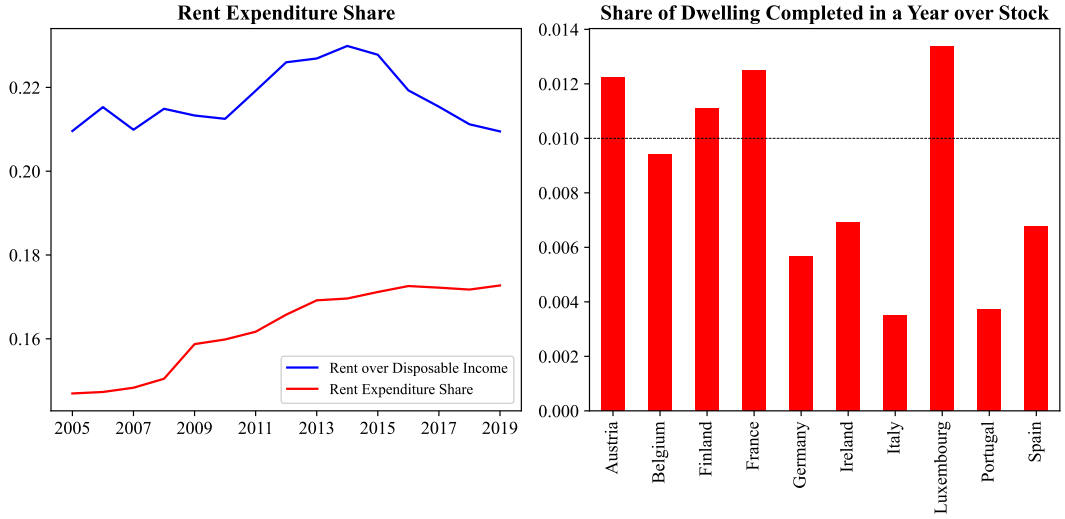
For Online Publication

Housing Rent, Inelastic Housing Supply, and International Business Cycles

by Seungyub Han[1]

1 Expenditure Weights and Housing Flow over Stock



2 Additional Backus-Smith Correlations Table

Table 1: Backus-Smith Correlations (per capita consumption)

	$Corr(\Delta c, \Delta q)$	$Corr(\Delta c, \Delta q^T)$	$Corr(\Delta c, \Delta q^{NT})$	$Corr(\Delta c, \Delta q^R)$
Austria	-0.048	-0.000	0.095	-0.445
Belgium	0.033	0.085	-0.009	-0.095
Finland	0.202	0.443	-0.052	-0.044
France	0.193	0.063	0.337	0.028
Germany	-0.145	-0.004	-0.022	-0.555
Greece	-0.207	-0.065	-0.235	-0.135
Ireland	-0.597	-0.359	-0.297	-0.718
Italy	0.082	-0.205	0.429	0.144
Luxembourg	-0.051	0.076	-0.037	-0.102
Netherlands	-0.138	-0.381	0.031	0.143
Portugal	-0.207	-0.231	-0.005	0.087
Spain	-0.024	0.183	-0.104	-0.110
Average	-0.075	-0.033	0.011	-0.150

$cc^* = ln(C_{it}/C_{EU12t})$ where C_{EU12t} is a geometric means of C over 12 eurozone countries. C is final consumption expenditure per capita.

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3 OECD Eurostat PPP Basic Headings

For the quality of the data, refer to the metadata[2] provided by Eurostat.

Table 2: Eurostat PPP Basic Headings

Class	Name	Class	Name	Class	Name
T	Rice	T	Electricity	T	Hotels, motels, inns and similar accommodation...
T	Flours and other cereals	T	Natural gas and town gas	T	Holiday centres, camping sites, youth hostels ...
T	Bread	T	Liquefied hydrocarbons (butane, propane, etc.)	T	Accommodation services of other establishments
T	Other bakery products	T	Liquid fuels	T	Electric appliances for personal care
T	Pizza and quiche	T	Solid fuels	T	Non-electrical appliances
T	Pasta products and couscous	T	Heat energy	T	Articles for personal hygiene and wellness, es...
T	Breakfast cereals	T	Household furniture	T	Jewellery
T	Other cereal products	T	Garden furniture	T	Clocks and watches
T	Beef and veal	T	Lighting equipment	T	Other personal effects
T	Pork	T	Other furniture and furnishings	NT	Cleaning, repair and hire of clothing
T	Lamb and goat	T	Carpets and other floor coverings	NT	Repair and hire of footwear
T	Poultry	T	Furnishing fabrics and curtains	NT	Services for the maintenance and repair of the...
T	Other meats	T	Bed linen	NT	Water supply
T	Edible offal	T	Table linen and bathroom linen	NT	Refuse collection
T	Dried, salted or smoked meat	T	Other household textiles	NT	Sewage collection
T	Other meat preparations	T	Refrigerators, freezers and fridge-freezers	NT	Other services relating to the dwelling n.e.c.
T	Fresh or chilled fish	T	Clothes washing machines, clothes drying machi...	NT	Repair of furniture, furnishings and floor cov...
T	Frozen fish	T	Cookers	NT	Repair of household textiles
T	Fresh or chilled seafood	T	Heaters, air conditioners	NT	Repair of household appliances
T	Frozen seafood	T	Cleaning equipment	NT	Domestic services by paid staff
T	Dried, smoked or salted fish and seafood	T	Other major household appliances	NT	Cleaning services
T	Other preserved or processed fish and seafood-...	T	Small electric household appliances	NT	Hire of furniture and furnishings
T	Milk, whole, fresh	T	Glassware, crystal-ware, ceramic ware and chin...	NT	Other domestic services and household services
T	Milk, low fat, fresh	T	Cutlery, flatware and silverware	NT	Medical services
T	Milk, preserved	T	Non-electric kitchen utensils and articles	NT	Dental services
T	Yoghurt	T	Repair of glassware, tableware and household u...	NT	Paramedical services
T	Cheese and curd	T	Major tools and equipment	NT	General hospitals
T	Other milk products	T	Small tools and miscellaneous accessories	NT	Mental health and substance abuse hospitals
T	Eggs	T	Cleaning and maintenance products	NT	Speciality hospitals
T	Butter	T	Other non-durable small household articles	NT	Nursing and residential care facilities
T	Margarine and other vegetable fats	T	Pharmaceutical products	NT	Maintenance and repair of personal transport e...
T	Olive oil	T	Other medical products	NT	Other services in respect of personal transpor...
T	Other edible oils	T	Therapeutic appliances and equipment	NT	Passenger transport by train
T	Other edible animal fats	T	New motor cars	NT	Passenger transport by underground and tram
T	Fresh or chilled fruit	T	Second-hand motor cars	NT	Passenger transport by bus and coach
T	Frozen fruit	T	Motor cycles	NT	Passenger transport by taxi and hired car with...
T	Dried fruit and nuts	T	Bicycles	NT	Passenger transport by sea and inland waterway
T	Preserved fruit and fruit-based products	T	Animal drawn vehicles	NT	Combined passenger transport
T	Fresh or chilled vegetables other than potatoe...	T	Tyres	NT	Other purchased transport services
T	Frozen vegetables other than potatoes and othe...	T	Spare parts for personal transport equipment	NT	Postal services
T	Dried vegetables, other preserved or processed...	T	Accessories for personal transport equipment	NT	Wired telephone services
T	Potatoes	T	Diesel	NT	Wireless telephone services
T	Crisps	T	Petrol	NT	Internet access provision services
T	Other tubers and products of tuber vegetables	T	Other fuels for personal transport equipment	NT	Bundled telecommunication services
T	Sugar	T	Lubricants	NT	Other information transmission services
T	Jams, marmalades and honey	T	Passenger transport by air	NT	Repair of audio-visual, photographic and infor...
T	Chocolate	T	Telephone and telefax equipment	NT	Maintenance and repair of other major durables...
T	Confectionery products	T	Equipment for the reception, recording and rep...	NT	Recreational and sporting services
T	Edible ices and ice cream	T	Equipment for the reception, recording and rep...	NT	Cinemas, theatres, concerts
T	Artificial sugar substitutes	T	Portable sound and vision devices	NT	Museums, libraries, zoological gardens
T	Sauces, condiments	T	Other equipment for the reception, recording a...	NT	Television and radio licence fees, subscriptions
T	Salt, spices and culinary herbs	T	Photographic and cinematographic equipment and...	NT	Hire of equipment and accessories for culture
T	Baby food	T	Personal computers	NT	Photographic services
T	Ready-made meals	T	Accessories for information processing equipment	NT	Other cultural services
T	Other food products n.e.c.	T	Software	NT	Education - HH
T	Coffee	T	Calculators and other information processing e...	NT	Restaurants, cafés and dancing establishments
T	Tea	T	Pre-recorded recording media	NT	Fast food and take away food services
T	Cocoa and powdered chocolate	T	Unrecorded recording media	NT	Canteens
T	Mineral or spring waters	T	Other recording media	NT	Hairdressing for men and children
T	Soft drinks	T	Major durables for outdoor recreation	NT	Hairdressing for women
T	Fruit and vegetable juices	T	Musical instruments and major durables for ind...	NT	Personal grooming treatments
T	Spirits	T	Games and hobbies	NT	Prostitution
T	Wine	T	Toys and celebration articles	NT	Repair of jewellery, clocks and watches
T	Beer	T	Equipment for sport, camping and open-air recr...	NT	Social protection
T	Tobacco	T	Garden products	NT	Life insurance
T	Narcotics	T	Plants and flowers	NT	Insurance connected with the dwelling
T	Clothing materials	T	Pets and related products	NT	Insurance connected with health
T	Garments for men	T	Veterinary and other services for pets	NT	Insurance connected with transport
T	Garments for women	T	Games of chance	NT	Other insurance
T	Garments for infants (0 to 2 years) and childr...	T	Books	NT	FISIM
T	Other articles of clothing and clothing access...	T	Newspapers	NT	Other financial services n.e.c.
T	Footwear for men	T	Magazines and periodicals	NT	Other services n.e.c.
T	Footwear for women	T	Miscellaneous printed matter	H	Actual rentals for housing
T	Footwear for infants and children	T	Stationery and drawing materials	H	Imputed rentals for housing
T	Materials for the maintenance and repair of th...	T	Package holidays		

[2] https://ec.europa.eu/eurostat/cache/metadata/en/prc$_{p}pp_{e}sms.htmrelatedmd$1678716803148

4 Relative Sectoral Productivity Estimation

In this section, I explain how I estimate the relative sectoral productivities of Eurozone countries. To estimate the sector-specific productivity shock process (i.e., tradable sector, nontradable sector and construction sector), I closely follow the procedure used by Berka et al. (2018) with a few modifications. The following is the overall procedure for calculating relative sectoral productivities.

1. Make a proper industry concordance between Groningen Growth and Development Centre (GGDC) 1997 and EUKLEMS & INTANProd 2023 in order to use the two datasets together.
2. Calculate the 1997 relative productivity level (against the 12 European countries) of each industry in each country by using the GGDC 1997 database.
3. Calculate the relative productivity growth of each industry in each country using EUKLEMS & INTANProd 2023 from 1995 to 2019.
4. Combining the levels and growth rates from the first and second steps and construct panel data on the relative productivity for each industry in each country from 1995 to 2019.
5. Aggregate industries into tradable, nontradable and construction sectors using industry-level value-added as weights.
6. Estimate the $AR(1)$ process for each sector and each country using the generated relative sectoral productivities from 2000 to 2019.

4.1 Sectoral Concordance

GGDC 1997 and EUKLEMS & INTANProd 2023 use different industry classification systems, as shown in Table 3 and Table 4. To align the two systems, I proceed as followings. First, I create concordance between industries as in Table 5. In some cases, to make mutually exclusive but informative connections, one industry in the GGDC industry classification system has been matched with two industries in the EUKLEMS classification system, or vice versa. When two industries in the GGDC are matched with one industry in the EUKLEMS, initial productivity levels are aggregated based on the sectoral output weights in that year. On the other hand, when two industries in the EUKLEMS are matched with one industry in the GGDC, each year's productivity growth rates are aggregated using the 2000-2019 average of the relative value-added weight of each sector.[3]

[3]This value-added weighted average allows the possibility that production inputs are not perfectly substitutable across industries, which is a more realistic approach than input-based aggregation

4.2 Relative Productivity Level: The GGDC 1997 Database

I calculate industry-level relative productivity across European countries using the GGDC 1997 TFP database. For industry i and country j, the GGDC database provides

$$C_{ij1997} = \frac{A_{ij1997}}{A_{iUS1997}}. \tag{1}$$

Among all productivity measures, I use **multi-factor productivity from the sectoral output-based** approach, which is used by Berka et al. (2018). The GGDC 1997 database provides data on a large set of industries. Table 3 shows the set of industries for which data are available. Of all available industries, to make a proper connection with the EUKLEMS 2023 database, I use only a subset of industries. Table 4 provides the set of industries for which the data are available for the EUKLEMS 2023 database, and Table 5 shows how I create a concordance between the GGDC 1997 database and the EUKLEMS 2023 database.

According to the concordance in Table 5, I need to aggregate *(13) "Wood and products of wood and cork"* and *(14) "Pulp, paper, paper products, printing and publishing."* Also, I need to aggregate *(17) "Rubber and plastics products"* and *(18) "Other non-metallic mineral products."* To aggregate these industries, I use the relative weights computed by their relative sectoral output. To aggregate industries $i1$ and $i2$ into an industry named i, when $SO_{i1j1997}$ is the output for industry $i1$ in country j in 1997, I calculate the following:

$$C_{ij1997} = \frac{SO_{i1j1997}}{SO_{i1j1997} + SO_{i2j1997}} \frac{A_{i1j1997}}{A_{i1US1997}} + \frac{SO_{i2j1997}}{SO_{i1j1997} + SO_{i2j1997}} \frac{A_{i2j1997}}{A_{i2US1997}}. \tag{2}$$

This gives me cross-sectional data on relative productivities for all industries in Table 5 for all countries.

Given these, for each industry i, I calculate the simple average of Austria, Belgium, Denmark, Finland, France, Germany, Italy, the Netherlands, Sweden, the United Kingdom, and Spain as follows:[4]

$$C_{iEU1997} = \frac{1}{12} \sum_j C_{ij1997} \sim \frac{A_{iEU1997}}{A_{iUS1997}}. \tag{3}$$

Then $C_{iEU1997}$ will be the average productivity of Europe for industry i relative to that of the US. Finally, by dividing C_{ij1997} by $C_{iEU1997}$, the relative productivity of

methods.

[4]These are the countries that provide industry-level productivity growth data in EUKLEMS 2023. For consistency, I calculate the European average using only these countries.

industry i in country j against the European average is calculated.

$$\tilde{A}_{ij1997} = \frac{C_{ij1997}}{C_{iEU1997}}. \tag{4}$$

4.3 Productivity Growth Rate: The EUKLEMS & INTANProd 2023 Databases

For growth rates, I use the EUKLEMS & INTANProd 2023 release to construct the industry-level productivity growth rate. While Berka et al. (2018) use the March 2011 updated version of EUKLEMS, I use the latest version of the database to extend the periods. This database covers the period from 1995 to 2020 for 27 European countries: the UK, the US, and Japan, and covers 42 industries.[5]

From the dataset, I use the value-added-based TFP index ($VATFP\_I$) and value-added in current prices (VA_CP) to calculate the industry-level productivity growth rate. $VATFP\_I$ shows how the productivity of a certain industry increases or decreases throughout the years. I set $VATFP\_I_{ij1997} = 100$ for all i and j.

As in the case of the GGDC 1997 database, I need to aggregate some industries to make a proper connection between the EUKLEMS & INTANProd 2023 and the GGDC database. In particular, for the EUKLEMS database, I need to aggregate *(12) "Manufacture of computer, electronic and optical products"* and *(13) "Manufacture of electrical equipment"*. Also, I need to aggregate *(17) "Electricity, gas, steam and air conditioning supply"* and *(18) "Water supply; sewerage, waste management and remediation activities"*. To aggregate these, I use the relative sizes of the time-series average of weights based on value-added in current prices.

$$\begin{aligned} VATFP\_I_{ijt} = &\frac{1}{T}\sum_t \left[\frac{VA\_CP_{i1jt}}{VA\_CP_{i1jt} + VA\_CP_{i2jt}}\right] VATFP\_I_{i1jt} \\ &+ \frac{1}{T}\sum_t \frac{VA\_CP_{i2jt}}{VA\_CP_{i1jt} + VA\_CP_{i2jt}} VATFP\_I_{i2jt}. \end{aligned} \tag{5}$$

Then, for each industry, I calculate the European average index as follows:

$$VATFP\_I_{iEUt} = exp\left(\frac{1}{12}\sum_j ln(VATFP\_I_{ijt})\right). \tag{6}$$

Several observations are missing in the dataset. For example, the US has missing observation for *"Electricity, gas, steam and air conditioning supply"* but has one with a

[5]This release is unique in the sense that it tried to incorporate intangible capital into growth accounting, which had not been tried before. In this appendix, I briefly discuss the parts that are related to my analysis. For more information, please refer to Corrado et al. (2023) and O'Mahony and Timmer (2009).

different name (likely because of the different classification system). I use the one with the different name. Spain has missing observations on *"Manufacture of computer, electronic and optical products"*, *"Manufacture of electrical equipment"*, and *"Computer, electronic, optical products; electrical equipment"*. I supplement these with the growth rates of the closest industries. Lastly, Belgium has missing observations for the growth rate of all industries from 1995 to 1998. I supplement these using the European average only for missing periods.

Lastly, given the calculated growth rate for each industry across countries, by using each country's and Europe 12 countries' average growth rate, I calculate the relative productivity growth rate for each industry as follows:

$$\tilde{A}_{ijt} = \tilde{A}_{ij1997} \frac{VATFP\_I_{ijt}}{VATFP\_I_{iEUt}}. \tag{7}$$

4.4 Aggregation of Industries into Sectors

Once each industry's productivity (relative to the US) throughout the years is constructed, I again aggregate these relative productivities of those industries into tradable, nontradable, and construction sector productivities. When I aggregate industries into a sector, I use the value-added weighted average of all industries' relative productivities, which are in one of three sectors (tradable/nontradable/construction.) Table 5 shows which industry belongs to which sector.[6] This value-added approach is based on the *bottom-up* approach explained by Corrado et al. (2023). Since this allows the imperfect substitution of inputs between sectors, which is more realistic, I proceed using the bottom-up method.[7]

In addition, I use a statistical module rather than an analytical module for comparability with previous research. However, productivity series generated from the statistical module and analytical module (which incorporates intangible capital in calculating industry productivity) show correlation higher than 0.98 between them, which implies that this should not be a big issue.

Given $\tilde{A}_{ijt}$ for all industry i, for country j, we have the following relative sectoral

[6]For the US, for industry 13, I use *Electricity, gas, steam; water supply, sewerage, waste management*. For other countries, I use *Electricity, gas, steam and air conditioning supply, Water supply; sewerage, waste management and remediation activities*. This difference comes from different industry classification systems in the US and Europe.

[7]Corrado et al. (2023, p. 36) explain how the industry aggregation can be implemented. There are two methods, *direct calculation* and *bottom-up*. The *Direct calculation* approach assumes a perfect mobility of input across industries, that labor and capital earn the same compensation in all industries, and that all industries have the same value-added function. So they aggregate all capital input, labor input, and value-added to calculate the TFP growth of the aggregate sector. The *Bottom-up* appraoch assumes that inputs are not perfectly mobile. Consequently, it adds capital input, labor input, and value-added as averages calculated with the weights of capital income, labor income, and value-added of a certain industry with respect to total industry. The aggregate TFP calculated using this approach reflects the value-added weighted contribution of industry-level TFP.

productivities. Note that the construction sector is equal to the construction industry.

$$\tilde{A}_{Tjt} = \frac{\sum_{i \in T}(\bar{VA}_{ij}\tilde{A}_{ijt})}{\sum_{i \in T}\bar{VA}_{ij}}, \quad \tilde{A}_{NTjt} = \frac{\sum_{i \in NT}(\bar{VA}_{ij}\tilde{A}_{ijt})}{\sum_{i \in NT}\bar{VA}_{ij}}, \quad \tilde{A}_{CRjt} = \tilde{A}_{CRjt}. \tag{8}$$

By taking log to these $\tilde{A}_{Tjt}$, $\tilde{A}_{NTjt}$, and $\tilde{A}_{CRjt}$, we have

$$a_{Tjt} = log(\tilde{A}_{Tjt}), \quad a_{NTjt} = log(\tilde{A}_{NTjt}), \quad a_{CRjt} = log(\tilde{A}_{CRjt}). \tag{9}$$

4.5 Graph of Relative Sectoral Productivities

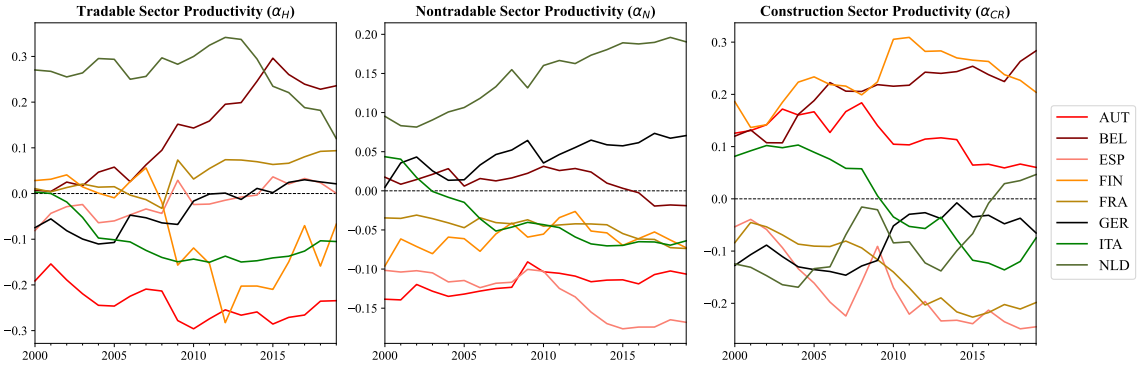

Figure 1: Sectoral Productivities

4.6 Estimation of Sectoral Productivities

Given these a_{Tjt}, a_{NTjt}, a_{CRjt} time series for all countries, I estimate the following AR(1) process as home country productivity relative to foreign country productivity using data from 2000 to 2019:

$$\begin{aligned}
\alpha_{T,jt} - \bar{\alpha}_T &= \rho_T(\alpha_{T,jt-1} - \bar{\alpha}_T) + \epsilon_{h,jt}, \\
\alpha_{N,jt} - \bar{\alpha}_N &= \rho_N(\alpha_{N,jt-1} - \bar{\alpha}_N) + \epsilon_{n,jt}, \\
\alpha_{CR,jt} - \bar{\alpha}_{CR} &= \rho_{CR}(\alpha_{CR,jt-1} - \bar{\alpha}_{CR}) + \epsilon_{cr,jt}.
\end{aligned}$$

After we estimate $\bar{a}_{Tj}$, ρ_{Tj}, $\bar{a}_{NTj}$, ρ_{NTj}, $\bar{a}_{CRj}$, ρ_{CRj}, we convert it to quarterly frequency parameters as follows: $\bar{a}_{Tj} = \bar{a}^q_{Tj}$, $\bar{a}_{NTj} = \bar{a}^q_{NTj}$, $\bar{a}_{CRj} = \bar{a}^q_{CRj}$, and $\rho^q_{Tj} = \rho^{(1/4)}_{Tj}$, $\rho^q_{NTj} = \rho^{(1/4)}_{NTj}$, $\rho^q_{CRj} = \rho^{(1/4)}_{CRj}$.

Lastly, by using the estimated residuals of all processes, I estimate the covariance-variance matrix for all sectors and countries (3 sectors $\times$ 8 industries.) I allow any potential positive correlation between productivity shocks across countries and sectors. Following Berka et al. (2018), I assume that $var(\epsilon_{h,jt}) = var(\epsilon^q_{h,jt})$ for all sector s.

4.7 Comparison with Berka et al. (2018)

First, the industry classification used here and the one used by Berka et al. (2018) are very similar. However, there are some differences due to differences in the versions of the EUKLEMS database used. First, I combine "*Wood and of wood and cork*" with "*Pulp, paper, paper printing, and publishing*" to obtain "*Manufacturing—Wood, paper, printing and reproduction.*" Second, "*Chemical, rubber, plastics and fuel*" is decomposed into "*Chemicals and chemical products*" and "*Rubber, plastics products, and other non-metallic products*". Lastly, I add "*Education*" and "*Health and social work*" to the industry list since they account for a certain portion of households' expenditure.

There are other differences as well too. First, Berka et al. (2018) used output-based productivity growth data, while my growth rate data are value-added-based. I use such measures because the EUKLEMS 2023 release only provides value-added-based productivity growth rates. Second, for aggregating industries' growth rate into that of the sector, I use the period-average of each industry's relative weight calculated based on the value-added of sectors, while Berka et al. (2018) use the relative weights based on sectoral output in 1995. Lastly, I use only 11 countries for the EU average, as those are the only available countries.

Table 3: Sectors in the GGDC 1997 TFP Level Database

	GGDC Industry Classification
1	**TOTAL INDUSTRIES**
2	*MARKET ECONOMY*
3	ELECTRICAL MACHINERY, POST AND COMMUNICATION SERVICES
4	Electrical and optical equipment
5	Post and telecommunications
6	GOODS PRODUCING, EXCLUDING ELECTRICAL MACHINERY
7	TOTAL MANUFACTURING, EXCLUDING ELECTRICAL
8	Consumer manufacturing
9	Food products, beverages and tobacco
10	Textiles, textile products, leather and footwear
11	Manufacturing nec; recycling
12	Intermediate manufacturing
13	Wood and products of wood and cork
14	Pulp, paper, paper products, printing and publishing
15	Coke, refined petroleum products and nuclear fuel
16	Chemicals and chemical products
17	Rubber and plastics products
18	Other non-metallic mineral products
19	Basic metals and fabricated metal products
20	Investment goods, excluding hightech
21	Machinery, nec
22	Transport equipment
23	OTHER PRODUCTION
24	Mining and quarrying
25	Electricity, gas and water supply
26	Construction
27	Agriculture, hunting, forestry and fishing
28	MARKET SERVICES, EXCLUDING POST AND TELECOMMUNICATIONS
29	DISTRIBUTION
30	Trade
31	Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of fuel
32	Wholesale trade and commission trade, except of motor vehicles and motorcycles
33	Retail trade, except of motor vehicles and motorcycles; repair of household goods
34	Transport and storage
35	FINANCE AND BUSINESS, EXCEPT REAL ESTATE
36	Financial intermediation
37	Renting of m&eq and other business activities
38	PERSONAL SERVICES
39	Hotels and restaurants
40	Other community, social and personal services
41	Private households with employed persons
42	*NON-MARKET SERVICES*
43	Public admin, education and health
44	Public admin and defence; compulsory social security
45	Education
46	Health and social work
47	Real estate activities

Table 4: Sectors in the EUKLEMS 2023 Release

	EUKLEMS 2023 Industry Classification
1	**Agriculture, forestry and fishing**
2	**Mining and quarrying**
3	**Manufacturing**
4	Manufacture of food products; beverages and tobacco products
5	Manufacture of textiles, wearing apparel, leather and related products
6	Manufacture of wood, paper, printing and reproduction
7	Manufacture of coke and refined petroleum products
8	Manufacture of chemicals and chemical products
9	Manufacture of basic pharmaceutical products and pharmaceutical preparations
10	Manufacture of rubber and plastic products and other non-metallic mineral products
11	Manufacture of basic metals and fabricated metal products, except machinery and equipment
12	Manufacture of computer, electronic and optical products
13	Manufacture of electrical equipment
14	Manufacture of machinery and equipment n.e.c.
15	Manufacture of motor vehicles, trailers, semi-trailers and of other transport equipment
16	Manufacture of furniture; jewellery, musical instruments, toys; repair and installation of machinery and equipment
17	**Electricity, gas, steam and air conditioning supply**
18	**Water supply; sewerage, waste management and remediation activities**
19	**Construction**
20	**Wholesale and retail trade; repair of motor vehicles and motorcycles**
21	Wholesale and retail trade and repair of motor vehicles and motorcycles
22	Wholesale trade, except of motor vehicles and motorcycles
23	Retail trade, except of motor vehicles and motorcycles
24	**Transportation and storage**
25	Land transport and transport via pipelines
26	Water transport
27	Air transport
28	Warehousing and support activities for transportation
29	Postal and courier activities
30	**Accommodation and food service activities**
31	**Information and communication**
32	Publishing, motion picture, video, television programme production; sound recording, programming and broadcasting activities
33	Telecommunications
34	Computer programming, consultancy, and information service activities
35	**Financial and insurance activities**
36	**Real estate activities**
37	**Professional, scientific and technical activities**
38	**Administrative and support service activities**
39	**Public administration and defence; compulsory social security**
40	Public administration, defence, education, human health and social work activities
41	**Education**
42	**Human health and social work activities**
43	Human health activities
44	Residential care activities and social work activities without accommodation
45	**Arts, entertainment and recreation**
46	Arts, entertainment, recreation; other services and service activities, etc.
47	**Other service activities**
48	**Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use**
49	**Activities of extraterritorial organisations and bodies**

Table 5: Sectoral Concordance

	EUKLEMS Industry	GGDC Industry	Industry Name	Sector
1	1	27	Agriculture, hunting, forestry and fishing	T
2	2	24	Mining and quarrying	T
3	4	9	Manufacturing - Food products, beverages and tobacco	T
4	5	10	Manufacturing - Textiles, textile products, leather and footwear	T
5	6	13	Manufacturing - Wood, paper, printing and reproduction	T
		14		
6	7	15	Manufacturing - Coke, refined petroleum products and nuclear fuel	T
7	8	16	Manufacturing - Chemicals and chemical products	T
8	10	17	Manufacturing - Rubber, plastics products, and other non-metallic products	T
		18		
9	11	19	Manufacturing - Basic metals and fabricated metal products	T
10	12	4	Manufacturing - Computer, electrical and optical equipment	T
	13			
11	14	21	Manufacturing - Machinery, nec	T
12	15	22	Manufacturing - Transport equipment	T
13	17	25	Electricity, gas, water supply, and waste management	NT
	18			
14	19	26	Construction	C
15	20	30	Wholesale trade, retail trade, and repair of vehicles	NT
16	24	34	Transport and storage	NT
17	30	39	Hotels and restaurants	NT
18	31	5	Information, post and telecommunications	NT
19	35	35	Finance and Business activities	NT
20	36	47	Real estate activities	NT
21	39	44	Public admin and defense; compulsory social security	NM
22	41	45	Education	NT
23	42	46	Health and social work	NT

References

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