

EU KLEMS Growth and Productivity Accounts

2012 release

Description of methodology and country notes for Japan

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Introduction

The 2012 EU KLEMS release follows up from the previous release in 2009 which showed detailed growth accounts up to 2007. 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. Accordingly, we adjusted the industrial classification used in EU KLEMS. We distinguish between 34 industries covering the total economy. Japan is a special case in the EU KLEMS database since the data is taken from the Japan Industrial Productivity (JIP) Database¹. This dataset uses its own industry classification, distinguishing 108 industries, covering the whole of the Japanese economy. Due to the switch to ISIC Revision 4 in EU KLEMS, new concordance tables have been developed to map the JIP industries to the new EU KLEMS list.

The JIP database contains a growth accounting decomposition of Gross Output growth into the contributions of aggregate Intermediate Inputs (II), aggregate Capital services and Labour services. Furthermore a Value Added (VA) growth decomposition is available by broad sectors. The JIP database employs its own measure of capital services which deviates in terms of methodology from the EU KLEMS approach. In order to preserve the methodological consistency in the EU KLEMS output files across countries, we have taken the source data on investment and initial capital stocks from the JIP database and recalculated the capital stocks and services according to the EU KLEMS method. For more detailed information on the general growth accounting methodology and construction of the EU KLEMS database, see O'Mahony, Mary and Marcel P. Timmer (2009)². The labour services index is taken as given from the JIP database. The new EU KLEMS dataset covers the period 1973-2009 and presents a Value Added growth decomposition into the growth contributions of hours worked, the composition of the labour force, IT capital services, Non-IT capital services and Total Factor Productivity (TFP).

Section 1 covers the notes on the mapping and aggregation of industries to the EU KLEMS ISIC Rev. 4 industry list. Section 2 explains the details concerning the construction of the capital services. The appendix shows the industry concordance table that is used to map the JIP industries to the new EU KLEMS ISIC Rev. 4 industry list, as well as mapping of the JIP capital assets to the EU KLEMS asset list.

¹ For this version of the Japanese EU KLEMS files, the [2012 version of the JIP database](#) has been used.

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

1 Industry mapping and aggregation

This section covers the main issues in mapping the JIP industries to the new EU KLEMS ISIC Rev. 4 industry list.

The JIP database consists of 108 industries, shown in **appendix table 1**. Each of these industries is mapped to a KLEMS ISIC Rev. 4 industry, according to the mapping in the appendix table. Data in nominal values are aggregated by simple summation. Volumes and price indices are aggregated using a Tornqvist³ aggregation procedure, using the corresponding nominal variable as weights. The same aggregation method is used to calculate sector aggregates available in the EU KLEMS industry list from the bottom up, to ensure that the indices of the industry aggregates are consistent with their underlying industries. In the JIP database, data for nominal values and volumes are available, but not prices. Price deflators are derived implicitly from the volumes and the nominal data at the most detailed level of EU KLEMS industries in ISIC Rev. 4.

For Value Added (VA) only the nominal values are given. Hence, the deflator is derived from the Gross Output (GO) and Intermediate Inputs (II) deflators using:

$$dP_{VA} = dP_{GO} \frac{\overline{GO}}{\overline{VA}} - dP_{II} \frac{\overline{II}}{\overline{VA}}$$

Where dX indicates a logarithmic growth rate and \bar{X} a period average. The industry subscript is suppressed to facilitate exposition. The VA volume growth is derived implicitly from the nominal and deflator data at the most detailed EU KLEMS industry level.

2 Construction of capital services

This section provides details on the specific methods applied to calculate the capital services from the source data available from the JIP database.

Although the JIP database readily provides data on capital services growth, the methods employed to compute aggregate capital services deviate from the methods of construction in the EU KLEMS database. The main differences being an Ex-Ante approach to the rate of return on capital assets and the use of different asset depreciation rates. In addition, the JIP database provides no split of capital services into the services for ICT and Non-ICT assets. Therefore investment data is taken from the JIP database with which the capital services are calculated, using the EU KLEMS methods which have also been employed for other countries available in the EU KLEMS database. This ensures consistency across the countries in the database in terms of the interpretation of the variables.

The JIP database provides data on investment by industry, in both current and constant prices, as well as capital stocks in constant prices, for 39 asset types. These asset types are listed in **appendix table 2**. Each JIP asset type is mapped to one of the 8 asset types distinguished in the EU KLEMS database. Additionally the data has to be aggregated over industries, for which the same methods

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](#).

are applied as explained in the previous section. The investment deflators are derived implicitly from the investment data in current and constant prices. The JIP database employs deflators that are asset specific. The 39 JIP asset deflators are Tornqvist aggregated to the 8 assets available in EU KLEMS, using the nominal total economy investment by JIP asset as weights.

For the capital stocks, only the values in the year 1970 are used for the 39 JIP assets. These stocks in constant prices are deflated using the investment deflators, and subsequently aggregated nominally over industries and assets. The 1970 stocks are used as the initial stock. Stocks are built up using the Perpetual Inventory Method (PIM), employing the geometric EU KLEMS asset depreciation rates. Capital compensation (CAP) by industry is derived as the residual from Value Added and Labour compensation (LAB). Labour compensation, as well as labour services are used directly from the JIP database. In order to calculate capital compensation by asset type we use the standard EU KLEMS methodology, employing an Ex Post, internal rate of return that is industry specific.⁴ Capital services for both ICT and Non-ICT assets are calculated.

⁴ For more detailed information on this procedure see the general EU KLEMS methodology [document](#).

Appendix Table 1

Japan JIP-ISC Rev. 4 many to one industry concordance			
JIP list	ISIC rev	JIP Description	KLEMS description
1	A	Rice, wheat production	AGRICULTURE, FORESTRY AND FISHING
2	A	Miscellaneous crop farming	AGRICULTURE, FORESTRY AND FISHING
3	A	Livestock and sericulture farming	AGRICULTURE, FORESTRY AND FISHING
4	A	Agricultural services	AGRICULTURE, FORESTRY AND FISHING
5	A	Forestry	AGRICULTURE, FORESTRY AND FISHING
6	A	Fisheries	AGRICULTURE, FORESTRY AND FISHING
7	B	Mining	MINING AND QUARRYING
8	10-12	Livestock products	Food products, beverages and tobacco
9	10-12	Seafood products	Food products, beverages and tobacco
10	10-12	Flour and grain mill products	Food products, beverages and tobacco
11	10-12	Miscellaneous foods and related products	Food products, beverages and tobacco
12	10-12	Prepared animal foods and organic fertilizers	Food products, beverages and tobacco
13	10-12	Beverages	Food products, beverages and tobacco
14	10-12	Tobacco	Food products, beverages and tobacco
15	13-15	Textile products	Textiles, wearing apparel, leather and related products
16	16-18	Lumber and wood products	Wood and paper products; printing and reproduction of
17	31-33	Furniture and fixtures	Other manufacturing; repair and installation of machinery and
18	16-18	Pulp, paper, and coated and glazed paper	Wood and paper products; printing and reproduction of
19	16-18	Paper products	Wood and paper products; printing and reproduction of
20	16-18	Printing, plate making for printing and	Wood and paper products; printing and reproduction of
21	13-15	Leather and leather products	Textiles, wearing apparel, leather and related products
22	22-23	Rubber products	Rubber and plastics products, and other non-metallic mineral
23	20-21	Chemical fertilizers	Chemicals and chemical products
24	20-21	Basic inorganic chemicals	Chemicals and chemical products
25	20-21	Basic organic chemicals	Chemicals and chemical products
26	20-21	Organic chemicals	Chemicals and chemical products
27	20-21	Chemical fibers	Chemicals and chemical products
28	20-21	Miscellaneous chemical products	Chemicals and chemical products
29	20-21	Pharmaceutical products	Chemicals and chemical products
30	19	Petroleum products	Coke and refined petroleum products
31	19	Coal products	Coke and refined petroleum products
32	22-23	Glass and its products	Rubber and plastics products, and other non-metallic mineral
33	22-23	Cement and its products	Rubber and plastics products, and other non-metallic mineral
34	22-23	Pottery	Rubber and plastics products, and other non-metallic mineral
35	22-23	Miscellaneous ceramic, stone and clay products	Rubber and plastics products, and other non-metallic mineral products
36	24-25	Pig iron and crude steel	Basic metals and fabricated metal products, except
37	24-25	Miscellaneous iron and steel	Basic metals and fabricated metal products, except
38	24-25	Smelting and refining of non-ferrous metals	Basic metals and fabricated metal products, except
39	24-25	Non-ferrous metal products	Basic metals and fabricated metal products, except
40	24-25	Fabricated constructional and architectural metal	Basic metals and fabricated metal products, except
41	24-25	Miscellaneous fabricated metal products	Basic metals and fabricated metal products, except machinery and equipment
42	28	General industry machinery	Machinery and equipment n.e.c.
43	28	Special industry machinery	Machinery and equipment n.e.c.
44	28	Miscellaneous machinery	Machinery and equipment n.e.c.
45	26-27	Office and service industry machines	Electrical and optical equipment
46	26-27	Electrical generating, transmission, distribution and industrial apparatus	Electrical and optical equipment
47	26-27	Household electric appliances	Electrical and optical equipment
48	26-27	Electronic data processing machines, digital and	Electrical and optical equipment
49	26-27	Communication equipment	Electrical and optical equipment
50	26-27	Electronic equipment and electric measuring	Electrical and optical equipment
51	26-27	Semiconductor devices and integrated circuits	Electrical and optical equipment
52	26-27	Electronic parts	Electrical and optical equipment
53	26-27	Miscellaneous electrical machinery equipment	Electrical and optical equipment

Japan JIP-ISC Rev. 4 many to one industry concordance (Continued)

JIP list	ISIC rev	JIP Description	KLEMS description
54	29-30	Motor vehicles	Transport equipment
55	29-30	Motor vehicle parts and accessories	Transport equipment
56	29-30	Other transportation equipment	Transport equipment
57	26-27	Precision machinery & equipment	Electrical and optical equipment
58	22-23	Plastic products	Rubber and plastics products, and other non-metallic mineral
59	31-33	Miscellaneous manufacturing industries	Other manufacturing; repair and installation of machinery and
60	F	Construction	CONSTRUCTION
61	F	Civil engineering	CONSTRUCTION
62	D-E	Electricity	ELECTRICITY, GAS AND WATER SUPPLY
63	D-E	Gas, heat supply	ELECTRICITY, GAS AND WATER SUPPLY
64	D-E	Waterworks	ELECTRICITY, GAS AND WATER SUPPLY
65	D-E	Water supply for industrial use	ELECTRICITY, GAS AND WATER SUPPLY
66	D-E	Waste disposal	ELECTRICITY, GAS AND WATER SUPPLY
67	46	Wholesale	Wholesale trade, except of motor vehicles and motorcycles
68	47	Retail	Retail trade, except of motor vehicles and motorcycles
69	K	Finance	FINANCIAL AND INSURANCE ACTIVITIES
70	K	Insurance	FINANCIAL AND INSURANCE ACTIVITIES
71	L	Real estate	REAL ESTATE ACTIVITIES
72	L	Housing	REAL ESTATE ACTIVITIES
73	49-52	Railway	Transport and storage
74	49-52	Road transportation	Transport and storage
75	49-52	Water transportation	Transport and storage
76	49-52	Air transportation	Transport and storage
77	49-52	Other transportation and packing	Transport and storage
78	61	Telegraph and telephone	Telecommunications
79	53	Mail	Postal and courier activities
80	P	Education (private and non-profit)	Education
81	M-N	Research (private)	PROFESSIONAL, SCIENTIFIC, TECHNICAL,
82	Q	Medical (private)	Health and social work
83	Q	Hygiene (private and non-profit)	Health and social work
84	S	Other public services	Other service activities
85	M-N	Advertising	PROFESSIONAL, SCIENTIFIC, TECHNICAL,
86	M-N	Rental of office equipment and goods	PROFESSIONAL, SCIENTIFIC, TECHNICAL,
87	45	Automobile maintenance services	Wholesale and retail trade and repair of motor vehicles and
88	M-N	Other services for businesses	PROFESSIONAL, SCIENTIFIC, TECHNICAL,
89	R	Entertainment	Arts, entertainment and recreation
90	58-60	Broadcasting	Publishing, audiovisual and broadcasting activities
91	62-63	Information services and internet-based services	IT and other information services
92	58-60	Publishing	Publishing, audiovisual and broadcasting activities
93	58-60	Video picture, sound information, character	Publishing, audiovisual and broadcasting activities
94	I	Eating and drinking places	ACCOMMODATION AND FOOD SERVICE ACTIVITIES
95	I	Accommodation	ACCOMMODATION AND FOOD SERVICE ACTIVITIES
96	S	Laundry, beauty and bath services	Other service activities
97	S	Other services for individuals	Other service activities
98	P	Education (public)	Education
99	P	Research (public)	Education
100	Q	Medical (public)	Health and social work
101	Q	Hygiene (public)	Health and social work
102	O	Social insurance and social welfare (public)	Public administration and defence; compulsory social security
103	O	Public administration	Public administration and defence; compulsory social security
104	Q	Medical (non-profit)	Health and social work
105	O	Social insurance and social welfare (non-profit)	Public administration and defence; compulsory social security
106	P	Research (non-profit)	Education
107	S	Other (non-profit)	Other service activities
108	N.A.	Activities not elsewhere classified	N.A.

Appendix Table 2

Asset concordance		
JIP assets	KLEMS assets	KLEMS description
1. Farm	OCon	Total non-residential construction
2. Other furniture	OMach	Other machinery and equipment
3. Nuclear fuel	OCon	Total non-residential construction
4. Household appliances	OMach	Other machinery and equipment
5. Other fabricated metal products	OMach	Other machinery and equipment
6. Steam engines and turbines	OMach	Other machinery and equipment
7. General industrial machinery, including materials handling equipment	OMach	Other machinery and equipment
8. Instruments	OMach	Other machinery and equipment
9. Mining and oil field machinery	OMach	Other machinery and equipment
10. Chemical machinery	OMach	Other machinery and equipment
11. Metalworking machines	OMach	Other machinery and equipment
12. Agricultural machinery, except tractors	OMach	Other machinery and equipment
13. Special industrial machinery	OMach	Other machinery and equipment
14. Photocopiers and related equipment	IT	Computing equipment
15. Office computing, and accounting machinery	IT	Computing equipment
16. Service industry machinery	OMach	Other machinery and equipment
17. Household electric appliances (excluding VTRs and applied electronic equipment)	OMach	Other machinery and equipment
18. Computers and peripheral equipment	IT	Computing equipment
19. Communications equipments for business purpose	CT	Communications equipment
20. VTRs and applied electronic equipment	CT	Communications equipment
21. Electricity transmission and distribution apparatus	OMach	Other machinery and equipment
22. Electric lighting fixtures and apparatus	OMach	Other machinery and equipment
23. Passenger cars	TraEq	Transport equipment
24. Trucks, buses, and truck trailers	TraEq	Transport equipment
25. Motorcycles and bicycles	TraEq	Transport equipment
26. Other transport equipment	TraEq	Transport equipment
27. Ships and boats	TraEq	Transport equipment
28. Internal combustion engines	OMach	Other machinery and equipment
29. Railroad equipment	TraEq	Transport equipment
30. Aircraft	TraEq	Transport equipment
31. Other equipments	OMach	Other machinery and equipment
32. Residential construction	RStruc	Residential structures
33. Non-residential construction	OCon	Total non-residential construction
34. Other (private non-residential structures)	OCon	Total non-residential construction
35. Railroad replacement tracks	OCon	Total non-residential construction
36. Construction of electric plants	OCon	Total non-residential construction
37. Construction for electronic communication	OCon	Total non-residential construction
38. Custom software	Soft	Software
39. Other business services	Other	Other assets