

EU KLEMS Growth and Productivity Accounts

2013 update¹

Description of methodology and country notes for Belgium

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Introduction

The EU KLEMS rolling updates from 2012 onwards follow up from the previous release in 2009 which showed detailed growth accounts up to 2007. These new updates are similar in concepts and methodologies to calculate the various growth and productivity variables as its predecessors, but it also has a number of new features;

- It provides updates to the most recent available year and revisions of longer time-series in case national statistical institutes (NSIs) provided these.
- Most importantly, a new industrial classification is used.

Since last year many European NSIs started to produce data based on the new NACE 2 industry classification, which is consistent with the international standardized ISIC Revision 4 industry classification (ISIC Rev. 4). Accordingly, we adjusted the industrial classification used in EU KLEMS. We distinguish between 35 industries covering the total economy. Many of the industries are a near perfect match with previous ISIC Rev. 3 industries, but the definition of various other industries has changed and some new industries have been introduced (see below). The National Accounts (NA) data in the new classification is provided for shorter time series than were previously available in the ISIC Rev. 3 classification. Earlier releases of the EU KLEMS databases provide time series back to 1970 with estimations of Total Factor Productivity (TFP) generally starting in 1980. In order to produce estimations of TFP in the new industry classification, back-casts of the time series of output and labour data have been made. These back-casts are based on data in the ISIC Rev. 3 (NACE 1) classification from the November 2009 release, updated in March 2011 and denoted in grey in the new release (see below).

Part I of this document describes the issues involved in constructing new output files based on the most recent data available in the ISIC Rev. 4 industry classification. Furthermore it provides the methods applied for the estimation of back casts of the time series using available data in the ISIC Rev. 3 industry classification. Part II covers the country specific notes on construction issues and revisions of the source data. A brief overview is provided of the most important changes compared to earlier releases of the EU KLEMS database. The appendix shows the industry mapping tables that are used for the estimation of the output, capital and employment variables.

¹ For comments and suggestions please send an email to euklems@rug.nl.

PART I General notes for the 2012 release

This section details the general methods applied in this EU KLEMS release to arrive at estimates of total factor productivity in the new ISIC Rev. 4 industry classification. In this section the main differences between the classifications are briefly highlighted. Additionally this section covers the methods applied for the back-casting of time series of output and labour in ISIC Rev. 4. For more detailed information on the general growth accounting methodology and construction of the database, see O'Mahony, Mary and Marcel P. Timmer (2009)².

Industry Classification changes

When producing back-casts of times series, industry mappings between the old and the new classifications have to be made. For many industries the ISIC Rev. 3 and ISIC Rev. 4 industry classifications are a close or even one to one match. However, the revised classification also features a number of industries which are completely new and are comprised of multiple activities at the 4-digit level spread across many ISIC Rev. 3 2-digit industry aggregates. For these industries it is impossible to make a perfect match given the level of detail at which ISIC Rev. 3 and ISIC Rev. 4 data is currently available, hence compromises have been made. The short list below indicates the most problematic industries:

- Postal and courier activities are allocated to ISIC Rev. 4 industry 53 whereas in ISIC Rev. 3 these activities were part of Post and Telecommunications, combined in the 2-digit industry 64.
- The ISIC Rev. 4 sector J, Information and communication, consists of Publishing, Audiovisual and broadcasting activities (58-60), Telecommunications (61), and IT and other information services (62-63). These activities consist of multiple ISIC REV. 3 industries belonging to several 2-digit sectors. Sector J is the sector for which time series estimates will be most inaccurate. A split of ISIC Rev. 3 industry 64 is not available in EU KLEMS so in general Postal and Courier activities are included in the estimation of the growth of J.

The next section presents the mapping tables that have been used for the estimation of the different variables at different levels of industry detail.

Back-casting time series in EU KLEMS

Whenever NA data is missing official values for output and labour data, the series are back-casted from the first year for which official data is available. The availability of data is dependent on the country and is indicated in the country specific notes. **Appendix table 1** details the many to one ISIC Rev. 3 – Rev. 4 industry mapping. It is based on the detailed 72 industries list which is available in the March 2011 update of the November 2009 release of the EU KLEMS database (09ii release) for output and labour variables.

The appendix table shows which ISIC Rev. 3 industry or combination of ISIC Rev. 3 industries from the 09ii output file are used to calculate a growth rate, which is applied to the value of the ISIC Rev. 4 industry in the following year. This is done only for the most detailed industries (lowest level). Industry aggregates are calculated from the bottom up, following the same approach as in previous

² O'Mahony, Mary and Marcel P. Timmer (2009), ['Output, Input and Productivity Measures at the Industry Level: the EU KLEMS Database'](#), *Economic Journal*, 119(538), pp. F374-F403

EU KLEMS releases. For nominal variables the ISIC Rev. 3 industries are aggregated by simple summation in order to calculate the NACE 2 industry's growth rate. For volumes and price deflators a Tornqvist³ growth rate is calculated from the ISIC Rev. 3 industries, using the corresponding nominal variable as weights. For back-casts of data on hours worked the growth trend of average hours worked is calculated using the same industry mapping. The resulting estimated average of hours worked for the NACE 2 industry is multiplied by the number of persons employed to arrive at values for total hours worked.

The growth accounting variables are available at the ISIC Rev. 3 32 industry level only in earlier versions of the EU KLEMS database. Therefore the detailed concordance table in appendix table 1 cannot be applied to estimate back casts for the growth accounting variables. Hence, back casts of the growth contributions and TFP have been estimated using an adjusted concordance shown in **appendix table 2**. No reliable estimates can be made for the ISIC Rev. 4 sector J (Information and communication) can be made based on the ISIC Rev. 3 32 industry list. Data for this sector and underlying industries have therefore been omitted from the back-casts. Growth rates for ISIC Rev. 4 industries R (Arts, entertainment and recreation) and S (Other service activities) have not been back-casted separately, only growth rates for the aggregate sector R-S have been estimated. Total economy figures are taken directly from the 09ii data.

PART II Country specific notes: BELGIUM

Release EU KLEMS files: December 2013

Synopsis of the main points

- Official data on output, labour input, labour services, and capital services are provided by FPB for the period 1995-2011 in the ISIC Rev. 4 industry classification.⁴
- No official data is available on investment. No official data is available for the detailed industries of the 'Wholesale and Retail Trade' sector (G) and the 'Transportation and Storage' sector (H). Splits for output and labour variables have been made using EUROSTAT data.
- The FPB industry list is aggregated to match the EU KLEMS industry list, according to appendix table 3.
- Values denoted in grey are EU KLEMS estimates. Prior to 1995 these are back-casts following the methodology as outlined in the previous section.
- The number of hours worked has been revised upwards considerably in the new FPB data.
- A worksheet with additional industry aggregates has been added.

General Approach

Official data on output, labour input, labour services, and capital services are supplied to us by FPB for the period 1995-2011 in the ISIC Rev. 4 industry classification. Detailed FPB industries are aggregated to conform to the EU KLEMS industry list using the concordance in **appendix table 3**. Volume indices have been TornQvist aggregated. No data has been supplied on investments and no

³ The Tornqvist aggregation approach uses annual moving weights based on averages of adjacent points in time. For more information on this procedure see the general EU KLEMS methodology [document](#).

⁴ [Federal Planning Bureau](#)

official data is available for the detailed industries of the 'Wholesale and Retail Trade' sector (G) and the 'Transportation and Storage' sector (H) in the FPB data. Back casts of output and labour data have been estimated, using a detailed many-to-one industry concordance, shown in **appendix table 1**. Back casts of the growth contributions have been estimated using less detailed industry concordance shown in **appendix table 2**. A sheet with an alternative industry list has been added to the output file, which includes a split between Market Economy and Non-Market Services.

Output and Labour

The official FPB data on output and labour input is used. In order to estimate values for the detailed industries of sectors G and H, EUROSTAT shares have been used. Average hours worked by employees from the 09ii output file are used together with the estimates of total persons engaged to estimate hours worked for these industries. The results are normalized to the levels of total hours worked of the G and H sectors. These figures are denoted in grey in the output file.

The output data remains comparable to the data in the 09ii release for the whole period except the latest years, 2005-2006, where revisions have been implemented. Labour input in terms of hours worked was revised upward by on average 11% at the total economy level for the period 1995-2011. For the most part this was due to increases in hours worked in the 'Agricultural' (A), 'Wholesale and Retail' (G), 'Accommodation and Foodservices' (I) and the Business Services sectors (M-N).

Capital and labour services

Capital and labour services are taken from the FPB data. The growth of these indices is comparable to that of the 09ii EUKLEMS output file. No attempt was made estimate values for the detailed industries of sectors G and H. No back-casted series are produced for these variables.

In addition to capital compensation from the national accounts (CAP), derived as Value Added (VA) minus Labour compensation (LAB), capital compensation corrected for negative rental prices (CAP_GFCE) is now supplied by FPB as well. ICT and NonICT shares in total capital compensation are also supplied by FPB. These shares are aggregated from the FPB to the EU KLEMS industry level by first multiplying the shares by nominal capital compensation corrected for negative rental rates (CAP_GFCE). The resulting values are aggregated by simple summation, from which new shares are derived at the EU KLEMS industry level.

Growth Accounting Variables

Back casts of TFP and growth contribution figures prior to 1995, colored grey in the output file, were taken directly from the 09ii release and mapped to ISIC Rev. 4 industries according to the many-to-one concordance in **appendix table 2**. Values for 'Total Manufacturing' (C) have been Tornqvist aggregated. Values for the other industry aggregates, as well as 'Total Economy' (TOT) figures are taken directly from the 09ii output file prior to 1995. For the 'Information and Communication' (J) sector, no figures are shown prior to 1995 due to the fact that a reasonable estimate from the Rev. 3 industries in the 09ii output file's industry list could not be made.

No detailed industries are shown for G and H since FPB did not provide information for these industries. Growth accounting estimates are consistent with the FPB results. The increase in the values of total hours worked is almost constant for the whole period for most industries Hence, it does not change the growth of hours worked to a large extend. Thus it has little impact on the growth accounting results.

Appendix table 1

Industry concordance for back casts of nominal output and labour data

ISIC Rev. 3 list (many to 1 mapping)

ISIC Rev. 3 list (many to 1 mapping)	ISIC Rev. 4	ISIC Rev. 4 Description
Aggregate	TOT	TOTAL INDUSTRIES
AtB	A	AGRICULTURE, FORESTRY AND FISHING
C	B	MINING AND QUARRYING
Aggregate	C	TOTAL MANUFACTURING
15t16	10-12	Food products, beverages and tobacco
17t19	13-15	Textiles, wearing apparel, leather and related products
20	16-18	Wood and paper products; printing and reproduction of recorded media
21	16-18	
22x	16-18	
23	19	Coke and refined petroleum products
24	20-21	Chemicals and chemical products
25	22-23	Rubber and plastics products, and other non-metallic mineral products
26	22-23	
27t28	24-25	Basic metals and fabricated metal products, except machinery and equipment
30t33	26-27	Electrical and optical equipment
29	28	Machinery and equipment n.e.c.
34t35	29-30	Transport equipment
36	31-33	Other manufacturing; repair and installation of machinery and equipment
37	D-E	
E	D-E	ELECTRICITY, GAS AND WATER SUPPLY
90	D-E	
F	F	CONSTRUCTION
Aggregate	G	WHOLESALE AND RETAIL TRADE; REPAIR OF MOTOR VEHICLES AND MOTORCYCLES
50	45	Wholesale and retail trade and repair of motor vehicles and motorcycles
51	46	Wholesale trade, except of motor vehicles and motorcycles
52	47	Retail trade, except of motor vehicles and motorcycles
Aggregate	H	TRANSPORTATION AND STORAGE
60t63	49-52	Transport and storage
64	53	Postal and courier activities
H	I	ACCOMMODATION AND FOOD SERVICE ACTIVITIES
Aggregate	J	INFORMATION AND COMMUNICATION
221	58-60	Publishing, audiovisual and broadcasting activities
921t2	58-60	
64	61	Telecommunications
72	62-63	IT and other information services
J	K	FINANCIAL AND INSURANCE ACTIVITIES
70	L	REAL ESTATE ACTIVITIES
71	M-N	
73	M-N	PROFESSIONAL, SCIENTIFIC, TECHNICAL, ADMINISTRATIVE AND SUPPORT SERVICE ACTIVITIES
74	M-N	
Aggregate	O-U	COMMUNITY SOCIAL AND PERSONAL SERVICES
L	O	Public administration and defence; compulsory social security
M	P	Education
N	Q	Health and social work
Aggregate	R-S	ARTS, ENTERTAINMENT, RECREATION AND OTHER SERVICE ACTIVITIES
923t7	R	Arts, entertainment and recreation
91	S	Other service activities
93	S	
P	T	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use
Q	U	Activities of extraterritorial organizations and bodies

Appendix table 2

Industry concordance for back cast of growth accounting variables		
ISIC Rev. 3 list (many to one mapping)	ISIC Rev. 4	ISIC Rev. 4 Description
TOT	TOT	TOTAL INDUSTRIES
AtB	A	AGRICULTURE, FORESTRY AND FISHING
C	B	MINING AND QUARRYING
Aggregate	C	TOTAL MANUFACTURING
15t16	10-12	Food products, beverages and tobacco
17t19	13-15	Textiles, wearing apparel, leather and related products
20+21t22	16-18	Wood and paper products; printing and reproduction of recorded media
23	19	Coke and refined petroleum products
24	20-21	Chemicals and chemical products
25+26	22-23	Rubber and plastics products, and other non-metallic mineral products
27t28	24-25	Basic metals and fabricated metal products, except machinery and equipment
30t33	26-27	Electrical and optical equipment
29	28	Machinery and equipment n.e.c.
34t35	29-30	Transport equipment
36t37	31-33	Other manufacturing; repair and installation of machinery and equipment
E	D-E	ELECTRICITY, GAS AND WATER SUPPLY
F	F	CONSTRUCTION
G	G	WHOLESALE AND RETAIL TRADE; REPAIR OF MOTOR VEHICLES AND MOTORCYCLES
I	H	TRANSPORTATION AND STORAGE
H	I	ACCOMMODATION AND FOOD SERVICE ACTIVITIES
J	K	FINANCIAL AND INSURANCE ACTIVITIES
70	L	REAL ESTATE ACTIVITIES
71t74	M-N	PROFESSIONAL, SCIENTIFIC, TECHNICAL, ADMINISTRATIVE AND SUPPORT SERVICE ACTIVITIES
LtQ	O-U	COMMUNITY SOCIAL AND PERSONAL SERVICES
L	O	Public administration and defence; compulsory social security
M	P	Education
N	Q	Health and social work
O	R-S	ARTS, ENTERTAINMENT, RECREATION AND OTHER SERVICE ACTIVITIES

Appendix table 3

Concordance industry list FPB to KLEMS list ISIC Rev. 4

FPB ISIC Rev. 4	KLEMS ISIC Rev. 4	ISIC Rev. 4 Description
TOT	TOT	TOTAL INDUSTRIES
A	A	AGRICULTURE, FORESTRY AND FISHING
B	B	MINING AND QUARRYING
C	C	TOTAL MANUFACTURING
10-12	10-12	Food products, beverages and tobacco
13-15	13-15	Textiles, wearing apparel, leather and related products
16-18	16-18	Wood and paper products; printing and reproduction of recorded media
19	19	Coke and refined petroleum products
20	20-21	Chemicals and chemical products
21	20-21	
22-23	22-23	Rubber and plastics products, and other non-metallic mineral products
24-25	24-25	Basic metals and fabricated metal products, except machinery and equipment
26	26-27	Electrical and optical equipment
27	26-27	
28	28	Machinery and equipment n.e.c.
29-30	29-30	Transport equipment
31-33	31-33	Other manufacturing; repair and installation of machinery and equipment
D	D-E	ELECTRICITY, GAS AND WATER SUPPLY
E	D-E	
F	F	CONSTRUCTION
G	G	WHOLESALE AND RETAIL TRADE; REPAIR OF MOTOR VEHICLES AND MOTORCYCLES
	45	Wholesale and retail trade and repair of motor vehicles and motorcycles
	46	Wholesale trade, except of motor vehicles and motorcycles
	47	Retail trade, except of motor vehicles and motorcycles
H	H	TRANSPORTATION AND STORAGE
	49-52	Transport and storage
	53	Postal and courier activities
I	I	ACCOMMODATION AND FOOD SERVICE ACTIVITIES
	J	INFORMATION AND COMMUNICATION
JA	58-60	Publishing, audiovisual and broadcasting activities
JB	61	Telecommunications
JC	62-63	IT and other information services
K	K	FINANCIAL AND INSURANCE ACTIVITIES
L	L	REAL ESTATE ACTIVITIES
MA	M-N	PROFESSIONAL, SCIENTIFIC, TECHNICAL, ADMINISTRATIVE AND SUPPORT SERVICE
MB	M-N	ACTIVITIES
MC	M-N	
N	M-N	
	O-U	COMMUNITY SOCIAL AND PERSONAL SERVICES
O	O	Public administration and defence; compulsory social security
P	P	Education
QA	Q	Health and social work
QB	Q	
	R-S	ARTS, ENTERTAINMENT, RECREATION AND OTHER SERVICE ACTIVITIES
R	R	Arts, entertainment and recreation
S	S	Other service activities
		Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use
T	T	
U	U	Activities of extraterritorial organizations and bodies