# USE OF GROSS DOMESTIC PRODUCT IN COMPARATIVE STUDIES

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#### Abstract

In this article, emphasis was put on highlighting models that can be based on international comparability using country-specific output indicators. It was also followed and highlighted the content of some indicators that were then used to ensure a real comparison of the level of development of the countries in the European Union considered. The study also referred to the fact that gross domestic product is the indicator that can form the basis of comparability. Also, Gross Domestic Product Gross Gross Domestic Product per capita as well as purchasing power parity indicator is the clear system for highlighting the results obtained by each of the states, which can be hierarchized according to these indicators.

**Keywords:** *comparative study, indicator, gross domestic product, variable, relative size* 

#### JEL Classification: E63, O11

#### Introduction

The article starts from the fact that gross domestic product is the worst performing indicator that can ensure international comparability. In this context, the most complex indicator that provides international comparability is analyzed and presented. Of course, in the alternative, it is understood that this indicator is deflated and thus brings the data to real comparability by eliminating the effects of inflation or other factors that may sometimes distort the data to be compared. In this study, the authors started from the significance of gross domestic product as a result indicator and emphasized how this indicator can be used in international comparisons. Also, the main concepts of macroeconomic aggregates were presented as they are the basis of the calculation of the macroeconomic indicators of results and definitely the gross domestic product indicator in the EU Member States. Data computed by the National Institute of Statistics and Eurostat is used which clearly shows the results obtained by each state on the basis of gross domestic product, gross

domestic product per capita or purchasing power parity indicator. Concrete data is used and for even better highlighting, tables and graphs are used that show the evolution of this indicator suggestively.

# Literature review

Ang, Bekaert and Wei (2008) addressed a number of aspects of inflation. Anghelache and Anghel (2017) achieved Romania's place in the European Union, compared to the other member states. Anghelache (2017) made a complex analysis of Romania's economy. Anghelache and Anghel (2017) surveyed Romania's GDP on the basis of deflated data. Anghelache, Popovici, Solomon and Stanciu (2017) studied the aggregates in real expression. Anghelache, Burea and Ursache (2017) analyzed relationships between external payment balance indicators and output macroeconomic aggregates. Calvo (2016) treated a series of concepts of inflation and deflation. Fundamentals of macroeconomic analysis are highlighted by Goodwin (2008). Koulakiotis, Lyroudi and Papasyriopoulos (2012) studied aspects of inflation and GDP in European countries. The inflation-GDP relationship analyzed by Lahiri and Sheng (2010) and Macchiarelli (2013).

# Research methodology, data, results and discussions

### • General aspects

The indicators that express the results of the activity at the macroeconomic level highlight the size and structure of the national production and ensure the possibility of characterizing the macroeconomic dynamics, performing the efficiency calculations. Also, result indicators are used to verify the proportions and fundamental correlations. These indicators are calculated within the National Accounts System (SCN).

Generally speaking, macroeconomic indicators fall into the generic category defined as aggregates. Aggregation has different meanings in statistics, such as:

- a summing up;

- getting a global size (aggregate) that is obtained by summing up those elements;

- the problem of aggregation is also related to index theory.

Aggregation in the first sense occurs in the following situations:

- summing by means of units. If for a population composed of n units that can be decomposed into k partial subpopulations (i = 1, 2, ..., k) with n1, n2 ..., nk units, X, Y, etc., is aggregated when:

- the distribution after  ${\rm X}$  in the total population is formed according to the same statistical variables of the general collectivity (the average for

example) is determined according to the subpopulation and volume parameters;

- a relative intensity (Z = X / Y) for the whole population is derived from the values of the structure elements of the population. Z is not just a sum ( $\Sigma$  bi), but a weighted sum ( $\Sigma$  bi qi) with the qi weights, which do not depend on it, but the distribution of the Y variable on the partial collectivity.

Summing is done through the variables. If the x1, x2, ... xm values of the variable X recorded for a unit corresponding to a variable are summed up, aggregation is also spoken.

Direct weighting or weighting is also an aggregation.

Estimating a global size. National revenue can not be calculated by summing up revenue because, on the one hand, errors would arise as revenue is redistributed and double records may occur. As such, the determination of national income is possible through the use of elements in the economic circuit. Many axioms, which are valid for dynamic sizes, are not met by the indexes determined as average values. The theory of indices is general because the index is a value of a population (for example the totality of labor productivity values or total prices, etc.), for which the partial values can not be summed up.

Consideration of structural elements also implies good suitability, which is a principle according to which the content of the indicators should be close to that of the empirical elements. Economics and statistics theory, as a rule, operate with similar notions. The question is the content of the statistical indicators is really the same and leads to the way the categories are formed in theory and implicitly to a fundamental problem of macroeconomic statistics, called adequacy? In economics, concepts serve systematic ordering and understanding the diversity of real phenomena. This means that these concepts are defined in such a way as to make it possible both to describe and judge the development of economic life, and to formulate assumptions about economic independence. In this approach, theory must formulate its concepts unambiguously.

The formation of concepts in statistics is subject to other rules. It considers both a broad-based theory of broad recognition and some fundamental rules:

- ensuring full consistency of the concepts used
- the theoretical concepts must be designed so that for any real phenomenon they can be precisely established;
- quantification is also feasible in terms of calculation costs.

In practice, pure types are not known and, as such, an overlapping of theoretical concepts can not be ensured. The content of the principle of adequacy consists in the requirement of the statistical categories to be theoretical. The system of macroeconomic calculations clearly shows that institutions and its functions, transactions and flows can be obtained by observing market processes and the way of experiments. For example, the circular flow theory with its actors (firms, state, private households, etc.) and the economic steps that constitute revenue, redistribution of income, use of income, patrimony modification made it possible to create a national record system through SCN. But the economic reality is much more complex than the ideal picture, theoretically. The business and household sphere can not always be separated. The results can not be rigorously broken down into intermediate consumption and final output. Indirect taxes do not add value, but contribute to creating VD (disposable income).

Differentiating domestic and national concepts, as well as all rules on banking services, patrimony, transfers, etc. are the effects and ways of solving the requirements of the principles of adequacy.

The set of determinations in the SCN contains, as a result, many rules on which the calculations are based.

# • Main aspects of macroeconomic aggregates

The main macroeconomic aggregates, in line with the SEC ,95 manual, are used in macroeconomic calculations.

The Gross Domestic Product at market prices is equal to the sum of the outputs of the resident productive economic units. GDP can be defined (calculated) in three ways:

- GDP resulting from the aggregation of the gross added values of the various institutional sectors plus taxes deducted from subsidies. GDP is the balance of the total economy production account;
- GDP calculated as the sum of the final uses (revenues);
- GDP determined as the sum of expenditure using elements in the corresponding macroeconomic accounts.

From the gross (net) surpluses of the various branches of exploitation, we obtain the national gross surplus, identical to the households' households.

The gross (or net) revenue of an enterprise in an economy is the sum of the gross (net) of enterprises in different sectors.

National income is equal to GDP minus primary income paid by resident agencies to non-resident units, plus those in resident units.

The concept of Gross National Income (GNI) (at market prices) is equal to gross national product (GNP) (market price) which has so far been used in national accounts. National income is not a concept of production, but an income concept that is more significant to be expressed in net terms, ie after falling fixed capital consumption (CCF).

# • Comparative analysis of GDP developments in U.E.

The main aggregates in the national accounts are represented by institutional units (ie non-financial corporations and financial corporations), public administration units, household units, and non-profit entities belonging to households.

Gross domestic product components (employment, final consumption and investment) are calculated at annual and quarterly levels and are part of the national accounts. Gross domestic product is an indicator of the central measure within national accounts, whereby a country or region is economically represented as a calculation method using one of the three methods.

An indicator derived from GDP in an economy is per capita GDP used to mitigate the influence of the total population, thus facilitating comparisons between economic growth in different countries. At the same time, gross domestic product per capita is an economic indicator of living standards. Using Purchasing Power Parity (PPP), the Gross Domestic Product (which measures the national currency of each country) is expressed as standard purchasing power (PPS), which is the purchasing power per national currency, thus removing any price differentials at the level of the countries covered by the analysis.

A benchmarking of economic growth across EU member states is possible by comparing the gross domestic product per capita with the standard purchasing power (the analysis is performed by comparing each individual average value recorded in the EU-28 member countries, which is set at value 100). An index of the country above 100 shows that the country's GDP per capita is above the average of EU countries, while an index of less than 100 indicates that GDP per capita is below the average level of member countries EU. It is worth noting that the usefulness of this index is reduced when performing comparative analyzes between countries, at a static point in time rather than a continuous period.

Gross domestic product at constant prices is an indicator of measuring a country's economic growth in a uniform manner without any influence from the point of view of price variation, a comparison that can be made both over a certain period of time and between the economic developments of different countries.

The growth rate of gross domestic product for EU-28 member countries (in current prices) slowed down significantly in 2008, and GDP contracted considerably in 2009 due to the economic and financial crisis. There has been a recovery in the EU-28 GDP level in 2010, and this has followed a steady trajectory in the years to come, with a slower growth rate; economic growth in EU-28 member countries has started to be on an upward path since 2014, recording a value in current prices of about EUR 14,000 billion.

While growth continues at a moderate pace in Europe, significant parts of the world economy are in the face of major challenges. Eurozone growth in 2016 is expected to continue, but recovery is slow, both from a historical perspective and relative to other advanced economies, while a further drop in energy prices should continue to stimulate revenue and consumption real households; public consumption has grown, and fiscal policy has long been expected to support this year's recovery, and monetary conditions are set to remain steady. Nevertheless, despite the continued confluence of the support factors, a slight acceleration of economic activity is expected: GDP in the euro area is projected to expand by 1.7%, compared with 1.6% last year.

The prognosis for GDP growth is up to 1.9% in 2017, but this will essentially depend on a return on investment, which was by far weaker and more sensitive to the materialization of scenario risks central. However, the downside risks arising from the global economy and the global financial markets are large and numerous.

Internally, expanding favorable conditions has created rising risks in the short term, but political risks and challenges have also increased. They include political reactions to migration and security threats, which could put pressure on the Schengen system, as well as the uncertainty surrounding the further implementation of the necessary reforms. Uncertainty about prospects for external and domestic demand is the biggest impediment to raising investment levels that are needed to sustain recovery and reverse the downward trend in growth potential. The policy at this stage is judged and requires reliable decisions to reduce uncertainty and intensify the necessary structural reforms, as well as the willingness to respond to any materialization of the considerable negative evolution risks. The weak external environment strengthens the need for a stronger balancing move towards domestic demand, especially investment. But the main risks are both externally and internally "politically". Leadership at the global and European level shows that joint actions are agreed, which are rapidly implemented and represent the effective response to the current economic problems. The European economy remains supported by a number of positive factors such as oil prices, the euro exchange rate and financing costs that stimulated exports and private consumption. Investment remains, however, hampered by economic and political uncertainty, and in some countries, an economy characterized by excessive debt is still encountering.

Now, as it enters the fourth year of recovery, the European economy is facing substantial risks from the slowdown in developing economies. Growth strong enough to reduce substantial unemployment has so far failed to materialize and evidence of an investment revival that is crucial to sustainable development remains limited. The economic recovery of the euro area remains moderate at the expense of the strong contribution of these positive factors, which is expected to be somewhat stronger and longer-lasting than previously expected. In particular, driven mainly by rising demand, the price of oil is on a downward slope again and for the time being the expectations are to maintain levels at this low level. While this should support an additional increase in the purchasing power of euro area households, it is equally expected to delay the return of inflation from the current very low level and put additional financial pressure on the predominantly exporting countries.

Fiscal policy in the euro area is becoming increasingly important in supporting growth, largely due to government spending associated with the decline in the external currency of the euro in the last period, especially against the US dollar, which should lead to a positive effect on the economic activity of euro area exporters. Additionally, the measures taken by the European Central Bank in December 2015 lead to euro area cost financing, thus maintaining a low level for a longer period of time. At the same time, the growing influence of these factors is increasingly being compensated by an uncertain global environment (mainly high levels of political uncertainty, debt and unemployment).

GDP in the euro area is expected to accelerate slightly from 1.6% in 2015 to 1.7%, which is lower than the fall forecasts. Once global economic activity begins to recover, the positive effects should be felt somewhat later in 2016 and 2017. Also, some of the structural reforms implemented in the Member States should continue to have a positive impact on economic growth, consumption and investment, although debt levels remain slightly high in some parts of the economy.

Funding conditions should restrict acute pressure to cut debt. Overall, GDP growth in the euro area should continue to reach 1.9% in 2017. Global GDP growth prospects have deteriorated again and the risks have increased considerably, mainly due to the decline intensified in emerging markets.

The combination of quantitative easing and credit easing by the ECB has successfully maintained cost-savings and returns at a low level and has therefore had a significant contribution to reducing financial fragmentation and differences between Member States.

The euro area credit cycle for both households and non-financial corporations (CNF) is now in a positive trend, suggesting that the transmission of monetary policies to the real economy has improved. Surveys show further improvement in the availability of bank loans and a weakening of funding constraints for euro area SMEs. Capital market funds continued to grow, the external enterprise financing cycle is high, although it remains at a low level

compared to previous cycles reflecting low investment demand and intensive use of non-financial institutions' funds. This suggests that the process of corporate disintermediation is still in progress. Since bank lending cycles and market funds are expected to accelerate this year, both external and domestic funds should be more easily accessible to finance an increase in investment.

In 2016, Member States should continue to move towards the recovery path, including Greece, if growth is set for the year. In 2017 economic activity should be increasing in all Member States. As expected, private consumption was sustained last year by the real increase in gross disposable income attributable to a fall in total inflation and an improvement in labor market conditions. Another acceleration is foreseen in the coming years, and private consumption should continue to be the main growth driver supported by the expected acceleration in real disposable income. Wage increases, due to employment, lead to somewhat stronger increases in earnings and property income, with a tangible result in higher transfers to households; these factors should continue to support this steady increase in consumption, although households are also expected to slightly increase the saving rate this year.

In 2017, however, consumption growth slowed down as real household disposable income lost its growth momentum due to the rise in inflation forecast. From the point of view of the level of investments at this time, they also appear to be not very sensitive to changes in the financing conditions. The investment plan for Europe should also start to have a positive impact on public and private investment. Investment in construction, meanwhile, is expected to benefit from increased real incomes available and low mortgage rates.

The deterioration of the external environment began to have a noticeable impact on euro area exports in the second half of 2015, despite the positive impact of the depreciation of the euro. But due to the improvement in price competitiveness, which is largely the result of the past depreciation of the euro and the fall in unit labor costs, external demand is expected to grow; growth in exports should accelerate over the course of 2016, in line with an increase in export markets. However, the annual growth rate of euro area exports of goods and services appears to be lower than last year. As a result, net exports are expected to have a negative impact on GDP growth in 2016, an impact that in 2017 is expected to be neutral.

The volume of gross domestic product in the euro area (EA-19) accounted for 72.6% of the EU-28 Member States' value in 2014, with a slight decrease in 2009. In 2015, gross of the European Union recorded by the five largest economies of the member countries (Germany, Great Britain, France, Italy and Spain) was about 72%. Comparisons between countries need

to be done cautiously, especially since exchange rate fluctuations significantly influence the values of nominal GDP by converting to a common currency.



**GDP** in current prices (billion euro)

Source: Eurostat and author's processing

In order to assess the living standards, it is necessary to use the purchasing power parity (PPS), ie the corrected value closely related to the size of an economy that takes into account the total population, but also the differences in price levels between countries. Average GDP per capita in the EU-28 Member States in 2014 was about 26,600 in PPS, slightly above the maximum (PPS 25900 in 2008) before the effects of the financial and economic crisis.

Country-by-country reporting is performed by comparing to the EU-28 = 100 baseline, which is a mean value set. The highest value among the EU Member States was recorded in Luxembourg, which had a GDP per capita in PPS of about 2.6 times the EU-28 average in 2014 (partly explained by the strong influence of the work from countries in the near vicinity Belgium, France and Germany). On the other hand, GDP per capita in PPS in Bulgaria has been below 50% of the EU-28 average in 2014.

Although results expressed in purchasing power parity are used to make comparisons between countries over a one-year period and less over a long period of time, the development of these results over the past years results in a convergence of living standards at the level of most of the Member States that joined the European Union in 2004, 2007 and 2013 respectively and have a value close to the EU average, despite some problems during the financial and economic crisis. Since Luxembourg, Germany and Austria have significantly outperformed the EU-28 average by comparing the situation in 2015 with that in 2004, in many EU-15 Member States, especially in the UK, Ireland, France and Belgium, the they were close to the EU-28 average; At the same time, Italy and Spain have shrunk their average level to the same level as the EU-28 average or even lower.

Compared to 2004, several member countries, including Romania, have seen a significant increase from a level below the EU-28 average, but in countries such as Greece, Cyprus and Slovenia, the levels have fallen below the EU average -28 in the period 2004-2015.



GDP per capita in current prices (EU-28 average = 100)

Source: Eurostat and author's processing

The global financial and economic crisis has led to a severe recession in the European Union and the United States in 2009, with a revival since 2010; the forecast for an economic crisis was expected from 2008, when there was a relatively small reduction in real GDP in the US economy, but also a decrease in the growth rate in the EU-28 countries. Real GDP contracted by 4.4% in EU-28 in 2009, while there was a 2.8% reduction in the United States. The EU-28 recovery saw a steady rise in prices of 2.1% in 2010, followed by a further increase of 1.7% in 2011. GDP contracted by 0.5% in 2012 and not there was no change in 2013, before the growth that recovered in 2014 (1.3%). For the euro area (EA-19), the growth rates for 2010 and 2011 were similar to those in EU-28 countries, while the contraction in 2012 was stronger (-0.8%) and was in 2013 (-0.4%) before a slight recovery (0.9%) compared to that of the EU-28 Member States in 2014. Regarding the United States, the recovery of was slightly stronger compared to EU-28 member countries in 2010 and comparable in 2011.



Source: Eurostat and author's processing

Within the European Union, the pace of real GDP growth varied significantly, from the point of view of the comparison of the member countries in the analyzed period. After a contraction in all EU Member States, apart from the situation recorded by Poland in 2009, economic growth has resumed in most member countries since 2010, a pattern that continued in the following year, when real GDP growth has been reached in 24 EU Member States. However, this trend has been reversed in 2012, so 50% of Member States reported economic expansion, an evolution that began to rise in 2013, reaching more than 50% of the EU- 28 to report growth.

Significant growth rates in 2015 were recorded in Ireland (around 5%), Hungary, Malta and Poland (around 3.5%). The increase in Spain (slightly above 1%) in 2015 was significantly higher than the EU-28 average (1.3%), and this was the first annual growth rate in the Spanish economy since 2008. While GDP growth rates in 2015, in Portugal and Greece (up to 1%) were lower than the EU-28 average, they still meant the first increases of the two countries since 2010, respectively with 2007 for Greece.

As a general characterization for the period under review for the EU Member States, there is a decline in overall economic performance, largely due to the effects of the economic crisis.

The average EU-28 average annual growth rates were 0.9% and 0.7% respectively for euro area countries (EA-19) between 2004 and 2015, with the highest level Growth: Poland (around 4% per year), Slovakia (with an average annual growth of 3.8%), Romania (2.7%) and Bulgaria and Latvia

(with over 2% growth). In contrast, the real value of Gross Domestic Product during the analyzed period 2004-2015 in Greece, Italy and Portugal was negative.

#### Conclusion

The study shows how the gross domestic product indicator can be used in international comparisons. It is also underlined that gross domestic product per inhabitant is calculated on the basis of gross domestic product as well as other derived indicators that can be used in the structural analysis of the gross domestic product by resources, uses, ownership forms or geographical distribution. Another conclusion is that the gross domestic product indicator, being the most complex of the macroeconomic indicators of results, gives consistency in international comparisons, in the context in which it is deflated, that is, translated into real figures corresponding to the economic situation at that time. In other words, by deflation it is ensured the elimination of the effects of inflation by bringing macroeconomic indicators to a level of internal comparability in the first place and then to international comparability, in the context in which all member countries that report data to Eurostat are doing so or wider the other countries using the national accounts system calculate the indicators according to the same methodology. The study is not a head of the road, the study can be extended by using macroeconomic models and by calculating their parameters it is possible to extend the results by calculating the parameters of the regression equation.

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