification of ISIC Rev. 4). These data have been distributed among ICT, MC, RS, the selected economic activities (additional sectors) and the rest of industries using data from Australian Industry Statistics, Experimental Estimates for the Manufacturing Industry, Information and Communication Technology Statistics, Information Media and Telecommunications Services Statistics, Retail and Wholesale Industries Statistics, provided by ABS, EU KLEMS database and correspondence tables between ANZSIC 2006 and NACE-Rev.2.

The availability of information for hours worked is similar to the employment data, as well as the procedures and sources used to obtain final dataset. In this case original data from ABS is expressed in weekly number of hours actually worked in all jobs. Assuming 52 working weeks in a year, we arrive at total number of hours worked.

The majority of sector gaps have been filled using percentage structure corresponding to the previous/following years and growth rates or hours worked/employment ratio of a more aggregated sector in the statistic.

In Australia datasets (employment and hours worked), Manufacturing (divisions 10-33) excludes part of Repair and installation of machinery and equipment (division 33); Manufacture of electronic components and boards (group 261) includes Manufacture of consumer electronics (group 264) and Manufacture of magnetic and optical media (group 268); Services, except trade (divisions 49-99) include part of Repair and installation of machinery and equipment (division 33); Repair of computers and communication equipment (group 951) include part of Repair and installation of machinery and equipment (division 33), and Retail sale via mail order houses or via Internet (RS sector, class 4791), includes Other retail sale not in stores, stalls or markets (class 4799).

Brazil

Sources

Annual National Accounts from Instituto Brasileiro de Geografia e Estatística (IBGE)
<http://www.ibge.gov.br/home/estatistica/economia/contasnacionais/2014/default.shtm>

Downloaded: 08-11-2016

Annual Survey of Industry from IBGE

<http://www.ibge.gov.br/home/estatistica/pesquisas/pesquisas.php>

Downloaded: 08-11-2016

Annual Survey of Trade from IBGE

<http://www.ibge.gov.br/home/estatistica/pesquisas/pesquisas.php>

Downloaded: 08-11-2016

Annual Survey of Services from IBGE

<http://www.ibge.gov.br/home/estatistica/pesquisas/pesquisas.php>

Downloaded: 08-11-2016

National Household Sample Survey from IBGE

<http://www.ibge.gov.br/home/estatistica/populacao/trabalhoerendimento/pnad2013/default.shtm>

Downloaded: 08-11-2016

World Input-Output Database ISIC Rev. 3 (WIOD)

http://www.wiod.org/new_site/database/seas.htm

Downloaded: 15-10-2015

(Socio Economic Accounts, Released July 2014)

Remarks

The elaboration of the NACE-Rev.2 employment (persons employed) and hours worked database for Brazil has been based on the information published by IBGE and WIOD database.

The SNA 2008 National Accounts (CNAE 2.0) data is available for the period 2000-2014 for employment, but does not publish any data for hours worked. Prior to 2006 WIOD database has been used to extrapolate the employment series backwards to 1995. Finally, the complete datasets for employment have been distributed among ICT sectors, MC sector and the rest of industries using the surveys (Industrial, Trade and Services) provided by IBGE (in CNAE 1.0 and CNAE 2.0), WIOD database and correspondence tables between CNAE 1.0, CNAE 2.0, ISIC Rev. 3.1 (NACE Rev. 1.1) and ISIC Rev. 4 (NACE-Rev.2).

To obtain hours worked dataset by industry we use the yearly number of hours worked by employed person derived from the WIOD database and final employment dataset. As hours worked in WIOD database covers period 1995-2009, we estimate forwards to 2014 using growth rates of employment by industry.

The majority of sector gaps have been filled using percentage structure corresponding to the previous/following years and growth rates or hours worked/employment ratio of a more aggregated sector in the statistic.

Brazil's Employment dataset does not include Retail sale via mail order houses or via Internet sector.

Canada

Sources

NA from Statistics Canada

<http://www5.statcan.gc.ca/cansim/a33?RT=TABLE&themeID=311&spMode=tables&lang=eng>

Downloaded: 11-11-2016

Annual Survey of Manufactures and Logging from Statistics Canada
<http://www5.statcan.gc.ca/COR-COR/COR-COR/objList?lang=eng&srcObjType=SDDS&srcObjId=2103&tgtObjType=ARRAY>
Downloaded: 11-11-2016

Labour Force Survey from Statistics Canada
<http://www5.statcan.gc.ca/cansim/pick-choisir?lang=eng&p2=33&id=2820008>
Downloaded: 11-11-2016

World Input-Output Database ISIC Rev. 3 (WIOD)
http://www.wiod.org/new_site/database/seas.htm
Downloaded: 15-10-2015
(Socio Economic Accounts, Released July 2014)

Remarks

The main source of the employment (jobs) and hours worked for Canada is National Accounts from Statistics Canada (CANSIM database).

The last National Accounts data published covers the period 1997-2014. Prior to 1997 WIOD database has been used to extrapolate the series by industry backwards to 1995. Finally, the complete datasets for employment have been distributed among ICT, MC, RS sector and the rest of industries using data from Annual Survey of Manufacturing and Logging, Annual Wholesale Trade Survey provided by Statistics Canada, WIOD database and correspondence tables between NAICS and NACE-Rev.2⁴¹.

The majority of sector gaps have been filled using percentage structure corresponding to the previous/following years and growth rates or hours worked/employment ratio of a more aggregated sector in the statistic.

In Canada datasets for employment and hours worked, Manufacturing (divisions 10-33) excludes part of Repair and installation of machinery and equipment (division 33), Manufacture of magnetic and optical media (group 268) includes Reproduction of recorded media (class 1820), Services, except trade (divisions 49-99) includes part of Repair and installation of machinery and equipment (division 33), Repair of computers and communication equipment (group 951) include part of Repair and installation of machinery and equipment (division 33) and part of Repair of personal and household goods (group 952).

China

Sources

World Input-Output Database ISIC Rev. 3 (WIOD)
http://www.wiod.org/new_site/database/seas.htm
Downloaded: 15-10-2015

(Socio Economic Accounts, Released July 2014)
China Industrial Productivity (CIP) Database 3.0 from Research Institute of Economy, Trade and Industry (RIETI) and Hitotsubashi University
<http://www.rieti.go.jp/en/database/CIP2015/>
Downloaded: 17-11-2016

Main Labour Statistics from National Bureau of Statistics of China
<http://www.stats.gov.cn/tjsj/ndsj/2014/indexeh.htm>
Downloaded: 18-11-2016

⁴¹ The correspondence between different versions of Canadian NAICS and ISIC Rev. 4 is available at: <http://www.statcan.gc.ca/concepts/concordances-classifications-eng.htm>. Ivie has also elaborated a correspondence table for ICT sectors (see Annex II).

Main industrial economic indicators from National Bureau of Statistics of China

<http://www.stats.gov.cn/tjsj/ndsj/2014/indexeh.htm>

Downloaded: 18-11-2016

Statistics on Production and Management in High-tech Industry by Industrial Sector from Ministry of Science and Technology of China

<http://www.stats.gov.cn/tjsj/ndsj/2014/indexeh.htm>

Downloaded: 18-11-2016

Remarks

Employment and hours worked by industry for China is taken from National Bureau of Statistics of China and WIOD ISIC Rev. 3 Database.

Employment information has been distributed among ICT sectors, RS sector and the rest of industries for the period 1995-2014 using the Main industrial economic indicators provided by National Bureau of Statistics of China, Statistics on Production and Management in High-tech Industry by Industrial Sector from Ministry of Science and Technology of China, CIP database provided by REITI and correspondence tables between National Economic Industrial Classification (GB/T 4754-2002), ISIC Rev. 3 and ISIC Rev. 4 (NACE-Rev.2)⁴².

To obtain hours worked dataset by industry we use the yearly number of hours worked by employed person derived from the WIOD database and final employment dataset. As hours worked in WIOD database covers period 1995-2009, we estimate forwards to 2014 using growth rates of employment by industry.

The majority of sector gaps have been filled using percentage structure corresponding to the previous/following years or growth rates of a more aggregated sector in the statistic.

China's datasets do not include ICT trade, MC and RS sectors. Manufacture of chemicals and chemical products (division 20) includes Manufacture of magnetic and optical media (group 268), Wholesale and retail trade, repair of motor vehicles and motorcycles (divisions 45-47) include Repair of personal and household goods (group 952), Services, except trade (divisions 49-99) include Remediation activities and other waste management services (division 39) and Development of building projects (group 411) and exclude Repair of personal and household goods (group 952), Transportation and storage (divisions 49-53) include Travel agency and tour operator activities (group 791), Professional, scientific, technical, administration and support service activities (divisions 69-82) excludes Travel agency and tour operator activities (group 791) and Veterinary activities (division 75), Divisions 69-75 excludes Veterinary activities (division 75), Divisions 86-88 includes Veterinary activities (division 75).

India

Sources

World Input-Output Database ISIC Rev. 3 (WIOD)

http://www.wiod.org/new_site/database/seas.htm

Downloaded: 16-10-2015

(Socio Economic Accounts, Released July 2014)

Productivity Database 2016 of Asian Productivity Organization (APO)

<http://www.apo-tokyo.org/wedo/measurement>

Downloaded: 11-11-2016

⁴² The correspondence between Chinese SIC and ISIC Rev. 3 is available at: http://www.stats.gov.cn/tjbz/t20040210_402369833.htm

Annual Survey of Industries from Ministry of Statistics and Programme Implementation (MOSPI), Government of India

http://mospi.nic.in/mospi_new/site/inner.aspx?status=3&menu_id=56

Downloaded: 16-10-2015

Employment and Unemployment Situation in India: 2007-08, Report No. 531, 64th Round (July 2007 - June 2008) from National Sample Survey Office (NSS), MOSPI

http://mospi.nic.in/Mospi_New/site/inner.aspx?status=3&menu_id=31

Downloaded: 16-10-2015

Key Indicators of Employment and Unemployment in India, July 2009-June 2010, KI (66/10), 66th Round (July 2009 - June 2010) from National Sample Survey Office (NSS), MOSPI

http://mospi.nic.in/Mospi_New/site/inner.aspx?status=3&menu_id=31

Downloaded: 16-10-2015

Value added & employment generation in the ICT sector in India from MOSPI

http://mospi.nic.in/mospi_new/upload/val_add ICT 21june11.pdf

Downloaded: 16-10-2015

Remarks

The main source of employment and hours worked data for India is WIOD ISIC Rev. 3 Database. This information has been distributed among ICT, MC, the selected economic activities (additional sectors) and the rest of industries using employment data from APO productivity database, Annual Survey of Industry, Key Indicators of Employment and Unemployment, Employment and Unemployment Situation, Value added & employment generation in the ICT sector in India provided by MOSPI. This last source gives the 2008 National Industry Classification (NIC) codes for ICT sectors following the 2007 definition of OECD, which coincide exactly with NACE-Rev.2 ones⁴³.

India's employment dataset does not include RS and ICT trade sectors. MC sector only includes Publishing of books, periodicals and other publishing activities (group 581). Wholesale and retail trade, Repair of motor vehicles and motorcycles (divisions 45-47 NACE-Rev.2) includes Repair of personal and household goods (group 952); Wholesale and retail trade and repair of motor vehicles and motorcycles (division 45) includes Retail sale of automotive fuel in specialized stores (group 473); Services, except trade (divisions 49-99) includes Development of building projects (group 411) and exclude Repair of personal and household goods (group 952); Transportation and storage (divisions 49-53) include Travel agency and tour operator activities (group 791); Professional, scientific, technical, administration and support service activities (divisions 69-82) exclude Travel agency and tour operator activities (group 791) and Veterinary activities (division 75); and Human health and social work activities (divisions 86-88) includes Veterinary activities (division 75).

Japan

Sources

Japan Industrial Productivity (JIP) from Research Institute of Economy, Trade and Industry (RIETI) and Hitotsubashi University

<http://www.rieti.go.jp/en/database/JIP2015/index.html>

Downloaded: 8-12-2015

EU KLEMS Growth and Productivity Accounts ISIC Rev. 4

<http://www.euklems.net/index.html>

⁴³ The structure of NIC 2008 is identical to the structure of ISIC Rev. 4 up to 4-digit level (class). NIC 2008 is available at: http://mospi.nic.in/Mospi_New/site/inner.aspx?status=2&menu_id=129.

Downloaded: 14-10-2015
(ISIC Rev. 4, Rolling updates)

Labour Force Statistics from Statistics Japan
<http://www.stat.go.jp/english/data/roudou/index.htm>
Downloaded: 14-10-2015

Annual manufacturing census from Economic and Industrial Policy Bureau, Ministry of Economy, Trade and Industry (METI)
<http://www.meti.go.jp/english/statistics/tyo/kougyo/index.html>
Downloaded: 14-07-2016

Survey of selected services industries from METI
<http://www.meti.go.jp/english/statistics/tyo/tokusabizi/index.html>
Downloaded: 14-10-2015

Structural Business Statistics ISIC Rev. 4 from OECD
http://stats.oecd.org/Index.aspx?DataSetCode=SSIS_BSC_ISIC4
Downloaded: 14-10-2015

Remarks

The main source of the employment and hours worked for Japan is JIP Database provided by RIETI and Hitotsubashi University. The JIP Database forms part of the World Input-Output Database (WIOD) project. This dataset uses its own industry classification, distinguishing 108 industries, covering the whole of the Japanese economy.

The JIP database covers the period 1995-2012 for both variables. These datasets have been distributed among ICT sector, MC sectors and the rest of industries using Annual manufacturing census provided by METI, Survey on Selected Service Industries provided by METI, Structural Business Statistics (OECD), EU KLEMS database and correspondence tables between JIP codes, Japan Standard Industrial Classification (JSIC), ISIC Rev. 3 (NACE Rev. 1) and ISIC Rev. 4 (NACE-Rev.2)⁴⁴. LFS has been used to extrapolate the employment series forwards to 2014. In the case of hours worked, we estimate forwards to 2014 using growth rates of employment by industry.

The majority of sector gaps in both variables have been filled using percentage structure corresponding to the previous/following years and growth rates or hours worked/employment ratio of a more aggregated sector in the statistic.

Japan's datasets do not include RS sector, ICT sector NACE 951 (Repair of computers and communication equipment), and NACE 62 (Computer programming, consultancy and related activities) includes ICT sector NACE 5820 (Software publishing).

South Korea

Sources

Economically Active Population Survey from Statistics South Korea
http://kosis.kr/eng/database/database_001000.jsp?listid=B&subtitle=Employment/Labor/Wage
Downloaded: 08-10-2015

NA from OECD
http://stats.oecd.org/Index.aspx?DataSetCode=SNA_TABLE7A

⁴⁴ The correspondences between JIP codes, JSIC, ISIC Rev. 3 and ISIC Rev. 4 are available at:
http://www.rieti.go.jp/en/database/d05_data/03-6.pdf
http://www.euklems.net/data/nace2/JPN_Sources_12i.pdf
<http://www.stat.go.jp/english/index/seido/sangyo/index07.htm>
Ivie has also elaborated correspondence tables (see Annex II)

Downloaded: 23-02-2016

Structural Business Statistics ISIC Rev. 4 from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=SSIS_BSC_ISIC4

Downloaded: 27-07-2016

Mining and Manufacturing Survey from Statistics South Korea

<http://kostat.go.kr/portal/english/surveyOutlines/6/2/index.static>

Downloaded: 27-07-2016

Service Industry Survey from Statistics South Korea

<http://kostat.go.kr/portal/english/surveyOutlines/5/5/index.static>

Downloaded: 27-07-2016

Survey of Business activities from Statistics South Korea

<http://kostat.go.kr/portal/english/surveyOutlines/6/5/index.static>

Downloaded: 27-07-2016

Wholesale and Retail trade Survey from Statistics South Korea

<http://kostat.go.kr/portal/english/surveyOutlines/5/2/index.static>

Downloaded: 27-07-2016

EU KLEMS Growth and Productivity Accounts ISIC Rev. 3

<http://www.euklems.net/index.html>

Downloaded: 11-11-2014

(March 2008 Release)

(November 2009 Release, updated March 2011)

Remarks

Employment and hours worked data by industry for South Korea are taken from Economically Active Population Survey from Statistics South Korea and NA from OECD.

These sources cover the period 2004-2014. Prior to 2004 EU KLEMS database has been used to extrapolate the series by industry backwards to 1995. Finally, the complete datasets that distinguishes among ICT, MC, RS sectors and the rest of industries for employment have been obtained using additional information: Surveys (Mining and Manufacturing, Business activities, Wholesale and Retail trade and Service Industry), provided by Statistics South Korea, NA from OECD, EU KLEMS database and correspondence tables between KSIC and NACE-Rev.2⁴⁵.

The majority of sector gaps have been filled using percentage structure corresponding to the previous/following years, growth rates or hours worked/employment ratio of a more aggregated sector in the statistic.

Transportation and storage (divisions 19-53) excludes postal and courier activities (division 53), because this sector is included in NACE 61 sector (Telecommunications).

Russia

Sources

World Input-Output Database ISIC Rev. 3 (WIOD)

⁴⁵ The correspondences between KSIC and ISIC Rev. 4 are available at:

<http://www.kostat.go.kr/kssc/attach/data/data161.xls>

<http://kostat.go.kr/kssc/main/MainAction.do?method=sub&catgrp=ekssc&catid1=ekssc01>

<http://kostat.go.kr/portal/english/help/1/index.board?bmode=read&aSeq=249244&pageNo=33&rowNum=10&amSeq=&sTarget=&sTxt=>. Ivie has also elaborated correspondence tables (see Annex II)

http://www.wiod.org/new_site/database/seas.htm

Downloaded: 16-10-2015

(Socio Economic Accounts, Released July 2014)

Labour Force Statistics (LFS) NACE Rev. 1.1 from Rosstat

http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/doc_1140097038766

Downloaded: 13-10-2015

Employed in the ICT sector (NACE Rev. 1.1)

Information provided by Galina Lyubova (Department of Foreign Statistics and International Cooperation from Rosstat)

Structural Business Statistics ISIC Rev. 3 from OECD

http://stats.oecd.org/Index.aspx?DataSetCode=SSIS_BSC

Downloaded: 13-10-2015

Remarks

The main source of the employment and hours worked for Russia is WIOD ISIC Rev. 3 database. As employment data from WIOD covers period 1995-2011, we estimate forward to 2014 using growth rates of employment from LFS of Rosstat. This initial employment data has been distributed among ICT, MC, RS and the rest of industries using LFS data provided directly by Rosstat, 4-digits Structural Business Statistics ISIC Rev. 3 (OECD), and the correspondence table between NACE Rev. 1.1 and NACE-Rev.2.

In order to obtain hours worked dataset by industry we use the yearly number of hours worked by employed person derived from the WIOD database and final employment dataset. As hours worked in WIOD database covers period 1995-2009, we estimate from 2009 onwards using growth rates of employment by industry.

The majority of sector gaps have been filled using percentage structure corresponding to the previous/following years, growth rates or hours worked/employment ratio of a more aggregated sector in the statistic.

Russia's employment and hours worked datasets do not include ICT trade sector; Manufacture of chemicals and chemical products (division 20) includes Manufacture of magnetic and optical media (group 268); Computer programming, consultancy and related activities (division 62) includes Software Publishing (group 582); Services, except trade (divisions 49-99) includes Development of building projects (group 411); Transportation and storage (divisions 49-53) includes Travel agency and tour operator activities (group 791); Professional, scientific, technical, administration and support service activities (divisions 69-82) exclude Travel agency and tour operator activities (group 791); and Retail sale via mail order houses or via Internet (class 4791) excludes Retail trade via internet.

Taiwan

Sources

Labour Force Statistics (Manpower Survey) from National Statistics, Directorate General of Budget, Accounting and Statistics (DGBAS) of Executive Yuan, Taiwan

<http://statdb.dgbas.gov.tw/pxweb/dialog/statfile1L.asp>

Downloaded: 16-11-2016

Earnings and productivity, Average Monthly Working Hours of Employees on Payrolls from National Statistics, Directorate General of Budget, Accounting and Statistics (DGBAS) of Executive Yuan, Taiwan

<http://statdb.dgbas.gov.tw/pxweb/dialog/statfile1L.asp>

Downloaded: 16-11-2016

Labour Force Statistics (Manpower Survey): Employed persons, by mid-category of industries and class of workers
Information provided by Teresa Chang (Directorate General of Budget, Accounting and Statistics (DGBAS) of Executive Yuan, Taiwan)

Census Statistics from National Statistics of Taiwan

<http://eng.stat.gov.tw/lp.asp?ctNode=1624&CtUnit=774&BaseDSD=7&mp=5>

Downloaded: 16-11-2016

World Input-Output Database ISIC Rev. 3 (WIOD)

http://www.wiod.org/new_site/database/seas.htm

Downloaded: 15-10-2015

(Socio Economic Accounts, Released July 2014)

Remarks

The elaboration of the NACE-Rev.2 employment for Taiwan has been based on the LFS information by industry provided by National Statistics of Taiwan (Directorate of Budget, Accounting and Statistics (DGBAS) of Executive Yuan). As employment data by industry from DGBAS covers period 2001-2014, we extrapolate series backwards to 1995 using WIOD database.

The LFS employment data has been distributed among distributed among ICT, MC, RS and the rest of industries using data from Census Statistics provided by National Statistics of Taiwan and correspondence tables between Standard Industrial Classification (SIC) of Taiwan and ISIC Rev. 4 (NACE-Rev.2).

In order to obtain hours worked dataset by industry we use the yearly number of hours worked by employed person derived from the WIOD database and final employment dataset. As hours worked in WIOD database covers period 1995-2009, we estimate from 2009 onwards using average working hours of employees by industry provided by DGBAS.

The majority of sector gaps have been filled using percentage structure corresponding to the previous/following years, growth rates or hours worked/employment ratio of a more aggregated sector in the statistic.

Taiwan's datasets for employment and hours worked do not include ICT trade sector; Services, except trade (divisions 49-99) include Development of building projects (group 411); Repair of computers and communication equipment (group 951) includes Repair of consumer electronics (class 9521); and RS sector (Class 4791) includes Other retail sale not in stores, stalls or markets (class 4799).

United States

Sources

NA from Bureau of Economic Analysis (BEA)

http://www.bea.gov/industry/gdpbyind_data.htm

Downloaded: 13-07-2016

NA ISIC Rev. 4 from OECD

<http://stats.oecd.org/Index.aspx?DataSetCode=STANI4>

Downloaded: 26-06-2016

Industry Productivity and Costs from Bureau of Labor Statistics (BLS)

<http://www.bls.gov/lpc/>

Downloaded: 29-06-2016

Labor Force Statistics (Current Population Survey) from BLS
<http://www.bls.gov/cps/>
Downloaded: 11-07-2016

Annual Survey of Manufactures from United States Census Bureau
<http://www.census.gov/manufacturing/asm/index.html>
Downloaded: 30-06-2016

Remarks

The elaboration of the NACE-Rev.2 employment and hours worked database distributed among ICT, MC, RS sector, the selected economic activities (additional sectors) and the rest of industries for United States have been based on NA data from BEA and other sources like NA ISIC Rev. 4 from OECD, Bureau of Labor Statistics and United States Census Bureau, and correspondence tables between NAICS and ISIC Rev. 4⁴⁶.

Following the OECD (and EU KLEMS) methodology, we obtain final employment data for the US combining the three categories publishes by BEA: Full-time and part-time employees (FTPT), Full-time equivalent employees (FTE) and Persons engaged in production (PEP). Total employment (number engaged) is defined as FTPT+ (PEP- FTE).

However, the information available in NA (Industry Economic Accounts) of the BEA does not cover the years 1995 to 1997 for both variables. Thus, the figures corresponding to these years have been extrapolated using EU KLEMS database.

In the case of hours worked, BEA publishes sectorial hours worked by employees, instead of hours worked by total employed persons, while OECD only offers annual hours worked by employed persons for the total economy (not by industry). We assume that the average number of hours worked by employee is equal to the average number of hours worked by self-employed persons. Combining all the available information we estimate complete series for the period 1995-2014.

The majority of sector gaps have been filled using percentage structure corresponding to the previous/following years, growth rates or hours worked/employment ratio of a more aggregated sector in the statistic

Manufacturing (divisions 10-33) excludes part of Repair and installation of machinery and equipment (division 33); Manufacture of magnetic and optical media (group 268) includes Reproduction of recorded media (class 1820); Services, except trade (divisions 49-99) includes part of Repair and installation of machinery and equipment (division 33); and Repair of computers and communication equipment (group 951) includes part of Repair and installation of machinery and equipment (division 33) and part of Repair of personal and household goods (group 952).

⁴⁶ The correspondences between different versions of US NAICS and ISIC Rev. 4 are available at <http://www.census.gov/eos/www/naics/concordances/concordances.html>. Ivie has also elaborated correspondence tables (see Annex II)

Labour Productivity

Sources

See sources in GVA and Employment

Remarks

Labour productivity datasets are provided in nominal euros per person and per hour worked and in euros PPS per person and per hour worked. See comments in related Sections for GVA and Employment.

Annex II: Tables of Correspondence

Table A I Approximate correspondence between NACE-Rev.2 (ISIC Rev. 4) and NACE Rev 1.1 (ISIC Rev. 3.1) for ICT, MC and RS sectors and additional sectors

a) Comprehensive definition of ICT sector (based on the 2007 OECD ICT sector definition)

NACE-Rev.2	ISIC Rev. 4	Description	NACE Rev. 1.1	ISIC Rev. 3.1
261-264, 268	261-264, 268	ICT manufacturing industries	2465, 30, 32	2429, 30, 32
261	261	Manufacture of electronic components and boards	321	321
2611	2610P	Manufacture of electronic components	321P	321P
2612	2610P	Manufacture of loaded electronic boards	321P	321P
262	262	Manufacture of computers and peripheral equipment	30	30
263	263	Manufacture of communication equipment	322	322
264	264	Manufacture of consumer electronics	323	323
268	268	Manufacture of magnetic and optical media	2465	2429
465	4651, 4652	ICT trade industries	5184, 5186	5151, 5152
4651	4651	Wholesale of computers, computer peripheral equipment and software	5184	5151
4652	4652	Wholesale of electronic and telecommunications equipment and parts	5186	5152
582, 61, 62, 631, 951	582, 61, 62, 631, 951	ICT services industries	642, 72	642, 72
582	582	Software publishing	7221	7221
5821	5820P	Publishing of computer games	7221P	7221P
5829	5820P	Other software publishing	7221P	7221P
61	61	Telecommunications	642	642
611	611	Wired telecommunications activities	642P	642P
612	612	Wireless telecommunications activities	642P	642P
613	613	Satellite telecommunications activities	642P	642P
619	619	Other telecommunications activities	642P	642P
62	62	Computer programming, consultancy and related activities	721, 7222, 726	721, 7229, 729
6201	6201	Computer programming activities	7222P	7229P
6202	6202P	Computer consultancy activities	721, 7222P	721, 7229P
6203	6202P	Computer facilities management activities	7222P	7229P
6209	6209	Other information technology and computer service activities	7222P, 726	7229P, 729
631	631	Data processing, hosting and related activities; web portals	723, 724	723, 724
6311	6311	Data processing, hosting and related activities	723, 724P	723, 724P
6312	6312	Web portals	724P	724P
951	951	Repair of computers and communication equipment	725	725
9511	9511	Repair of computers and peripheral equipment	725P	725P
9512	9512	Repair of communication equipment	725P	725P

b) Operational definition of ICT sector

NACE-Rev.2	ISIC Rev. 4	Description	NACE Rev. 1.1	ISIC Rev. 3.1
261-264	261-264	ICT manufacturing industries	30, 32	30, 32
261	261	Manufacture of electronic components and boards	321	321
262	262	Manufacture of computers and peripheral equipment	30	30
263	263	Manufacture of communication equipment	322	322
264	264	Manufacture of consumer electronics	323	323
582, 61, 62, 631, 951	582, 61, 62, 631, 951	ICT services industries	642, 72	642, 72
61	61	Telecommunications	642	642
582, 62, 631, 951	582, 62, 631, 951	Computer and related activities	72	72

c) Media and content (MC sector) (based on the 2007 OECD definition)

NACE-Rev.2	ISIC Rev. 4	Description	NACE Rev. 1.1	ISIC Rev. 3.1
581, 59, 60, 639	581, 59, 60, 639	MC sector	221, 921, 922, 924	221, 9211-9213, 922
581	581	Publishing of books, periodicals and other publishing activities	221 (ex. 2214)	221 (ex. 2213)
5811-5812	5811-5812	Book publishing; Publishing of directories and mailing lists	2211	2211
5811	5811	Book publishing	2211P	2211P
5812	5812	Publishing of directories and mailing lists	2211P	2211P
5813-5814	5813	Publishing of newspapers, journals and periodicals	2212, 2213	2212
5813	5813P	Publishing of newspapers	2212	2212P
5814	5813P	Publishing of journals and periodicals	2213	2212P
5819	5819	Other publishing activities	2215	2219
59-60	59-60	Audiovisual and broadcasting activities	2214, 921, 922	2213, 9211-9213
59	59	Motion picture, video and television programme production, sound recording and music publishing activities	2214, 921	2213, 9211-9213
591	591	Motion picture, video and television programme activities	921	9211-9212
5911	5911	Motion picture, video and television programme production activities	9211P	9211P
5912	5912	Motion picture, video and television programme post-production activities	9211P	9211P
5913	5913	Motion picture, video and television programme distribution activities	9212	9211P
5914	5914	Motion picture projection activities	9213	9212
592	592	Sound recording and music publishing activities	2214	2213
60	60	Programming and broadcasting activities	922	9213
601	601	Radio broadcasting	922P	9213P
602	602	Television programming and broadcasting activities	922P	9213P

639	639	Other information service activities	924	922
6391	6391	News agency activities	924P	922P
6399	6399	Other information service activities n.e.c.	924P	922P

d) Retail sale via mail order houses or via Internet (RS sector)

NACE-Rev.2	ISIC Rev. 4	Description	NACE Rev. 1.1	ISIC Rev. 3.1
4791	4791	Retail sale via mail order houses or via Internet	5261	5251

e) Additional sectors

NACE-Rev.2	ISIC Rev. 4	Description	NACE Rev. 1.1	ISIC Rev. 3.1
10-33	10-33	Manufacturing	15-21, 22 (ex. 221), 23-36	15-21, 22 (ex. 221), 23-36
20-21	20-21	Manufacture of chemicals and chemical products; Manufacture of pharmaceuticals, medicinal chemical and botanical products	24 (ex. 2465)	24 (ex. 2429)
20	20	Manufacture of chemicals and chemical products	24 (ex. 244, 2465)	24 (ex. 2423, 2429)
21	21	Manufacture of pharmaceuticals, medicinal chemical and botanical products	244	2423
26	26	Manufacture of computer, electronic and optical products	30, 32, 33	30, 32, 33
27-28	27-28	Manufacture of machinery and equipment	29, 31	29, 31
29-30	29-30	Manufacture of transport equipment	34-35	34-35
29	29	Manufacture of motor vehicles, trailers and semi-trailers	34	34
30	30	Manufacture of other transport equipment	35	35
303	303	Manufacture of air and spacecraft and related machinery	353	353
45-47	45-47	Wholesale and retail trade, repair of motor vehicles and motorcycles	50-52 (ex. 527)	50-52 (ex. 526)
49-99	49-99	Services, except trade	221, 527, 60-99 (ex. 7011, 90)	221, 526, 60-99 (ex. 7010P, 90)
49-53	49-53	Transportation and storage	60-63 (ex. 633), 641	60-63 (ex. 6304), 641
58-63	58-63	Information and communication	221, 642, 72 (ex. 725), 921, 922, 924	221, 642, 72 (ex. 725), 921, 922
64-66	64-66	Financial and insurance activities	65-67	65-67
69-82	69-82	Professional, scientific, technical, administration and support service activities	633, 71, 73, 74, 852	6304, 71, 73, 74, 852
69-75	69-75	Professional, scientific and technical activities	73, 741-744, 7481, 7487, 852	73, 741-742, 7494, 7499P, 852
85	85	Education	80	80
86-88	86-88	Human health and social work activities	85 (ex. 852)	85 (ex. 852)

Note: The P indicates that the NACE (ISIC) codes are linked with more than one NACE-Rev.2 (ISIC Rev. 4) code.

Source: Own elaboration

Table A II Correspondences between NACE-Rev.2 and ANZSIC (Australia)**a) ICT sector**

	NACE-Rev.2	ANZSIC 2006
ICT manufacturing industries		
Manufacture of electronic components and boards	261	2429P
Manufacture of electronic components and boards	2611	2429P
Manufacture of electronic components	2619	2429P
Manufacture of computers and peripheral equipment	262	2421
Manufacture of communication equipment	263	2422
Manufacture of consumer electronics	264	2429P
Manufacture of magnetic and optical media	268	2429P
ICT trade industries		
Wholesale of computers, computer peripheral equipment and software	4651	3492
Wholesale of electronic and telecommunications equipment and parts	4652	3493
ICT services industries		
Software publishing	582	542
Publishing of computer games	5821	542P
Other software publishing	5829	542P
Telecommunications	61	58, 591P
Wired telecommunications activities	611	5801, 591P
Wireless telecommunications activities	612	5802P, 591P
Satellite telecommunications activities	613	5802P, 591P
Other telecommunications activities	619	5809, 591P
Computer programming, consultancy and related activities	62	70
Computer programming activities	6201	70P
Computer consultancy and computer facilities management activities	6202-6203	70P
Computer consultancy activities	6202	70P
Computer facilities management activities	6203	70P
Other information technology and computer service activities	6209	70P
Data processing, hosting and related activities; web portals	631	591P, 592
Data processing, hosting and related activities	6311	592
Web portals	6312	591P
Repair of computers and communication equipment	951	9422
Repair of computers and peripheral equipment	9511	9422P
Repair of communication equipment	9512	9422P

b) RS sector

	NACE-Rev.2	ANZSIC 2006
Retail sale via mail order houses or via Internet	4791	431P

c) MC sector

	NACE-Rev.2	ANZSIC 2006
Publishing of books, periodicals and other publishing activities		
Book publishing	5811	5413
Publishing of directories and mailing lists	5812	5414
Publishing of newspapers, journals and periodicals	5813-5814	5411-5412
Publishing of newspapers	5813	5411
Publishing of journals and periodicals	5814	5412
Other publishing activities	5819	5419
Audiovisual and broadcasting activities		
Motion picture, video and television programme production, sound recording and music publishing activities	59	55
Motion picture, video and television programme activities	591	551
Motion picture, video and television programme production activities	5911	5511
Motion picture, video and television programme post-production activities	5912	5514, 5512P
Motion picture, video and television programme distribution activities	5913	5512P
Motion picture projection activities	5914	5513
Sound recording and music publishing activities	592	552
Programming and broadcasting activities	60	56,57
Radio broadcasting	601	561, 57P
Television programming and broadcasting activities	602	562, 57P
Other information service activities		
News agency activities	6391	602P
Other information service activities n.e.c.	6399	602P

Note: The P indicates that the ANZSIC codes are linked with more than one NACE-Rev.2 (ISIC Rev. 4) code.

Source: Own elaboration

Table A III Correspondences between NACE-Rev.2 and CNAE (Brazil)

	NACE-Rev.2	CNAE 2.0
a) ICT sector		
ICT manufacturing industries		
Manufacture of electronic components and boards	261	261
Manufacture of electronic components and boards	2611	
Manufacture of electronic components	2619	
Manufacture of computers and peripheral equipment	262	262
Manufacture of communication equipment	263	263
Manufacture of consumer electronics	264	264
Manufacture of magnetic and optical media	268	268
ICT trade industries		
Wholesale of computers, computer peripheral equipment and software	4651	4651
Wholesale of electronic and telecommunications equipment and parts	4652	4652
ICT services industries		
Software publishing	582	6203, 6203
Publishing of computer games	5821	-
Other software publishing	5829	-
Telecommunications	61	61
Wired telecommunications activities	611	6110, 6141
Wireless telecommunications activities	612	6120, 6142
Satellite telecommunications activities	613	6130, 6143
Other telecommunications activities	619	6190
Computer programming, consultancy and related activities	62	6201, 6204, 6209
Computer programming activities	6201	6201
Computer consultancy and computer facilities management activities	6202-6203	6204
Computer consultancy activities	6202	-
Computer facilities management activities	6203	-
Other information technology and computer service activities	6209	6209
Data processing, hosting and related activities; web portals	631	631
Data processing, hosting and related activities	6311	6311
Web portals	6312	6319
Repair of computers and communication equipment	951	951
Repair of computers and peripheral equipment	9511	9511
Repair of communication equipment	9512	9512

b) RS sector

	NACE-Rev.2	CNAE 2.0
Retail sale via mail order houses or via Internet	4791	4713P

c) MC sector

	NACE-Rev.2	CNAE 2.0
MC sector		
Publishing of books, periodicals and other publishing activities		
Book publishing	5811	5811, 5821
Publishing of directories and mailing lists	5812	5819, 5829
Publishing of newspapers, journals and periodicals	5813-5814	5812, 5813, 5822, 5823
Publishing of newspapers	5813	5812, 5822
Publishing of journals and periodicals	5814	5813, 5823
Other publishing activities	5819	5819, 5829
Audiovisual and broadcasting activities		
Motion picture, video and television programme production, sound recording and music publishing activities	59	59
Motion picture, video and television programme activities	591	591
Motion picture, video and television programme production activities	5911	5911
Motion picture, video and television programme post-production activities	5912	5912
Motion picture, video and television programme distribution activities	5913	5913
Motion picture projection activities	5914	5914
Sound recording and music publishing activities	592	5920
Programming and broadcasting activities	60	60
Radio broadcasting	601	601
Television programming and broadcasting activities	602	602
Other information service activities		
News agency activities	6391	
Other information service activities n.e.c.	6399	

Note: The P indicates that the CNAE codes are linked with more than one NACE-Rev.2 (ISIC Rev. 4) code.

Source: Own elaboration

Table A IV Correspondences between NACE-Rev.2 and JSIC (Japan)

	NACE-Rev.2	JSIC Rev. 13
a) ICT sector		
ICT manufacturing industries		
Manufacture of electronic components and boards	261	28 (ex. 283)
Manufacture of electronic components and boards	2611	28 (ex. 2814, 283, 284)
Manufacture of electronic components	2612	2814, 284
Manufacture of computers and peripheral equipment	262	303
Manufacture of communication equipment	263	301 (ex. 3014, 3015)
Manufacture of consumer electronics	264	3014, 302 (ex. 3022)
Manufacture of magnetic and optical media	268	2832
ICT trade industries		
Wholesale of computers, computer peripheral equipment and software	4651	5432P
Wholesale of electronic and telecommunications equipment and parts	4652	5432P
ICT services industries		
Software publishing	582	3913, 3914
Publishing of computer games	5821	3913P
Other software publishing	5829	3913P, 3914
Telecommunications	61	37
Wired telecommunications activities	611	371
Wireless telecommunications activities	612	372P
Satellite telecommunications activities	613	372P
Other telecommunications activities	619	373
Computer programming, consultancy and related activities	62	3911, 3912
Computer programming activities	6201	3911P, 3912
Computer consultancy and computer facilities management activities	6202-6203	3911P
Computer consultancy activities	6202	3911P
Computer facilities management activities	6203	3911P
Other information technology and computer service activities	6209	3911P
Data processing, hosting and related activities; web portals	631	3921, 40 (ex. 4013)
Data processing, hosting and related activities	6311	3921, 4012
Web portals	6312	4011
Repair of computers and communication equipment	951	9021P
Repair of computers and peripheral equipment	9511	9021P
Repair of communication equipment	9512	9021P

b) RS sector

	NACE-Rev.2	JSIC Rev. 13
Retail sale via mail order houses or via Internet	4791	611P, 619P

c) MC sector

	NACE-Rev.2	JSIC Rev. 13
MC sector		
Publishing of books, periodicals and other publishing activities		
Book publishing	5811	414P
Publishing of directories and mailing lists	5812	414P
Publishing of newspapers, journals and periodicals	5813-5814	414P, 415
Publishing of newspapers	5813	414P
Publishing of journals and periodicals	5814	414P
Other publishing activities	5819	415
Audiovisual and broadcasting activities		
Motion picture, video and television programme production, sound recording and music publishing activities	59	42
Motion picture, video and television programme activities	591	411, 4169P
Motion picture, video and television programme production activities	5911	4111, 4112
Motion picture, video and television programme post-production activities	5912	4113, 4169P
Motion picture, video and television programme distribution activities	5913	4114
Motion picture projection activities	5914	4114
Sound recording and music publishing activities	592	412, 4169P
Programming and broadcasting activities	60	381, 382
Radio broadcasting	601	3822
Television programming and broadcasting activities	602	381, 3823, 3829, 3821
Other information service activities		
News agency activities	6391	4161
Other information service activities n.e.c.	6399	3922, 3929, 4013

Note: The P indicates that the JSIC codes are linked with more than one NACE-Rev.2 (ISIC Rev. 4) code.

Source: Own elaboration

Table A V Correspondences between NACE-Rev.2 and KSIC (South Korea)**a) ICT sector**

	NACE-Rev.2	KSIC Rev. 9
ICT manufacturing industries		
Manufacture of electronic components and boards	261	261, 262
Manufacture of electronic components and boards	2611	261, 262 (ex. 2622)
Manufacture of electronic components	2612	2622
Manufacture of computers and peripheral equipment	262	263
Manufacture of communication equipment	263	264
Manufacture of consumer electronics	264	265
Manufacture of magnetic and optical media	268	266
ICT trade industries		
Wholesale of computers, computer peripheral equipment and software	4651	4651
Wholesale of electronic and telecommunications equipment and parts	4652	4652
ICT services industries		
Software publishing	582	582
Publishing of computer games	5821	5821
Other software publishing	5829	5822
Telecommunications	61	612
Wired telecommunications activities	611	6121
Wireless telecommunications activities	612	6122
Satellite telecommunications activities	613	6123
Other telecommunications activities	619	6129
Computer programming, consultancy and related activities	62	62
Computer programming activities	6201	6201
Computer consultancy and computer facilities management activities	6202-6203	6202
Computer consultancy activities	6202	62021
Computer facilities management activities	6203	62022
Other information technology and computer service activities	6209	6209
Data processing, hosting and related activities; web portals	631	631
Data processing, hosting and related activities	6311	6312
Web portals	6312	6311
Repair of computers and communication equipment	951	95121, 95122
Repair of computers and peripheral equipment	9511	95121
Repair of communication equipment	9512	95122

b) RS sector

	NACE-Rev.2	KSIC Rev. 9
Retail sale via mail order houses or via Internet	4791	4791

c) MC sector

	NACE-Rev.2	KSIC Rev. 9
MC sector		
Publishing of books, periodicals and other publishing activities		
Book publishing	5811	58111, 58112
Publishing of directories and mailing lists	5812	58119
Publishing of newspapers, journals and periodicals	5813-5814	5812
Publishing of newspapers	5813	58121
Publishing of journals and periodicals	5814	58122-58123
Other publishing activities	5819	5819
Audiovisual and broadcasting activities		
Motion picture, video and television programme production, sound recording and music publishing activities	59	59
Motion picture, video and television programme activities	591	591
Motion picture, video and television programme production activities	5911	5911
Motion picture, video and television programme post-production activities	5912	5912
Motion picture, video and television programme distribution activities	5913	5913
Motion picture projection activities	5914	5914
Sound recording and music publishing activities	592	592
Programming and broadcasting activities	60	60
Radio broadcasting	601	601
Television programming and broadcasting activities	602	602
Other information service activities		
News agency activities	6391	6391
Other information service activities n.e.c.	6399	6399

Note: The P indicates that the KSIC codes are linked with more than one NACE-Rev.2 (ISIC Rev. 4) code.

Source: Own elaboration

Table A VI Correspondences between NACE-Rev.2 and SIC (Taiwan)

	NACE-Rev.2	SIC (9th version)
a) ICT sector		
ICT manufacturing industries		
Manufacture of electronic components and boards	261	26
Manufacture of electronic components and boards	2611	2691, 2699P
Manufacture of electronic components	2612	26 (ex. 2691, 2699P)
Manufacture of computers and peripheral equipment	262	271
Manufacture of communication equipment	263	272
Manufacture of consumer electronics	264	273
Manufacture of magnetic and optical media	268	274
ICT trade industries		
Wholesale of computers, computer peripheral equipment and software	4651	4641P
Wholesale of electronic and telecommunications equipment and parts	4652	4641P
ICT services industries		
Software publishing	582	582
Publishing of computer games	5821	-
Other software publishing	5829	-
Telecommunications	61	61
Wired telecommunications activities	611	-
Wireless telecommunications activities	612	-
Satellite telecommunications activities	613	-
Other telecommunications activities	619	-
Computer programming, consultancy and related activities	62	62
Computer programming activities	6201	6201
Computer consultancy and computer facilities management activities	6202-6203	6202
Computer consultancy activities	6202	-
Computer facilities management activities	6203	-
Other information technology and computer service activities	6209	6209
Data processing, hosting and related activities; web portals	631	631
Data processing, hosting and related activities	6311	6312
Web portals	6312	6311
Repair of computers and communication equipment	951	952
Repair of computers and peripheral equipment	9511	9521
Repair of communication equipment	9512	9522

b) RS sector

	NACE-Rev.2	SIC version) (9th)
Retail sale via mail order houses or via Internet	4791	4874

c) MC sector

	NACE-Rev.2	SIC version) (9th)
MC sector		
Publishing of books, periodicals and other publishing activities	581	581
Book publishing	5811	5813
Publishing of directories and mailing lists	5812	5819P
Publishing of newspapers, journals and periodicals	5813-5814	5811, 5812
Publishing of newspapers	5813	5811
Publishing of journals and periodicals	5814	5812
Other publishing activities	5819	5819P
Audiovisual and broadcasting activities	59-60	59-60
Motion picture, video and television programme production, sound recording and music publishing activities	59	59
Motion picture, video and television programme activities	591	591
Motion picture, video and television programme production activities	5911	5911
Motion picture, video and television programme post-production activities	5912	5912
Motion picture, video and television programme distribution activities	5913	5913
Motion picture projection activities	5914	5914
Sound recording and music publishing activities	592	592
Programming and broadcasting activities	60	60
Radio broadcasting	601	601
Television programming and broadcasting activities	602	602
Other information service activities	639	639
News agency activities	6391	6391
Other information service activities n.e.c.	6399	6399

Note: The P indicates that the SIC codes are linked with more than one NACE-Rev.2 (ISIC Rev. 4) code.

Source: Own elaboration

Table A VII Correspondences between NACE-Rev.2 and NAICS (US and Canada)**a) ICT sector**

	NACE-Rev.2	NAICS2007
ICT manufacturing industries		
Manufacture of electronic components and boards	261	3344
Manufacture of electronic components and boards	2611	334412- 334417; 334419
Manufacture of electronic components	2619	334418
Manufacture of computers and peripheral equipment	262	3341
Manufacture of communication equipment	263	3342
Manufacture of consumer electronics	264	3343
Manufacture of magnetic and optical media	268	3346
ICT trade industries		
Wholesale of computers, computer peripheral equipment and software	4651	42343 (41731 in Canada)
Wholesale of electronic and telecommunications equipment and parts	4652	4236P (41732 in Canada)
ICT services industries		
Software publishing	582	5112
Publishing of computer games	5821	5112P
Other software publishing	5829	5112P
Telecommunications	61	517
Wired telecommunications activities	611	5171
Wireless telecommunications activities	612	5172
Satellite telecommunications activities	613	5174
Other telecommunications activities	619	5179
Computer programming, consultancy and related activities	62	5415
Computer programming activities	6201	541511
Computer consultancy and computer facilities management activities	6202-6203	541512, 541513
Computer consultancy activities	6202	541512
Computer facilities management activities	6203	541513
Other information technology and computer service activities	6209	541519
Data processing, hosting and related activities; web portals	631	5182
Data processing, hosting and related activities	6311	5182P
Web portals	6312	5182P
Repair of computers and communication equipment	951	811212, 811213
Repair of computers and peripheral equipment	9511	811212
Repair of communication equipment	9512	811213

b) RS sector

	NACE-Rev.2	NAICS2007
Retail sale via mail order houses or via Internet	4791	4541

c) MC sector

	NACE-Rev.2	NAICS2007
MC sector		
Publishing of books, periodicals and other publishing activities		
Book publishing	5811	51113
Publishing of directories and mailing lists	5812	51114
Publishing of newspapers, journals and periodicals	5813-5814	51111, 51112
Publishing of newspapers	5813	51111
Publishing of journals and periodicals	5814	51112
Other publishing activities	5819	51119
Audiovisual and broadcasting activities		
Motion picture, video and television programme production, sound recording and music publishing activities	59	512
Motion picture, video and television programme activities	591	5121
Motion picture, video and television programme production activities	5911	51211
Motion picture, video and television programme post-production activities	5912	51219
Motion picture, video and television programme distribution activities	5913	51212
Motion picture projection activities	5914	51213
Sound recording and music publishing activities	592	5122
Programming and broadcasting activities	60	515
Radio broadcasting	601	51511
Television programming and broadcasting activities	602	51512, 5152
Other information service activities		
News agency activities	6391	51911
Other information service activities n.e.c.	6399	51919

Note: The P indicates that the NAICS codes are linked with more than one NACE-Rev.2 (ISIC Rev. 4) code.

Source: Own elaboration

Table A VIII NABS - NACE Rev. 1.1. correspondence table

NABS 2007		NACE Rev. 1.1	
Code	Name	Code	Name
1	Exploration and exploitation of the Earth	10	Mining of coal and lignite; extraction of peat
		11	Extraction of crude petroleum and natural gas
		12	Mining of uranium and thorium ores
		13	Mining of metal ores
		14	Other mining and quarrying
		74.3 (p)	Technical testing and analysis
2	Environment	23.3	Processing of nuclear fuel
		37	Recycling
		90	Sewage and refuse disposal, sanitation and similar activities
		74.3 (p)	Technical testing and analysis
3	Exploration and exploitation of space	62.3	Space transport
		64.2 (p)	Telecommunications
		74.3 (p)	Technical testing and analysis
4	Transport, telecommunication and other infrastructures	41	Collection, purification and distribution of water
		45	Construction
		60	Land transport; transport via pipelines
		61	Water transport
		62	Air transport
		63	Supporting and auxiliary transport activities; activities of travel agencies
		64	Post and telecommunications
		74.2	Architectural and engineering activities and related technical consultancy
		64.1	Post and courier analysis
		64.2 (p)	Telecommunications
5	Energy	40	Electricity, gas, steam and hot water supply
		74.3 (p)	Technical testing and analysis
6	Industrial production and technology	15-37	Manufacturing
		64.2 (p)	Telecommunications
		72	Computer and related activities
		74.3 (p)	Technical testing and analysis
		excluded here: 22.1, 23.3, 24.15, 24.2, 29.3, 29.6, 37	
7	Health	85.1	Human health activities
		85.31	Social work activities with accommodation
8	Agriculture	1	Agriculture, hunting and related service activities
		2	Forestry, logging and related service activities
		5	Fishing, fish farming and related service activities
		24.15	Manufacture of fertilisers and nitrogen compounds
		24.2	Manufacture of pesticides and other agrochemical products
		29.3	Manufacture of agricultural and forestry machinery
		85.2	Veterinary activities
		74.3 (p)	Technical testing and analysis
9	Education	80	Education
10	Culture, recreation, religion and mass	22.1	Publishing
		91.3	Activities of other membership organizations

	media	92	Recreational, cultural and sporting activities
11	Political and social systems, structures and processes	74.1 74.5 75 85.32 excluded here: 75.22	Legal, accounting and consultancy Labour recruitment and provision of personnel Public administration and defence; compulsory social security Social work activities without accommodation
12	General advancement of knowledge (General University Funds - GUF)	73 (p)	Research and development
13	General advancement of knowledge (other sources than GUF)	73 (p)	Research and development
14	Defence	29.6 75.22	Manufacture of weapons and ammunition Defence activities

Note: some NACE sub-categories are referred as *excluded* - it is because they are part of a different NABS chapter.

Table A IX NABS - NACE Rev. 2 correspondence table

NABS 2007		NACE Rev. 2	
Code	Name	Code	Name
1	Exploration and exploitation of the Earth	5	Mining of coal and lignite
		6	Extraction of crude petroleum and natural gas
		7	Mining of metal ores
		8	Other mining and quarrying
		9	Mining support service activities
		71 (p) (excl: 71.11)	Engineering activities; technical testing and analysis
2	Environment	37	Sewerage
		38	Waste collection, treatment and disposal activities; materials recovery
		39	Remediation activities and other waste management services
		71 (p) (excl: 71.11)	Engineering activities; technical testing and analysis
3	Exploration and exploitation of space	51.22	Space transport
		61 (p)	Telecommunications
		71 (p) (excl: 71.11)	Engineering activities; technical testing and analysis
4	Transport, telecommunication and other infrastructures	36	Water collection, treatment and supply
		37	Sewerage
		41	Construction of buildings
		42	Civil engineering
		43	Specialised construction activities
		49	Land transport and transport via pipelines
		50	Water transport
		51 (exc: 51.22)	Air transport
		52	Warehousing and support activities for transportation
		53	Postal and courier activities
		61 (p)	Telecommunications
		71.11	Architectural activities
		71 (p) (excl: 71.11)	Engineering activities; technical testing and analysis
5	Energy	35	Electricity, gas, steam and air conditioning supply
		71 (p) (excl: 71.11)	Engineering activities; technical testing and analysis
6	Industrial production and technology	10 - 33	(all) Manufacturing
		582	Software publishing
		62	Computer programming, consultancy and related activities
		63	Information service activities
		61 (p)	Telecommunications
		71 (p) (excl: 71.11)	Engineering activities; technical testing and analysis
		excluded here: 20.15, 20.2, 25.4, 28.3, 30.4	
7	Health	86	Human health activities

		87	Residential care activities
8	Agriculture	1	Crop and animal production, hunting and related service activities
		2	Forestry and logging
		3	Fishing and aquaculture
		20.15	Manufacture of fertilisers and nitrogen compounds
		20.2	Manufacture of pesticides and other agrochemical products
		28.3	Manufacture of agricultural and forestry machinery
		75	Veterinary activities
		71 (p) (excl: 71.11)	Engineering activities; technical testing and analysis
9	Education	85	Education
10	Culture, recreation, religion and mass media	581	Publishing of books
		59	Motion picture, video and television programme production, sound recording and music publishing activities
		60	Programming and broadcasting activities
		90	Creative, arts and entertainment activities
		91	Libraries, archives, museums and other cultural activities
		93	Sports activities and amusement and recreation activities
		94.9	Activities of other membership organisations
		11	Political and social systems, structures and processes
70	Activities of head offices; management consultancy activities		
78	Employment activities		
84	Public administration and defence; compulsory social security		
88	Social work activities without accommodation		
excluded here: 84.22			
12	General advancement of knowledge (General University Funds – GUF)	72 (p)	Scientific research and development
13	General advancement of knowledge (other sources than GUF)	72 (p)	Scientific research and development
14	Defence	25.4	Manufacture of weapons and ammunition
		30.4	Manufacture of military fighting vehicles
		84.22	Defence activities

Note: some NACE sub-categories are referred as *excluded* - it is because they are part of a different NABS chapter.

Table A X ICT occupations in ISCO-88 classification**ISCO-88**

1236	Computing services managers
213	Computing professionals
2144	Electronics and telecommunications engineers
2359	Information technology trainers
3114	Electronics and telecommunications engineering technicians
312	Computer associate professionals
313	Optical and electronic equipment operators
7242	Electronics fitters
7243	Electronics mechanics and servicers
8283	Electronic-equipment assemblers

Source: Eurostat (2016).
http://ec.europa.eu/eurostat/cache/metadata/en/isoc_skslf_esms.htm

Table A XI ICT occupations in ISCO-08 classification**ISCO-08**

133	Information and communications technology services managers
2152	Electronic engineers
2153	Telecommunication engineers
2166	Graphic and multimedia designers
2356	Information technology trainers
2434	ICT sales professionals
251	Software and multimedia developers and analysts
252	Database specialists and systems administrators
35	Information and communications technicians
7421	Electronics mechanics and servicers
7422	ICT installers and servicers

Source: Eurostat (2016).
http://ec.europa.eu/eurostat/cache/metadata/en/isoc_skslf_esms.htm

Table A XII ICT occupations in COC and SOC classifications (US)

2010 COC	2010 SOC	
110	11-3021	Computer and Information Systems Managers
1000 1010 1020 1040 1050 1060 1100 1110	15-1100	Computer Occupations
1400	17-2061	Computer Hardware Engineers
1550	17-3023	Electronics Engineering Technicians
5010 5020 5030	43-2000	Communications Equipment Operators
5800	43-9011	Computer Operators
5830	43-9031	Desktop Publishers
7020	49-2020	Radio and Telecommunications Equipment Installers and Repairers
7420	49-9052	Telecommunications Line Installers and Repairers

Source: Stančik (2012) and own elaboration.

Table A XIII NABS - CIC correspondence table (US)

NABS 2007		CIC 2010	
Code	Name	Code	Name
1	Exploration and exploitation of the Earth	0370-0490	Mining, quarrying, and oil and gas extraction
2	Environment	0680 7790 7290 (p)	Sewage treatment facilities Waste management and remediation services Architectural, engineering and related activities
3	Exploration and exploitation of space	3590 9570	Aerospace product and parts manufacturing Administration of economic programs and space research
4	Transport, telecommunication and other infrastructures	0770 6070 - 6390 6680 - 6690 (p) 7290 (p)	Construction Transportation and warehousing Telecommunications Architectural, engineering, and related services
5	Energy	0570 - 0690 7290 (p)	Utilities Architectural, engineering, and related services excluded here: 0680
6	Industrial production and technology	1070 - 2390 2470 - 2990 3090 3170 3180 3190 3290 3360 3370 3380 3390 3470 - 3490 3570 (p) 3580 (p) 3680 (p) 3770 - 3870 3970 3980 3990 6490 6680 - 6690 (p) 7290 (p) 7380	Nondurable goods manufacturing Durable goods manufacturing Commercial and service industry machinery manufacturing Metalworking machinery manufacturing Engines, turbines, and power transmission equipment manufacturing Machinery manufacturing, n.e.c. Not specified machinery manufacturing Computer and peripheral equipment manufacturing Communications, and audio and video equipment manufacturing Navigational, measuring, electromedical, and control instruments manufacturing* Electronic component and product manufacturing, n.e.c. Electrical equipment and appliances manufacturing Motor vehicles and motor vehicle equipment manufacturing Aircraft and parts manufacturing Ship and boat building Wood products manufacturing Sporting and athletic goods, and doll, toy and game manufacturing Miscellaneous manufacturing, n.e.c. Not specified manufacturing industries Software publishers Telecommunications Architectural, engineering, and related services Computer systems design and related services excluded here: 2180, 2970
7	Health	2190 3960 7970 - 8180 8270 - 8290	Pharmaceutical and medicine manufacturing Medical equipment and supplies manufacturing Health services, except hospitals Health services, except hospitals
8	Agriculture	0170 0290 2180	Agriculture, forestry, fishing, and hunting Agricultural chemical manufacturing

		3070	Agricultural implement manufacturing
		7480	Veterinary services
9	Education	7860 - 7890	Educational services
10	Culture, recreation, religion and mass media	6470 - 6480	Publishing, except Internet
		6570 - 6590	Motion picture and sound recording industries
		6770 - 6780	Other information services
		8560 - 8590	Arts, entertainment, and recreation
		9160 - 9190	Membership associations and organizations
		9290	Private households
11	Political and social systems, structures and processes	7270	Legal services
		7280	Accounting, tax preparation, bookkeeping, and payroll services
		7570	Management of companies and enterprises
		7390	Management, scientific, and technical consulting services
		7580	Employment services
		8370 - 8470	Social assistance
		9370 - 9590	Public administration
		excluded here: 9570, 9590	
12	General advancement of knowledge (General University Funds - GUF)	7460 (p)	Scientific research and development services
13	General advancement of knowledge (other sources than GUF)	7460 (p)	Scientific research and development services
14	Defence	2970	Ordnance
		3380 (p)	Navigational, measuring, electromedical, and control instruments manufacturing*
		3570 (p)	Motor vehicles and motor vehicle equipment manufacturing*
		3580 (p)	Aircraft and parts manufacturing*
		3680 (p)	Ship and boat building*
		9590	National security and international affairs

Source: Stančík (2012) and own elaboration.

Note: some NACE sub-categories are referred to as *excluded*; this is because they are part of a different NABS chapter.

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List of Tables

Table 1 The comprehensive definition of the ICT sector (based on NACE-Rev.2)10

Table 2 The operational definition of the ICT sector (based on NACE-Rev.2)11

Table 3 MC sector disaggregation (based on NACE-Rev.2).....11

Table 4 Additional sectors (based on NACE-Rev.2)12

Table 5 Data used to estimate the ICT services and the MC sector13

Table 6 Explanatory variables by estimated sector. Annualized predictors from the
Quarterly National Accounts17

Table 7 NABS 2007 chapters20

List of Tables of Correspondence

Table A I Approximate correspondence between NACE-Rev.2 (ISIC Rev. 4) and NACE Rev 1.1 (ISIC Rev. 3.1) for ICT, MC and RS sectors and additional sectors111

Table A II Correspondences between NACE-Rev.2 and ANZSIC (Australia).....114

Table A III Correspondences between NACE-Rev.2 and CNAE (Brazil)116

Table A IV Correspondences between NACE-Rev.2 and JSIC (Japan).....118

Table A V Correspondences between NACE-Rev.2 and KSIC (Korea).....120

Table A VI Correspondences between NACE-Rev.2 and SIC (Taiwan)122

Table A VII Correspondences between NACE-Rev.2 and NAICS (US and Canada) ..124

Table A VIII NABS - NACE Rev. 1.1. correspondence table126

Table A IX NABS - NACE Rev. 2 correspondence table.....128

Table A X ICT occupations in ISCO-88 classification.....130

Table A XI ICT occupations in ISCO-08 classification.....130

Table A XII ICT occupations in COC and SOC classifications (US).....131

Table A XIII NABS - CIC correspondence table (US).....132

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