The Comparison Between International Comparison Program（ICP） and Eurostat-OECD PPP Programme*

Qiang Xu*
Dongbei University of Finance and Economics, Dalian, China – xuqiang@dufe.edu.cn

Huachao Chen
Dongbei University of Finance and Economics, Dalian, China – chcdufe@163.com

Abstract

The World Bank's International Comparison Program (ICP), a global statistical activity, mainly uses purchasing power parity to compare the real size of all participating economies. The Eurostat-OECD PPP Programme is a regional international comparison activity dominated by Eurostat and OECD. The ICP and Eurostat-OECD PPP Programme are two relatively independent international comparison systems. There are many differences between them, such as development process, frequency and organizational structure, GDP expenditure classifications and price data collection, comparison methods in specific areas, PPP calculation methods, update of non-benchmark years PPP, and data release and use. Compared with the Eurostat-OECD PPP Programme, ICP has many disadvantages. The successful experience of the Eurostat-OECD PPP Programme has important reference value for the improvement of ICP.

Keywords: International Comparison Program (ICP); Eurostat-OECD PPP Programme; Purchasing Power Parity (PPP); International Comparison.

1. Introduction

International Comparison Program (ICP) is a global statistical activity hosted by the World Bank, which estimates Purchasing Power Parity (PPP) as currency converters to compare the size and price level of economies around the world. In the calculation process, economic aggregates measured by local currency are converted to indicators measured by uniform monetary units, in order to eliminate the influence of price level differences between countries, so as to realize the comparison of economic size and economic structure. The forty-seventh Conference of the UN Statistical Commission, which was held in March 2016, officially listed ICP as a permanent global statistical project, and the ninth round of ICP will be implemented in 2017 as the benchmark year.

Eurostat-OECD PPP Programme is a regional statistical activity led by the Eurostat and OECD, which has been carried out for 11 rounds since 1980. Although the Eurostat-OECD PPP Programme is included in the global ICP, it has a set of independent, scientific and complete methodical system, and its theoretical research and practical application of PPP are at the most advanced level in the world.

This paper makes a comprehensive comparison of ICP and Eurostat-OECD PPP Programme from several main aspects such as development process, organizational structure, technical methods, and data release and use.

2. Comparison of development process

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The development of theory and practice of ICP has gone through a long history. Gustav Cassel put forward the concept of PPP in 1916, but until 1968, the International Comparison Project Group of University of Pennsylvania and the United Nations Statistics Division jointly established the ICP. The final results of the sixth round ICP based on the benchmark year of 1993 could not be released because of the serious problems of the comparison results, therefore interrupted the development of ICP. Since then, the organization responsible for ICP was transformed from the United Nations to the World Bank, and the World Bank carried out the seventh and eighth round of international comparison in 2005 and 2011. The development from the first round to the eighth round of ICP and the number of participating economies are shown in Table 1.

Table 1 Number of economies participating in each round of ICP

Geographical Regions	Research Phase			Operation Phase				
	First	Second	Third	Fourth	Fifth	Sixth	Seventh	Eighth
	1970	1973	1975	1980	1985	1993	2005	2011
Africa	1	1	3	15	22	22	48	50
Middle East	—	—	1	—	—	8	11	13
Asia and the Pacific	2	6	9	8	13	16	27	44
North America	1	1	1	2	2	2	2	2
Central and South America	1	1	5	16	7	—	11	41
Europe	5	7	15	19	20	35	48	49
Total	10	16	34	60	64	83	147	199
Year of release	1975	1978	1982	1986	1994	—	2007	2014

Eurostat-OECD PPP Programme originated in 1975 and the Eurostat conducted an international comparison involving 9 Member States based on PPP just at that moment. OECD launched the first round of official international comparison together with Eurostat in the early 1980s. Up to 2014 round, a total of eleven rounds of comparative work were carried out. The development process and the number of participating economies in the Eurostat-OECD PPP Programme are shown in Table 2.

Table 2 Number of economies participating in Eurostat-OECD PPP Programme

Benchmark Year	1980	1985	1990	1993	1996	1999	2002	2005	2008	2011	2014
Managed by Eurostat	13	13	14	16	19	31	31	37	37	37	38
Including : EU members	10	10	12	12	15	15	25	25	27	27	28
non-EU OECD members	3	3	2	4	4	8	1	4	4	4	4
Others	—	—	—	—	—	8	5	8	6	6	6
Managed by OECD	5	9	10	8	13	12	12	9	9	10	10
Including: non-EU OECD members	5	9	10	8	9	7	7	7	7	9	9
Others	—	—	—	—	4	5	5	2	2	1	1
Total	18	22	24	24	32	43	43	46	46	47	48

From the perspective of starting time, ICP was prepared from 1968 and conducted the first round of comparative activities in 1970. However, the Eurostat-OECD PPP Programme started in 1975 and began the first round of comparison activities in 1980, ten years later than ICP. From the perspective of development, ICP had experienced setbacks and faced bankruptcy dilemma, due to the shortage of

funds, technical bottlenecks and other issues. Although the comparative work of Europe lagged behind ICP, due to the strong industrial development, steady economic growth, stability of the regional political environment and other factors, the progress of comparative work relatively smoothed in Europe. From the perspective of leading department, ICP's leading department changed from University of Pennsylvania to the United Nations to the World Bank, which made the development of ICP interrupted. On the contrary, the leading department of Eurostat-OECD PPP Programme was Eurostat in the early stages, and then OECD also participated later.

3. Comparison of frequency and organizational structure

(1) Comparison of frequency

The ICP has an extremely unstable frequency of activity, and the intervals between the two rounds of comparison are between two and twelve years. In contrast, the Eurostat-OECD PPP Programme is scheduled to be launched and the results are regularly published due to the strong statistical capacity of the EU and OECD. The comparison of frequency about the ICP and Eurostat-OECD PPP Programme is shown in Table 3.

Table 3 Comparison of frequency about the ICP and Eurostat-OECD PPP Programme

ICP		Benchmark Year	Eurostat-OECD PPP Programme	
Round	Intervals with previous (Year)		Round	Intervals with previous (Year)
First	—	1970	—	—
Second	3	1973	—	—
Third	2	1975	—	—
Fourth	5	1980	First	—
Fifth	5	1985	Second	5
—	—	1990	Third	5
Sixth	8	1993	Fourth	3
—	—	1996	Fifth	3
—	—	1999	Sixth	3
—	—	2002	Seventh	3
Seventh	12	2005	Eighth	3
—	—	2008	Ninth	3
Eighth	6	2011	Tenth	3
—	—	2014	Eleventh	3

Although the Eurostat-OECD PPP Programme is an overall activity, there are differences in the survey cycle and the frequency of comparison. The Eurostat collects data by rolling benchmark approach so that the economies managed by Eurostat can achieve annual comparison and update data every year from the 1990 round. However, OECD but non-EU members carry out price survey and comparative work every three years.

(2) Comparison of organizational structure

From the perspective of organizational structure, the ICP and Eurostat-OECD PPP Programme conduct comparison in the way of regionalization. The ICP set up global, regional and national management and coordination institutions since the 2005 ICP. In the collection of data, every country reports the data to the regional institutions, which are responsible for calculating the PPP of each country in the region, and then these data are aggregated and linked to global PPP by the World Bank. In 2011 ICP, the economies participating in the international comparison were divided into 8 groups, namely the Eurostat-OECD, Asia and the Pacific, Africa, the Commonwealth of Independent States,

Latin America, West Asia, the Caribbean and Pacific Islands. The grouping method of 2011 Eurostat-OECD PPP Programme followed the principle of proximity, so 37 countries managed by Eurostat were divided into four groups according to geographical orientation in Europe, and a leader was selected in each group. The countries managed by OECD were divided into the fifth group which was directly coordinated by OECD.

4. Comparison of GDP expenditure classification and price data collection

(1) Comparison of GDP expenditure classification

The classification of the price specifications was based on the System of National Accounts 1993 (SNA 1993) in 2011 ICP round. The breakdown of the GDP expenditures into 155 basic headings formed the building blocks to estimate PPP in 2011 round, including 110 individual consumption expenditure by households, 1 individual consumption expenditure by nonprofit institutions serving households, 21 individual consumption expenditure by government, 5 collective consumption expenditure by government, 12 gross fixed capital formation, 4 changes in inventories and valuables, and 2 balance of exports and imports.

For the Eurostat-OECD PPP Programme, GDP expenditure classification was based on the SNA 1993 or European System of Accounts 1995 (ESA 1995) for the 5 rounds of comparison between 1999 and 2011. But for the 2014 round, classification basis had been upgraded to SNA 2008 or ESA 2010 in most of the EU and OECD members. From the classification point of view, expenditure classification of Eurostat-OECD PPP Programme was more detailed than ICP. The breakdown of the GDP expenditures into 31 categories in 2011 round was 5 more than ICP. Meanwhile, the groups, classes and basic headings were also more detailed than ICP. There were 206 basic headings which included 143 individual consumption expenditure by households, 6 individual consumption expenditure by nonprofit institutions serving households, 21 individual consumption expenditure by government, 7 collective consumption expenditure by government, 26 gross fixed capital formation, 2 changes in inventories and valuables, and 1 balance of exports and imports.

(2) Comparison of price data collection

It takes about 3 to 4 years to complete a round of comparisons from preparation to PPP results release, however, the longest time is spent in pricing the specifications and verification of data. At the time of pricing specifications, ICP Executive Board has only a rough plan, and the specific implementation plan is coordinated by the regional authorities. Compared with the ICP, the Eurostat-OECD PPP Programme is implemented every 3 years, part of the project is carried out year by year, and the management of the pricing plan is more strict. The prices of consumer goods and services are collected by rolling survey. 6 major commodity prices are collected in 3 years, and 1/3 of the product prices in household final consumption expenditure products are collected each year.

5. Comparison of comparison methods in specific areas

(1) Housing

Household consumption expenditure for housing includes the actual rent expenditure and virtual rental housing expenditure. The proportion and the calculation methods of rental housing and private housing differ from country to country, which leads to the mismatch of the international comparison data and the deviation of housing expenditure data and actual expenditure data. In 2011 ICP, the Commonwealth of Independent States, West Asia and Latin America mainly used the method of Housing Quantity Comparison and referred to the method of Market Rent, however, the Asia Pacific region used the method of Analogy. Direct price and indirect volume approaches are used to calculate the housing PPP in Eurostat-OECD PPP Programme, which mainly compares the market rent, while referring to the number of housing.

(2) Construction

Influenced by the factors such as region, culture and design concept, the construction project may differ from country to country, so it is difficult to collect comparable price data about construction project. Most participating economies in Asia Pacific, Africa and so on used the Basket of

Construction Components (BOCC) to compare the construction projects in the first few rounds. In 2011 ICP, all regions except for Eurostat-OECD compared construction projects using input price method. However, the construction PPP of Eurostat-OECD PPP Programme is based on a model-based technique known as the Bills of Quantities (BOQ) approach. The BOQ is an output pricing approach, and it is an ideal international comparison method for construction projects.

(3) Machinery and equipment

In the first few rounds of ICP, mechanical and equipment and consumer goods using the same method of comparison, that was, directly collected market prices. The price of machinery and equipment had been adjusted properly in 2011 ICP. Firstly, in terms of specification selection, the method recommended by the Eurostat-OECD was used, that was, selecting the international machinery and equipment produced by multinational corporations, which could ensure the global comparability of mechanical product prices. Secondly, experience from the 2005 ICP suggested that some countries would not be able to follow the standard method for pricing machinery and equipment, so 2011 ICP used the Price Factor Method (PFM). That was, using existing statistics to calculate the prices of equipment with the same model and brand in the exporting country as the market purchaser price of the importing country, and estimating the price of the equipment without corresponding models and brands.

(4) Government public service

For market education and health services, the output method is used for comparison; but for non-market education, non-market medical services and the collective service provided by the government, the input cost method is used for comparison. In the 2011 ICP, except for the comparison of non-market education output using the output method in Eurostat-OECD, the comparison of government public service continued to use the cost method and all regions implemented productivity adjustments on wages. For the non-market education and non-market medical services provided by the government, the comparison method had been transformed from input cost method to output method in Eurostat-OECD PPP Programme; but for the collective services, the input cost method is still used for comparison in both Eurostat-OECD PPP Programme and ICP. Since 2008, Eurostat had used the output method to calculate the PPP based on the benchmark year of 2005 and OECD had used the same method when calculating the PPP based on the benchmark year of 2008. In addition, 2011 round of Eurostat-OECD PPP Programme conducted a quality adjustment on non-market education and non-market medical services PPP for the first time in order to ensure the accuracy of the results. For the comparison of non-market medical services, Eurostat-OECD PPP Programme began using the output method since the end of 2013.

6. Comparison of PPP calculation methods

(1) Comparison of basic heading PPP

The Country Product Dummy (CPD) method was used to aggregate the price data of basic heading in 2005 ICP. In 2011 ICP, most countries used weighted CPD method to calculate the basic heading PPP. Unlike the ICP, the Eurostat-OECD PPP Programme began using the GEKS method to calculate the basic heading of PPP from the first round of 1980. The GEKS method uses the bilateral Fisher index of all participating countries, so as to avoid the substitution bias of GK method.

(2) Comparison of PPP aggregation method above the basic heading

The GK method was used when aggregating the total volumes in the first six rounds of ICP. Because the GK method could not reflect the substitution bias effect in reality, 2005 and 2011 ICP abandoned the GK method which had been used in the first six rounds and used GEKS method instead. The method of aggregation above the basic heading in Eurostat-OECD PPP Programme changed from GK method to GEKS method in 1990 round.

Both at the basic heading and above the basic heading, the verification of results are required after aggregation. Eurostat-OECD PPP Programme requires all countries to check on each survey data, including not only the household consumption expenditure data, but also housing, construction, machinery and equipment, government public service and other special items. The aggregated results

also need to be carefully verified when all levels are summarized, in order to ensure the accuracy of the data. The ICP handbook also makes the instructions for data verification, but ICP focuses on how to get to the basic data such as expenditures and price, rather than on verification of the calculation results.

(3) Comparison of the linking method about regions comparison results

The ICP is based on regional comparison, and regional PPP needs to be linked to global PPP. The global core list was used to link the results of basic heading PPP of each region in 2011 round. The Eurostat is responsible for the annual comparison of the EU and other European countries, and OECD is responsible for non-European members of the comparative activity which is carried out every three years. The two organizations calculate, aggregate and verify PPP for the management countries respectively. There are differences between the ICP and the Eurostat-OECD PPP Programme in terms of data collection, aggregation and verification, therefore, the World Bank links the results of PPP for all regions including the Eurostat-OECD PPP Programme, which impacts on global PPP:

Firstly, this link does not change the relative results of each country PPP within the region. The PPP is represented by the base currency in each region. One principle of ICP is to maintain the invariance of the PPP results in the same region when the results of each region are linked together to form a global PPP in dollars. For instance, the base currency in the Asia Pacific region is Hong Kong dollar, so the PPP between the RMB and the baht in Hong Kong dollars is the same as the PPP between the RMB and the baht in US dollars. For Eurostat-OECD, its base currency is also the U.S. dollar which does not affect the Eurostat-OECD internal PPP results.

Secondly, this link affects the comparability of global PPP results. First of all, the differences in the level of development affect comparability. A relatively closer degree of development of countries in Eurostat-OECD results in a higher comparability. However, other regions in the ICP are divided according to geographical regions, and the larger differences reduce the comparability. And then, due to the differences in the angle of measurement, some projects are not comparable actually. In addition, the inconsistency of the methods for calculating PPP may affect comparability. The method for calculating PPP used by Eurostat-OECD is not entirely consistent with the ICP, and the results of PPP calculated in different methods are linked together, which affects the comparability.

Finally, this link affects the reliability of the global PPP results. Eurostat-OECD PPP Programme carries out strict verification on the basic data, and then links its PPP results with other regions together. This is equivalent to link the high quality data of Eurostat-OECD and low quality data of other regions together, so that the reliability of global PPP is lower than the reliability of the EU-OECD results.

7. Comparison of PPP calculation methods for non-benchmark year

The intervals of 2005, 2011 ICP rounds with the latter are 6 years, that is to say, there are 5 non-benchmark years PPP data need to be calculated between each two rounds. Since 2005 ICP round, reduced information method was used to calculate the data of non-benchmark years and PPP data for countries not participating in ICP by the Asian Development Bank and the African Development Bank, and extrapolation method was used by South America, Commonwealth of the Independent States and West Asia. After the 2011 round, the regional coordination agencies also updated the PPP data based on the benchmark year of 2011. In addition, the World Development Indicators Database (WDI) of Word Bank calculated the non-benchmark years PPP data with the extrapolation method, and provided the PPP data of 214 countries and regions in the world for GDP and household final consumption expenditure at the same time. The former used the ratio of GDP deflator between the calculated country and the US to extrapolate the base year PPP, and the latter used the ratio of CPI between the calculated country and the US.

Eurostat-OECD PPP Programme mainly uses the rolling benchmark to calculate the PPP data of each member. In practice, the resident consumer price survey project is divided into 6 parts, and every part is finished in six months so that all surveys are finished in 3 years. The price of specifications that not surveyed is extrapolated by the CPI. The representative price about fixed capital formation,

government consumption expenditure and the price of service items such as rent need to be surveyed every year. Through annual survey of part of the commodity prices and the use of the latest year's GDP expenditure data for weighted summary, this method not only realizes the annualization of ICP survey and PPP estimation but also fully reflects the actual changes of expenditure structure and price level, and minimizes the calculation error of PPP data on each year. In addition, the Eurostat also uses the categorization project extrapolation to calculate and revise its member countries' non-benchmark PPP data.

8. Comparison of data release and use

(1) Comparison of data release

For the timeliness of data release, the results of the 2005 and 2011 ICP rounds were released after the start of 2 to 3 years. For instance, the results of 2011 round were released in 2014, including GDP, PPP, Price Level Index (PLI) and so on. However, the related data below basic heading had not been released.

Compared with the global ICP, the Eurostat-OECD PPP Programme has more standardized requirements on data release. Due to the similar degree of development of the country coordinated by Eurostat-OECD, the data is more consistent and detailed. The items of analysis data released by the Eurostat are 60, but by OECD are 49 (of which the same with Eurostat are 46), including PPP, PLI, national fiscal expenditure, actual expenditure level, actual expenditure per capita and so on. The countries coordinated by Eurostat have been compared year by year, and the final results will be released by the public database of Eurostat.

(2) Comparison of data use

The ICP is committed to using the PPP method to compare the actual size of economies, and the main economic indicators provided include PPP, actual expenditure, PLI and so on. Volume index and price index composed by comprehensive index and data set above-mentioned are used for economic research and policy analysis. The volume index is used to measure the economic size and the level of material welfare, consumption and investment, government expenditure and national productivity and so on. The price index is used to compare the price level, price structure, price convergence, competitiveness and so on. In addition, the 2011 ICP round also focused on the measurement of poverty, calculating the international poverty line based on PPP and reflecting the true degree of poverty of each economy. For the World Bank, the results of ICP provide a very important basis for measuring poverty, which is one of the reasons why the World Bank has supported ICP strongly. Due to the extensive use of PPP data, the ICP users include international organizations, research institutions, researchers and so on.

As a relatively independent comparative project, Eurostat-OECD PPP Programme mainly applies the results to EU, OECD members and a few non-members. The EU, OECD and IMF refer to the PPP of each country to determine how much a country should pay the membership fee, the proportion of voting rights and the share of assistance, as well as the size of the SDR.

9. Conclusions

(1) Both the ICP and Eurostat-OECD PPP Programme have a history of several decades of development. The development of ICP was twists and turns, but relatively smooth for Eurostat-OECD PPP Programme. From the view of development process, the ICP started earlier, but the leading department changed from University of Pennsylvania to the United Nations to the World Bank, which made the development become uneven. While the Eurostat-OECD PPP Programme started late, the development was rapidly and steadily.

(2) The execution frequency of Eurostat-OECD PPP Programme is higher than ICP, so the former can provide more timely PPP data. From the perspective of frequency of international comparison, Eurostat-OECD PPP Programme began to change the activity cycle to three years from the third round (1990 round). The original execution frequency of ICP was not fixed, and the longer

interval between two rounds led to significant delay. From the view of organizational structure, both the ICP and Eurostat-OECD PPP Programme adopt the way of regionalization management.

(3) The Eurostat-OECD PPP Programme is superior to ICP in expenditure classification and price data collection. For the classification of GDP expenditure, the Eurostat-OECD PPP Programme is more detailed than the ICP. As for the price data collection, the ICP uses a one-time survey method based on benchmark year, while the Eurostat-OECD uses the rolling survey approach.

(4) The comparative methods of the ICP and Eurostat-OECD PPP Programme are not yet mature in the fields of housing, construction, machinery and equipment, government public services and other special areas, which need to be further improved. For instance, Eurostat-OECD PPP Programme is improving the international comparison method of education, health care and other areas, from input method to more scientific output method gradually. Other regions of ICP also use input method for comparison, so that the two projects need a unified approach and to improve gradually.

(5) There are differences between the ICP and Eurostat-OECD PPP Programme in the methods of PPP calculation and inference. For the PPP calculation method, the Eurostat-OECD PPP Programme started to calculate all levels of PPPs using GEKS from 1990, while the ICP aggregated the basic heading based on CPD in the first 8 rounds. For the aggregation method above the basic heading, both of the ICP and Eurostat-OECD PPP Programme have experienced a shift from GK to GEKS. In addition, the ICP and Eurostat-OECD PPP Programme both need to link the regional PPP. For the reference method of the non-benchmark PPP, the ICP uses the method of volume extrapolation and reduced information method, while the rolling benchmark method and extrapolation method by GDP main aggregates are used by Eurostat-OECD PPP Programme.

(6) Eurostat-OECD PPP Programme is more timely and standardized in terms of data release, and different with ICP in data use. From the view of data release, Eurostat-OECD PPP Programme has more standardized requirements, but the ICP has a long lag for data release. For data use, the results of ICP provide a global comparison and can be used for the analysis of global issues, while the results of Eurostat-OECD PPP Programme are mainly used in the scope of the EU and OECD.

In summary, two basic understandings can be obtained: firstly, Eurostat-OECD PPP Programme has relative independence with the ICP. Although the ICP is a global statistical activity, and the Eurostat-OECD PPP Programme is theoretically included in the ICP, however, the Eurostat-OECD PPP Programme has a separate comparison method system. In fact, the two programs are relatively independent. Secondly, Eurostat-OECD PPP Programme is more advanced than ICP in many aspects. Therefore, the ICP is moving closer to Eurostat-OECD PPP Programme. For instance, the ICP will begin to collect price data with rolling survey from the 2017 ICP round, which means that the ICP will be implemented in line with the EU-OECD PPP Programme.

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