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Unit C-4: Price statistics. Purchasing Power Parities. Housing statistics



EURIPID

Study on the Calculation of Purchasing Power Parities (PPPs) for pharmaceutical products

(Contract N°: PN5C/06/2016/C4)

Final Report
V 3.0

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1. Introduction

1.1. Aim of the Project

The main objective of this undertaking is to investigate the possibility of using the EURIPID database as a data source for the calculation of Purchasing Power Parities (PPPs) for pharmaceutical products, including analysing all advantages and disadvantages compared to the existing methodology, as well as making test PPP calculations using different models, for the years 2015, 2016 and 2017.

The proposed study aims to identify a new methodological approach based on the features of the EURIPID database in close collaboration between the members of the EURIPID Collaboration and EUROSTAT experts.

In the course of this pilot study (Contract N°: PN5C/06/2016/C4), different options of calculation were developed, tested and critically reflected together. Project period is January 2017 till March 2018.

1.2. The EURIPID Database

The EURIPID (European Integrated Price Information Database) Collaboration is a voluntary and strictly non-profit cooperation between mostly European countries on building up and maintaining a database with information on national prices of pharmaceutical products in a standardised format. It intends to make prices of reimbursable pharmaceuticals more transparent via an online accessible, comprehensive, reliable, continuously maintained and easy-to-use database that is available around the clock.

The EURIPID database is currently exclusively available online for national competent authorities for pricing and reimbursement of pharmaceutical products, who agreed on the rules of the collaboration and who participate actively. The European Commission and thus Eurostat experts have access to the database.

The EURIPID database contains data on official prices of publicly reimbursed, mainly outpatient products that are published by national authorities in line with the Transparency Directive 89/105/EEC and contains data from 29 countries. Missing EU Member States are Germany, Malta and Luxembourg. Romanian data are available for the period 1.10.2013 till 31.07.2017 only, so a PPP can only be calculated until 2016 (for 2015 and 2016) in the course of this exercise. Basically the data available to EURIPID are suitable for a PPP calculation.

EURIPID offers price information for four price types (levels):

- manufacturer price (= price of the marketing authorisation holder, ex-factory price)
- wholesale price (= pharmacy purchasing price)
- pharmacy retail price net (excl. all consumer taxes like VAT)
- pharmacy retail price gross (incl. VAT and other consumer taxes, e.g. INFARMED tax in Portugal)

In some countries pharmaceutical products (all or those with a specific status, e.g. reimbursable ones) are exempt from VAT. Examples are Sweden or the UK, see Table 1.

Table 1: Standard VAT rates and those on pharmaceutical products in EU Member States, as of March 2018

Country	Standard VAT rate	VAT rate on pharmaceuticals	Further VAT rules for pharmaceuticals
AT	20	10	n.a.
BE	21	6	n.a.
BG	20	20	n.a.
CH	7.7	2.5	n.a.
CY	19	5	n.a.
CZ	21	10	15% VAT on certain products (e.g. dietary supplements)
DE	19	19	n.a.
DK	25	25	n.a.
EE	20	9	n.a.
EL	24	6	13% VAT on certain products (e.g. Glands and other organs for organotherapeutic uses; heparin and its salts; human blood; animal blood; antisera, other blood fractions and immunological products).
ES	21	4	n.a.
FI	24	10	n.a.
FR	20	2.1	10% VAT on non-reimbursable medicines
HR	25	5	25% VAT on non-reimbursable medicines
HU	27	5	n.a.
IE	23	0	23% VAT on non-oral pharmaceuticals (e.g., creams, lotions, ointments, eye/ear drops, injections, suppositories, dressings), 13.5% VAT on non-oral contraceptive products and external applications.
IT	22	10	4% VAT on therapeutic oxygen
LU	17	3	n.a.
LT	21	5	n.a.
LV	21	12	n.a.
MT	18	0	n.a.
NL	21	6	n.a.
PL	23	8	n.a.
PT	23	6	n.a.
RO	19	9	n.a.
SE	25	0	25% VAT on non-reimbursable OTC medicines
SI	22	9.5	n.a.
SK	20	10	n.a.
UK	20	0	20% VAT on non-reimbursable medicines, and 5% VAT on nicotine replacement therapy products

OTC = Over-the-counter, i.e. non-prescription medicines, n.a. refers to not applied.

Sources: EURIPID Country Background Information and https://ec.europa.eu/taxation_customs/sites/taxation/files/resources/documents/taxation/vat/how_vat_works/rates/vat_rates_en.pdf, accessed by 22 February 2018.

A point for consideration is that the definition of the four above mentioned price types differs in a few countries, e.g. AT, NL and the UK, see also Table 2.

Table 2: Overview of Price Types in EURIPID 2017

Country	Available price types in EURIPID			
	per December 2017			
	MP	WP	NRP	GRP
Austria	delivered	delivered	delivered*	delivered*
Belgium	delivered	calculated	calculated	delivered
Bulgaria	delivered	delivered	delivered	delivered
Croatia	approx.	delivered	n.a.	n.a.
Cyprus	n. a.	delivered	delivered	delivered
Czech Republic	delivered	n.a.	calculated	delivered
Denmark	approx.	delivered	calculated	delivered
Estonia	calculated	calculated	calculated	delivered
Finland	approx.	delivered	delivered	delivered
France	delivered	n.a.	calculated	delivered
Greece	delivered	delivered	calculated	delivered
Hungary	delivered	delivered	delivered	delivered
Iceland	approx.	delivered	calculated	delivered
Ireland	n. a.	delivered	n. a.	n. a.
Israel	n. a.	delivered	delivered	delivered
Italy	delivered	n. a.	calculated	delivered
Latvia	calculated	delivered	delivered	delivered
Lithuania	delivered	calculated	calculated	delivered
Netherlands	approx.	delivered	n.a.	n.a.
Norway	approx.	delivered	calculated	delivered
Poland	delivered	delivered	partly calculated	partly delivered
Portugal	n. a.	n. a.	calculated	delivered
Romania	delivered	delivered	calculated	delivered
Slovakia	delivered	delivered	delivered	delivered
Slovenia	calculated	delivered	approx.	approx.
Spain	delivered	n. a.	calculated	delivered
Sweden	approx.	delivered	delivered	delivered
Switzerland	delivered	n. a.	calculated	delivered
United Kingdom	n. a.	approx.	delivered**	delivered**

* AT: The NRP is the price paid by the Austrian third party payers, i.e. the sickness funds and is also called "reimbursement" price (in German: Kassenpreis). The GRP (pharmacy price) is the price a private customer would need to pay in Austria when purchasing a prescription or non-prescription medicine in a pharmacy or from a dispensing doctor out-of-pocket, the latter includes 10% VAT. The reason is that the pharmacy add-on for private customers is higher than for third party payers.

** UK: Reimbursement price to community pharmacies for dispensing the medicine against a NHS prescription. For branded medicines, the price is the NHS list price, set by the PPRS. For most generic medicines, this is the reimbursement price listed in Part VIII of the Drug Tariff. But where a supplier name is specified on the prescription e.g. omeprazole AAH or a product is not listed in Part VIII, the pharmacist is reimbursed the supplier's list price. The price includes wholesaler and pharmacy margins that are not regulated. The UK does not hold information on the manufacturer or wholesale price. Community pharmacies and hospitals may be able to purchase medicines at a discount to these prices.

MP = Manufacturer Price, WP = Wholesale price (=Pharmacy Purchasing Price), NRP = Net Pharmacy Retail Price, GRP = Gross Pharmacy Retail Price

Legend:

Approx. = price type could be approximated by applying an average add-on / mark-up if country agrees - not the case currently
 Calculated = price type is not available in the data set provided by countries for EURIPID but as the price type is statutorily regulated it is calculated by the team and added to the database, n.a. = not available

Deviations are clearly outlined in the database but could lead to some limitations in generating the PPP index as for some countries only an approximation of the Consumer price (i.e. Gross Retail Price) is possible (see also chapter 4). Price information is available in local currencies and Euro.

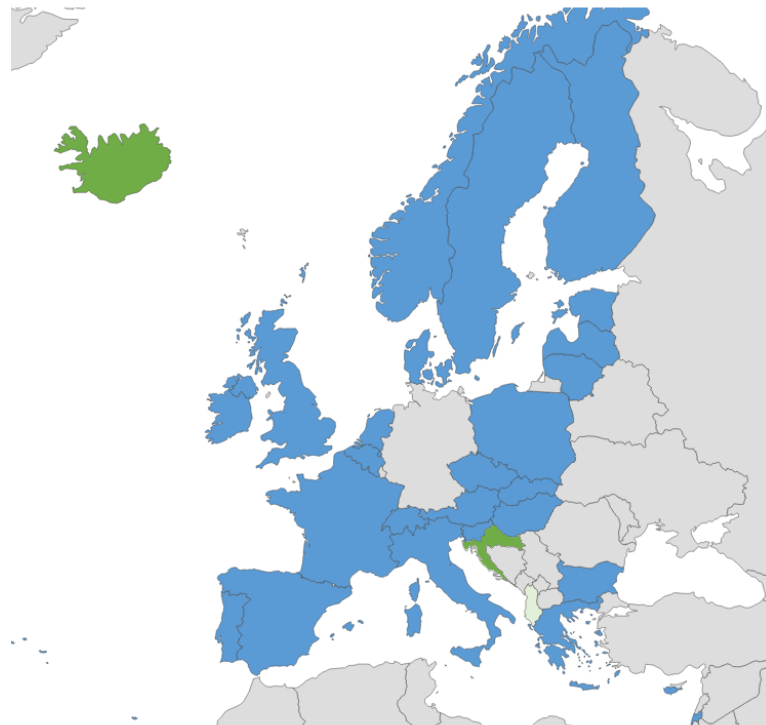
The database features the following data fields:

- beginning of data validity
- end of data validity
- country name
- product ID (internal field)
- brand name
- product name (in local language)
- package name (in local language)
- dosage form (standardised in English)
- ATC code¹

In the ATC classification system, the active substances are classified in a hierarchy with five different levels. The system has fourteen main anatomical/pharmacological groups or 1st levels. Each ATC main group is divided into 2nd levels which could be either pharmacological or therapeutic groups. The 3rd and 4th levels are chemical, pharmacological or therapeutic subgroups and the 5th level is the chemical substance. The 2nd, 3rd and 4th levels are often used to identify pharmacological subgroups when that is considered more appropriate than therapeutic or chemical subgroups.
- International non-proprietary name and strength (standardised in English)
- number of units (standardised)
- Company name (in local language, usually the marketing authorisation holder a/o the actual distributor).

¹ Anatomical Therapeutic Chemical (ATC) classification system of medicinal products, https://www.whocc.no/atc_ddd_index/

Figure 1: EURIPID 2018: member countries (blue), data available (green) and interested (orange)



Note: Data for France and Romania in 2017 is not available (as of January 2018). For that reason, these two countries were left out in the calculation of PLIs for 2017, and fixity was calculated with regard to the remaining EU/EURIPID countries (for all years).

Regarding availability of price information for countries we have three different categories of involvement:

Official Members of the EURIPID Collaboration who have signed a “letter of commitment” and who actively pay for the maintenance of the database and contribute to the work of the Collaboration by providing their data:

Austria, Belgium, Bulgaria, Czech Republic, Cyprus, Denmark, Estonia, Finland, France, Greece, Hungary, Ireland, Israel, Italy, Latvia, Lithuania, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom

These **partners** have a seat in the Board of Participants and have a voting right on decisions (for instance, they decided that EURIPID shall collaborate with Eurostat).

Interested countries: Malta is interested to join as a partner and is willing to pay but cannot share their price data, therefore the Collaboration has not accepted their membership application so far. Also FYRM and Kazakhstan recently showed interest to join.

Previous partners who have left the Collaboration: Albania, Croatia (for financial reasons)

Countries who allow the use of their publicly available data for the purpose of EURIPID: Romania (till 2017), Iceland and Croatia

Non-interested countries: Germany, Luxembourg

So currently we are able to provide data from 28 countries, thereof 24 EU Member States. For the analysis we disregarded Israel as it is not part of the Eurostat country basket, leaving 23 countries (cf. section 3.1).

2. Methodology

2.1. Virtual products

The comparison of pharmaceutical products across countries is difficult because pharmaceutical markets are intentionally fragmented. Pharmaceuticals are sold under different brand names, in different package sizes or in different strengths to make price comparisons difficult. This is because most European countries rely on price comparison mechanisms (reference pricing) when regulating prices or reimbursement of pharmaceuticals, and the more difficult price comparisons across Europe are, the less pressure providers face to lower prices of their products (Dylst et al. 2012).

This means that the question which products are identical and should be paired in price comparisons is essential in calculating PPPs for pharmaceuticals.

We construct “**virtual products**” that are defined by their

- ATC code,
- International non-proprietary names (INN) nomenclature ² & strength,
The INN identifies pharmaceutical substances or active pharmaceutical ingredients. Each INN is a unique name that is globally recognized and is public property. A non-proprietary name is also known as a generic name.
- package size group³, and
- dosage form group⁴.

All pharmaceuticals that share these four characteristics belong to the same “virtual product”.

2.2. Price

The price of “virtual products” is calculated from the **gross retail price** of all pharmaceuticals that share the criteria mentioned above. The gross retail price corresponds to the price that consumers pay when they purchase the medicine (e.g. in a pharmacy). Prices paid by other purchasers, such as sickness funds or hospitals, may be lower.

Furthermore, the analysis is based on unit prices, i.e. the price of a dosage form unit within the package (e.g. the price of a single tablet).

Prices are calculated via the procedure given below:

1. Calculation of day-weighted average monthly prices (concrete products)
2. Calculation of average annual prices as arithmetic mean of monthly prices (concrete products)
3. Calculation of average annual **unit prices** via division by package size (concrete products)
4. Calculation of average annual prices of virtual products as unweighted arithmetic means of all products within the same virtual product (*virtual products*)

² <http://www.who.int/medicines/services/inn/en/>

³ 1-10 units, 11-20 units; 21-50 units, 51+ units

⁴ see annex

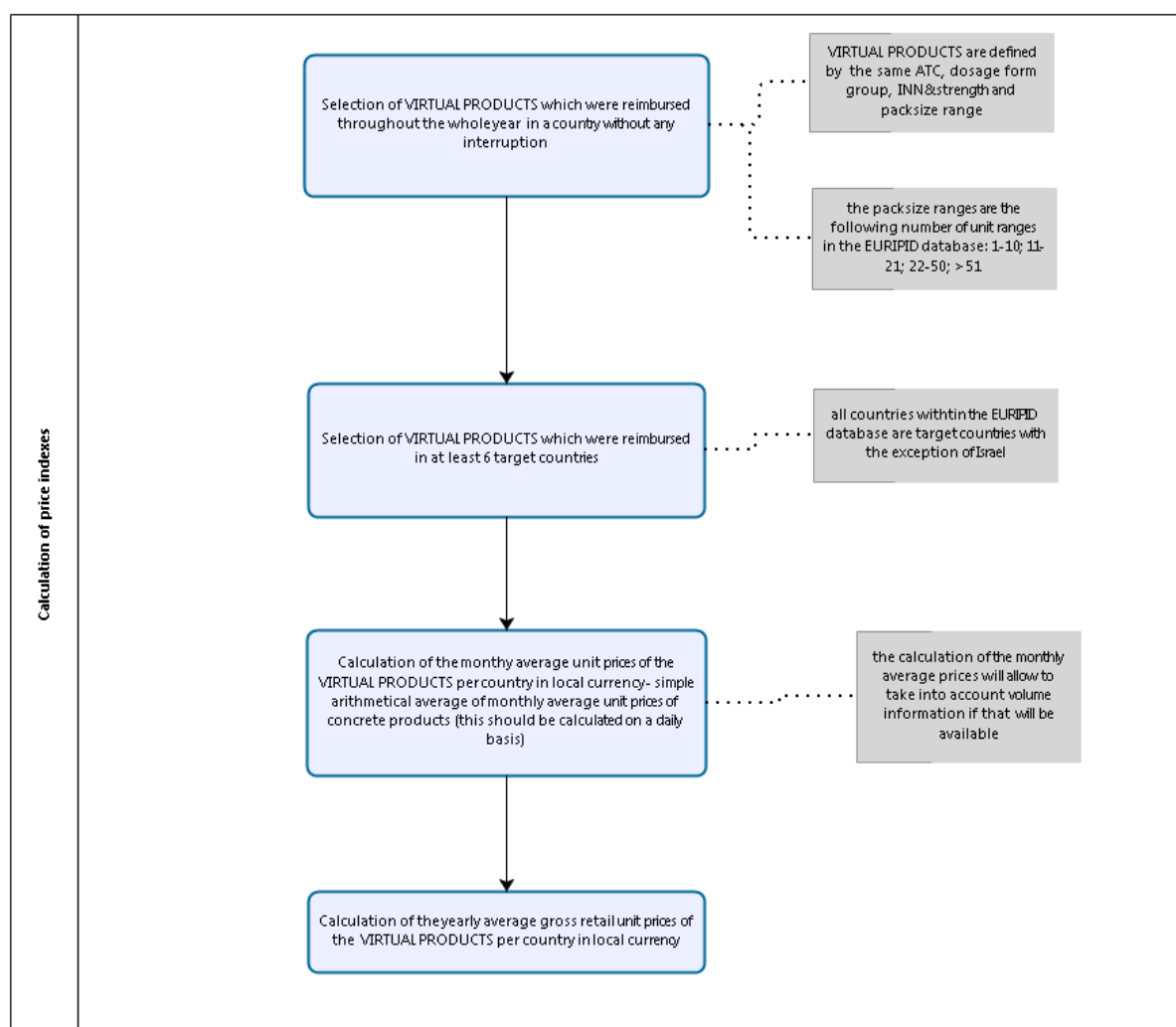
2.3. Data extraction

Two further inclusion/exclusion criteria are applied to ensure comparability of products.

- Virtual products are selected only if they are available for the whole year in EURIPID (for 365 resp. 366 days).
- Virtual products need to be contained in the EURIPID database for at least six countries, which are part of the sample basket.

Figure 2 illustrates the data extraction and price calculation algorithm.

Figure 2: Calculation of average prices



All together more than two thirds of the data available per country for the years 2015-2017 were included into the analysis, see Table 3. Still, the ratio of products considers is strongly linked to the size of the country market as the likelihood of inclusion of a product is lower if it is not marketed in all countries (but rather in bigger ones).

Table 3: Ratio of Euripid actual products that went into analysis, per country for 2015-2017

	Country	2015	2016	2017
1	Austria	63%	65%	64%
2	Belgium	72%	74%	72%
3	Bulgaria	73%	73%	72%
4	Cyprus	60%	63%	60%
5	Czech Republic	75%	78%	74%
6	Denmark	64%	67%	65%
7	Estonia	71%	74%	74%
8	Finland	74%	79%	76%
9	France	64%	67%	n.a.
10	Greece	60%	64%	60%
11	Hungary	76%	78%	76%
12	Iceland	68%	71%	71%
13	Italy	63%	66%	63%
14	Latvia	86%	88%	87%
15	Lithuania	83%	83%	81%
16	Netherlands	67%	70%	67%
17	Norway	68%	68%	66%
18	Poland	82%	83%	82%
19	Portugal	62%	65%	60%
20	Romania	69%	62%	n.a.
21	Slovakia	74%	78%	74%
22	Spain	64%	67%	66%
23	Sweden	67%	71%	70%
24	Switzerland	n.a.	62%	59%
25	United Kingdom	45%	47%	43%
	in Average	69%	70%	69%

n.a. = Data were not available at time of analysis because of delayed delivery by country (FR) resp. cease of cooperation (RO)

2.4. Calculation of PPP and PLI

Based on unit prices of virtual products, PPPs and PLIs are computed following the method described in the Eurostat-OECD Methodological Manual on Purchasing Power Parities (Eurostat/OECD 2012).

Different versions of the calculations serve to explore properties of the dataset, calculate PPPs of ATC subheadings, the impact of different specifications of inclusion/exclusion criteria or expenditure weights etc. (see section 4.2). PPPs and PLIs are presented for the years 2015, 2016 and 2017.

3. Results

This report presents the deliverables as agreed in the contract, namely D.2.2. Methodology Report 2 including an explanation how the calculation was made including challenges and limitations and D.3, the final report.

3.1. Dataset summary statistics

The analysis dataset comprises 117 952 price quotations in 23 countries (2017). These were summarised in a total of 2 720 different **virtual products**.

Refer to Figure 3,

Figure 4, Table 4 and the Annex for details.

The **product intersection** (i.e. number of products that are priced in a country-pair and serve as basis for calculation of price ratios) ranges between 350 and 2163 (median: 888) – see Table 4. This indicates that a large enough number of products can be used to compute price ratios.

Table 4: Number of products and virtual products by year and country

	Products			virtual products		
	2015	2016	2017	2015	2016	2017
AT	4408	4709	4681	1462	1578	1512
BE	4356	4524	4503	1414	1498	1455
BG	2330	2261	2082	1076	1055	965
CH	0	6025	5854	0	2229	2132
CY	3419	3619	3529	1587	1714	1619
CZ	6262	6118	6115	1827	1960	1881
DK	6087	6461	6514	1967	2142	2067
EE	807	833	866	704	726	737
EL	5685	6300	6226	1714	1916	1784
ES	12244	12960	13314	2084	2271	2163
FI	3642	3845	3841	1410	1538	1517
FR	9988	10639	0	1555	1650	0
HU	3520	3548	3469	1467	1549	1492
IS	2119	2268	2221	1361	1431	1424
IT	6456	6735	6686	1512	1655	1584
LT	1788	1847	1795	804	874	864
LV	1367	1437	1459	772	814	812
NL	11292	11676	11314	2005	2136	2037
NO	2635	2723	3046	1215	1302	1466
PL	2909	3005	3142	870	902	899
PT	6731	7093	6717	1147	1236	1164
RO	4224	4121	0	1655	1568	0
SE	8310	9087	9323	1799	1971	1904
SK	3378	3531	3393	1554	1659	1552
UK	7675	8341	7862	1948	2093	2016
∅	5068	5348	5128	1455	1579	1524
median	4290	4524	4503	1490	1578	1517

Data source: EURIPID (2018), own calculation

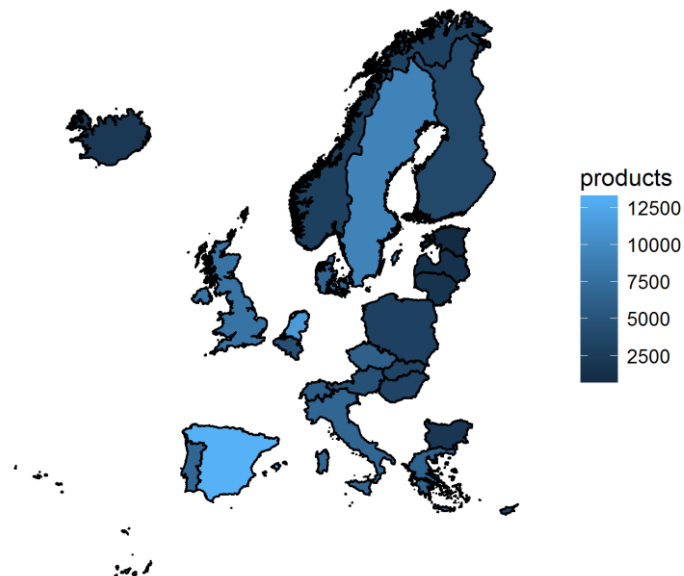
Table 5: Number of virtual products by country and subheading, 2017

	A	B	C	D	G	H	J	L	M	N	P	R	S	V
AT	154	121	227	45	50	47	141	160	49	377	2	80	41	18
BE	141	107	258	34	41	41	159	128	53	337	2	73	39	42
BG	86	97	184	0	37	26	111	158	19	158	0	34	22	33
CH	192	166	317	55	83	61	209	298	60	478	4	87	63	59
CY	129	124	238	36	62	42	183	240	48	350	3	77	41	46
CZ	173	149	283	37	84	52	180	251	60	413	3	88	53	55
DK	174	185	235	54	92	59	201	312	61	494	5	91	55	49
EE	76	58	128	25	39	26	51	83	23	148	2	51	23	4
EL	161	162	235	46	75	54	206	273	45	332	3	80	55	57
ES	185	193	304	53	78	63	223	313	65	483	3	84	52	64
FI	146	120	252	43	74	43	73	182	51	401	1	85	34	12
HU	126	146	195	26	59	43	165	223	49	297	2	73	35	53
IS	107	119	133	40	67	43	152	244	37	354	5	60	40	23
IT	147	152	176	26	56	48	187	290	46	286	2	71	35	62
LT	70	39	201	9	16	26	63	134	38	190	1	51	21	5
LV	83	41	200	6	25	33	42	119	20	172	1	44	22	4
NL	199	147	324	48	89	64	210	207	67	488	5	99	60	30
NO	126	152	211	30	41	47	116	168	39	396	3	88	39	10
PL	82	40	174	9	44	32	63	63	27	276	1	64	24	0
PT	110	48	224	34	58	43	79	79	36	337	1	64	46	5
SE	178	181	221	51	79	63	155	254	56	495	5	91	55	20
SK	134	130	242	36	69	45	135	195	51	332	4	89	43	47
UK	181	167	236	56	84	63	224	311	58	448	4	95	58	31
Ø	137	124	226	35	61	46	145	204	46	350	3	75	42	32
me- dian	141	130	227	36	62	45	155	207	49	350	3	80	41	31

Data source: EURIPID (2018), own calculation

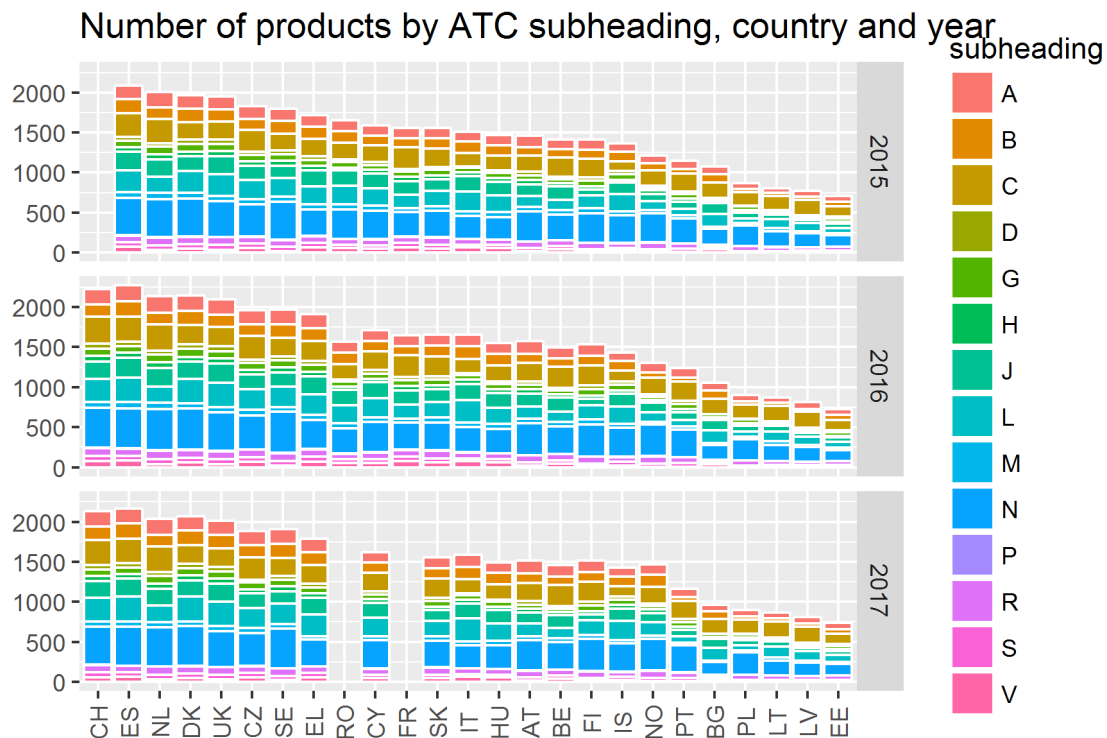
Figure 3: Number of products by country, 2017

Number of products by country
2017



Data source: EURIPID (2018), own illustration

Figure 4: Number of virtual products by year, country, and ATC subheading



Data source: EURIPID (2018), own calculation

ATC-1 Headings

- A- ALIMENTARY TRACT AND METABOLISM**
- B- BLOOD AND BLOOD FORMING ORGANS**
- C- CARDIOVASCULAR SYSTEM**
- D- DERMATOLOGICALS**
- G- GENITO URINARY SYSTEM AND SEX HORMONES**
- H- SYSTEMIC HORMONAL PREPARATIONS, EXCL. SEX HORMONES AND INSULINS**
- J- ANTIINFECTIVES FOR SYSTEMIC USE**
- L- ANTINEOPLASTIC AND IMMUNOMODULATING AGENTS**
- M- MUSCULO-SKELETAL SYSTEM**
- N- NERVOUS SYSTEM**
- P- ANTIPARASITIC PRODUCTS, INSECTICIDES AND REPELLENTS**
- R- RESPIRATORY SYSTEM**
- S- SENSORY ORGANS**
- V- VARIOUS (ALLERGENS)**

Table 6: Size of product intersection (2017)

	AT	BE	BG	CH	CY	CZ	DK	EE	EL	ES	FI	HU	IS	IT	LT	LV	NL	NO	PL	PT	SE	SK	UK
AT	1512	930	591	1255	989	1100	1106	536	1087	1213	932	940	725	977	631	554	1197	892	626	750	1122	941	1211
BE	930	1455	516	1219	876	1056	1128	457	943	1184	917	843	761	847	533	497	1188	867	570	759	1074	915	1049
BG	591	516	965	778	727	809	722	350	786	822	473	715	510	723	453	454	740	460	360	401	600	684	781
CH	1255	1219	778	2132	1309	1534	1652	605	1439	1731	1259	1223	1157	1301	718	682	1605	1194	712	957	1531	1277	1604
CY	989	876	727	1309	1619	1178	1234	502	1327	1349	869	1013	888	1084	599	546	1259	833	566	711	1104	1001	1284
CZ	1100	1056	809	1534	1178	1881	1422	613	1296	1515	1077	1212	1001	1172	735	712	1418	1007	743	847	1294	1364	1374
DK	1106	1128	722	1652	1234	1422	2067	533	1352	1677	1337	1126	1348	1234	610	559	1580	1335	626	861	1652	1167	1630
EE	536	457	350	605	502	613	533	737	549	594	520	516	391	491	492	438	628	432	367	439	556	538	572
EL	1087	943	786	1439	1327	1296	1352	549	1784	1534	935	1103	918	1247	624	600	1344	879	567	745	1191	1096	1427
ES	1213	1184	822	1731	1349	1515	1677	594	1534	2163	1208	1237	1166	1377	687	650	1655	1159	690	968	1524	1268	1693
FI	932	917	473	1259	869	1077	1337	520	935	1208	1517	828	945	842	561	519	1216	1138	567	771	1335	916	1146
HU	940	843	715	1223	1013	1212	1126	516	1103	1237	828	1492	778	1022	621	601	1119	770	575	682	1005	1035	1157
IS	725	761	510	1157	888	1001	1348	391	918	1166	945	778	1424	838	432	396	1098	984	450	623	1164	812	1124
IT	977	847	723	1301	1084	1172	1234	491	1247	1377	842	1022	838	1584	571	560	1197	815	499	671	1083	966	1310
LT	631	533	453	718	599	735	610	492	624	687	561	621	432	571	864	569	703	488	437	453	599	648	670
LV	554	497	454	682	546	712	559	438	600	650	519	601	396	560	569	812	653	429	400	435	560	630	618
NL	1197	1188	740	1605	1259	1418	1580	628	1344	1655	1216	1119	1098	1197	703	653	2037	1178	727	964	1498	1177	1594
NO	892	867	460	1194	833	1007	1335	432	879	1159	1138	770	984	815	488	429	1178	1466	536	709	1307	829	1118
PL	626	570	360	712	566	743	626	367	567	690	567	575	450	499	437	400	727	536	899	543	632	647	647
PT	750	759	401	957	711	847	861	439	745	968	771	682	623	671	453	435	964	709	543	1164	888	723	869
SE	1122	1074	600	1531	1104	1294	1652	556	1191	1524	1335	1005	1164	1083	599	560	1498	1307	632	888	1904	1088	1496
SK	941	915	684	1277	1001	1364	1167	538	1096	1268	916	1035	812	966	648	630	1177	829	647	723	1088	1552	1135
UK	1211	1049	781	1604	1284	1374	1630	572	1427	1693	1146	1157	1124	1310	670	618	1594	1118	647	869	1496	1135	2016

Data source: EURIPID (2018), own calculation

3.2. Price Level Indices (PLIs)

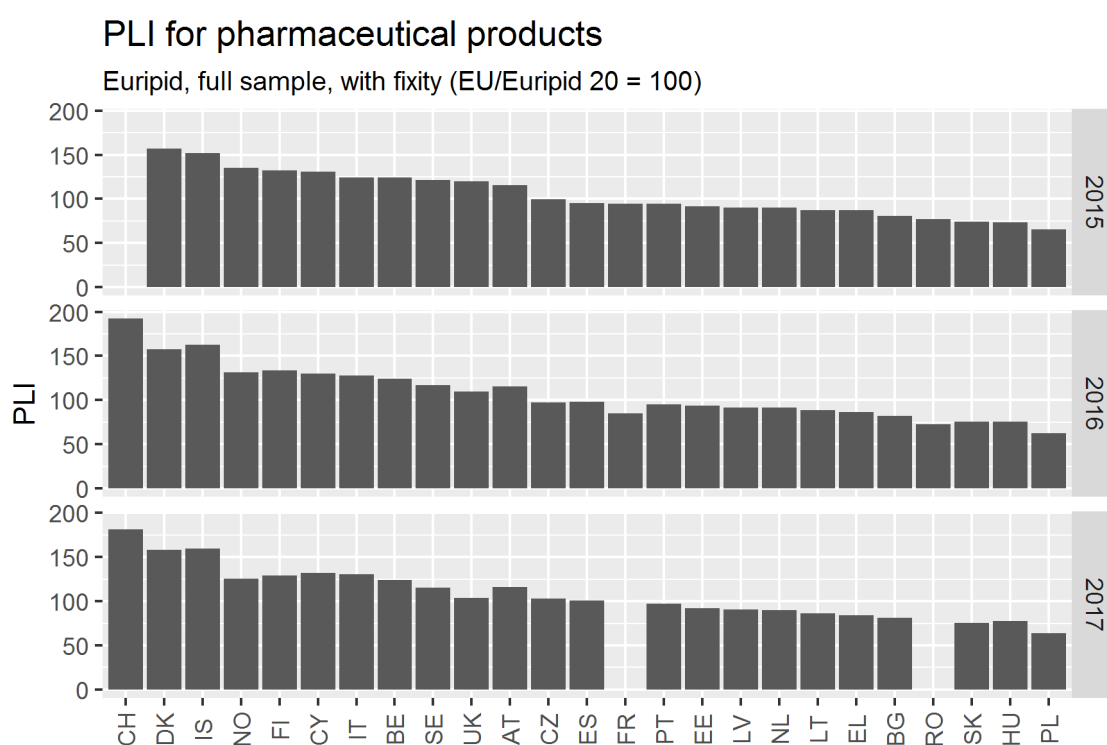
The PPPs and PLIs were calculated using EKS method, using no weights (all products are marked as representative). Results are summarised in Figure 5 and Table 7.

Fixity is calculated with respect to the group of 20 EURIPID countries for which data is available in 2017 and that are Member States of the European Union. These are Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Greece, Spain, Finland, Hungary, Italy, Lithuania, Latvia, Netherlands, Poland, Portugal, Sweden, Slovakia and the United Kingdom.

Note that this facilitates comparisons between 2015, 2016 and 2017 PLIs. Although the set of countries is different, fixity is calculated with respect to the same country set.

A separate analysis of prices for ATC subheadings is presented in Figure 6 and Table 8. Note that the particular large variance in subheading P can be attributed to the low number of virtual products within that group.

*Figure 5: PLIs for pharmaceutical products
Method: ÉKS (unweighted), with fixity (EU/EURIPID 20 = 100)*



Data source: EURIPID (2018), own calculation

Table 7: PLIs for pharmaceutical products
Method: ÉKS (unweighted), with fixity (EU/EURIPID 20 = 100)

	2015	2016	2017
AT	115.56	115.59	115.94
BE	124.21	123.82	124.13
BG	80.75	81.86	81.23
CH		192.11	181.76
CY	130.45	129.63	131.77
CZ	99.37	97.63	102.78
DK	156.99	157.49	157.85
EE	91.50	93.74	92.01
EL	87.15	86.45	84.14
ES	95.32	98.26	100.63
FI	132.12	133.50	129.21
FR	94.69	85.24	
HU	73.16	75.18	77.75
IS	151.88	162.95	159.55
IT	124.24	127.60	130.47
LT	87.20	88.44	86.25
LV	89.99	91.13	90.62
NL	89.88	91.22	89.69
NO	135.27	131.43	125.57
PL	65.06	62.18	64.11
PT	94.17	94.99	96.93
RO	77.37	72.29	
SE	121.10	116.88	115.28
SK	74.22	75.59	75.13
UK	119.56	109.47	103.84

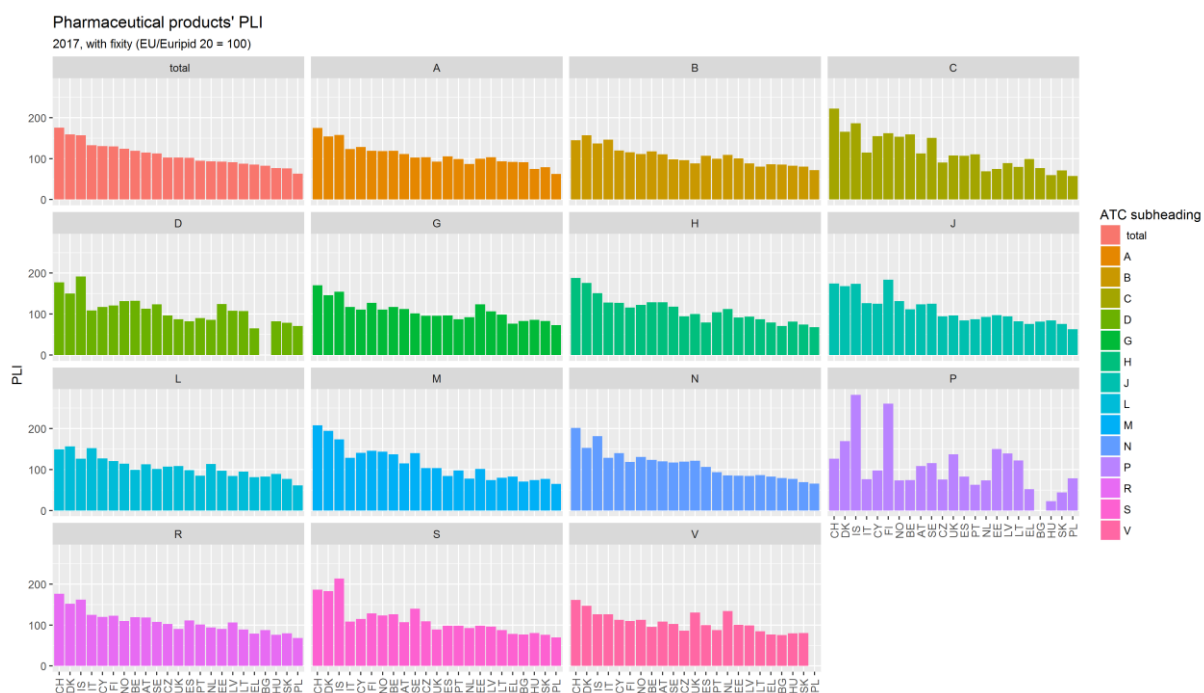
Data source: EURIPID (2018), own calculation

Table 8: PLIs by ATC subheadings, 2017
Method: ÉKS (unweighted), with fixity (EU/EURIPID 20 = 100)

	A	B	C	D	G	H	J	L	M	N	P	R	S	V
AT	111.26	110.65	112.38	113.22	112.55	128.70	123.79	112.56	114.98	119.91	108.71	118.16	106.84	108.38
BE	119.06	117.51	159.25	132.22	117.49	128.52	111.62	99.47	136.93	123.48	73.98	119.05	126.03	95.43
BG	91.33	85.51	76.86		82.82	71.02	81.61	82.66	70.27	79.00		87.61	76.70	75.57
CH	174.47	145.03	221.79	177.11	170.53	188.02	174.30	148.98	207.95	201.18	126.60	176.59	186.57	161.57
CY	128.40	119.88	154.57	117.21	110.76	127.39	125.50	127.20	140.75	140.23	97.95	119.56	115.03	112.25
CZ	103.16	96.44	90.52	96.47	96.10	94.28	94.14	107.20	103.69	119.38	75.54	102.83	108.71	86.37
DK	153.93	156.72	165.42	150.27	146.00	176.20	167.87	156.36	194.37	153.22	169.07	152.13	182.83	147.19
EE	99.66	100.41	74.48	124.74	124.07	91.29	97.07	97.17	101.32	84.97	150.04	90.65	98.30	100.17
EL	91.84	85.86	99.12	65.35	76.33	79.25	75.67	81.56	82.63	82.97	52.23	78.74	77.92	76.78
ES	105.24	106.70	107.14	82.43	96.55	79.53	84.53	98.25	84.40	106.44	82.79	111.23	98.40	99.97
FI	118.89	115.73	161.88	121.13	127.11	115.63	184.12	120.75	145.40	118.67	261.24	122.52	128.25	109.39
HU	74.48	82.51	59.74	82.40	85.62	81.87	84.73	89.39	74.46	77.12	22.94	75.76	80.70	79.66
IS	157.61	136.61	186.27	191.67	154.75	150.69	173.55	126.19	173.83	181.15	282.34	161.64	213.74	126.12
IT	123.45	145.96	115.07	108.87	117.57	128.17	126.35	151.98	128.62	128.55	76.33	125.00	108.63	126.46
LT	92.94	80.42	79.67	107.39	98.73	87.61	82.65	94.68	79.80	86.26	121.97	88.84	87.28	84.55
LV	103.28	88.22	88.80	107.82	106.95	93.45	94.22	83.86	74.14	84.46	139.51	106.07	95.85	98.69
NL	87.10	108.77	69.10	86.10	92.17	112.07	92.76	113.49	77.83	85.65	73.55	94.03	92.26	134.39
NO	118.38	110.97	153.53	131.62	111.10	122.41	131.67	114.22	143.46	130.65	73.22	109.56	123.52	112.61
PL	62.62	72.01	57.18	70.57	73.27	68.13	63.12	61.21	64.66	65.70	78.56	68.03	69.53	
PT	98.93	100.06	110.51	89.96	87.15	104.61	87.07	84.69	98.07	93.48	62.60	100.89	98.51	87.42
SE	102.37	98.39	150.84	123.53	101.69	118.23	125.35	101.67	139.76	117.19	115.54	107.26	139.68	102.36
SK	78.62	80.32	71.29	78.98	83.08	74.32	76.02	76.91	76.78	69.05	44.14	79.60	75.98	80.71
UK	92.36	88.13	107.40	87.19	95.65	100.27	96.58	108.61	103.36	121.72	137.49	90.69	89.08	130.65

Data source: EURIPID (2018), own calculation

Figure 6: PLIs by ATC subheadings, 2017
Method: ÉKS (unweighted), with fixity (EU/EURIPID 20 = 100)



Data source: EURIPID (2018), own calculation

3.3. Volume-based PPPs

For three countries, it is possible to include volume data in the EURIPID database: Czech Republic, Hungary and Sweden.

Calculation of average annual prices was changed to incorporate (monthly) volume data:

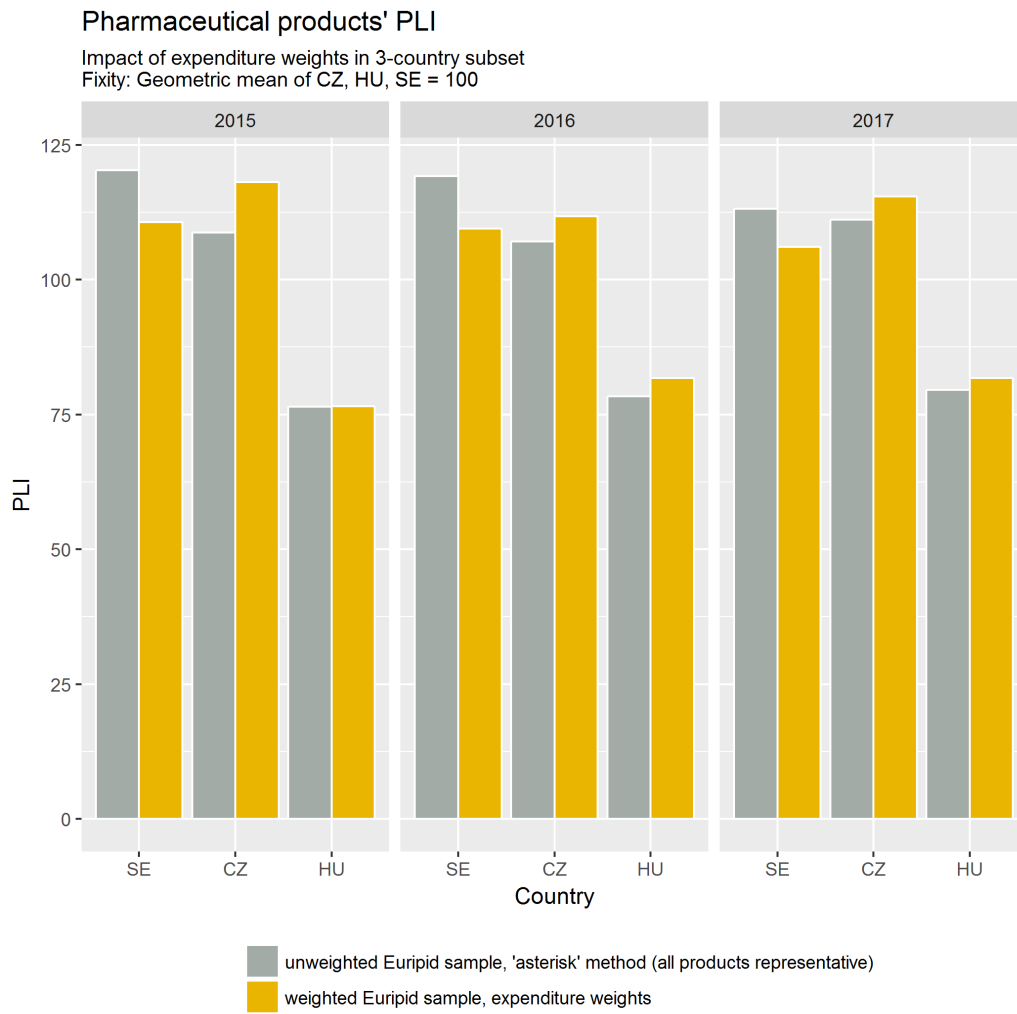
1. Calculation of day-weighted average monthly prices (concrete products)
2. Calculation of average annual prices as *volume-weighted* mean of monthly prices (concrete products)
3. Calculation of average annual **unit prices** via division by package size (concrete products)
4. Calculation of average annual prices of virtual products as *volume-weighted* means of all products within the same virtual product (*virtual products*)
 - Furthermore, the same inclusion criteria are applied: Virtual products are selected only if they are reimbursed for the whole year.
 - Virtual products are discarded if less than 6 countries reimburse them.

PPPs and PLIs were then calculated using expenditures as weights in price ratios as described in the OECD/Eurostat manual (Eurostat/OECD 2012).

Table 9 and Figure 7 contrast results obtained from this calculation method and from an unweighted calculation.

These results suggest that adjustment for expenditure weights may not have a particularly large impact on PPPs and PLIs for pharmaceutical products in calculations based on the EURIPID database. However, the sample of 3 countries is very small.

Figure 7: Comparison of PLIs from EURIPID-subset where volume data is available



Data source: EURIPID (2018), own calculation

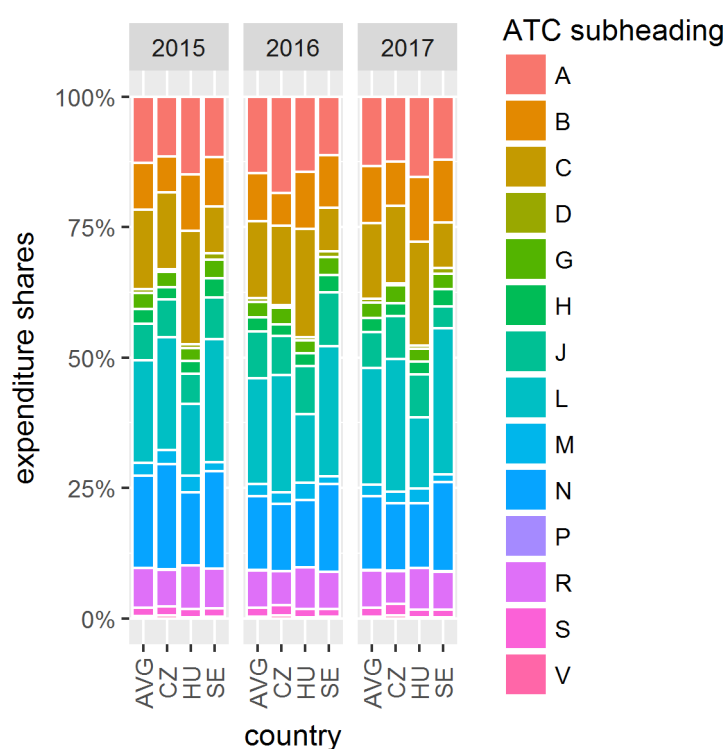
Table 9: Comparison of PLIs from EURIPID-subset where volume data is available
Fixity: CZ, HU, SE = 100

		'asterisk' method (all products representative)	using expenditure weights	relative change
2015	CZ	108.75	118.05	-7.9%
	HU	76.45	76.54	-0.1%
	SE	120.27	110.67	8.7%
2016	CZ	107.10	111.77	-4.2%
	HU	78.37	81.71	-4.1%
	SE	119.14	109.50	8.8%
2017	CZ	111.07	115.39	-3.7%
	HU	79.58	81.74	-2.6%
	SE	113.13	106.02	6.7%

Data source: EURIPID (2018), own calculation

The analysis of expenditure patterns within these three countries however reveals that expenditure shares for ATC subheadings are rather similar across countries.

Figure 8: Expenditure by ATC subheading



Data source: EURIPID (2018), own calculation

Table 10: Expenditure shares by ATC subheading, 2017

ATC	CZ	HU	SE	AVG
A	12.48%	15.35%	12.06%	13.30%
B	8.48%	12.43%	12.00%	10.97%
C	14.80%	19.91%	8.80%	14.51%
D	0.38%	0.60%	1.04%	0.67%
G	3.51%	2.51%	2.97%	3.00%
H	2.40%	2.37%	3.35%	2.71%
J	8.28%	8.31%	4.10%	6.90%
L	25.35%	13.66%	28.02%	22.34%
M	2.25%	2.76%	1.46%	2.16%
N	12.95%	12.44%	17.19%	14.19%
P	0.05%	0.03%	0.07%	0.05%
R	6.35%	7.93%	7.21%	7.16%
S	2.12%	1.48%	1.50%	1.70%
V	0.61%	0.19%	0.21%	0.34%

Data source: EURIPID (2018), own calculation

We therefore calculate average expenditure shares per ATC subheading and use these expenditure shares in aggregation of subheadings' PPPs. While this can be argued to reflect expenditure patterns among ATC subheadings in more detail, impact on PLIs is minimal for most countries. Average absolute difference of PLIs is around 1% (see Table 11).

Table 11: Impact of expenditure weights by ATC subheading (extrapolation of volume-subsample)

	2015				2016				2017			
	no weights ¹	SH' avg. exp. ²	rel. Δ	abs. Δ	no weights ¹	SH' avg. exp. ²	rel. Δ	abs. Δ	no weights ¹	SH' avg. exp. ²	rel. Δ	abs. Δ
AT	115.14	115.56	0.4%	0.42	115.57	115.59	0.0%	0.02	114.99	115.94	0.8%	0.95
BE	121.21	124.21	2.5%	3.00	119.88	123.82	3.3%	3.94	119.27	124.13	4.1%	4.87
BG	81.52	80.75	-0.9%	0.77	83.08	81.86	-1.5%	1.22	82.53	81.23	-1.6%	1.30
CH					187.03	192.11	2.7%		175.86	181.76	3.4%	5.90
CY	130.81	130.45	-0.3%	0.36	129.28	129.63	0.3%	0.36	130.81	131.77	0.7%	0.96
CZ	100.32	99.37	-0.9%	0.95	97.51	97.63	0.1%	0.12	102.71	102.78	0.1%	0.07
DK	157.89	156.99	-0.6%	0.90	158.92	157.49	-0.9%	1.43	159.13	157.85	-0.8%	1.28
EE	91.57	91.50	-0.1%	0.07	94.15	93.74	-0.4%	0.41	92.81	92.01	-0.9%	0.80
EL	88.64	87.15	-1.7%	1.49	87.25	86.45	-0.9%	0.80	85.42	84.14	-1.5%	1.28
ES	96.43	95.32	-1.2%	1.11	99.04	98.26	-0.8%	0.78	101.61	100.63	-1.0%	0.98
FI	131.89	132.12	0.2%	0.23	134.25	133.50	-0.6%	0.75	129.65	129.21	-0.3%	0.43
FR	95.50	94.69	-0.9%	0.81	86.92	85.24	-1.9%	1.68				
HU	71.50	73.16	2.3%	1.66	73.92	75.18	1.7%	1.26	76.94	77.75	1.1%	0.81
IS	151.32	151.88	0.4%	0.56	161.35	162.95	1.0%	1.59	156.79	159.55	1.8%	2.76
IT	124.20	124.24	0.0%	0.04	128.34	127.60	-0.6%	0.74	132.52	130.47	-1.5%	2.05
LT	88.00	87.20	-0.9%	0.80	89.12	88.44	-0.8%	0.67	87.46	86.25	-1.4%	1.21
LV	90.21	89.99	-0.2%	0.22	91.61	91.13	-0.5%	0.48	90.95	90.62	-0.4%	0.33
NL	91.99	89.88	-2.3%	2.10	93.74	91.22	-2.7%	2.52	92.96	89.69	-3.5%	3.27
NO	133.00	135.27	1.7%	2.26	128.75	131.43	2.1%	2.68	123.77	125.57	1.5%	1.80
PL	65.21	65.06	-0.2%	0.15	61.77	62.18	0.7%	0.41	63.08	64.11	1.6%	1.03
PT	92.51	94.17	1.8%	1.66	93.42	94.99	1.7%	1.57	95.04	96.93	2.0%	1.90
RO	78.09	77.37	-0.9%	0.72	72.90	72.29	-0.8%	0.61				
SE	118.16	121.10	2.5%	2.94	114.65	116.88	1.9%	2.22	112.22	115.28	2.7%	3.05
SK	74.34	74.22	-0.2%	0.12	76.08	75.59	-0.6%	0.50	76.05	75.13	-1.2%	0.92
UK	119.55	119.56	0.0%	0.01	108.65	109.47	0.8%	0.81	102.57	103.84	1.2%	1.27
	ρ = 0.9987		Ø = 0.97		ρ = 0.9988		Ø = 1.15		ρ = 0.9978		Ø = 1.71	

¹ Unweighted calculation, asterisk method, all (virtual) products are representative.

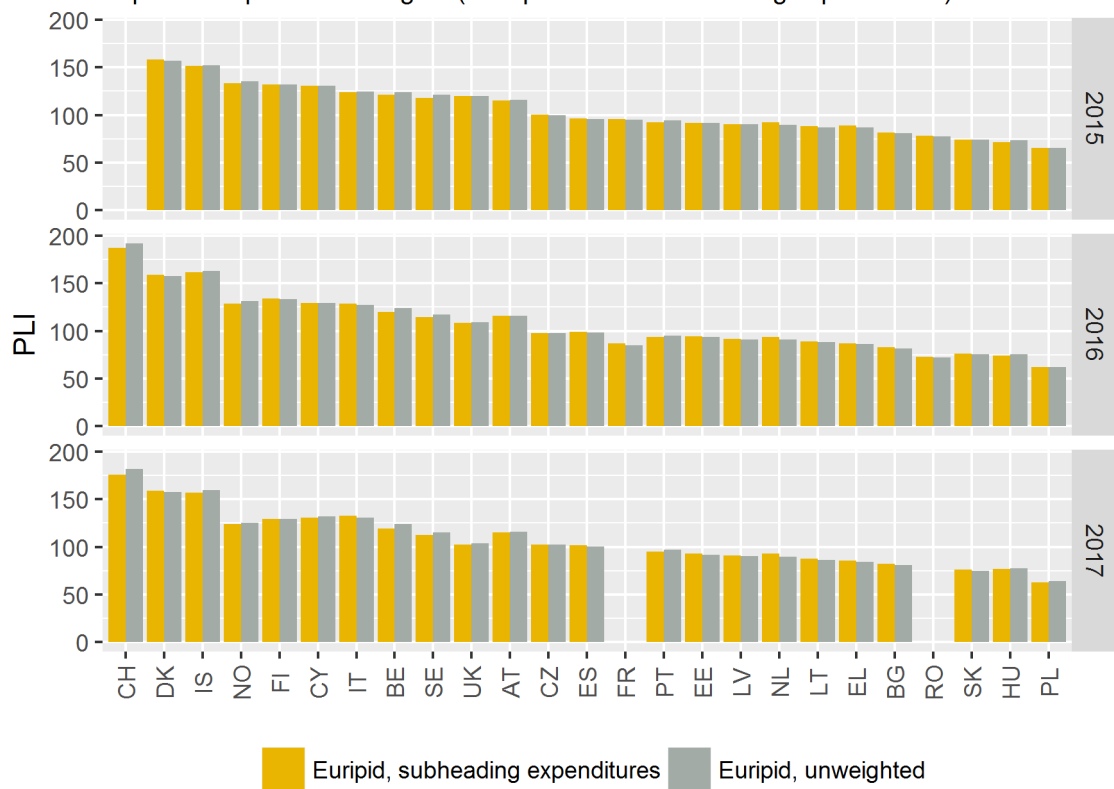
² In this calculation, expenditures for ATC subheadings were weighted according to the average in SE, CZ and HU. For all ATC subheadings, PLIs were calculated using the unweighted 'asterisk' method, all (virtual) products are representative

Data source: EURIPID (2018), own calculation

Figure 9: Impact of expenditure weights by ATC subheading (extrapolation of volume-subsample)

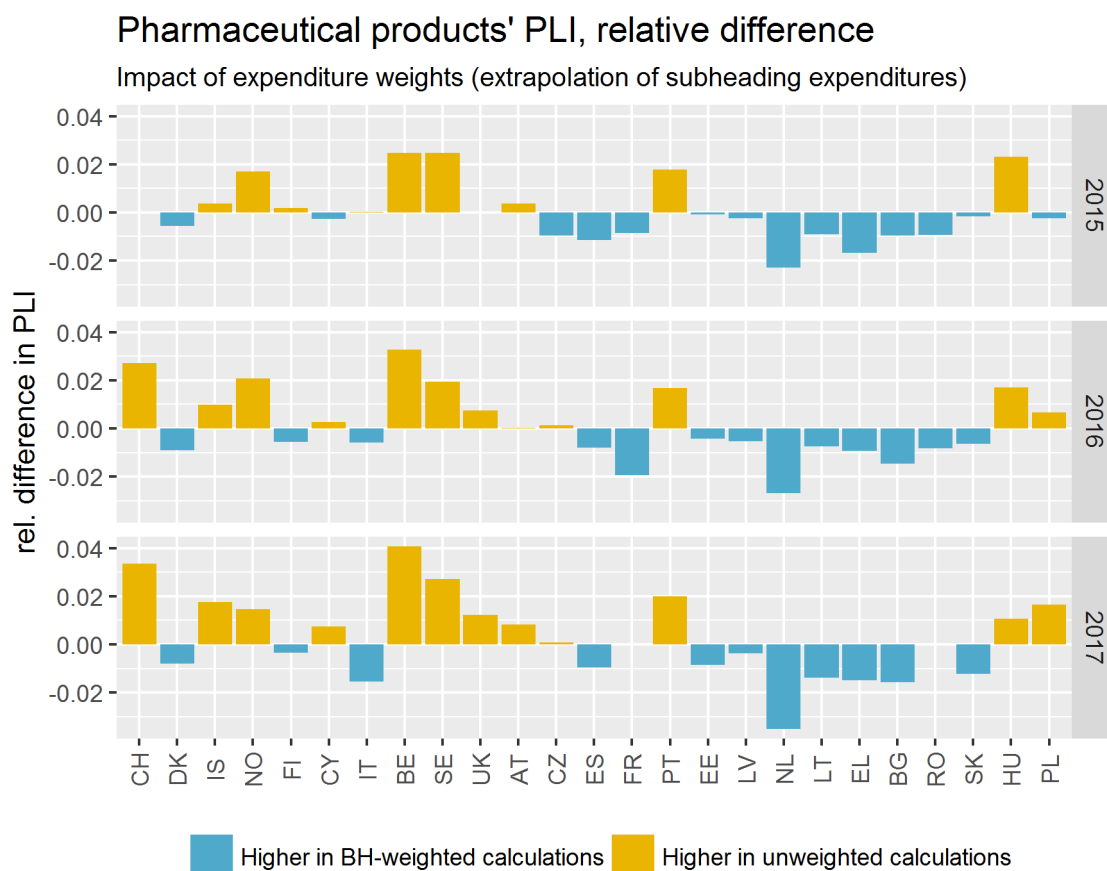
Pharmaceutical products' PLI

Impact of expenditure weights (extrapolation of subheading expenditures)



Data source: EURIPID (2018), own calculation

Figure 10: Impact of expenditure weights by ATC subheading (extrapolation of volume-subsample), relative difference



Data source: EURIPID (2018), own calculation

3.4. Comparison with Eurostat CGS results: summary statistics

The Eurostat “Consumer Goods Survey (CGS) on furniture and health” reports prices for a limited set of pharmaceuticals. These data are used to compute PPPs and PLIs for pharmaceuticals in the Eurostat PPP exercise⁵.

This exercise aims to compare results obtained from the CGS with results obtained from the Eurostat database. Two steps were undertaken to improve comparability between these two data sources:

- Limitation to countries covered by both datasets. While it is not necessary to drop countries that are only in one dataset, it is important to calculate fixity with regard to those countries that are in both datasets. Otherwise, PLIs obtained from one source may be systematically higher or lower. For this reason, all calculations have been performed with fixity such that the geometric mean of all 20 countries in both EURIPID and EU is equal to 100.
- Limitation to products covered by both datasets. Due to heterogeneous naming of pharmaceuticals across countries, trade names cannot be used to identify products. For this reason, products were identified using their ATC code.

⁵ <http://ec.europa.eu/eurostat/web/purchasing-power-parities/overview>

Table 12 summarises the number of products' ATC codes that are present in EURIPID only, Eurostat CGS only, and both datasets. Unsurprisingly, the majority of ATC codes that are included in the Eurostat CGS are also in EURIPID. Exceptions are products that are not even partly paid (reimbursed) by state or social insurance authorities (see section 1.2). However, the EURIPID database has entries for more than 70% of ATCs listed in the CGS for every country. Since EURIPID has a larger number of product entries, a large share of ATC codes in the EURIPID database has no match in the Eurostat CGS.

Calculations of PPPs and PLIs were performed based on both the full sample and the sample of products whose ATC codes are both in Eurostat CGS and EURIPID.

Table 12: Comparison of ATC codes in CGS and EURIPID database

	CGS only	both	EURIPID only	CGS matches in EURIPID (in % CGS)	EURIPID matches in CGS (in % EURIPID)
AL	67				
AT	13	95	527	88%	15%
BA	90				
BE	12	68	473	85%	13%
BG	22	77	441	78%	15%
CH	2	54	721	96%	7%
CY	5	64	656	93%	9%
CZ	6	54	679	90%	7%
DE	57				
DK	5	49	748	91%	6%
EE	13	75	339	85%	18%
EL	6	88	714	94%	11%
ES	7	92	762	93%	11%
FI	12	88	436	88%	17%
FR	81				
HR	100				
HU	12	88	550	88%	14%
IE	66				
IS	9	67	570	88%	11%
IT	18	75	629	81%	11%
LT	22	74	323	77%	19%
LU	102				
LV	26	60	318	70%	16%
ME	74				
MK	80				
MT	84				
NL	10	90	666	90%	12%
NO	12	75	427	86%	15%
PL	23	73	231	76%	24%
PT	13	78	412	86%	16%
RO	97				
RS	101				
SE	11	80	596	88%	12%
SI	85				
SK	11	81	591	88%	12%
TR	104				
UK	8	85	755	91%	10%

Data source: EURIPID (2018), Eurostat CGS (2018), own calculation

3.5. Comparison with Eurostat CGS results: PPPs and PLIs

PPPs and PLIs have been computed from the Eurostat CGS (fixity with regard to EU/EURIPID 20) and from EURIPID in 6 separate calculations.

Table 14 describes differences in data sources, subset and methodology between these 6 calculations. Table 13 and Figure 11 illustrate PLIs.

Quaranta tables, product tables and product-level cross tables can be found in the Excel files shared by data transfer.

Table 13: Comparison of PLIs for 2017

	(1)	(2)	(3)	(4)	(5)	(6)
AL						60.48
AT	119.96	114.99	115.37	115.94	132.56	132.84
BA						87.38
BE	117.18	119.27	130.87	124.13	116.56	121.97
BG	77.15	82.53	80.20	81.23	72.13	70.69
CH	193.90	175.86	218.63	181.76	221.42	228.93
CY	149.27	130.81	156.51	131.77	156.41	149.59
CZ	108.41	102.71	108.50	102.78	72.76	74.15
DE						154.94
DK	165.42	159.13	162.98	157.85	127.02	124.53
EE	79.04	92.81	81.44	92.01	87.49	90.33
EL	92.72	85.42	98.13	84.14	95.12	88.00
ES	107.08	101.61	99.71	100.63	94.56	93.71
FI	123.41	129.65	147.03	129.21	137.57	131.67
FR						102.70
HR						69.84
HU	57.73	76.94	66.88	77.75	76.16	76.68
IE						142.67
IS	146.94	156.79	182.96	159.55	192.06	203.66
IT	144.73	132.52	123.27	130.47	121.19	129.25
LT	71.59	87.46	79.80	86.25	82.59	88.91
LU						133.95
LV	86.17	90.95	89.86	90.62	101.38	105.28
ME						79.25
MK						62.87
MT						167.72
NL	73.28	92.96	71.58	89.69	127.14	121.43
NO	129.74	123.77	136.91	125.57	114.03	139.17
PL	64.54	63.08	63.67	64.11	72.24	75.78
PT	127.59	95.04	105.06	96.93	97.65	97.13
RO						64.84
RS						57.91
SE	113.75	112.22	123.65	115.28	136.18	132.53
SI						96.64
SK	100.56	76.05	66.71	75.13	69.48	68.54
TR						53.38
UK	99.98	102.57	109.07	103.84	87.42	85.56

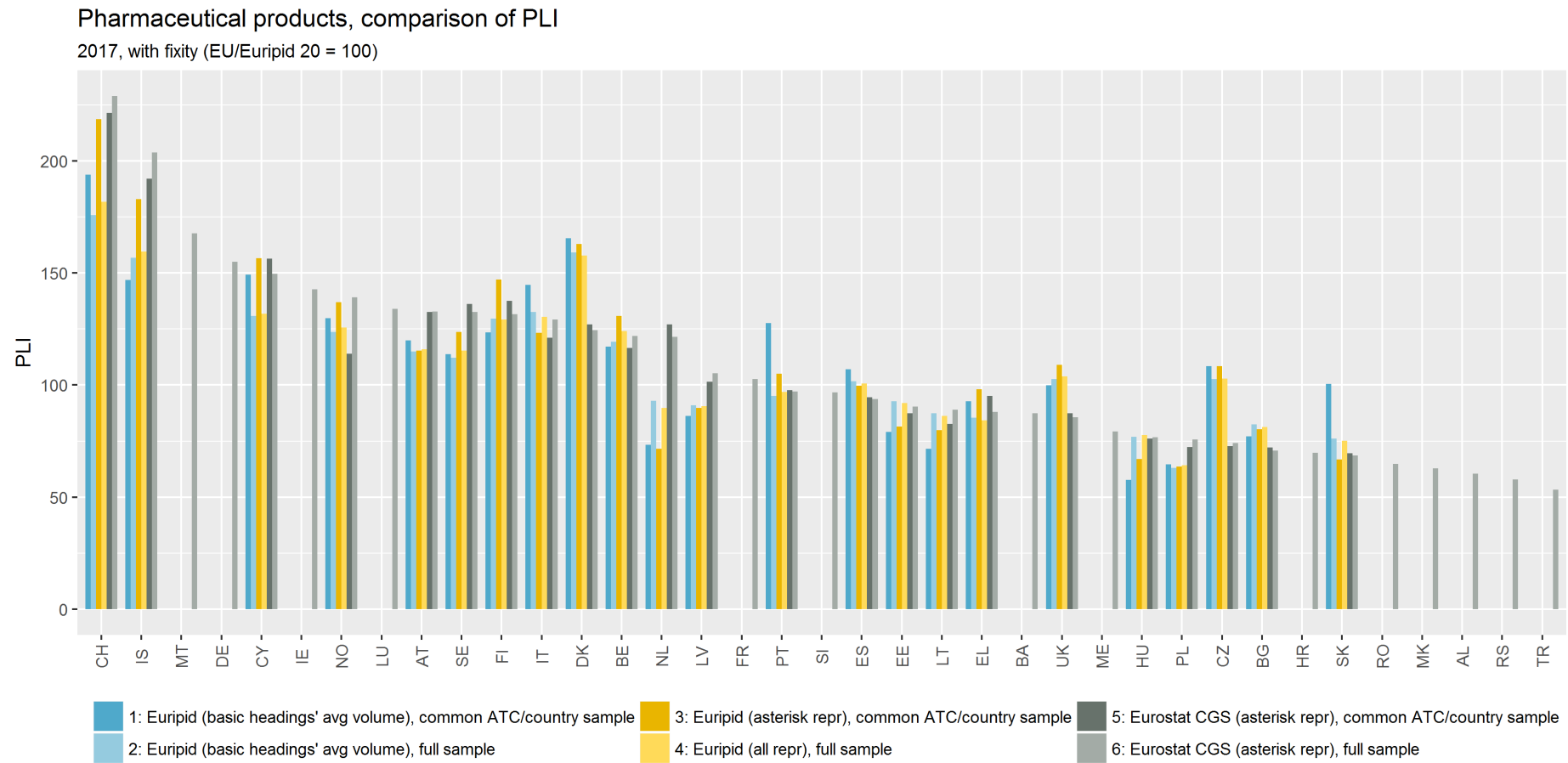
Data source: EURIPID (2018), Eurostat CGS (2018), own calculation (with fixity EU/EURIPID 20 = 100)

Table 14: Summary of calculation methods used in comparison between EURIPID and Eurostat results

	(1)	(2)	(3)	(4)	(5)	(6)
	EURIPID (basic headings' avg volume), common ATC/country sample	EURIPID (basic headings' avg volume), full sample	EURIPID (asterisk repr), common ATC/country sample	EURIPID (all repr), full sample	Eurostat CGS (asterisk repr), common ATC/country sample	Eurostat CGS (asterisk repr), full sample
<i>data source</i>	EURIPID	EURIPID	EURIPID	EURIPID	Eurostat CGS	Eurostat CGS
<i>year</i>	2017	2017	2017	2017	Nov 2017	Nov 2017
<i>sample: countries</i>	all that are also in Eurostat CGS	all EURIPID countries	all that are also in Eurostat CGS	all EURIPID countries	all that are also in EURIPID	all Eurostat countries
<i>fixity</i>	EU/EURIPID 20 = 100	EU/EURIPID 20 = 100	EU/EURIPID 20 = 100	EU/EURIPID 20 = 100	EU/EURIPID 20 = 100	EU/EURIPID 20 = 100
<i>sample: ATC</i>	all that are also in Eurostat CGS (by country)	all ATC in EURIPID	all that are also in Eurostat CGS (by country)	all ATC in EURIPID	all that are also in EURIPID (drop some OTC-only products, by country)	all ATC in Eurostat
<i>calculation method</i>	calculate PLI for subheadings first, then calculate aggregate PLI for pharmaceutical products, ÉKS method	calculate PLI for subheadings first, then calculate aggregate PLI for pharmaceutical products, ÉKS method	calculate PLI in one step (no subheadings), ÉKS method	calculate PLI in one step (no subheadings), ÉKS method	calculate PLI in one step (no subheadings), ÉKS method	calculate PLI in one step (no subheadings), ÉKS method
<i>weighting method</i>	BH level: representativeness (*) as in CGS, aggregation of BH to pharmaceutical products: using average expenditure shares from CZ, HU, SE.	BH level: all products are representative, aggregation of BH to pharmaceutical products: using average expenditure shares from CZ, HU, SE.	representativeness (*) as in CGS	all products are representative	representativeness (*) as in CGS	representativeness (*) as in CGS

Data source: GÖG, own compilation

Figure 11: Comparison of PLIs using different calculation methods



Data source: EURIPID (2018), Eurostat CGS (2018), own calculation (with fixity EU/EURIPID 20 = 100)

Table 15: Average of absolute differences between calculation methods' PLI

	(1)	(2)	(3)	(4)	(5)	(6)
(1)	—	10.61	11.23	10.44	19.61	20.19
(2)	10.61	—	11.41	1.71	15.56	15.31
(3)	11.23	11.41	—	10.12	13.22	14.51
(4)	10.44	1.71	10.12	—	15.09	14.54
(5)	19.61	15.56	13.22	15.09	—	4.95
(6)	20.19	15.31	14.51	14.54	4.95	—

Data source: EURIPID (2018), Eurostat CGS (2018), own calculation (with fixity EU/EURIPID 20 = 100)

Table 16: Pearson correlation coefficients between calculation methods' PLI

	(1)	(2)	(3)	(4)	(5)	(6)
(1)	—	0.92	0.93	0.93	0.79	0.79
(2)	0.92	—	0.96	1.00	0.87	0.88
(3)	0.93	0.96	—	0.97	0.88	0.89
(4)	0.93	1.00	0.97	—	0.88	0.89
(5)	0.79	0.87	0.88	0.88	—	0.98
(6)	0.79	0.88	0.89	0.89	0.98	—

Data source: EURIPID (2018), Eurostat CGS (2018), own calculation (with fixity EU/EURIPID 20 = 100)

Table 17: Spearman correlation coefficients between calculation methods' PLI

	(1)	(2)	(3)	(4)	(5)	(6)
(1)	—	0.91	0.91	0.91	0.72	0.76
(2)	0.91	—	0.96	0.99	0.82	0.84
(3)	0.91	0.96	—	0.97	0.80	0.82
(4)	0.91	0.99	0.97	—	0.82	0.85
(5)	0.72	0.82	0.80	0.82	—	0.95
(6)	0.76	0.84	0.82	0.85	0.95	—

Data source: EURIPID (2018), Eurostat CGS (2018), own calculation (with fixity EU/EURIPID 20 = 100)

4. Discussion

4.1. Methodological issues

As mentioned in section 1.2, the EURIPID database does not contain volume data. This causes two potential issues:

- Firstly, **aggregation of prices of actual products to virtual products** is potentially subject to bias. If, for a given country, two products with same ATC, INN & strength, package size, and dosage form are priced in the EURIPID database, the price of the virtual product should be ideally computed as a weighted average, where weights are sale numbers of these products.

If the average price is instead calculated as an unweighted mean, bias may result.

This bias affects countries differently, and consequently results in biased PPPs, if some countries included in the EURIPID database are more likely than others to list high (or low) priced pharmaceuticals that are rarely sold, thus biasing the average price of virtual products up (or down).

- Secondly, Laspeyres- and Paasche-type **price indices** were calculated without using weights. In reality, some types of medicines are prescribed and bought more frequently than others, and they should have higher weight in price ratio calculations. The unweighted calculation implicitly assumes that all virtual products have an equal market share.

Again, it could be the case that this problem affects all countries in the same way and has thus little impact on PPPs. However, the number of virtual products within a country, and correspondingly, the likelihood that virtual products with small market shares have a too high weight in calculation of price indices, differs substantially across EURIPID countries (see Table 4). Unfortunately, the extent of that bias cannot be exactly identified without availability of volume data for a large number of countries.

Furthermore, the EURIPID database does not include hospital-only products or OTC products in most cases⁶. This does not introduce bias if price ratios of these products are similar to reimbursable pharmaceuticals included in the EURIPID database.

4.2. EURIPID Prices

Please note the following comments when looking at the results, we also made comments on the information the national statistical offices gave regarding their approach to collect prices of pharmaceuticals in their countries (see section 6.1).

- Discounts, rebates and clawbacks, even if publicly known, are not considered in our analysis.
- In **Austria** the so-called “Kassenpreis” was taken instead of the final gross consumer retail price, as the latter includes a 15% extra add-on for “private clients”. The “Kassenpreis” is the reimbursement price the Austrian sickness funds pay, which is the vast majority for reimbursed products as those in the data-set. This was also considered in the CGS.
- The composition of the pharmaceutical price in the **Netherlands** is different from those of many EU countries as the published price does not include the remuneration of the dispensing unit (usually a pharmacy). Pharmacies are reimbursed separately for their services but there is not statutorily fixed amount.⁷ We approximated the gross consumer price as explained in the footnote, but we learned in the meantime that the Dutch Statistic Office also added a flat rate of Euro 7.00 to each pack before applying the VAT rate which explains the deviation when comparing the results.
- In **Czech Republic** all prices in EURIPID are official maximum prices. But, whereas in many countries (AT, ES, etc.) the “maximum” price is usually charged to patients and payers, in the Czech Republic the actual prices as taken for the CGS are usually around 20% (in some cases even more) lower which could be an explanation for the diverging results.

⁶ Note: Hospital-only is not a legally defined term in the majority of EU countries; also the focus of EURIPID are out-patient reimbursed medicines. It now depends, e.g., if a country is likely to treat patients in out-patient clinics or if these places are defined as “hospitals” if a product is included in EURIPID. Spain has the largest sample, Estonia the smallest (see Table 3).

⁷ For interim results (presented at the PPP Working Group meeting of November 2017) NL was not included in the analysis as the price type they report to EURIPID is considered by them as “wholesale” price. Still it was agreed in a subsequent meeting to add the VAT of 6% to this reported price and use it as proxy for the gross consumer price.

Other differences could be explained by some sub-set analysis on how the price collection for the CGS took place, e.g. if really no discounts were considered or where the price was obtained and if it was weighted or not. For instance, in Denmark the average of the three lowest priced products meeting the criteria went into the CGS whereas in our analysis all virtual products that were marketed for the whole year went into the analysis which is a good explanation why “our” PLI is higher.

4.3. Sensitivity analysis

A number of additional analyses were performed to test the impact of different specifications of the calculation procedure.

These comprise:

- Changing the minimum number of countries a virtual product must be available in to be included in the analysis from 8 to 10.

This analysis reveals that there is no substantial difference in resulting PPPs and PLIs.

- Limiting the analysis to those virtual products whose ATC code matches with a pharmaceutical listed in the Eurostat CGS.

This analysis reveals some differences in resulting PPPs and PLIs (see Table 15–16). It should be discussed whether these results are more likely to reflect true price levels than the results obtained from the unweighted analysis using all EURIPID virtual products.

- Exploration of the impact of expenditure weights by constructing different expenditures by ATC subheading and calculating corresponding PPPs and PLIs for the pharmaceuticals aggregate.

This analysis reveals differences in PPPs and PLIs particularly in countries where a small number of actual products within an ATC subheading leads to large country-variance in ATC-PLIs. Since, however, PLIs are similar across most subheadings, a weighting of subheadings does not have excessive impact on aggregate PPPs (see Table 10).

Table 18: Sensitivity analysis: Impact of country threshold (EURIPID 2017 dataset)

	PLI <i>min 8 countries</i>	PLI <i>min 10 countries</i>
AT	115.81	115.94
BE	123.81	124.13
BG	81.19	81.23
CH	182.03	181.76
CY	132.32	131.77
CZ	103.13	102.78
DK	156.76	157.85
EE	91.77	92.01
EL	84.44	84.14
ES	101.95	100.63
FI	128.75	129.21
HU	78.08	77.75
IS	158.64	159.55
IT	131.00	130.47
LT	86.42	86.25
LV	90.63	90.62
NL	87.91	89.69
NO	125.25	125.57
PL	64.59	64.11
PT	97.58	96.93
SE	115.33	115.28
SK	74.53	75.13
UK	103.46	103.84

Data source: EURIPID (2018), own calculation

4.4. Conclusions and recommendation

Obtain more volume-data

Currently, the EURIPID database does not include expenditure volumes or prescription numbers for pharmaceuticals. This will be – according to a decision of the Members of the EURIPID collaboration (BoP) – addressed in the near future. For the purpose of this exercise volume data from three countries (SE, CZ and HU) could be integrated for testing. The following Table 19 shows the possibility to integrate volume information on product basis into EURIPID database, i.e. the ability of countries to provide this information in a comparable and timely format way.

Table 19: Countries ability to basically provide volume information for their pharmaceutical products on product level basis to EURIPID

Country	Volume information available	Country	Volume information available	Country	Volume information available
AT	Yes	FI	No	MT	No member, no info
BE	No*	FR	No info	NL	Yes
BG	Yes	HR	No info	NO	No*
CY	No	HU	Yes	PL	Yes
CH	No	IE	Yes	PT	No
CZ	Yes	IL	No	RO	No member, no info
DE	No member, no info	IS	No info	SE	Yes
DK	Yes, but only annually	IT	Yes	SI	No info
EE	No	LU	No member, no info	SK	Yes
EL	Unknown	LV	No info	UK	No
ES	Yes	LT	Yes		

* Currently not possible, but perhaps in the long run. Sum Yes: 13; Sum no or no info: 18; 1 unknown

Source: GÖG Survey among countries in April-June 2017

Countries usually are only able to provide selected price types, not all four types (manufacturer, wholesale, net retail, gross retail = consumer price) covered by EURIPID

Distinguish between generics and originals

The Eurostat CGS distinguishes between generics and originals. While that distinction cannot be made in the EURIPID database, it is possible to estimate roughly, by virtual product and country, whether there are more than one actual products marketed that share the same ATC, INN & strength, and dosage form group. If there is only one such pharmaceutical product marketed, this product can be classified as having a monopoly or monopoly-like situation by proxy. Likewise, if more than one pharmaceutical product is marketed, the most expensive one can be considered an 'original' product while all others can be considered 'follower' products that may be generics, parallel imported products, etc.

Such an analysis would require a refined query of the EURIPID database which is technically challenging and would require time and some amount of manual work.

Outlook

Based on the results presented, a decision whether the EURIPID-based calculations of PLI and PPP should continue and whether or to what extent they could complement or even could replace results obtained from CGS should be made.

One next step could be a discussion in one of the upcoming PPP Working Group Meetings. We think that EURIPID data and the developed extraction mechanism could replace the current (partly manual) data collection on condition that the significant differences experienced in some countries are investigated, explained and duly considered.

We thus propose to discuss both,

- 1) the potential inclusion of the now missing countries in Euripid, i.e. how Consumer prices can be best approximated if they are not available by now and
- 2) the general approach towards a change of data collection by countries for the purpose of the CGS.

Euripid collaboration is willing and interested to continue the collaboration. The Executive Committee also offers to explore possibilities to give NIS access to Euripid data on conditions to be agreed.

5. References

Dylst, Pieter; Vulto, Arnold; Simoens, Steven (2012): Reference pricing systems in Europe: characteristics and consequences. In: Generics Biosimilars Initiative J 1/127-131
Eurostat/OECD (2012): Eurostat-OECD Methodological Manual on Purchasing Power Parities. Publications Office of the European Union, Luxembourg

6. Annex

6.1. Annex I: Comments of authors to the information provided by countries regarding their approaches for provision of price data for pharmaceutical products for the CGS.

Austria (AT)

AT PPP team got access to a central database provided by the Austrian Chamber of Pharmacists with the actual prices for all Austrian pharmacies (November 2017). Each item was investigated manually case by case.

Because of the Austrian bi-price system (private and public consumers), for each single medicine two price quotations were figured out in the database:

- a) Pharmacy retail price for private consumers;
- b) Health insurance company price for public patients - A public patient with an active health insurance and a prescription pays currently (Nov. 2017) a fee of € 5.85.

Both cases are reported but there is no mixed or weighted price.

The prices reported do not include any additional fees or transaction costs and represent the full price of the medicine paid to the pharmacy (directly by the customer or via insurance company).

In practice public patients with a prescription pay a fee of € 5.85 (2017) as a kind of contribution to the full price to be paid by the health insurance. Consequently, medicaments with a full price of less than € 5.85 are sold with the original price; in these cases the self-contribution is not applied. The standard VAT rate for all medicaments is 10%

→ It is unclear from the description with of both prices is taken for the analysis we did receive. After talking to the Austrian colleague it seems to be price b), i.e. the one with a 15% discount to the Pharmacy Retail price = so called "Kassenpreis". We up-dated the calculations for EURIPID using the later price type.

Belgium (BE)

The price collection of pharmaceutical products was fully done by the in-house PPP team with the help of an internet database (a website from a private organization - <http://www.cbip.be>).

No average price for pharmaceutical products.

No fixed costs are charged.

→ The source indicated contains the gross retail price, i.e. the price type we also used from EURIPID.

Bulgaria (BG)

Pharmaceutical products were surveyed only in pharmacies placed in various regions of the city. More than twenty chains and single pharmacies were visited during the price collection period.

Bulgaria does not report weighted average prices.

There are no fixed costs included in the reported prices for pharmaceutical products.

→ We used the Gross Retail Price from EURIPID that is also published in <http://portal.ncpr.bg/registers/pages/register/list-medicament.xhtml>

Switzerland (CH)

CH surveyed prices for November 2017 published by the national health authorities (Spezialitätenliste), but only, if they are included in the 1800 top sellers in the year 2016. CH didn't survey prices for pharmaceuticals with a very low expenditure share.

No weighted average price calculated.

No fixed costs included.

→ CH does not state which of the 2 published prices in the "Spezialitätenliste" they used. We uses the "PP – Publikumspreis"; a deviation could be caused the choice of products as they put an indirect weight on sales which we did not.

Cyprus (CY)

The prices were collected from the Pharmaceutical Services of the Ministry of Health.

Only one price per pharmaceutical product was collected as the prices of pharmaceutical products are regulated from the Ministry of Health. All the prices refer to November 2017.

No weighting was done in the prices of pharmaceutical products.

Concerning pharmaceutical products, there is a prescription fee of 1.19€ for each prescription no matter how many products are included in it. By doing a minor survey in pharmacies, CY used the assumption that a rough estimate of the average products subscribed should be close to two. Therefore, CY have added a 0.60€ fee in each pharmaceutical product that needs prescription.

→ The price in EURIPID is the gross retail price as published by Cyprus; still we did not add the mentioned prescription fee.

Czech Republic (CZ)

In pharmaceuticals, prices were collected using two EXCEL files from the State Institute for Drug Control with 2500 drugs each, which were best sellers in pharmacies in September 2017. We found there the average full market price of drugs.

This price is a weighted average of producers reported by distributors (to the State for Drug Control) in relation to the number of packages. The price is further calculated by adding the maximum business surcharge and VAT. CZ randomly checked prices of drugs in the pharmacies (full market price) and didn't find significant price differences.

The pharmaceutical products do not include any fixed cost (the fee per prescription, which was included in the prices of the 2014 survey, was cancelled in January 2015 by a political decision).

→ → From EURIPID we took the Gross Retail Price as published by the mentioned SUKL <http://www.sukl.cz/seznam-leciv-a-pzlu-hrazenych-ze-zdrav-pojisteni>

Denmark (DK)

Pharmaceutical products and drugs which can be bought only with prescription were collected centrally from Danish Medicine Agency. Non-prescription drugs were collected from the pharmacies, and other different shops and chains eligible to sell medicine without prescription.

In DK the pharmacies are obliged to offer to the clients the cheapest available medicine containing the same active substance and being of the same strength as the one prescribed by the doctor.

In the reported dataset the three cheapest available medical products were priced and recorded as the best sellers, assuming that they will represent the reliable average best seller price for the respective product. The distinction between generics and originals wasn't always straightforward, and conclusions made were mostly based on the price level of the single product in comparison with other products belonging to the same ATC code.

There is a fixed cost of 10 DKK for issuing of prescription. This cost is included in the price for pharmaceutical products purchased in pharmacy.

No weighting was used; reported prices refer to public patients only, since the public health care system covers 98% of the population.

→ In EURIPID we also use the Gross Pharmacy Retail Price incl. the mentioned 10 DKK fee. But we included all products meeting the definition into our analysis, not only the 3 cheapest ones, which could be the reason for the deviation. EURIPID does only included medicines available in hospitals and pharmacies, not in supermarkets or gas stations.

Estonia (EE)

Pharmaceuticals collected from internet by members of office staff (State Agency of Medicines. Health insurance Fund). No fixed fees.

→ EURIPID uses the Gross Retail Price as provided by the Estonian Ministry for Social Affairs.

Greece (EL)

No information.

→ EURIPID uses the Gross Retail Prices provided by the Ministry for Health and Social Solidarity <http://www.moh.gov.gr/articles/times-farmakwn/deltia-timwn>

Spain (ES)

For pharmaceutical products the prices were collected from a database on the internet called "www.portalfarma.org". No fixed fees. Representativity based on Ministry of Health information about top sellers.

→ EURIPID uses the all products meeting the defined criteria and applies the maximum Gross Retail Price as published by the Ministry of Health.

Finland (FI)

CPI receives scanner data on the prices and quantities of pharmaceuticals. This data could be used in the price collection as it covers all the pharmaceuticals sold. No fixed fees for pharmaceuticals. Representativity based on scanner data sales figures.

→ EURIPID uses the information on fully reimbursed medicinal products and their gross retail price as published by the Ministry in charge (STM). Scanner data can also include non- or only partly reimbursed medicines.

France (FR)

Price collection using data sent by IMS Health, an annual database also used for the CPI. No fixed costs included.

- ➔ EURIPID uses the Gross Retail Price data provided by the national sickness fund CNAMTS, non-reimbursed medicines are not included. IMS to our knowledge collects sales figures for standards units and approximates the price from that.

Hungary (HU)

Database of subsidized medicines was used during the pre-survey (Hungarian National Health Insurance Fund). Price collectors were free to visit any places, but for pharmaceuticals PPP expert did more centralized price collection by use of a database and an Excel-macro. No fixed costs included.

- ➔ EURIPID features the official gross retail prices as published by the National Health Insurance Fund NEAK, who is also project leader of EURIPID.

Iceland (IS)

Price list of "Icelandic Medicine Pricing and Reimbursement Committee" and sales data from "Icelandic Medicines Agency". Sales data were used to give weights for each price observation.

Ireland (IE)

No information.

- ➔ We did not consider Ireland for PPP calculation as the price in EURIPID, the so called HSE-price could be more considered as wholesale price than as Gross Retail Price. Please note that there is a similarity to the British NHS-price, which, however is considered as retail price by the national authorities.

Italy (IT)

The price collection for 'Health' survey was conducted by price collectors and PPP staff. Price collectors are the same who work for CPI/HICP surveys. Data on pharmaceutical products were collected mainly in centralized databases of pharmaceutical organizations and from price lists while others (OTC medicines) were priced in the pharmacies and parapharmacies. For the medicines we used a special database also used for CPI/HICP surveys provided by FEDERFARMA. No fixed costs included.

- ➔ EURIPID uses the Pharmacy Retail Price Gross as provided by the Italian Ministry of Health.

Lithuania (LT)

Prices for reimbursed medical products were taken from the Price List of "Reimbursed Medicinal Products of the Ministry of Health of The Republic of Lithuania". No fixed costs for pharmaceutical products.

- ➔ EURIPID also focuses on reimbursed medicines and took the Gross Retail Price from the above mentioned list.

Latvia (LV)

List with 100 most sold medicines provided by the State Agency of Medicines. No fixed costs for medicinal products.

→ EURIPID provides the Gross Retail Price of all out-patient RX medicines, not only a selection

Netherlands (NL)

Website set by the Dutch Health Authority. In case the specific drug was available more cheaply or equally through parallel imports, this was included in price collections. A charge of €7 was added to prices of pharmaceutical products that required a prescription.

→ EURIPID uses information from the Z-Index: This does not contain the retail price, as does no official Dutch source. In dialogue with the national statistic officer we added the VAT rate to the price of the surveyed products but not the mentioned € 7.00 add-on which seem to be the main reason for the high deviation between EURIPID and CGS results.

Norway (NO)

Norwegian Medicines provided the data source. List prices not reported. For prices collected via scanner data only one price was reported from each outlet. No fixed costs.

→ EURIPID provides the maximum gross retail price based on the Norwegian Medicines Agency NOMA list <https://legemiddelverket.no/offentlig-finansiering/pris-pa-lege-midler/maksimalpris#oversikt-over-maksimalpriser>

Poland (PL)

External Source: Cooperation between pharmacies and the contractor PEX PharmaSequence. Prices collected included fixed costs. For reimbursed pharmaceutical products, full market prices were given.

→ EURIPID provides the official gross retail prices as published by the Ministry of Health.

Portugal (PT)

Database provided by National Association of Pharmacies (ANF). No fixed costs.

→ EURIPID source is the Portuguese Medicines Agency INFARMED, we use the gross retail price including the 0.4% so-called INFARMED tax.

Romania (RO)

Data source used was "The National catalogue of prices for pharmaceutical products" published by the Ministry of Health. Pharmaceutical products that require a medical prescription, retail prices included VAT.

→ No longer maintained in EURIPID for time being as the Romanian MoH did not publish data for more than 1 year.

Sweden (SE)

Medical agencies contracted for pharmaceutical products price collection. For pharmaceutical products on prescription, prices were gathered from a central database available online at the

website of TLV Tandvårds- och läkemedelsförmånsverket (<https://www.tlv.se/in-english.html>).

Prices for non-prescription pharmaceuticals were collected from physical and online pharmacies. Physical pharmacies prices were collected using scanner data. For online pharmacies, no delivery charges were included.

→ It is not stated which price type was notified to CGS as the mentioned website shows both, the approved wholesale price and the Gross Retail Price. EURIPID used the Gross Retail Price, but information is only available for reimbursable medicines.

Slovenia (SI)

No information.

→ EURIPID does not contain information on the Pharmacy Retail Price as this is no published information. Instead to approximate the price, as it was done for the Netherlands, the country was omitted from the PPP calculation.

Slovak Republic (SK)

Centralised database provided by the Ministry of Health and a contract with a pharmacist to collect prices. Fixed costs included in prices for pharmaceutical products. In some cases recipes are also paid.

→ EURIPID provides Gross Pharmacy Retail Price; we can not tell from the information given if also this price type was used for the CGS.

United Kingdom (UK)

Most prices collected using the electronic drug tariff. Original drugs prices using the British National Formulary (BNF). UK has fixed costs for pharmaceuticals- £0.90 dispensing fee + £0.10 container fee. Solely in England a charge of £8.60 is charged for prescription.

→ It is unclear if the price type used is the NHS-trade price (which is considered as Pharmacy Retail Price in EURIPID) or the NHS-trade price with the mentioned add-ons. In EURIPID we do not differ between prices for England and other regions. We are aware that the price type used can not be fully compared with the prices in other countries.