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# Spatial cohesion in Greece: The impact of GDP revision in the measurement of spatial inequalities in Greece and policy dimensions

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## Χωρική συνοχή στην Ελλάδα: Η επίδραση της αναθεώρησης του ΑΕΠ στη μέτρηση των χωρικών ανισοτήτων στην Ελλάδα και διαστάσεις της πολιτικής

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### ABSTRACT

The paper provides a systematic comparative exploration of the measurement of spatial inequalities in Greece, at regional and prefectural level, before and after the last GDP revision. The aim is to determine the rate and the content of change in spatial inequalities - towards either an increase or decline - after the revision, so as to evaluate the new situation and set regional policy in its proper dimensions. The analysis is based on the examination of GDP data (total and per capita) for the years 2003 and 2001, before and after the revision, as well as on population derived from the last Census (2001). The paper uses statistical methods of regional analysis for the exploration of spatial inequalities. The main conclusion is that the spatial disparities have been affected from the revision in a remarkable degree and therefore the regional policy must be suitably adapted in the new conditions.

**KEY WORDS:** Spatial cohesion, income spatial allocation, regional inequalities, regional analysis methods, regional policy

### ΠΕΡΙΛΗΨΗ

Το άρθρο περιλαμβάνει μια συγκριτική ανάλυση της μέτρησης των χωρικών ανισοτήτων (σε περιφερειακό και νομαρχιακό επίπεδο) της Ελλάδας, πριν και μετά την τελευταία αναθεώρηση του ΑΕΠ. Κύριος στόχος είναι να προσδιορισθεί ο βαθμός και το περιεχόμενο της μεταβολής των ανισοτήτων μετά την αναθεώρηση, προκειμένου να αξιολογηθεί η νέα κατάσταση και να τεθεί η περιφερειακή πολιτική στις σωστές της διαστάσεις. Η ανάλυση βασίζεται σε στοιχεία ΑΕΠ (συνολικού και κατά κεφαλήν), για τα έτη 2003 και 2001, πριν και μετά την αναθεώρηση, καθώς επίσης και του πληθυσμού της τελευταίας απογραφής της ΕΣΥΕ. Η στατιστική επεξεργασία γίνεται με τη χρήση ειδικών μεθόδων περιφερειακής ανάλυσης για τη διερεύνηση των χωρικών ανισοτήτων. Το συμπέρασμα που προκύπτει, είναι ότι η αναθεώρηση έχει επηρεάσει τις χωρικές ανισότητες της Ελλάδας και συνεπώς, η περιφερειακή πολιτική θα πρέπει να προσαρμοσθεί κατάλληλα στις νέες συνθήκες.

**ΛΕΞΕΙΣ-ΚΛΕΙΔΙΑ:** Χωρική συνοχή, χωρική κατανομή του εισοδήματος, περιφερειακές ανισότητες, μέθοδοι περιφερειακής ανάλυσης, περιφερειακή πολιτική

## 1. The status and the content of the GDP revision

The European Union (EU) member-states are obliged to constantly harmonize their Systems of National Accounts with the European integrated System of economic Accounts. Especially in recent years, according to the European Council Regulation 2223/96 regarding the European System of National and Regional Accounts of the Union, as of 1999, all member states are required to apply the new European System of Accounts and re-adjust the Systems of National Accounts every five years, setting 1995 as the first base year (EC 1998, 2002).

In this framework, Greece, being a full member state of the EU, is obliged to constantly adapt its System of National Accounts with that of the EU's. This adaptation and harmonization process ensures primarily the comparativeness of the Greek GDP to that of the other countries – member states of the European Union, the credibility of future estimates and the provision of a full description of the country's economic activity (Ministry of Economy and Finance 2006a; National Statistical Service of Greece 2006).

Thus, the first revision to the System of National Accounts in Greece, so as to harmonize it with that of the European System of integrated economic Accounts (ESA) of the EU, took place in 1990. In accordance with the EU Directive 89/130/EEC/EURATOM of 13 February 1989, member states had to harmonize the setting of Gross Domestic Product (GDP) at market prices (ESA 79). In the framework of the first revision to the Greek System of National Accounts, 1988 was set as a year base, due to the fact that the VAT (Value Added Tax) was imposed in 1987 and in the year 1988 a general industrial census and a household budget survey were conducted. This first revision led to an increase in Greek GDP by approximately 20%, with regard to the previous OECD (Organisation of Economic Cooperation and Development) standardized system of 1958.

As we mentioned above, according to the recent Regulation 2223/96 for the European System of National and Regional Accounts, as of 1999, all member states are required to re-adjust the Systems of National Accounts every five years, setting 1995 as the first base year, in accordance with the new European System of Accounts (known as ESA 95) (EC, 2002). In the case of Greece, although the new system was implemented by the National Statistical Service of Greece (NSSG) on 1995 data, the year 1995 was not considered as a base year. This occurred mainly due to the lack of primary research, a fact that was also noted by the EU authorities, which expressed reservations on the matter. Thus, in Greece, the implementation of ESA 95 was, in essence, a combination of ESA 79 and ESA 95 systems and the results that emerged from this process covered the period of 1988-1998 (NSSG, 2006).

In 2006, according to the aforementioned Regulation, a new, more extended and systematic revision to Greek GDP was conducted by NSSG. This revision was based on a reformation of the System of National Accounts, setting the year 2000 as a year base. Thus, apart from the formal justification, this revision was considered to embody a number of significant parameters, such as: the incorporation of the last 2001 Population and Dwellings Census results, as well as of other, new statistical research data on activities, for which there was no relevant research in the past, the greater utilisation of administrative data such as VAT statements and the updating of the cross-sectoral economic relationships framework, through the creation of production matrices and intermediary inputs, etc. All these, according to the Ministry of Economy and Finance (2006 a,b), assist towards a more accurate determination of the size and the structure of the Greek GDP.

Essentially, as argued by the Ministry of Economy and Finance, the GDP revision is based on a more systematic incorporation of factors referring to a better description of the tertiarization of the national economy. Up to the present, these factors have either not been added at all to the GDP, or the figures used were based more on estimates rather than primary researches. More specifically, the

recently GDP revision was based on (Ministry of Economy and Finance, 2006b): research on wholesale and retail trade, transports, hotel industry, construction and rents; the general Population and Dwellings Census of 2001; the use of the national Tax Information System (TAXIS) after it became fully operational; the use of data coming from non-profit institutions (such as the non-governmental organizations, etc.); public infrastructure annual depreciation and fixed assets data; as well as the inclusion of economic data referring to the hidden and informal - unrecorded activities.

Thus, a serious attempt was made to include the hidden and informal economy in the GDP of Greece, following the international trends in this issue. The "unrecorded" or "non-observed", "hidden and informal", even the "illegal and semi-illegal" economy has been a subject of several academic research projects at an international level (Luttikhuisen 1997; Groom et. al. 1998; Calzaroni 2000; Luttikhuisen and Kazemier 2000; Schneider and Enste 2000; Colledge 2001, 2004). Similar GDP revision attempts have also been undertaken by many countries of the European Union as well as by many other countries of the world (OECD 2002; NSSG 2006). Moreover, several studies have been done for the exploration of the impacts of the informal economic activities in urban and regional development as well as in the socio-spatial inequalities in the formal economy (Davis 2006; Williams and Round 2007). More specifically, according to Williams and Round (2007, p. 435), as the evidence in support of the informal economy as a complement to the formal economy clearly displays, informal work, at least in some of its varieties, is often not a sphere inhabited purely by the marginalized, but rather, is a realm which reinforces, rather than reduces, the socio-spatial disparities in the formal economy.

It should be stressed, that the revision to Greece's GDP, became an issue of political juxtaposition between the Government and the Opposition, mainly because of the strong relationship between the hidden economy and corruption, as it has been proved by a lot of studies (Katsios, 2006).

Thus, after this last attempt, the revision to Greece's GDP, led to a 25.7% increase. This figure was the initial proposal of Greek Government to the European Union. From the supply side, this GDP change is fuelled by a 29% increase of the gross value added figures, mainly in the tertiary economy. More specifically, 77% of the increase is accounted for by 8 key service industries. According to the Ministry of Economy and Finance (2006a), these are: 1. wholesale trade, 2. hotels and restaurants, 3. constructions, 4. other entrepreneurial activities, 5. public administration and defence, 6. water transport, 7. recreational, cultural and sporting activities, and 8. other services. It should be mentioned that the contribution of hidden and informal activities to the GDP increase was very limited, being a small 0.7% of the upward revision to the level of GDP of 25.7%; that is approximately 2.7% of the total GDP increase.

Finally, after the negotiations of the Greek Government with the European Union officials, the final agreement about the revision level of Greece's GDP, led only to a 9.6% increase of the country's Gross Domestic Product. Although this figure seems to be very low, comparing with the initial proposed 25.7%, it is still remaining very significant.

Following this final GDP revision, a change in the Regions and Prefectures economic positioning was observed at national level. In the Regions and Prefectures where the tertiary sector appears strong, GDP revision was more evident. This is even more intense in areas characterized by an increased presence of tertiary economy branches, which have greater contribution to GDP increase.

In this framework, the key question that emerges and the present paper is attempting to tackle, is whether GDP revision in Greece has effected worth noticing changes in the way inter-regional and inter-prefectural inequalities are recorded in the country. If this is the case, the reliability of the data and the scale of change should be systematically explored, followed by the examination of the emerging need for the readjustment of the Greek regional policy, something that has not yet been examined by the Greek Government to a great extent.

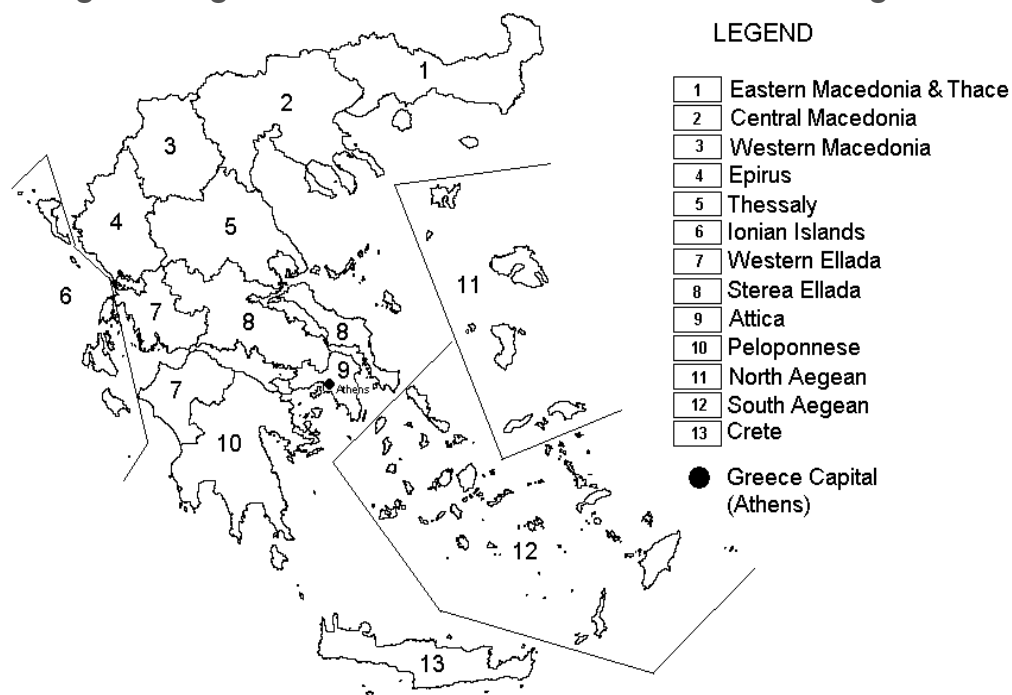
## 2. Methodological framework for the comparative exploration of spatial inequalities before and after the GDP revision

The basic aims of a country's regional policy are the exploitation of growth capabilities of its spatial units such as its cities, prefectures and regions, as well as the decrease of inequalities among the units themselves (Papadaskalopoulos and Christofakis 2002; 2004); the end aim being to spread economic wellbeing. The quantitative description and analysis of spatial economic disparities primarily depends on the kind of available statistics. For that reason, the use of data and the evaluation of the results of regional inequality measures should occur with caution, so as to achieve a better understanding and more effective monitoring of regional disparities in our country (Papadaskalopoulos 2000), especially after the recent GDP revision.

The measurement of regional inequalities (especially in terms of total and per capita GDP) is made possible initially, through the utilisation of basic measures of descriptive statistics, such as the measures of central tendency. On a second stage, adjusted measures of quantitative regional analysis are used, either on inter-regional – national (Theil 1958; Isard 1960; Williamson 1965; Papadaskalopoulos 2000), or even on inter-(macro)regional – supranational level (Vanhove and Klaasen 1980).

In this framework, in order to investigate the degree of influence of GDP revision, as regards the measuring of Greek inter-regional and inter-prefectural changes, total GDP and per capita GDP data from the 13 Regions of NUTS 2 level (see Figure 1) as well as the 51 Prefectures (NUTS 3 level) are used for the year 2003, before and after the final revision.

**Figure 1. Regional administrative division – Greek NUTS 2 Regions**



It should be mentioned, that 2003 is the last year for which common reference data do exist, before and after the Greek GDP revision. Also, since the last official Population Census was performed by the National Statistical Service of Greece in 2001, GDP per capita and population data of that year were used (before and after the GDP revision) for the calculation of Weighted Coefficients of Variation.

The results of this exploration are presented in the following section. Map presentations are used in order to achieve a fuller understanding and provide a more systematic account of the relevant conclusions derived from the analysis of the present paper.

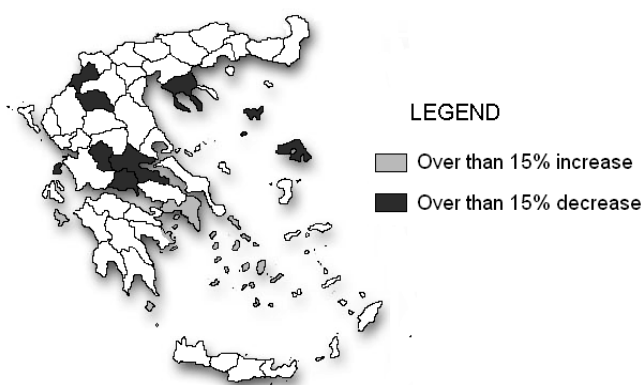
### 3. Statistical analysis and presentation of the findings

A first approach to the GDP unequal spatial allocation issue is achieved through the exploration of the percentage distribution among Prefectures and Regions of the country, before and after the GDP revision, as well as of the percentage change of GDP between the two cases under consideration.

Data analysis shows substantial changes in the share of Prefectures and Regions in the country's total GDP after the revision. Most country's Prefectures show a decreased share in total national product after the GDP revision. This decrease takes place to the advantage of the increased share of Attica, which includes the greater Athens area. This fact is best described when the new percentage share of Greek Regions in the revised GDP is examined. Only two Regions, Attica and the insular Region of South Aegean (to a much lesser degree though) have achieved substantial share increases in total GDP of the country (from 38.7% to 46.6% and from 3.02% to 3.14% respectively).

Along with that, the highest percentage GDP increase, after GDP revision for the year 2003, appears in the Attica Region (56.71%) as well as in the two insular regions, namely the South Aegean (37.59%) and the Ionian Islands (24.48%). This situation isn't so clear at prefectural level. More specifically, in the same year, as we can see also in Figure 2, the Prefectures with the highest percentage increase of GDP (over than 15%), after the GDP revision, are Zakynthos (61.43%), Attica (34.88%) and Kyklades (26.24%). In the opposite side, the highest percentage decrease of GDP (over than 15%) - due to the revision - appears in Evritania (52.69%), Lefkada (37.59%), Lesvos (31.46%), Fokida (26.30%), Chalkidiki (20.32%), Fthiotida (19.53%), Kastoria, (18.19%) and Grevena (17.36%).

**Figure 2. Prefectures of Greece with the highest percentage change of GDP (2003 data), due to the GDP revision**



However, from the above analysis, some initial remarks can be made. It can be argued that GDP revision in Greece appears to upgrade the position of some Prefectures in main coastal and island areas, with strong tourism activity as well as in the area with the highest urban concentration of the country, which is the metropolitan center of Attica. In other words, these Prefectures base their growth on tertiary sector activities, such as tourism (mainly in the island areas), trade, public administration, real estate etc. Moreover, with GDP revision, a number of isolated, mountainous and mainland Prefectures as well as a small number of island Prefectures fall behind. These Prefectures still appear to have strong dependence on the primary sector activities and a relatively small presence in the tertiary sector as well as a lack of significant urban centres.

More significant changes are observed in the comparative presentation of per capita GDP, a representative indicator of the growth level. Analysis has shown that, after the GDP revision, the number of the Prefectures and Regions that surpasses the country's average GDP per capita is significantly decreased. More specifically, the number of 17 Prefectures which surpassed the national average per capita GDP, before the revision, turned into just 6 after the revision of GDP (see comparatively the Figures 3 and 4).

These include Greece's Capital (Attica Prefecture) and its neighbouring Prefectures (Viotia, Korinthia), which host a great part of Attica's industrial activity (in essence, this area as a whole is referred to as the Metropolitan Area of the Capital). The list of the Prefectures with per capita GDP greater than the country average also includes the island Prefectures of Zakynthos, Dodekanese and Kyklades (see Table 1 and Figure 4), apparently, due to the intense tourism activity that has been developed in these areas.

**Table 1. Prefectures of Greece with per capita GDP greater than the national average (2003 data)**

Ranking	Prefectures	GDP p. c. before GDP revision (Country =100)	Ranking	Prefectures	GDP p. c. after GDP revision (Country =100)
1	Viotia	259.85	1	Viotia	212.32
2	Korinthia	142.39	2	Attica	130.77
3	Lefkada	128.09	3	Korinthia	127.99
4	Evrytania	122.55	4	Kyklades	124.20
5	Lesvos	113.70	5	Dodekanese	109.16
6	Fokida	113.64	6	Zakynthos	105.36
7	Lasithi	113.16			
8	Dodekanese	111.49			
9	Thessaloniki	111.34			
10	Chalkidiki	110.33			
11	Kyklades	108.40			
12	Fthiotida	108.23			
13	Evia	107.01			
14	Attica	106.83			
15	Kozani	106.35			
16	Magnisia	101.57			
17	Arkadia	101.18			

Figures 3, 4. Prefectural GDP per inhabitant in Greece, in 2003, *before* (Fig. 3) and *after* (Fig. 4) the national GDP revision (Country=100-National Average)

Figure 3

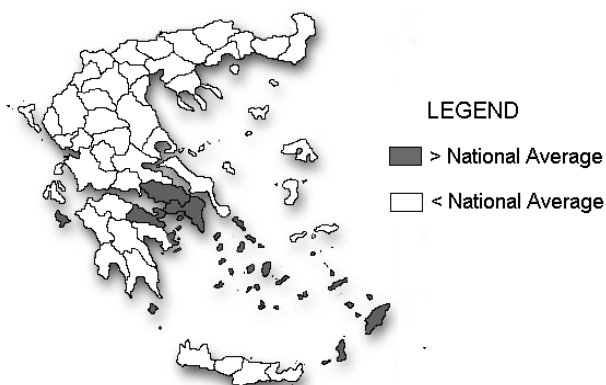
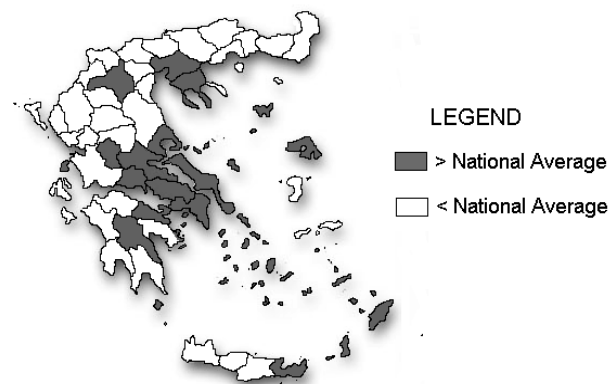


Figure 4



The same situation, as expected, appears also in the respective ranking of Greek Regions. The 5 Regions that were surpassing the national average per capita GDP are now limited into just 3 (see comparatively the Figures 5 and 6). More specifically, these are the Capital Region of Attica, its neighbouring Region of Sterea Ellada, as well as the insular Region of South Aegean (Table 2 and Figure 6).

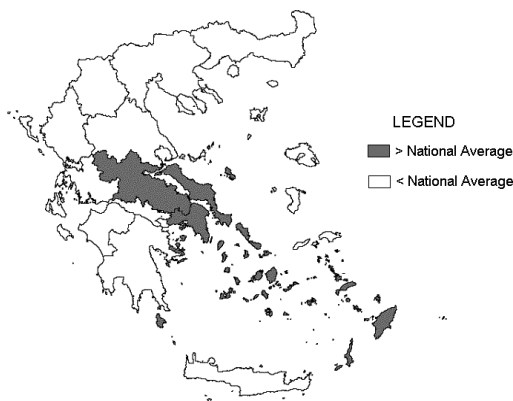
**Table 2. Regions of Greece with per capita GDP greater than the national average (2003 data)**

Ranking	Regions	GDP p. c. before GDP revision (Country =100)	Ranking	Regions	GDP p. c. after GDP revision (Country =100)
1	Sterea Ellada	142.67	1	Attica	130.77
2	South Aegean	110.35	2	South Aegean	114.67
3	Attica	106.83	3	Sterea Ellada	110.80
4	Crete	100.44			
5	North Aegean	100.07			

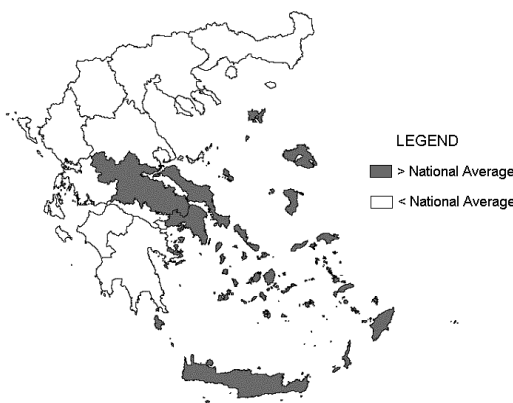


**Figures 5, 6. Regional GDP per inhabitant in Greece, in 2003, *before* (Fig. 5) and *after* (Fig. 6) the national GDP revision (Country=100-National Average)**

**Figure 5**



**Figure 6**



Essentially, as shown in the above Figure 6, after the GDP revision, the new ranking of the Regions does not include two insular Regions (Crete and North Aegean), which present a GDP per capita higher than the national average. These two Regions continue to exhibit a strong dependence on the primary sector and a lower presence of tourism activity. This is the case primarily for the North Aegean Region. On the other hand, it should be noted that, after the recent GDP revision, the Crete Region is close to the national average GDP per capita because it is more developed in terms of tourism.

The analysis of per capita GDP inequalities across the country shows clearly that Greece is characterized by the pole development paradigm; high per capita GDP is mainly concentrated in the Metropolitan Athens Region.

The aforementioned analysis, despite the fact that it provides significant indications for a change in the inter-related status of Prefectures and Regions, due to the GDP revision, does not offer a clear picture on the degree of change of inequalities among Prefectures and Regions.

A more coherent account of regional disparities in GDP distribution is given by the results of Standard Deviation and the Coefficient of Variation, which also has the advantage of not being affected by the inflation (Vanhove and Klaasen 1980; Papadaskalopoulos 2000). We remind that the Standard Deviation ( $\sigma$ ) and the Coefficient of Variation (CV), are calculated as follows:

$$\sigma = \sqrt{\frac{\sum (Y_r - \bar{Y})^2}{N}}$$

$$CV (\sigma^2) = \frac{\sum (Y_r - \bar{Y})^2}{N}, \text{ with:}$$

$Y_r$ , the GDP of the Prefecture or Region,

$\bar{Y}$ , the country's average GDP (Arithmetic Mean)

$N$ , the total number of the Prefectures or Regions of the country

Therefore, the comparative results derived from these two measures, before and after GDP revision, lead to the conclusion that inequalities among the country's Prefectures and Regions have been intensified after the GDP revision (Table 3).

**Table 3. Inter-Prefectural and Inter-Regional inequalities in GDP distribution in Greece (2003 data) – Measuring indicators results**

Measure	Inter-Prefectural analysis		Inter-Regional analysis	
	Before GDP revision	After GDP revision	Before GDP revision	After GDP revision
Arithmetic Mean ( $\bar{Y}$ )	3,047.59	3,357.92	11,955.92	13,173.69
Standard Deviation ( $\sigma$ )	8,297.08	11,031.66	14,811.24	19,933.95
Coefficient of Variation (CV)	272.25	328.53	123.88	151.32

The above analysis shows that, after GDP revision, inter-prefectural and inter-regional disparities appear more intense in the country.

This is, also, verified by the use of the Weighted Coefficient of Variation (WCV), which, using GDP and population data, measures the dispersion of regional (or prefectural) per capita GDP from the national average, weighted by the share of the Region (or the Prefecture) in the country's total population (Williamson, 1965). The Weighted Coefficient of Variation (WCV) is calculated as follows:

$$WCV = \frac{\sqrt{\sum_r (y_r - \bar{y})^2 X_r}}{\bar{y}} 100, \text{ with:}$$

$y_r$ , per capita GDP of the Prefecture or Region,

$\bar{y}$ , the GDP per capita - country average, and

Xr, Prefecture's or Region's share in the country's total population.

The results derived from the calculation of this coefficient for 2001 - the year of the last official Population Census by the National Statistical Service of Greece - have as follows:

**Table 4. Weighted Coefficient of Variation results based on per capita GDP and population figures of the country's Regions and Prefectures (2001 data)**

Measure	Results before GDP revision	Results after GDP revision
WCV – Inter-Prefectural Inequalities	23.61	25.63
WCV – Inter-Regional Inequalities	14.30	22.78

Thus, according to the WCV results, inter-prefectural and inter-regional inequalities, regarding the Prefectural and Regional GDP distribution in the Greek population, appear clearly increased after GDP revision, especially at regional level.

## 4. Conclusions and necessary policy directions

The above analysis leads initially to the main conclusion that GDP revision in Greece has affected the spatial inequalities at prefectural and regional level as well.

As it has been argued, GDP revision upgrades the position of Prefectures and Regions, which are heavily oriented towards tertiary sector activities (Attica, South Aegean). More specifically, there is an upgrading of Prefectures in coastal and island areas as well as in areas with the largest urban concentrations in the country. These are areas which base their development in tertiary sector activities, such as tourism (mainly the islands), trade, transports, public administration, real estate, etc. However, this occurs at the expense of mountainous as well as inland Prefectures of mainland Greece. These areas are still characterised by a strong dependence on the primary sector and manufacturing, a relatively small presence of the tertiary sector and, finally, a lack of significant urban centres.

Therefore, GDP revision boosts even further the concentration of growth paradigm in Greece; namely polarisation. The Capital Region (Attica) appears to absorb the largest part of GDP increase, due to the intense tertiarisation of the economy and the strong presence of service industries. Evidently, even the largest part of the activities of the hidden and informal economy - which were attempted for the first time to be recorded and included in the revised GDP - are concentrated in the Metropolitan Region of Attica.

The Prefectures and Regions with strong orientation towards manufacturing (such as the Attica's neighbouring Prefectures of Viotia and Korinthia) still continue to maintain a GDP per capita higher than the national average. However, after the GDP revision, this gap has shrunk. A decline of per capita GDP, as compared to the national average, has, also, been noted in other areas with relatively strong orientation towards primary sector activities, namely agriculture, animal breeding, fishery, etc. (e.g. certain Prefectures in the island Regions of Crete and North Aegean).

Spatial disparities on inter-prefectural as well as inter-regional level appear strengthened after the recent GDP revision. All measuring indicators, which have been used, lead to this conclusion. Clearly, there is an increase in GDP distribution inequality in the country at prefectural as well as regional level. This is, also, supported by the results deriving from the calculation of the dispersion

of prefectural and regional per capita GDP from the national average, weighted by these spatial units' share in the country's total population, as shown by the use of the Weighted Coefficient of Variation (Williamson, 1965).

Based on the above, it becomes apparent that spatial disparities in the country should be a subject of systematic and continuous exploration. A detailed description and true knowledge of the situation, as well as of changes that occur in these disparities, constitute significant prerequisites for an efficient regional development policy and planning in Greece.

In this framework, the change in range and content of prefectural and regional inequalities, after the GDP revision, should lead to the necessary adjustment in the country's regional policy, as well as in the policy that refers to the National Strategic Reference Framework (ESPA) 2007-2013, which is implemented and co-funded by the EU and national state. At the same time, the impact of GDP revision on future EU cohesion policy on Greece should also be investigated (eligibility status in relation to the aims of Structural Funds).

In this direction, the possibility of redistributing resources for tackling inter-prefectural and inter-regional disparities should be explored in a systematic way, combined with the probable reorientation of spatial priorities in Greece. Finally, the reformation of sectoral and incentive policies and their adaptation to the new situation constitute two key issues, which should, also, be examined in depth.

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