Jean Monnet Chair

Small Area Methods for Monitoring of Poverty and Living conditions in EU (SAMPL-EU)

II.3. Measuring Prices: Comparisons of Economic Aggregates and Indicators over Time and Space

Luigi Biggeri

Outline

1. Introduction: comparisons **over time** and **space** of economic aggregates and indicators
2. Comparisons **over time**: computation of **aggregates at Constant Prices**
3. Comparisons **over time by using the Price indexes** (the Consumer Price Indexes (**CPIs**)
4. Comparisons **over space**: Elementary Spatial Price Indexes and **Purchasing Power Parities (PPPs)**
5. **Use of the PPPs** to compare GDP, Consumption, Income and Poverty among different countries

Introduction: comparisons over time and space of economic aggregates and indicators -1-

- One of the most important use of the economic aggregates and indicators is their **comparisons over time and over space**
- The **main issue** for the interpretation of the comparisons is **due to the prices used** to compute the value of the aggregates and related indicators.
- Usually, the economic aggregates and indicators are computed by using the **current value data**, that is by using the quantities and prices data of each current time and of each country. In this case, we said that the comparisons are made in **"nominal"** terms.
- However, from **economic points of view** is much more important to do the comparisons of GDP, Income, Consumption and Poverty by considering the changes and/or the differences of the aggregates due only to the changes of the quantities, that is **eliminating the effect due to the changes and/or the level of the prices**. In this case, we said that the comparisons are made in **"real"** terms.

Introduction: comparisons over time and space of economic aggregates and indicators -2-

- Therefore it is important to know the ways to conduct **comparisons in real terms**, that is the:

- **Comparisons over time**: considering the **Real growth** of GDP and its components and of poverty indicators over time (1, 2, 3…), eliminating the differences due to the evolution of prices

- **Comparisons over space**: considering the **Real difference** of GDP and its components and of poverty indicators in two or more countries or areas (A, B, C, etc.), eliminating the differences due to the different level of prices

,

Comparisons over time - at Elementary Level (1)

- At **elementary level** (for **one product**) **over time**

Quantity	time 1 = 4	time 2 = 5	Index 2/1 = 1,25
Price	time 1 = 10	time 2 = 12	Index 2/1 = 1,20
Current Value	time 1 = 40	time 2 = 60	Index 2/1 = 1,50

- **Current value** = quantity * price, as in the two first columns
- The **real or constant value** can be obtained by using the same price in the two periods, in this case the real or constant value for period two will be 5*10 = 50

- To measure the relative change between period 1 and 2, we can use also the price index I, of the value, quantity and price
  In fact in this case $I_{value} = I_{quantity} * I_{price}$ (see **following slide**)

$I_{quantity} = I_{value} / I_{price} = 1,50 / 1,20 = 1,25;$

Value2=60; I_{price} = price2/price1=1,2; 60/1,2=50 : **real or costant value (at constant price) obtained by deflation**

- Obviouly the **product must be the same in the two times *and we have to consider the quality issue***:

✓ Price indices should follow same products over time.
✓ However, products change -> **adjustment for quality changes**

Comparisons over time - Elementary Indexes

To measure the evolution over time for one product: **Elementary Indexes**

- **Elementary Indexes** at time 1, 2, 3,…,t-1, t
  Prices $p_1, p_2, p_3,\ldots, p_{t-1}, p_t$
- **Price Indexes** with **fixed base** time 1: p_2 / p_1 , p_3 / p_1 ,…, p_{t-1} / p_1 , p_t / p_1
  Quantity (or volume) $q_1, q_2, q_3,\ldots, q_{t-1}, q_t$
- **Quantity Indexes** with fixed base time 1: q_2 / q_1 , q_3 / q_1 ,…, q_{t-1} / q_1 , q_t / q_1
  Value $v_1, v_2, v_3,\ldots, v_{t-1}, v_t$
- **Value Indexes** with fixed base time 1: v_2 / v_1 , v_3 / v_1 ,…, v_{t-1} / v_1 , v_t / v_1
- **Value Index** $v_2/v_1 = p_2/p_1 * q_2/q_1$

- **Properties** of Elementary Index: most useful for comparisons (for prices)

1. **Time reversal property**: $p_2 / p_1 : p_1 / p_2 = 1$; $p_2 / p_1 = 1 / p_1 / p_2$

if two periods are interchanged the corresponding indexes are **reciprocals** each other

2. **Circular (transitive) property** : $p_2 / p_1 * p_3 / p_2 * p_4 / 3 = p_4 / p_1$

it allow to pass from one base time to another base time

Comparisons over time – at Elementary Level (2)

- At elementary level the requirement of **aggregation from quantity and Price to Value** is satisfied

  A "full" breakdown of value change in price change and volume change

  Value change: 5%

  Price change: 3%

  Volume change: 2% (1.94)

  *(1.0194 * 1.03 = 1.05)*

- **Basic Concepts for quality**: value, quantity, volume and price; definition of **volume**

  value = price * volume

  volume = quantity * quality

Comparisons over time – at Aggregate Level (1)

1. The properties valid at **elementary level** should be verified and satisfied at **aggregate level**.

2. In any case, the computation of the aggregates and of the computed Indexes should **face** and **solve** the

✓ **Quality issue**

The quality adjustment recovers several aspects:

- "structure" (heterogeneous goods or sales conditions)
- introduction of new products;
- perpetual change of characteristics...

(There are various methods to take into account the quality adjustment)

✓ **Consistency in aggregation**

Comparisons over time – at Aggregate Level (2)

- **Current prices** (CUP) = **Current Value**, at time t

$$AggregateCupValue_t = \sum p_{it} * q_{it}$$

where, i is a generic product (i = 1,2, …,n) and the total number of the products is n

- At time 1 and 2 the Aggregates at Current value are:

$$AgCupValue_1 = \sum p_{i1} * q_{i1} \quad AgCupValue_2 = \sum p_{i2} * q_{i2}$$

- When the **products** are heterogeneous: the sum of prices and quantity have no significance or it is impossible to compute

- Therefore, the **breakdown of the changes** of value in price change and quantity change **is impossible to compute directly**

Comparisons over time – at Aggregate Level (3)

- **Constant prices** (COP) = **Constant Value**, at time t, with price of time 0, that is **at same Purchasing Power** how much we can buy (the i for the product is not written to simplify the reading)

$$\text{AgCopValue}_t = \sum p_0 * q_t$$

$$\text{AgCopValue}_{t-1} = \sum p_0 * q_{t-1}$$

$$\ldots\ldots \qquad \ldots\ldots$$

$$\text{AgCopValue}_1 = \sum p_0 * q_1$$

  - The **direct computation** of the aggregates at constant prices **is not easy** because the products and the quality of products change over time
  - The **computation** can be done by using adequate **Price Indexes** through the **deflation**

Comparisons over time - at Constant Prices

Need for Consistency in aggregation (Example)

Level estimate in constant prices (deflating the current value by prices) of an aggregate **must equal the sum of the level estimates** in constant prices **of its components**

This is the requirement of additivity

	CUP	***PI***	***COP***
Consumption	*75*	*1.03*	*72.82*
Capital formation	*20*	*1.05*	*19.05*
Exports	*60*	*1.10*	*54.54*
Imports (-)	*50*	*1.08*	*46.30*
GDP	*105*	*1.04*	*100.96 ≠ 100.11*

Not consistent

CUP= Current Prices
COP= Constant Prices

Comparisons over time – by Aggregated Indexes (1)

Value index at Current Prices (CUP)

$$Value_t = \sum p_t * q_t$$

$$Value_0 = \sum p_0 * q_0$$

$$Valueindex(VI) = \sum p_t * q_t / \sum p_0 * q_0$$

Ratio between two aggregates at current prices

Comparisons over time - by Aggregated Indexes (2)

- The most used indices of price and quantity.

Laspeyres index of **price** : $\mathbf{Lp_{t/0} = \Sigma\, q_0 p_t / \Sigma\, q_0 p_0}$

Laspeyres i. of **quantity** (volume): $\mathbf{Lq_{t/0} = \Sigma\, p_0 q_t / \Sigma\, p_0 q_0}$

Paasche index symmetric of Laspeyres index.

Paasche index of **price**: $\mathbf{Pp_{t/0} = \Sigma\, q_t p_t / \Sigma\, q_t p_0}$

Paasche i. of quantity (**volume)**: $\mathbf{Pq_{t/0} = \Sigma\, p_t q_t / \Sigma\, p_t q_0}$

- It is possible to show that these indices can be obtained as **weighted averages** of price and quantity index, with **values as wheights**

- The Lasperyres and Paasche indexes are additive but **do not satisfy the circular or transitive property**

Comparisons over time: by Aggregated Indexes (3)

- A **Fisher index** is the geometric mean of Laspeyres and Paasche indexes : $F = \sqrt{L * P}$

It satisfy the properties as the elementary indexes

But difficult to compile

- In fact: how to know values (or quantities, or prices) in the current and base periods? **Laspeyres indices are used because less demanding** (weights at the base period)

- A **bias can exist**, as we usually state a spread:

$$\mathbf{Pp_{t/0}} < \text{chained } \mathbf{Pp_{t/0}} < \text{chained } \mathbf{Lp_{t/0}} < \mathbf{Lp_{t/0}}$$

- The **bias increase** as the base time is far from current time

Comparisons over time: by Aggregate Indexes (4)

Chaining (the base time is the previous one)

SNA 2008 says:

15.51 As explained earlier, the index number spread between Laspeyres and Paasche indices may be greatly reduced by chaining when prices and quantities move smoothly over time. […].

In practice, most chained indicators are derived from Laspeyres indices.

Drawback of chaining**: additivity is lost** (no consistency in aggregation).

Comparisons over time – by Aggregated Indexes (5)

- **Decompositions**

Using Laspeyres Price and Quantity Indexes

$$VI = \frac{\sum p_t * q_t}{\sum p_0 * q_0} \neq \frac{\sum p_t * q_0}{\sum p_0 * q_0} * \frac{\sum p_0 * q_t}{\sum p_0 * q_0}$$

Using Paasche Price and Quantity Indexes

$$VI = \frac{\sum p_t * q_t}{\sum p_0 * q_0} \neq \frac{\sum p_t * q_t}{\sum p_0 * q_t} * \frac{\sum p_t * q_t}{\sum p_t * q_0}$$

- **Decomposition** of Value Index by using Price and Quantity Index of the same type (Laspeyres or Paasche) is **not satisfied**

Comparisons over time – Decomposition and Value at constant price

- **Decomposition and consistency in aggregation**

➢ Only **using different type of indexes** (Laspeyres and Paasche or Paasche and Laspeyres)

$$VI = \frac{\sum p_t * q_t}{\sum p_0 * q_0} = \frac{\sum p_t * q_t}{\cancel{\sum p_0 * q_t}} * \frac{\cancel{\sum p_0 * q_t}}{\sum p_0 * q_0}$$

Price index Paasche

Quantity Index Laspeyres

➢ **Deflation to obtain Value at constant prices**

$$Value_t / P_p = \sum p_t * q_t / \left\{ \frac{\sum p_t * q_t}{\sum p_0 * q_t} \right\} = \sum p_0 * q_t$$

➢ **Aggregate at constant price is a «virtual» aggregate**

Comparisons over time: Computation of Value Indexes at constant prices

- Deflated aggregate = sum deflated components
- **Difficulties of aggregation**
- "Volume" = aggregation of quantities weighted by prices

➢ Volume index = Ratio between a virtual aggregate and a current aggregate

⇔ Volume index = average of quantity indices (**weighted** by values).

$$VI(COP) = \frac{\sum p_0 * q_t}{\sum p_0 * q_0} = \sum \frac{q_t}{q_0} * \frac{p_0 * q_0}{\sum p_0 * q_0}$$

Construction of Price Indexes – Some issues

- Price Index for a representative sample of goods and services can be used as typical for all goods and services in the same group in a way that volume measures would not be representative.
- More importantly, the volume changes associated with new and disappearing products can be properly reflected when current values are deflated by price indices

Sampling of quantities would need an exhaustive approach (different markets, substitution effects) where prices are naturally more correlated

Consumer Price Indexes (CPIs). Some issues

- For time series of NA, the "Purchasing Power of Household Gross disposal income" = **Household Gross disposal income** / **Global Consumer Price Index (CPI)**

Points of discussion

- The most used for "inflation", is the Harmonised Consumer Price Index at European level (HICP).

- Theoretical debate between different approaches
- Chain-linked Laspeyres Index with weights of year n-2 from NA (recommended practice).
- Generally never revised.
- Distinguishes between "homogeneous" and "heterogeneous" products, with different combinations of arithmetic and geometric means.
- Requested to publish apart prices "in level" and impact of "quality effects".

Construction of Price Indexes. CPIs

ILO manual on CPI

- A utility based approach (COLI)

7.24 […] The equating of the value of quality change with the change in utility derived by the consumer, while falling naturally under a COLI framework, is not exclusive to it. […]
7.25 Note that the definition of a quality change is based on equating some change in characteristics to a different level of utility provided. […]

Comparisons over space: Spatial Price Indexes

Comparisons over space: Spatial Price Indexes

- The National Accounts aggregates and the indicators of Poverty to be compared must be **valued at a common price level** and expressed in a common currency.
- It is possible to compare the aggregates and indicators in real terms among countries or intra-country areas **by removing the price level differences** between them
- At this end, we need to compute the **Spatial Price Indexes (or Purchasing Power Parities)**. In fact, also for comparisons among countries the **exchange rates cannot be used** because they are not ratios of prices and are affected by financial aspects.
- To compute adequate spatial comparisons the United Nations and other international bodies (World Bank, International Monetary Fund, Oecd, Eurostat) are carrying out a special complex statistical project (the **International Comparison Program**) to compute the **Purchasing Power Parities (PPPs)** that involve about 200 countries.

Comparisons over space - at Elementary Level -1-

- At **elementary level** (for **one product**) **over space** **(country or area)**

Quantity	country A = 10	country B = 8	Index A/B = 1,25
Price	country A = 6	country B = 10	Index A/B = 0,60
Value (current)	country A = 60	country B = 80	Index A/B = 0,75

- The **value at comparable price** can be obtained by using the price of country B also for country A. In this case the comparable value of the country A with that of country B will be 10*10 = 100

- The same result can be **obtained by deflation** using the Price index. That is ValueA/Price IndexA/B= 60/0,60=100 **removing the difference in price**

- Obviously the **product must be the same in country A and country B and of the same quality**

Comparisons over space - at Elementary Level -2-

- **The comparison** can be done taking **as base country**, respectively the country A or the country B

- For the previous example, the elementary spatial price indexes are Price Index A/B and Price Index B/A, respectively equal to 0,60 and 1,66, that **are reciprocal each other**

- The results of the example show that **the level of price in country A is lower** then in country B and therefore the **Purchasing Power** is **higher**

➢ Moreover, the elementary spatial price indexes **satisfy the property of the reversibility of space**

- That property must be satisfied also by the **aggregated price spatial indexes**

Comparisons over space: can be used one product?

- **Approximation by One product**

  Elementary Price Index of  , or 

Not the same results => need to be comprehensive.

- The first comparisons have been made in this way, and still today **sometimes only one product is used** (see Penn)
- However, to be precise it is necessary to consider a **basket of products and services** representative of the aggregate involved in the comparison

- A very complex statistical program for the collection of data and computation of adequate spatial price indexes, the International Comparison Program has been implemented and carried out to compute the **Purchasing Power Parities** (PPPs)

Comparisons over space: PPPs

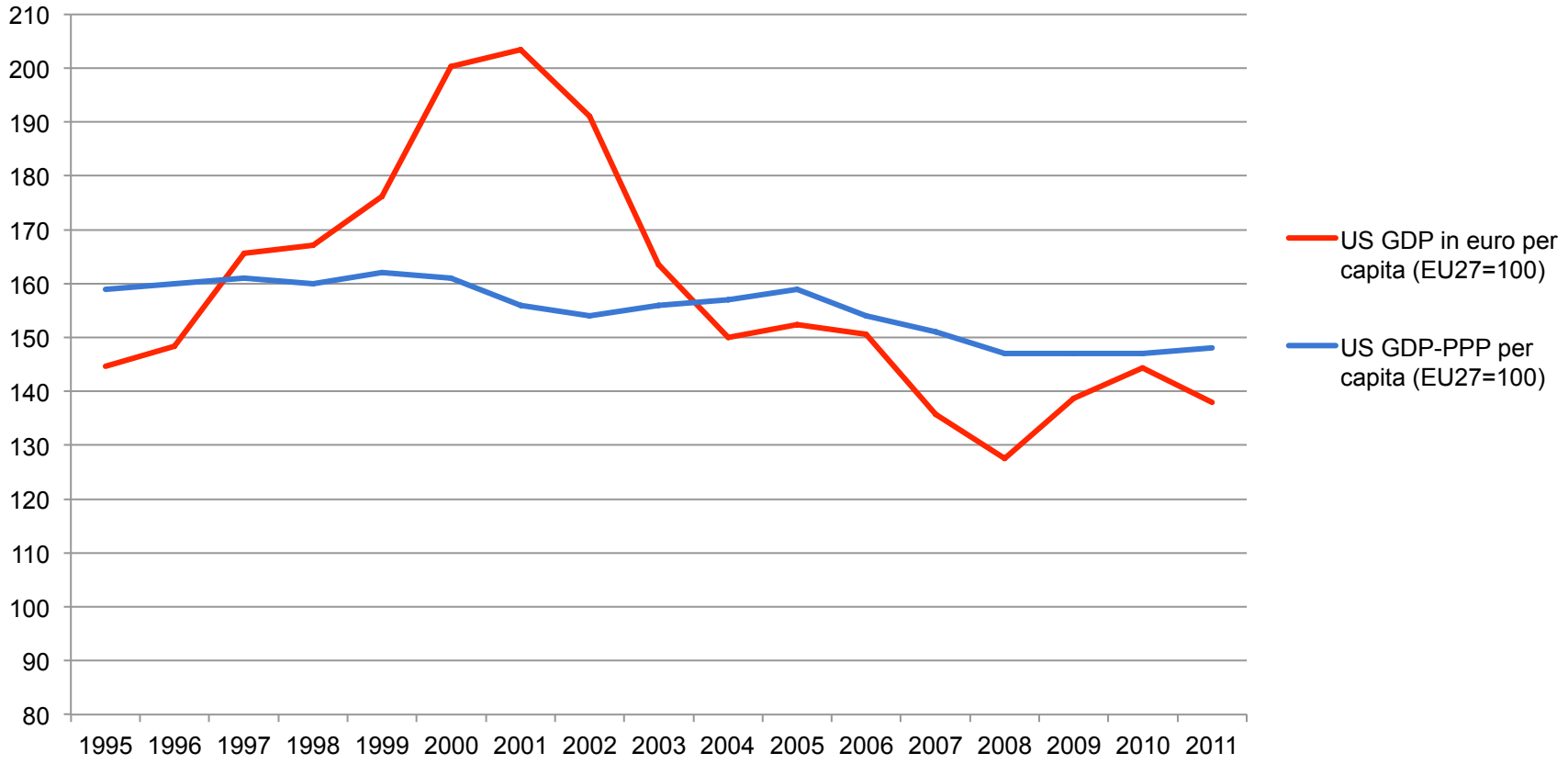
What are PPPs?

- Indicators of price level differences across countries: they tell us **how many currency units** a given quantity of goods and services costs in different countries.
- **Currency converters**: **PPPs** are used to convert values (e.g. GDP, Household Income) into a common currency that **neutralises prices differences**, thereby enabling a pure volume comparison

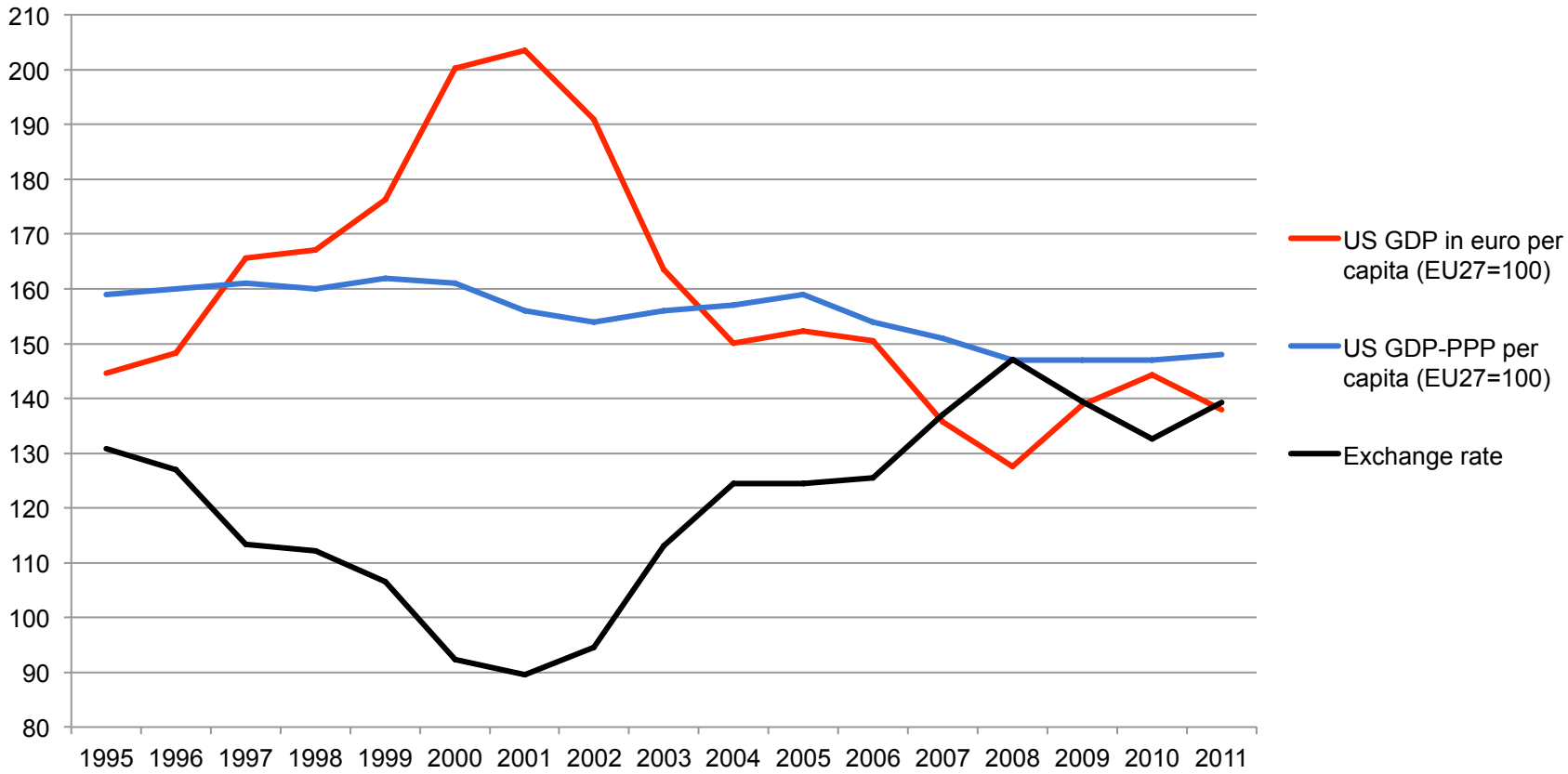
Why use PPPs instead of exchange rates?

- **Exchange rates** are influenced by many factors and **do not reflect the relative purchasing powers of currencies** in their national markets

Example: US GDP and US GDP-PPP, per capita, in Euro



Example: US GDP and US GDP-PPP, per capita, in Euro and Exchange rate



The construction of PPPs. The collection of prices

PPPs are based on price surveys on many product and services

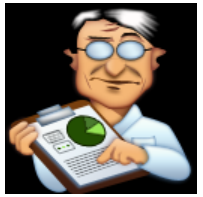
consumer products 

housing rents

machinery and equipment 

health 

construction



government

education 

The construction of PPPs. The collection of prices

- The **items** to be included in the basket must be **representative** of the aggregate for each country but at the same time **comparable** among countries

Example: consumer products

Prices of about 2400 precisely defined products are collected

Two *Challenges:*

Comparability

Representativity

The construction of PPPs: the Indexes Formulae -1-

- The computation of PPPs is done before **at Basic Heading Level (BH)** and then from the PPPs of each BH to **Aggregate level**

✓ **Basic heading = finest level for which an expenditure weight is available.**

- In order to compare 2 countries (A and B), same kinds of indices as for time series are available. **Replace "Base period" by "partner country" or "base country"** (Basket Cost Method)

✓ **Laspeyres** index: $\mathbf{Lp_{B/A} = \Sigma\, q_A p_B / \Sigma\, q_A p_A}$
(reference volume structure country A)

✓ **Paasche** index: $\mathbf{Pp_{B/A} = \Sigma\, q_B p_B / \Sigma\, q_B p_A}$
(reference volume structure country B)

➢ At the origin, the US was taken as the base country
~ constant prices (fixed base Laspeyres or Paasche index). Consistent in aggregation.

The construction of PPPs: the Indexes Formulae -2-

- **The Laspeyres and Paasche indexes do not satisfy the transitivity property for multilateral comparison**

Moreover

Gerscheckron effect:

with reference price structure, the more a country is far from the base (country) structure of price, the higher its GDP will appear. That was the case for OECD and GK (Geary-Kamis) technique.

Same phenomenon as classical relation between Laspeyres and Paasche indices (negative correlation between volume and price): $\mathbf{Pp_{B/A} < Lp_{B/A}}$

The computation of PPPs: at Basic Heading Level -1-

- At **Basic Heading level**, the data on prices are aggregated by using **unweighted geometric average**

✓ A product is representative or not (for a country).

Abusively, PPP literacy says "Laspeyres type" and "Paasche type" indices for unweighted geometric means on representative products of one country:

Laspeyres type index:

$$L_{AB} = \prod_{i \in R_A} \left[\frac{p_{iB}}{p_{iA}} \right]^{\frac{1}{n_A}}$$

Paasche type index:

$$P_{AB} = \prod_{i \in R_B} \left[\frac{p_{iB}}{p_{iA}} \right]^{\frac{1}{n_B}}$$

➢ This two indexes **do not satisfy** the property of **reversibility of space**

The computation of PPPs: at Basic Heading Level -2-

- In order **to guaranty the multilateral transititvity**, ***Eurostat-Oecd*** conduct the computation of PPPs in 5 steps by using the **Gini-Èltetö-Köves-Szulc (GEKS)** method

All countries are treated symmetrically

The 5 steps are :

- calculation of Laspeyres-type Indexes - PPPs matrix (country x country),
- calculation of Paasche-type Indexes - PPPs matrix,
- calculation of Fisher-type Indexes - PPPs (transitivity between two countries),
- calculation of GEKS PPPs matrix (multilateral transitivity)
- standardisation of GEKS PPPs matrix (multilateral transitivity)

The computation of PPPs: Above Basic Headings

- **GEKS technique**: unweighted geometric means of **direct** and **indirect bilateral indices** (=> transitive).

$$ {}_{t}EKS_{s} = \left(\prod_{i=1}^{z} \frac{{}_{t}F_{i}}{{}_{s}F_{i}} \right)^{\frac{1}{z}}, \forall_{t,s} $$

- **Computation above the BH for aggregating BH up to total, taking account of the weights in term of GDP Expenditures for each BH**

- **Same calculation in 5 steps** of Laspeyres type indices, Paasche indices, then Fisher indices for all pairs of countries, made transitive by GEKS technique and standardised.

The availability and use of PPPs

What is the Purchasing Power Standard (PPS)?

- **Artificial currency unit**: one PPS can buy the same amount of goods and services in each country
- "True" prices that allow to obtain spatial comparisons of "real" GDP or Income per head by deflation, **rather than by official exchange rates (**=> "true" relative wealth of nations)
- **GDP in PPS** = GDP in national currency/PPP

✓ It is computed also for the sub-aggregates of GDP

✓ PPPs can be interpreted as the exchange rate of the PPS against the national currency

What are PPPs used for?

- Economic analysis, research, involving inter-country comparisons
- Statistical compilation (e.g. to provide country weights)
- Administrative uses:
  - EU: eligibility of regions to structural funds
  - EU: correction coefficients for EU staff
  - IMF: quota

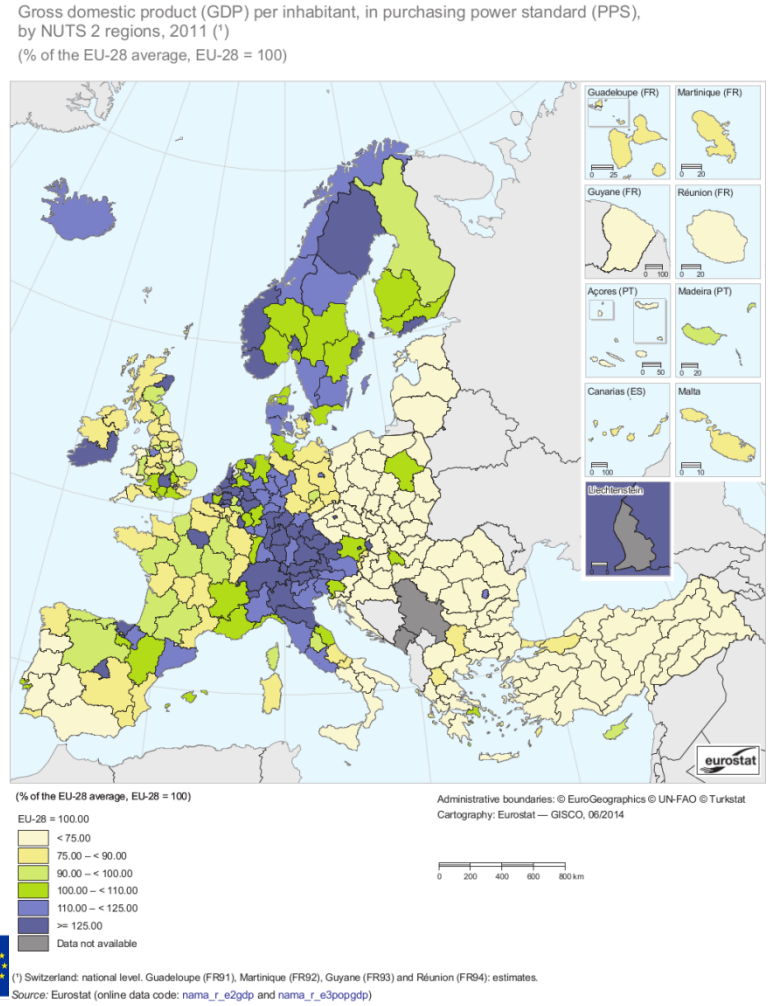
A. The uses in Europe for the regional policy

- OECD at the origin of concepts and formulas.
- ➢ EU very active because of needs for regional policy. Eurostat calculates and disseminates PPPs - See the Eurostat web site
-

Current programming period: 2014-2020.

*76 regions (NUTS 2) benefit from **cohesion funds** because average GDP per inhabitant **< 75% EU-28** on 2007-2009 period.*

Most part of structural funds.

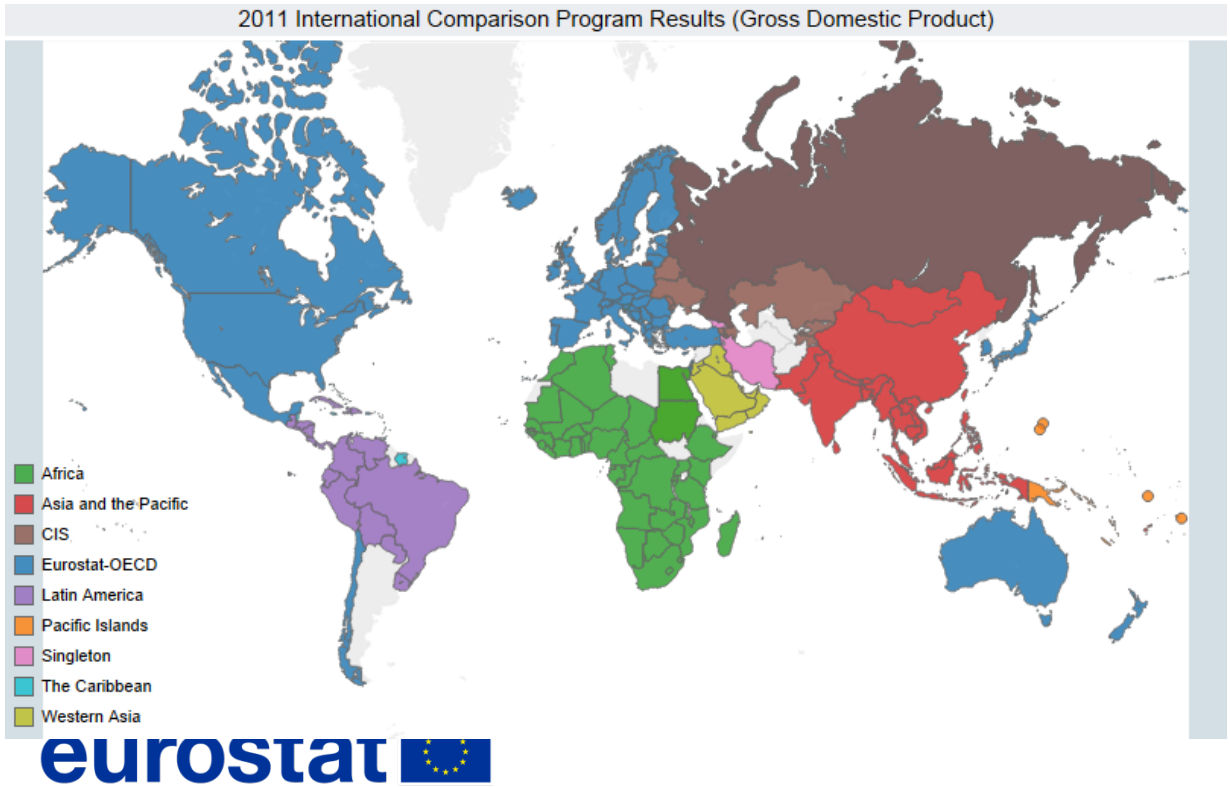


A. Beyond Europe

- OECD organizes collection and compilation of PPP for non European members (United States, Canada, Japan…) and Russia. 1 survey every 3 years.
- OECD keeps Eurostat figures "frozen".

*World Bank completes "**International Comparison Program**", with less regularity (ICP 1993, ICP 2005, ICP 2011).*

8 ICP groups for 200 countries:



The availability and use of PPPs

International co-operation

- **Eurostat** produces annual PPPs for 37 European countries
- Close co-operation with **OECD** that use approx. same methodology for producing three-yearly PPPs for 10 non-European OECD countries ("Eurostat-OECD PPP program")
- Eurostat-OECD data flow into **International Comparison Programme (ICP)** run by World Bank – 2011 benchmark results were published end April 2014 – nearly 200 countries covered

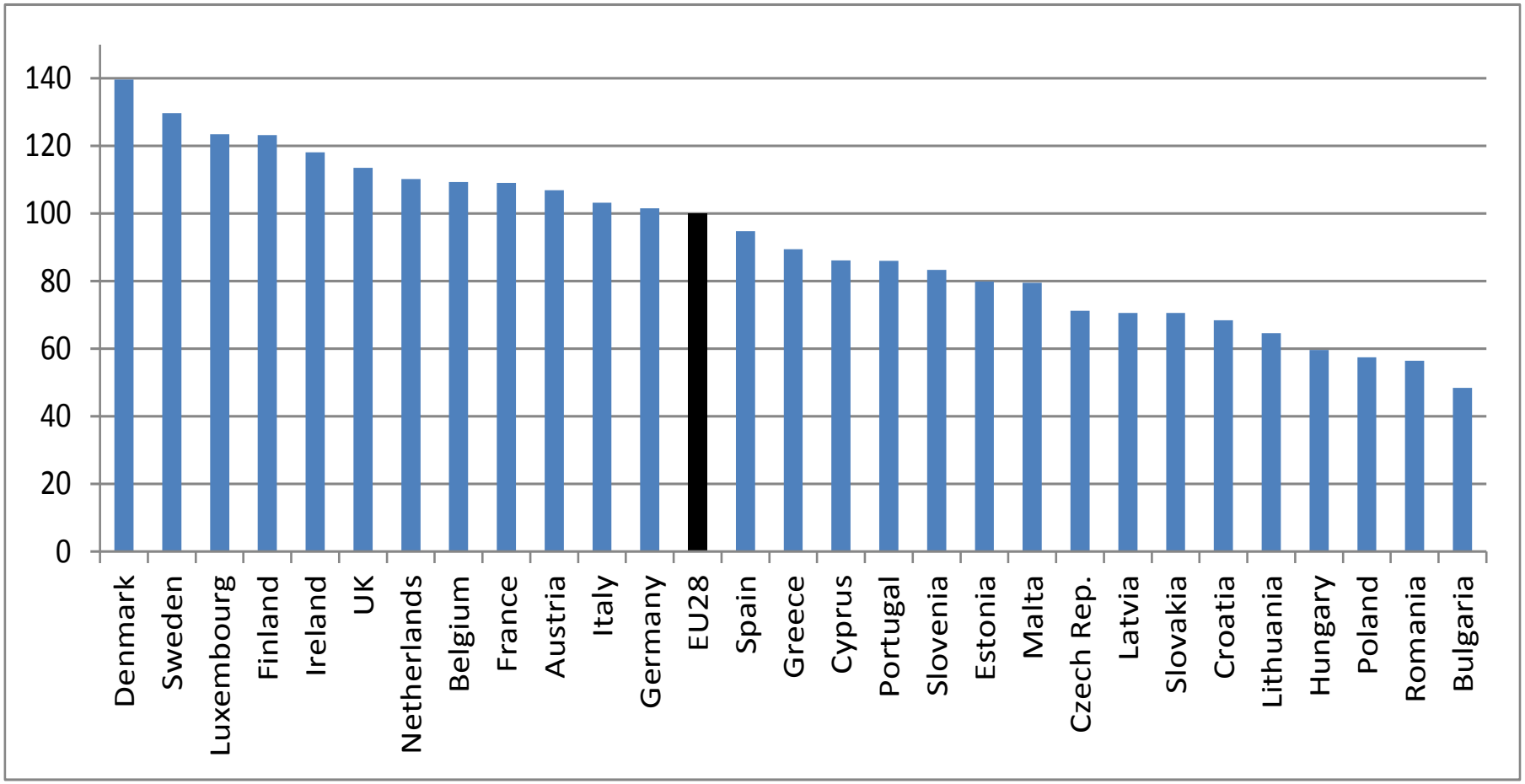
Main Output

- **Headline indicator**: volume index of GDP per capita in PPS (but **increased focus on Actual Individual Consumption and Family Income**)
- **Other main indicators**: price level indices + price convergence

The availability and use of PPPs

PLIs - 2013

PLIs =PPP of each economy is standardized by dividing it by PPP for EU28

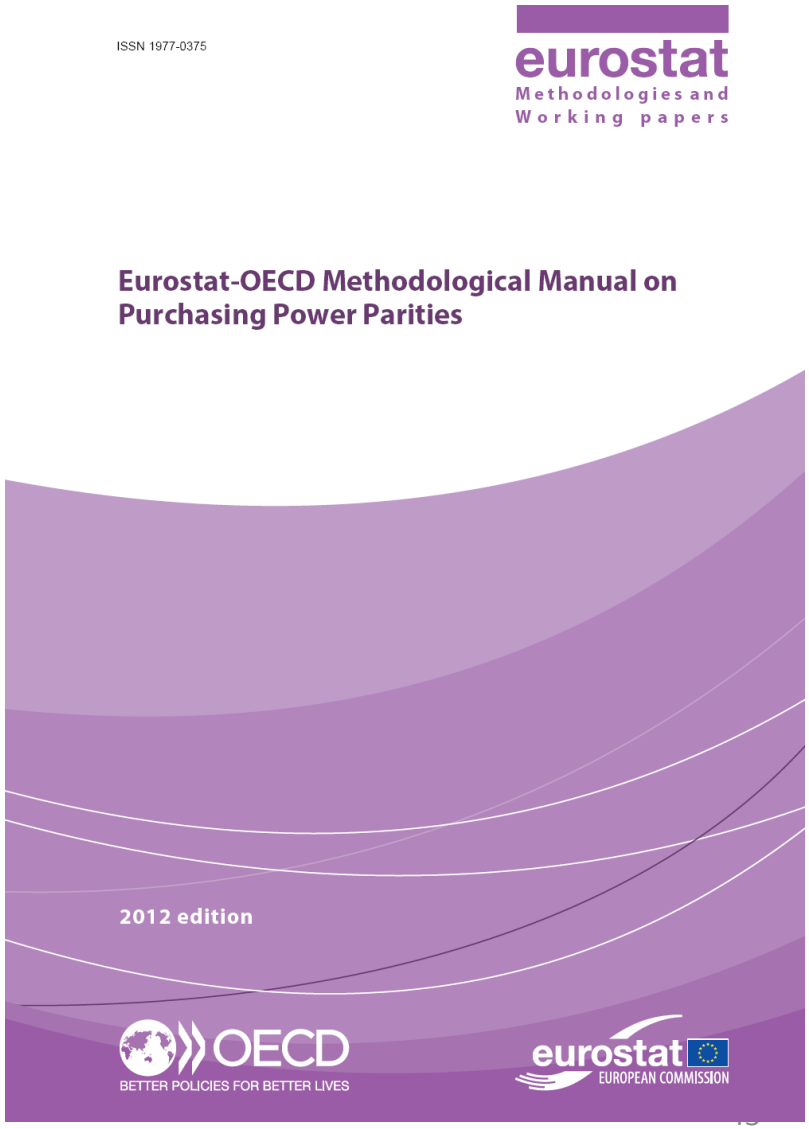


Eurobase

- PPP domain: updated twice a year (June and December) to reflect latest price and national accounts data
- NA domain: updated continuously with fresh national accounts data from countries (PPPs updated when PPP domain is updated) -> GDP per capita in PPS may differ from PPP domain

More info:

Eurostat-OECD Methodological Manual on Purchasing Power Parities



The availability and use of PPPs for Poverty

Some Problems to compute Poverty indicators in real term

- Use of PPPs for the values of **mean income** in local areas. Need for **sub-national (local areas) PPPs** **(available at level of NUTS 1 areas; not available for smaller areas)**

- Use of PPPs for **Indicators** based on **income distribution**. Need for specific PPPs at least for the **quintiles of the distribution** **(not available)**

- Use of PPPs for **absolute poverty**. Need to consider the **consumption basket of the poor** (Deaton, 2010) and compute specific PPPs **(not available)**

The interpretation of 2011 China PPPs

Main Aggregates Categories	PPPs (US$=1)	PLIs (US =1)*	Expenditure Shares
Individual consumption expenditure by households	3,696	0,572	34,4
- .01 Food and non-alcoholic beverages	5,155	0,798	8,1
- .02 Alcoholic beverages, tobacco and narcotics	5,564	0,861	0,9
- .03 Clothing and footwear	4,351	0,673	3,0
- .04 Housing, water, electricity, gas and other fuels	2,651	0,410	5,9
- .05 Furnishings, household equipment and maintenance	5,837	0,903	2,1
- .06 Health	2,026	0,314	6,4
- .07 Transport	4,619	0,715	2,5
- .08 Communication	2,392	0,370	1,5
- .09 Recreation and culture	3,179	0,492	2,3
- .10 Education	1,761	0,273	4,3
- .11 Restaurants and hotels	3,453	0,534	2,2
- .12 Miscellaneous goods and services	4,425	0,685	3,7
- .13 Net purchases abroad			0,0
Individual consumption expenditure by government	2,115	0,327	8,6
Actual Individual Consumption	3,493	0,541	42,9
Collective consumption expenditure by government	3,407	0,527	6,3
Gross fixed capital formation	3,769	0,583	45,6
- .01 Machinery and equipment	7,771	1,203	13,1
- .02 Construction	2,184	0,338	28,8
- .03 Other products			3,7
Change in inventories and acquisitions less disposals of valuables			2,7
Balance of exports and imports			2,6
Gross Domestic Product (GDP)	3,506	0,543	100.0
(*) PLIs are obtained dividing PPPs by the exchange rate RMB-US$ = 6, 461			

Some computations and analysis: China/Usa

To understand the use of PPP or PLI to deflate China GDP: instead of using a common currency as US$, we do the deflation using together the ER and the PLI

BILLIONS

Aggregates	Billion RMB	US$ ER	US$ PPPs	Virtual Differ.
GDP	47,310	7,321	13,494	+6,461
Food and non-alcoholic beverages	3,814	590	740	+ 150
Housing, water, electricity, gas	2,814	435	1,061	+ 626
Health	3,045	471	1,503	+1,032
Education	2,042	316	1,160	+ 844
Machinery and equipment	6,185	957	796	- 161
Construction	13,610	2,106	6,203	+4,079 (66.1%)

- In 2011 the GDP of the USA was estimated = 15,534 US$ (GDP/PPP of China = 13,494 become 87% of US)
- Virtually, if the evaluation of the China Construction Production is done using the average PPP of China the GDP in terms of US/PPP became 11,174 instead of 13,494 (That is only 72% of the USA GDP)

The interpretation PPPs: the case of China

Some computations and analysis

➢ *Computation of the **contribution of each PPPs** **of the BHs** to the value of the overall PPP for China economy*

- In 2011 the most important contribution was done by the **Gross fixed Capital formation**, about the **45%** (about 24% by Machinery and Equipment; and 17% by Construction), while the **Individual Consumption Expenditure by Household** gave a contribution to the value of overall PPP only for about the **37%**
- This particular situation **depends** on the **particular economic structure of the Chinese economy**
- For a **comparison with other countries**, consider that the **contribution to the PPPs** of the aggregates, Capital formation and Individual Consumption, was respectively **40%** and **57%** in **India**, **62%** and **26%** in **Indonesia**, and **65%** and **21%** in **Japan**.

References

- **For Consumer Price Indexes**:
- Eurostat, Harmonized indices of consumer prices (HICPs) - A short guide for users, see Eurostat web site
- ILO (2004), Consumer price index manual. Theory and Practice

- **For Purchasing Power Parities**
- Eurostat-OECD (2012), Methodological Manual on Purchasing Power Parities
- ICP World Bank (2013), Measuring the Real Size of the World Economy. The framework, Methodology and Results of the International Comparison Program
- Deaton A (2010) Price indexes, inequality, and the measurement of world poverty, American Economic Review, 100:5–34