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Cohesion Policy of the European Union and Parameterization of the Level of Development and Hysteresis of Regions

George N. Botzoris [1] Panagiotis D. Koudoumakis [2]

1. Democritus Thrace University, Department of Civil Engineering, Section of Transportation, Vas. Sofias 12, 67100, Xanthi, Greece, gbotzori@civil.duth.gr
2. Intermediate Managing Authority of Region of East Macedonia - Thrace, Irodotou 28, 69100 Komotini, Greece, pkoudoum@civil.duth.gr

Abstract
The European Union connects the level of development of regions and the intensity of economic funds distribution with Gross Domestic Product (GDP). At the same time it is recognized that the GDP cannot constitute an indicator of mapping out policy in all sectors. In the present paper, an indicator of hysteresis of regions is developed (Regions Hysteresis Index, RHI) based on the fact that it is proposed for the distribution of economic funds of National Strategic Reference Framework (NSRF) in the Greek regions in order to decrease harmoniously their hysteresis. Alternative solutions of distribution of economic funds are evaluated, as the Gross Domestic Product (GDP), the Indicator of Human Development Index (HDI), the Composite Index of Prosperity and Development (CIPD) and the Vulnerability Index (VI).
As the environment constitutes a pillar of Sustainable Development, the paper also presents a Regional Index of Environmental Deficiency (RIED) which can be used to determine the needs of regions in funds. The RIED methodology is considered to offer an efficient tool for rational decisions that will tend to balance the environmental inequalities among regions.
Keywords: European Union, regional development, sustainable development, hysteresis, inequalities, indicators of prosperity and development, environmental deficiency

1. The Cohesion Policy of the European Union

Regional disparities in economic output and income in the European Union (EU) are far more extreme than in similar economies such as the US or Japan, (Ezcurra *et al.*, 2005; Geppert & Stephan, 2008). The richest regions are eight times richer than the poorest regions. The primary dimension of regional income disparities in the EU remains East-West, with a weaker North-South dynamic and core-periphery pattern at both EU and national levels. The key cohesion challenge will therefore continue to be the integration and convergence of the EU member states, (Petrakos *et al.*, 2005).
The largest investment ever made by the EU will amount to some €350 billion (at current prices) and is designed to support regional growth and development and to stimulate job creation. During the period 2007-2013, the *European Regional Development Fund*, the *European Social Fund* and the *Cohesion Fund* will contribute to three objectives, (European Union, 2008a) (Table 1): 81.5% of the total amount will be concentrated on the convergence objective, under which the poorest member states and regions are eligible; in the remaining regions, 16.0% of the Structural Funds will focus on supporting innovation, sustainable development, better accessibility and training projects under the regional competitiveness and employment objective; the remaining 2.5% will be available for cross-border, transnational and interregional cooperation.
Global financial and economic turbulence adds a high degree of unpredictability about the future of the world economy. Thus, it is even more important to examine the extent to which European Community policies are adapted to future challenges that European regions will face in the coming years, and what the role of Community policies should be in responding to these challenges.

Table 1. Allocation of European Regional Development Fund, Cohesion Fund and European Social Fund by sector of intervention

Sector of intervention	European Regional Development Fund and Cohesion Fund	European Social Fund
Transport	28.3%	-
Research and technological development innovation and entrepreneurship	23.8%	0.1%
Environmental protection and risk prevention	18.7%	-
Investment in social infrastructure	6.2%	0.2%
Information society	5.6%	0.2%
Energy	4.0%	-
Urban and rural regeneration	3.8%	-
Technical assistance	3.0%	3.3%
Tourism	2.3%	-
Culture	2.2%	-
Strengthening institutional capacity at national, regional and local level	0.6%	2.7%
Improving access to employment and sustainability	0.4%	28.4%
Improving human capital	0.4%	32.9%
Increasing the adaptability of workers and firms, enterprises and entrepreneurs	0.3%	17.8%
Reduction of additional costs hindering the outermost regions development	0.2%	-
Improving the social inclusion of less-favoured people	0.1%	13.1%
Mobilization for reforms in the field of employment and inclusion	0.1%	1.2%

2. Current Indexes of Growth and Hysteresis Measurement

In order to measure the growth and hysteresis of areas, numerous indexes have been developed, four of which will be studied in this paper. Specifically, the Gross Domestic Product (GDP) is analyzed, as the well known and widely spread index of growth (Barrios & Strobl, 2009), which, despite the criticism (European Commission, 2009), still continues to be an indicator of prosperity and development in an area. Moreover, the Human Development Index (HDI) is also analyzed. It was developed by the United Nations (UN) and it is the only reliable and continuous effort to express growth by taking into consideration a wider spread of intervention than the one of economical growth, (UNDP, 2013).

In the Greek bibliography (Petrakos & Psicharis, 2004), the Composite Index of Welfare and Development (CIWD) has been developed as a means to express the growth and prosperity of the thirteen regions of Greece, (Figure 1). For the formulation of the CIWD twenty one variables of seven sectors are used. These include: economy, production structure, prosperity, human resources and employment, demographic conditions, attractivity, social and productive infrastructure.

The most recent effort to develop an index to measure the growth of hysteresis of an area is that of the Vulnerability Index (VI) of the European Commission (European Union, 2008b). For the formulation of the index four individual vulnerability indexes regarding the climatic changes, energy, globalization and demographic evolution are taken into consideration. The index is characterized by the high vulnerability it defines for the Greek regions, which are ordered, in a total of 267 regions, between the 8th (Islands of the Ionian) and the 62nd (Attica) place. Lastly, regarding the measurement of inequalities, the coefficient of variation (CV) is chosen, as it is calculated by the ratio of the average value to the standard deviation.

3. Development of Regions Hysteresis Indicator

The Regions Hysteresis Index (RHI) expresses the ratio by which the standard funds must be distributed amongst the thirteen regions of the country for the balanced reduction of their hysteresis. It is calculated as the average value of thirteen individual indexes for the formulation of which seventy one (71) variables are formulated and added. The Regions Hysteresis Index and the individual hysteresis indexes can take values from 0 to 100 and have no dimensions. A large (100) value of hysteresis index expresses high hysteresis, meaning a high need of funds distribution to counter the hysteresis. On the contrary, a small value (0) of hysteresis index expresses low hysteresis, thus a low need of funds distribution for the counter of hysteresis.

Figure 1. The thirteen administrative divisions (regions) of Greece

Generally, the variables chosen for the development of the individual hysteresis indexes express an unfavorable situation (i.e. inhabitants who are not served by waste processing facilities, who are unemployed, by the number of accidents, etc.) and consequently the sum of the normalized values also expresses an unfavorable situation. For the case that the use of variables that express a favorable status (i.e. number of visitors in museums and archaeological sites, productivity, beds of touristic facilities, GDP) was deemed necessary to formulate the hysteresis index the additional value of the normalized variable was taken into consideration, i.e. (1–normalized variable value). Furthermore, in some cases, the normalized value was weighted by a weight factor that expresses the intensity of hysteresis such as the percentage of workers or the size of the agricultural area. For the export of conclusions regarding the inequalities amongst the regions of the country, the Coefficient of Variation (CV) is evaluated. A large CV value expresses great inequalities amongst the regions of the country and vice-versa.

Regions Hysteresis Indicator is calculated as the average value of the following thirteen individual hysteresis indexes:

1. *Human Resources and Employment (XHUM)*. This expresses the ratio of funds distribution to counter unemployment. For its formulation, a number of factors are taken into consideration. These include the total number of unemployed people, long-term unemployed people, unemployed women, and the unemployed young and elderly. In addition, the population age group between 25 to 64 years old that do not participate in any educational program, the percentage of employees in the primary sector, the number of low-educated (mandatory and primary education) unemployed people and the unemployment rate are also taken into account.
2. *Competitiveness (XCOM).* This expresses the ratio of funds distribution for the strengthening of business productivity. For its formulation the productivity of the primary sector, the productivity of the processing, construction and trade industries, of hotels, restaurants, of transportation, storage and communication, of the intermediate financial organizations, of the real estate, the public domain and the domain of national defense are taken into consideration.
3. *Information and Communications Technologies (XICT)*. This expresses the ratio of funds distributed to improve accessing internet conditions and to increase its usage. For its formulation the number of households without internet access, the number of households without broadband connection, the number of individuals who did not have internet access and, finally, the number of people who have never used a computer are taken into consideration.
4. *Research and Innovation (XRDI).* This expresses the ratio of funds distribution for the growth of research and the funds occupied for research and innovation. For its formulation the Regional Synoptic Index of Innovation is taken into consideration, (European Commission, 2009).
5. *Education (XEDU).* Expresses the ratio of funds distribution for the development and upgrade of all

levels of education. For its formulation the number of students per elementary school, per secondary school, per high school, the number of students per teaching personnel of elementary, secondary and high school, the population aged from 5 to 19 that does not participate in primary or secondary education, the population aged from 20 to 24 that does not participate in tertiary education, the population aged from 25 to 64 that does not participate in any educational program are taken into consideration.

6. *Health – Providence (XHEL).* This expresses the ratio of funds distribution for covering needs in infrastructure and personnel in the field of health. For its formulation the number of inhabitants per doctor, per hospital bed, per pharmacy, the number of elderly people, the aging rate and the dependency rate are taken into consideration
7. *Tourism (XTOUR).* This expresses the ratio of funds distribution for the growth of touristic infrastructure and the cover of needs produced by the growth of tourism. For its formulation the number of beds of all facilities per 1,000 inhabitants, the average stay duration and the touristic intensity are taken into consideration.
8. *Culture (XCUL).* Expresses the ratio of funds distribution to promote the cultural heritage and the increase of visits. For its formulation the number of visitors and the income of museums and archaeological sites are taken into consideration.
9. *Local Road Network (XRDI).* This expresses the ratio of funds distribution for the construction of new roads and the upgrading and improvement of the safety conditions of the existing road network. For its formulation the length of the road network, the density of the road network, the number of vehicles per 1,000 inhabitants and, finally, the number of deaths and injuries due to traffic accidents per 1,000 inhabitants are taken into consideration.
10. *Environment (XENV).* Expresses the ratio of funds distribution for the protection of the environment. For its formulation the size of the protected area, the population density, the forest area, the deficit in water supply, the equivalent population that is not served by the waste processing facilities, the sum of the polluting load, the budget of construction works for the application of the regional waste management system and the number of cars are taken into consideration.
11. *Energy (XENE).* Expresses the ratio of funds distribution to cover the demand in electric power from renewable sources. For its formulation the total consumption of electric energy, the consumption of household energy per inhabitant, the balance of the electric energy, as defined by the difference between the consumption and the installed power, are taken into consideration.
12. *Rural Sector (XFRM)*, as the average value of the individual hysteresis indexes of agriculture (XAGR), livestock (XLIF) and fisheries (XFIS). Expresses the ratio of funds distribution to boost the productivity of the rural areas, of the livestock and of the fishery. For its formulation the productivity of the arable areas, of the vegetable growing land, of the vineyards and the raisin yards, of the tree-lined areas, the productivity of cow milk, of sheep milk, of goat milk, the production of meat and, finally, the productivity of fishery are taken into consideration.
13. *Special Territorial Areas (XSPA)*. Expresses the ratio of funds distribution to counter problems in less favored areas as well as in regions with high population concentration, such as conurbations. For its formulation the size of the less favourable areas, the density of the population and the urban population are taken into consideration.

In Table 2 the Region Hysteresis Index (RHI) for 2001 and for 2009 is presented. The evaluation of the results shows that in 2001 Attica has the highest hysteresis (RHI=59.5), whereas in 2009 Central Macedonia has the highest hysteresis (RHI=49.2). The lowest hysteresis is found for the year 2001 in the South Aegean, (RHI=30.4), whereas for the year 2009 in Epirus (RHI=27.6). The hysteresis of all Greek regions reduced by 11.4%, from RHI=499.0 in 2001 to RHI=442.1 in 2009. The coefficient of variation is also reduced by 6.1%, from CV=0.228 in 2001 to CV=0.214 in 2001, expressing in this way the reduction of inequalities of the regions during the period 2001-2009. During the same period of analysis, the biggest decrease of the Region Hysteresis Index is found in Attica (20.7%) and the smallest in the South Aegean (6.2%).

Table 2. Regions Hysteresis Indexes (RHI)

Regions	2001			2009			RHI change
	RHI	(%)	Rank	RHI	(%)	Rank	2001-2009
Total Greece	498.9	100.0%	-	442.3	100.0%	-	-11.40%
East Macedonia and Thrace	38.2	7.7%	6	34.6	7.8%	5	-9.50%
Central Macedonia	52.8	10.6%	2	49.2	11.1%	1	-6.90%
West Macedonia	32.4	6.5%	10	27.7	6.3%	12	-14.60%
Thessaly	39.4	7.9%	4	32.1	7.3%	7	-18.50%
Epirus	31.7	6.4%	11	27.6	6.2%	13	-13.10%
Ionian Islands	32.9	6.6%	8	29.9	6.8%	8	-9.20%
Western Greece	36.4	7.3%	7	33.3	7.5%	6	-8.70%
Central Greece	42.1	8.4%	3	39.4	8.9%	3	-6.40%
Peloponnesus	38.6	7.7%	5	36.1	8.2%	4	-6.40%
Attica	59.5	11.9%	1	47.1	10.7%	2	-20.70%
North Aegean	31.6	6.3%	12	28.3	6.4%	11	-10.40%
South Aegean	30.4	6.1%	13	28.6	6.5%	9	-6.20%
Crete	32.9	6.6%	9	28.4	6.4%	10	-13.90%
Average value	38.4			34			-11.10%
Typical deviation	8.8			7.3			4.70%
Highest value	59.5			49.2			-6.20%
Lowest value	30.4			27.6			-20.70%
Maximum / Minimum	2			1.8			0.3
Coefficient of variation	0.228			0.214			-0.427

4. Evaluation of the Growth and Hysteresis Indexes and Application for the Funds Distribution of Community Structural Funds

4.1 Distribution of the 3rd Community Structural Funds

Data for 33.264 regional projects (29.93 billion € budget) that was implemented by the 3rd Community Structural Funds (CSF), has been collected, (Koudoumakis, 2010). The data approached the final implementation of the 3rd CSF for the Regions of the country, as 31/12/2009 was the deadline for the eligibility of all operational programs. In the region of Attica, a total of 4,567 projects were implemented (5.80 billion €), whereas in the Ionian Islands 1,641 projects of a 0.90 billion € budget, thus 6.5 times less funds. In Attica and Central Macedonia 9.9 billion € or 36.7% of the 3rd CSF funds was distributed followed by Crete in which 2.2 billion € were distributed or 8.1% of the 3rd CSF funds.

The regional scope actions were grouped i) by Barrier category of intervention (European Council, 2002) and ii) by Region, in 13 individual sectors of intervention, as the individual hysteresis indexes, (Table 3). The evaluation of the results shows that in the sector of strengthening competition, that includes major investment plans of developmental laws and generally state aids, the majority of the funds were distributed (4.55 billion € or 16.9% of the 3rd CSF). Significant aid is also shown in the sector of human resources growth and employment (4.09 billion € or 15.2%) and the protection of the environment (4.06 billion € or 15.1%). The sector of education comes next with 3.14 billion € (11.7%) and the actions for the upgrade of the local road network with 2.71 billion € (10.3%). The lowest financial aid was given to the energy section with 117 million € (0.43%) and the sector of the growth of research and innovation with 513 million € (1.9%).

Table 3. Budget of Regional Projects per Sector of Intervention

	Sector of Intervention	Budget of Regional Projects		
		(€)	(%)	Rank
1	Human Resources and Employment	4,091,805,783	15.2%	2
2	Competitiveness	4,551,912,457	16.9%	1
3	Information and Communications Technologies	1,476,551,269	5.5%	7
4	Research and Innovation	513,907,712	1.9%	12
5	Education	3,143,749,956	11.7%	4
6	Health – Providence	832,572,016	3.1%	10
7	Tourism	740,078,184	2.7%	11
8	Culture	1,052,393,227	3.9%	8
9	Local Road Network	2,765,848,059	10.3%	5
10	Environment	4,059,895,787	15.1%	3
11	Energy	116,898,339	0.4%	13
12	Rural Sector	2,715,439,662	10.1%	6
13	Special Territorial Areas	869,825,865	3.2%	9
	Total	26,930,878,315	100.0%	-
	Average value	2,071,606,024		
	Typical deviation	1,544,480,708		
	Highest value	4,551,912,457		
	Lowest value	116,898,339		
	Maximum / Minimum	38.9		
	Coefficient of variation	0.746		

4.2 Regression of the Region Hysteresis Index (RHI) and the funds of the 3rd CSF

The evaluation of the regression of the funds, that were driven by the 3rd CSF to the Greek regions, and of the Region Hysteresis Index (RHI) in 2001 shows a robust linear regression ($R^2 = 0.875$), (Figure 2). It is estimated that the reduction (11.4%) of the hysteresis on the sum of the regions of the country in the period 2001-2009 and the reduction (6.1%) of the inequalities, as defined by the Coefficient of Variation (CV), are owed to the powerful regression of hysteresis and funds distribution.

According to the implemented funds distribution, 5,184€ corresponds to every inhabitant of the North Aegean, whereas in Attica 1,499€ (3.5 times less funds). According to the calculated funds distribution based on the value of the Region Hysteresis Index (RHI) in 2001, in Attica 3.21 billion € should be distributed and in the South Aegean 1.64 billion €. In that case, for every inhabitant of the Ionian Islands corresponds to 8,750 € and in Attica 824 €, thus 10.3 times less funds.

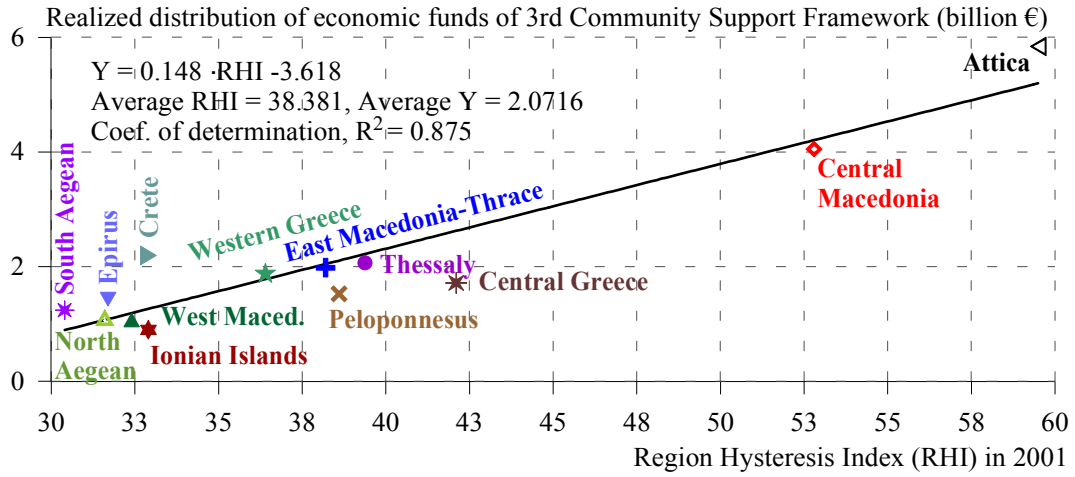

Figure 2. Regression of the realized funds distribution by the 3rd CSF and Region Hysteresis Index (RHI)

4.3 Evaluation of the Hysteresis Indexes

The four existing growth and hysteresis measurement indexes are evaluated, as well as the Region Hysteresis Index (RHI) that was developed on the frame of this paper. The evaluation is based on the application of five (5)

criteria, regarding:

i. *Capability to determine the distribution of economic funds*. For the application of this criterion, we consider the absolute value of the coefficient of linear regression of the Index with the realized funds distribution of the 3rd CSF. It takes values from 0 when the coefficient of linear regression approaches 0 (which represents a weak regression between hysteresis and distribution of economic funds) to 100 when the coefficient of linear regression takes values close to 1 (which means there is a strong regression between deficiency and distribution of economic funds). A 50% weight is applied to this criterion.

ii. *Change of the hysteresis*. For the application of this criterion, we consider the percentage of the hysteresis change, in all Greek regions for the period 2001-2009. It takes values from 0, when hysteresis increases, to 100, when hysteresis is reduced. A 15% weight is applied to this criterion.

iii. *Change of the inequalities*. For the application of this criterion, we consider the percentage of the change of the inequalities of the Greek regions for the period 2001-2009, as it is identified by the change of the coefficient of variation CV. This criterion takes values from 0, when the inequalities increase, to 100, when the inequalities are reduced and a 15% weight is applied to this criterion.

iv. *Representation*. This criterion assesses the number of variables that participate in the formulation of each Index. It takes values from 0, when the index has the smallest number of variables, to 100 when the index has the biggest number of variables. A 15% weight is applied to this criterion.

v. *Ease of formulation*. A quality criterion that expresses the degree of easiness of the index formulation. Data availability, processing time needed and other factors are taken into consideration. It takes values from 0, when the index is hard to formulate, to 100 when the index is easy to formulate. A 5% weight is applied to this criterion.

The results of the application of the above evaluation criteria are show in Table 4. The biggest score is taken by the Region Hysteresis Index (RHI) with 81 points, which was developed in this paper. The second place is taken by the Hysteresis Index of Composite Index of Welfare and Development (HICIWD) with 62 points and in the third place the Hysteresis Index of Vulnerability Index (HIVI) with 45 points, despite the fact that the criteria B and C, regard the change of the hysteresis and the inequalities, was not ranked due to lack of available data. The Hysteresis Index of Gross Domestic Product (HIGDP) is in 4th place with 36 points and in the last place the Hysteresis Index of Human Development Index (HIHDI) with 25 points.

Table 4. Application of the Evaluation Criteria of the Hysteresis Indexes for the Distribution of Economical Funds

Evaluation criteria		Region Hysteresis Index (RHI)		Hysteresis Index of Gross Domestic Product (HIGDP)		Hysteresis Index of Human Development Index (HIHDI)		Composite Index of Welfare and Development (HICIWD)		Hysteresis Index of Vulnerability Index (HIVI)	
		Value	Rating[1]	Value	Rating	Value	Rating	Value	Rating	Value	Rating
A	Ability to define the distribution of economic funds	0.935	50	0.494	24	0.0936	0	0.835	44	0.782	41
B	Hysteresis change	-11.40%	1	-25.40%	7	-46.70%	15	-7.60%	0	n.a.	
C	Inequalities change	-6.10%	15	96.20%	0	57.30%	6	19.30%	11	n.a.	
D	Representativity	71	15	1	0	3	0	21	4	5	1
E	Easiness of formulation	0	0	100	5	80	4	50	3	60	3
Total Rating			81		36		25		62		45

[1] The rating of the evaluation criteria is the standarized value of the criteria weighted with the Gravity Coefficient (GC) of the criteria. Rating = $[100 \times (VALUE_i - VALUE_{min}) / (VALUE_{max} - VALUE_{min})] \times G.C.$

4.4 Proposal of Distribution of the Funds of National Strategic Reference Framework (NSRF) and Evaluation of the 3rd CSF Funds Distribution

The funds of NSRF for the period 2007-2013, will be directed for the implementation of regional actions and projects are about 23.949 billion €. Their distribution per region is not known beforehand. Considering the results of the evaluation of the Hysteresis Indexes, it is suggested, (Figure 3), their distribution per region should be done proportionally with the value of the Region Hysteresis Index (RHI) in 2009.

According to the proposal of the present study, most funds of the NSRF distribution are directed in Central Macedonia. 2.663 billion €, whilst the least funds are directed in Epirus, 1.494 billion €. Most funds per capita are

directed in the North Aegean (7,652 €) and the least in Attica (652 €), changing the rate of the maximum to the minimum value to 12.3. Moreover, it is significant that if the 3rd CSF funds distribution was done according to the value of the Region Hysteresis Index (RHI) in 2001, in Attica it would be distributed 3.21 billion € instead of the current 5.84 billion € and in the Ionian Islands 1.77 billion € instead of 0.90 billion €.

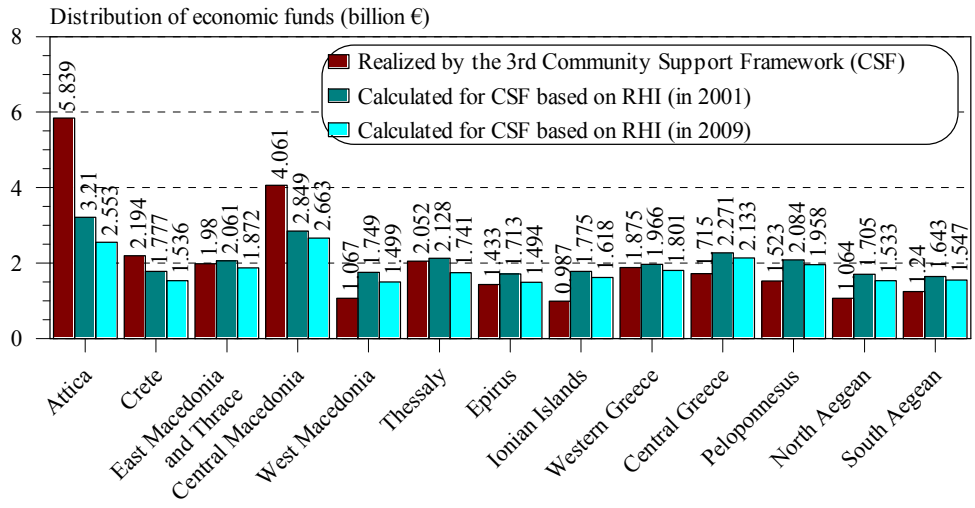

Figure 3. Funds distribution as implemented by the 3rd CSF and as calculated by the Region Hysteresis Index (RHI) in 2001 and 2009

4.5 The Regional Index of Environmental Deficiency (RIED)

The environment constitutes the background of public health and standard of living of citizens. At he same time it constitutes also a pillar of Sustainable Development (as opposed to Growth), which includes environmental, societal and economic values. In the last three decades, public demands for upgraded quality of the urban environment and simultaneously for the protection of the natural environment are continuously more imperative. Accordingly the need for urban environmental infrastructure has increase. New institutions and legislature for the protection of the natural environment, as a reserve of environmental capital and biodiversity have been created.

Given the significant Community resources available for Greece via the EU structural funds and the up-to-date results of projects financed by these resources to protect the environment, a specific need emerges: to balance the environmental inequalities among Regions by developing an suitable indicator, named Regional Index of Environmental Deficiency, or RIED, which will be applied for the allocation of resources to the regions of the country, (Koudoumakis *et al.*, 2011).

The assessment of regional conditions in the sector of the environment is based on: 1) the extent of protected areas, 2) population density 3) the area of forest lands, 4) the adequacy of water supply, 5) the population not served by wastewater treatment plants, 6) the total waste load that includes BOD, total suspended solids, total nitrogen and total phosphorus, 7) the budget required for the management of solid waste and 8) the overshooting of ecological capacity, and 9) the number of passenger cars. RIED measures the need for allocation of resources for environmental protection among the regions of the country.

RIED values are presented in Figure 4, for all regions of Greece in 1991, 2001 and 2009 as the average value of standardized values for the above-mentioned nine (9) variables. The results indicate that Attica for all three years of interest, 1991, 2001 and 2009, presents the maximum deficiency, with RIED=65.3, 67.9 and 56.4 respectively. More specifically, Attica presents the highest need for potable water, for wastewater treatment and for atmospheric pollution abatement due to urban traffic. In Thessaly has the highest need for the protection of biodiversity in protected areas, while Central Macedonia requires the highest allocation of resources for solid waste management. Ionian Islands has the smallest values of RIED for all three years of interest.

The overall RIED for all regions of the country decreases from 359.9 in 1991 to 351.6 in 2001 (by 2.3%) and to 320.5 in 2009 (by 8.9%). The coefficient of variation (CV) increases from 0.531 in 1991 to 0.568 in 2001 (by 7.0%) and decreases to 0.511 in 2009 (by 10.0%) expressing thus the increase of regional inequalities in the period 1991-2001 and the reduction of them in the period 2001-2009. Largest decrease of the RIED (11.5%) for the period 1991-2001 is recorded in Peloponnese while largest increase (3.9%) in Attica.

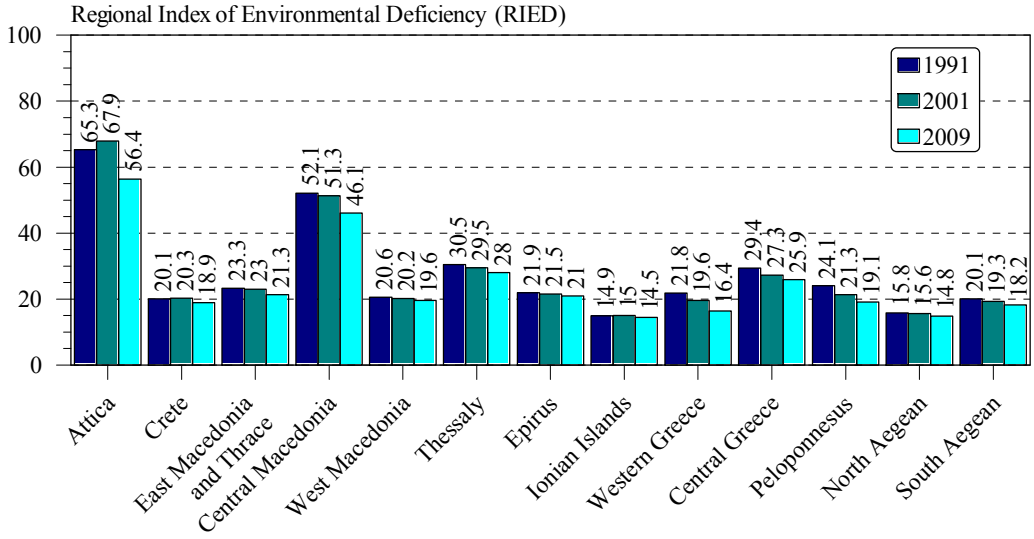

Figure 4: Regional Index of Environmental Deficiency (RIED) values for the years 1991, 2001 and 2009.

5. Conclusion

The Greek economy has been in recession since 2008. In 2011, real GDP contracted substantially more than in 2010, falling by -7.1%. Despite continued economic growth until 2008, disparities within and among Greek regions remain pronounced. In fact, figures regarding the average GDP per capita for the period 2007-2009 of the thirteen Greek regions in comparison with the EU average demonstrate significant divergences. Preliminary figures for 2010 show that the disparity among regions has further deteriorated and that the average per capita GDP has continued to fall dramatically across the country. There are serious structural challenges that need to be addressed nationally and trans-nationally to make the Greek economy more sustainable and inclusive. The lack of an efficient public administration and a modern, flexible and competitive business-friendly environment prohibits growth and job creation.

For the most effective use of the community and national economical funds, a targeted, needs related funds distribution is required. The common indexes which are used for the calculation of the growth and hysteresis of the regions are not related to specific decisions but remain on the hierarchical ranking of the regions, according to the level of their growth or hysteresis. In this paper, the Region Hysteresis Index (RHI) is developed, which calculate how exactly the distribution of the available economical funds should be allocated amongst the regions, for the achievement of a balanced reduction of hysteresis.

According to the Region Hysteresis Index (RHI) in 2001, Attica shows the greatest hysteresis, whereas in 2009 the greatest hysteresis recorded in Central Macedonia. The smallest hysteresis in 2001 is recorded in the South Aegean whilst in 2009 in Epirus. The hysteresis in all the regions of the country is reduced from 2001 to 2009 by 11.0% and the coefficient of variation is reduced by 6.1% expressing the reduction of the inequalities of the regions of the country in the period 2001-2009.

Seven individual sectors are distinguished (Tourism, Agriculture, Culture, Local Road Network, Livestock, Special Territorial Areas and Energy) in which the distribution of funds in the regions of country was done without taking into consideration the needs and the reduction of hysteresis that was achieved, is characterized as marginal. Moreover, in the sectors of Health–Providence and Fishery, the funds distribution is not satisfactorily related with the defined need of the regions. It is estimated that if the 3rd CSF funds distribution had been done in the above sectors based on the individual hysteresis indexes, the total reduction in the hysteresis of the regions would be more than 20.0% instead of 11.4% calculated in this paper.

A serious lack of data was noted in sectors such as Environment, Accessibility, Research and Innovation which absorb more than 50% of the economical funds. An improvement in the monitoring of the impacts by the implemented interventions in the above mentioned sectors is suggested, thus representing a fundamental prerequisite for regional policy planning.

It is estimated that the Region Hysteresis Index (RHI) can contribute to more effective distribution and use of economic funds thus contributing to tackling the financial crisis, better preparation for the planned period 2014-2020 where the inflow of funds will be directly linked to the achievement of certain goals (NSRF, 2012), and a vital tool for decision making for the funding of projects at a local level.

The paper also presents a Regional Index of Environmental Deficiency (RIED) which can be used to determine the needs of regions in funds. RIED was calculated for the 13 Regions of Greece as the average value of nine

normalized individual indicators of environmental characteristics. The RIED methodology is considered to offer an efficient tool for rational decisions that will tend to balance the environmental inequalities among regions.

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