

Dimaki, Katerina; Angelis, Vasilis; Gaki, Eleni

Conference Paper

Regional Development and Income Distribution The Case of Greece

50th Congress of the European Regional Science Association: "Sustainable Regional Growth and Development in the Creative Knowledge Economy", 19-23 August 2010, Jönköping, Sweden

Provided in Cooperation with:

European Regional Science Association (ERSA)

Suggested Citation: Dimaki, Katerina; Angelis, Vasilis; Gaki, Eleni (2010) : Regional Development and Income Distribution The Case of Greece, 50th Congress of the European Regional Science Association: "Sustainable Regional Growth and Development in the Creative Knowledge Economy", 19-23 August 2010, Jönköping, Sweden, European Regional Science Association (ERSA), Louvain-la-Neuve

This Version is available at:

<https://hdl.handle.net/10419/119178>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

Regional Development and Income Distribution
The Case of Greece

Katerina Dimaki¹, Vasilis Angelis², Eleni Gaki²

¹Department of Statistics
Athens University of Economics and Business
76, Patission str., 10434 Athens, Greece
dimaki@aueb.gr

²Quantitative Methods Laboratory
Department of Business Administration
University of the Aegean,
8, Michalon str., 82100 Chios, Greece
v.angelis@aegean.gr, e.gaki@aegean.gr

ABSTRACT

The distribution of income has always been a main concern of economic theory and policy. Classical economists were concerned with the distribution of income between the main factors of production, land, labour and capital. Modern economists, on the other hand, are concerned with the distribution of income across individuals and households. Furthermore, the unequal distribution of personal income and wealth is one of the most prominent features of our society and one which has a profound effect on economic and social relationships. The theoretical aspects of income distribution and a number of income inequality measures have been presented in some previous work (Dimaki et al. 2001).

In this paper we focus on income inequality at a regional level. Almost all countries face regional disparities, due to a variety of reasons, historic, socioeconomic, structural and geographic, leading to a number of adverse consequences for the less favored regions. Hence, Governments take certain alternative measures to alleviate those disparities and assist the less developed regions.

Our objective in this paper is to:

- Define a measure expressing a region's current state of development and future prospects.

- Assess the changes in that measure over time, resulting from both endogenous development and the implementation of alternative state measures for its improvement.
- Relate the changes in that measure to the respective changes in the regional income inequality measures over the same period of time.

The theoretical findings will be applied to the case of Greek regions over a period of time and the results will be presented and critically discussed.

Keywords: Income Distribution, Income Inequality, Regional Development

1. Introduction

Greece is a country with noticeable regional disparities. Those disparities are due to a number of reasons, historic, socioeconomic, structural and geographic, and create a series of adverse consequences such as over congestion and environmental degradation in big urban areas and depopulation, unutilized resources, low income and unemployment in rural areas. The need to bridge inequalities between Greek regions has been the focus of all regional policies implemented in Greece over the last 40-50 years. The main objectives of those policies were to limit further concentration of economic activities and population in large urban areas and ensure a well-balanced growth of all regions. Towards this end, regions were classified in various groups on the basis of their state of development. Within this framework, large amounts of money have been spent to improve the infrastructure of less developed regions and to provide financial incentives to industries and employees so as to move into those regions. However the results of those measures have been rather poor and the main reason for that were that the policies employed were ill-designed and addressed to regions unprepared to take full advantage of them.

After this brief introduction, section 2 outlines the regional policies implemented in Greece over the last 40-50 years, discusses their relative ineffectiveness and suggests that a first step towards improving this situation would be to define a measure giving the true picture of the region and the prospects of its sustainable development. Section 3 introduces Basic Image, i.e. a measure of the region's present state and prospects of future development, and suggests ways of measuring it. Section 4 applies the theoretical finding for the case of Greece and correlates the values of that measure with the values of regional income. Finally, section 5 summarizes the main conclusions and makes suggestions for further research.

2. Regional Policy in Greece

The need to bridge regional disparities between Greek regions has led Greek governments to adopt and implement a variety of measures. A brief outline of the measures taken over the last 40 to 50 years is given below.

During the 1970s the small handicraft and agricultural enterprises, which had been created in the years leading up to the 70s, grew, whilst in structure and operation they began to adjust to European standards. At the same time, the first industries appeared and the first industrial regions were established. Apart from tax reduction, other financial incentives were also used such as low-interest

loans, grants and subsidies. The basic innovation from 1971 onwards was that regional development legislation was enacted and the incentives included therein referred to specific Greek prefectures, which were classified into five zones according to their level of development. The most significant legislation in that decade was Act 289/1976, which specifically addressed the economic development of the Greek border prefectures i.e. Thrace, the Eastern Aegean islands and the Dodecanese. This piece of legislation was subsequently extended to include agriculture, stock breeding and the breeding of poultry and game birds, whereas the next Act 849/1978 ranked the sectors of the Greek economy into three categories, on the basis of their need for high, moderate or low support. The high risk, high technology sector was placed in the first category; the core industrial sectors were placed in the second category and the traditional sectors that can operate with minimal or no support were placed in the third category.

During the 1980s, the incentives policy and the legislation for development assumed a definite direction and structure. The legislation became robust and concerned with reinforcing the existing institutional framework. Its main innovation was the establishment of a different framework of incentives for tourism and its extension so as to cover new production sectors like informatics and software. The basic law in this decade was Act 1262/1982, which was later amended and completed by Acts 1360/83, 1563/85 and 1282/87. In contrast to Act 289/1976, the above mentioned laws cover all the Greek prefectures and the development incentives used were grants, loans, subsidies, legal reductions and high depreciations (Doumi, 2006). This set of measures was considered to be a driving force in promoting a faster implementation of the economic and social decentralization and a more rational distribution of economic activities within Greece. Furthermore, these measures were meant to incorporate decentralization and transparency in the procedures used for the approval of subsidies and the determination of their amount pertaining to various activities and regions.

Legislation in the 1990s introduced various examples of specialisation concerning economic activities. The most significant law in this decade was Act 1892/1990, which concerned renovation or conversion of traditional buildings, informatics, tourism and hotel business, manufacturing, exploitation of therapeutic springs (spas), stock breeding, agriculture and fish-farming etc. The incentives provided by this law were in line with the incentives of Act 1262/1982, i.e. grants, loan subsidies, tax reductions and high depreciations.

The next law (Act 2008/92) adjusted the use of incentives so as to attract productive investment in the border regions. In addition to that, Act 2093/92 made several provisions for indirect taxation. Subsequent legislation (Act 2234/1994) was intended to reform previously enacted legislation (Act 1892/1990). It aimed to increase the international competitiveness of the Greek economy, create permanent jobs, balance regional development and protect the environment. In short, the provisions of

this legislation aimed to assist private investment, to promote the adoption of new technology in the production process, to provide every means of technical support to all businesses, to support long-term business planning and to cooperate more closely with any relevant organisation, involved in economic planning. Finally, Act 2601/1998 was the latest in a series of development laws enacted in order to promote private investments, increase employment, improve competitiveness and protect the environment. This law has many points in common with Act 1892/1990. On the other hand their main differences are to be found in the process of approving financial assistance and in the replacement of grants with subsidies and tax reductions. The objectives of Act 2601/1998 were to contribute to meeting regional development targets, to boost employment, to reform production sectors, to make full use of domestic and international business opportunities and to contribute to environmental protection and energy preservation. The incentives used were similar to those that came under the previous law, i.e. grants, loan interest subsidies, leasing subsidies, tax breaks and other special incentives. Furthermore, specific combinations of the above incentives were also used i.e. a first package included grant and loan interest subsidy and leasing subsidy, whereas a second package consisted of tax cuts and loan interest subsidy.

The legislation in the 2000's continues along the same lines as before and the emphasis was placed on measures taken to protect the environmental.

Looking back at the measures presented above, we may say that their overall effectiveness has been rather limited. The reason for that is obvious. The effectiveness of this type of measures presupposes that the regions themselves have development perspectives (Romer, 1986). However, the majority of Greek prefectures in need for such measures did not have the mechanisms required to take the full advantage of the benefits offered. Hence, the effects of those measures were in the best of the cases doubtful and short lasting. A first step towards improving this situation would be to define a measure giving the true picture of the region and its prospects for sustainable development. Hence, the next section introduces Basic Image, i.e. a measure of the region's present state of development and future prospects and suggests ways of measuring it.

3. The concept of Basic Image

The growth or decline of a region depends on its power to "pull" and "retain" business activities but also the right blend of people to run them; this pulling power depends on what we call the Image of a region. At each point in time the region «sends out» its Image and depending on its impact on the people (both employers and employees) the area may be considered as Attractive or Repulsive.

However, one may argue that since people «receiving» the Image of a region belong to various distinct groups (i.e. employers, professionals, unskilled workers, skilled workers etc.) and are sensitive to different factors; the impact of the region's Image on the members of each particular group will be different. Whilst this is plausible, empirical evidence suggests that all groups of potential movers react similarly to a basic set of factors; more precisely, a set of minimum standards, largely common to all groups, must be satisfied if the region is to be considered as a potential choice by any of them. To reconcile these two views we refine the concept of a region's Image by introducing the following two concepts *Basic Image and Specific Image* (Angelis, 1981).

The Basic Image of a given region measures the degree to which this region satisfies a set of basic criteria, common for all movers. A region satisfying those criteria is considered, by all potential movers, as worth a closer examination and a potential final choice.

The Specific Image of a given region, as perceived by a particular group of potential movers, measures the degree to which movers belonging to that particular group consider this region as their best final choice.

At this point it should be mentioned that the growth or decline of a region may be expressed both in absolute or relative terms. In the latter and most interesting case the development pattern of a given region is compared to that of a hypothetical region, which is referred to as the "typical" region and expresses, as far as possible, an average of the main areas of a similar type to that of the study. In this paper we shall be looking at the relative development patterns of a region. Hence, all the factors affecting its images (Basic and Specific) should be expressed in relative values as compared to the corresponding values of the "typical" region.

2.1. The Concept of Basic Image

The concept of Basic has been discussed in full detail in some earlier papers (Angelis, 1990; Angelis and Dimopoulou, 1991). Summarising the main findings about Basic Image (*BI*) we could say it may be expressed as a multitude of factors (Cullingworth, 1969; Hunter and Reid, 1968; Rhodes and Khan, 1971; Townroe, 1971, 1979). Furthermore, those factors may be divided into two groups according to which of the two conflicting functions of a region, economic or social, they concern. The factors of the first group (*Accessibility to Centers of Influence, Land Availability, Financial Conditions*) properly quantified and scaled, define three respective multipliers, which in turn provide a measure of the region's economic potential. This measure is referred to as **Economic Indicator** and it is defined as follows:

$$EI = \sqrt[3]{LOCM * LAVM * FCM}$$

where

<i>EI</i> :	Economic Indicator
<i>LOCM</i> :	Location Multiplier
<i>LAVM</i> :	Land Availability Multiplier
<i>FCM</i> :	Financial Conditions Multiplier

The three multipliers are presented below:

The **Location Multiplier** expresses the proximity of a region to influence centers i.e. raw material sources, markets, administration centers and industrial clusters. It is a function of distance/transportation cost between the region and the main influence centres. Spatial discontinuity is also taken into account.

The **Land Availability Multiplier** expresses the availability of land which may be required to accommodate a region's expansion. It is a function of the region's population density. Local regulations for land use may also be taken into account whenever this is necessary.

The **Financial Conditions Multiplier** expresses the economic conditions prevailing in the region and somehow reflects the standard of living of its inhabitants. It is a function of the region's GDP per capita.

Similarly, the factors of the second group (*Housing Conditions, Environmental Conditions, Social Conditions*) properly quantified and scaled define three respective multipliers which in turn provide a measure of a region's social potential. This measure is referred to as **Social Indicator** and it is defined as follows:

$$SI = \sqrt[3]{HCM * ECM * SCM}$$

where

<i>SI</i> :	Social Indicator
<i>HCM</i> :	Housing Conditions Multiplier
<i>SCM</i> :	Social Conditions Multiplier
<i>ECM</i> :	Environmental Conditions Multiplier

The three multipliers are presented below:

The **Housing Conditions Multiplier** expresses the availability and quality of the region’s housing stock. It is a function of the ratio of houses over the population as well as of the ratio of new houses in the region’s total housing stock.

The **Social Conditions Multiplier** expresses the level of health and education services provided in the region. It is a function of the ratios of doctors, hospital beds, teachers and classrooms, respectively, over the population.

The **Environmental Conditions Multiplier** expresses the quality of the environment of the region. It is a function of the ratio of energy used for industrial purposes over the total energy used and the ratio of the number of cars over the population.

Having defined the two indicators, we can now go on to define the Basic Image as a function of them. Hence,

$$BI = \varphi(EI, SI)$$

where

- BI* : Basic Image
- EI* : Economic Indicator
- SI* : Social Indicator

The expression of the Basic Image as a function of those two Indicators is not accidental; on the contrary, it is consistent with the concept of a region as a socio-economic unit. The main advantage of such an expression is that it may be used to underline and eventually describe, the basic conflict that characterises the development of a region (Perloff and Wingo, 1971; Zolotas, 1981).

Furthermore, there seems to be evidence to suggest that the Basic Image function is non-linear and its graph discontinuous. To study this function, Catastrophe Theory has been employed, a general mathematical theory, which is particularly applicable in cases where continuous underlying forces result in discontinuous and divergent phenomena. The theory is derived from topology and classifies the ways in which discontinuities may occur in terms of a few archetypal forms called elementary catastrophes. Although the underlying mathematics are difficult, the elementary catastrophes themselves are relatively easy to understand and can be used profitably even by non experts on the subject (Thom, 1975; Zeeman, 1973, 1977).

Table 2.1 summarizes the elementary catastrophes in the case where a process is expressed through one behavior variable depending on one up to four control variables In the case of a process, for

example, whose behavior depends on two control variables it is sufficient to know that a theorem exists giving the qualitative shape of a 3-dimensional surface which shows all possible ways in which a discontinuity in the behavior may occur. The two control variables are usually referred to as normal and splitting factor respectively and the three dimensional surface as the Cusp Catastrophe Surface.

Table 2.1. Some Elementary Catastrophes

Number of Behavior Variables	Number of Control Variables	Type of Catastrophe
1	1	Fold
1	2	Cusp
1	3	Swallowtail
1	4	Butterfly

Returning to the present case, it is reminded that the Basic Image of a region has been defined as a function of two conflicting indicators. Hence, according to Catastrophe Theory, the value $BI = i$, of a region's Basic Image, at each point in time, is given as a solution of the equation

$$i^3 - bi - a = 0 \tag{2.1}$$

with

$$\begin{cases} a = m(a - a_0) + (\beta - \beta_0) \\ b = (a - a_0) - m(\beta - \beta_0) \end{cases} \text{ if } m \leq 1 \text{ (i.e. } \theta \leq 45^\circ) \quad \text{and}$$

$$\begin{cases} a = (a - a_0) + (1/m)(\beta - \beta_0) \\ b = (1/m)(a - a_0) - (\beta - \beta_0) \end{cases} \text{ if } m > 1 \text{ (i.e. } \theta > 45^\circ)$$

Equation (2.1) is referred to as the Basic Image Equation and its graph is qualitatively equivalent to the Cusp Catastrophe Graph (Figure 2.1.).

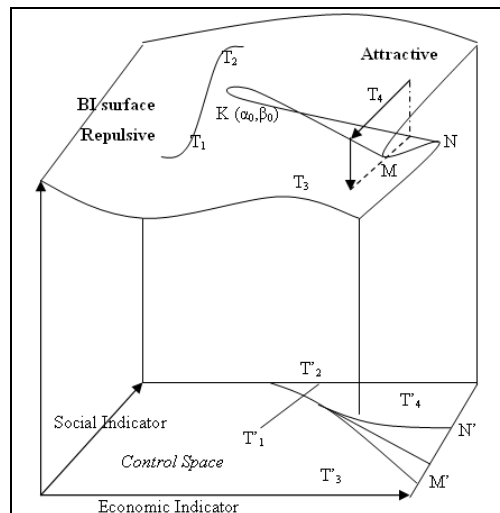


Figure 2.1. The Cusp Catastrophe graph in the case of Basic Image

The variables α , β express the values of the given region's Industrial and Social Indicator respectively, while α_0 , β_0 , express the values of those two Indicators for the "typical" region. The point (α_0, β_0) corresponds to the vertex of the cusp, while $m = \tan \theta$ represents the slope of the cusp axis and expresses the relative weights attached to each one of the two indicators in defining the Basic Image.

2.2. The Concept of Specific Image

Having defined a region's Basic Image and having suggested ways of measuring it, we may now go on to define the region's Specific Images for the various groups of potential movers. The concepts of Specific Images have been discussed in full detail in some previous papers (Angelis, 1990; Angelis and Dimopoulou, 1991). Summarizing the main findings we could say that the Specific Image, as perceived by a group of potential movers, may be expressed as a function of the region's Basic Image and certain specific factors relevant to this particular group. The two main groups of potential movers are industries and employees. Furthermore, if needed, industries may be classified into several subgroups i.e. new, mature and declining and the same goes for employees who may be subdivided into professionals, skilled workers and unskilled workers. However, for the purposes of this work, we will limit our analysis to the two basic groups, industries and employees.

2.2.1. Specific Image for Industries

Specific Image for Industries is expressed as a function of four multipliers, corresponding to the region's Basic Image and the three major factors affecting this Specific Image, i.e. Labor Availability, Labor Quality and Financial Incentives for Industries. Those four multipliers are discussed below:

The **Basic Image Multiplier** expresses the effect of the region's Basic Image on its Specific Image for industries. It is a function of the Basic Image value as it has already been defined.

The **Labor Availability Multiplier** expresses the region's availability of labor. For the purposes of this work, labor availability for each group of active employees is measured as the ratio of the total number of economically active persons belonging to that group over the number of jobs available for them. Labor Availability Multiplier is a weighted average of all those ratios.

The **Labor Quality Multiplier** expresses the quality of labor in the region. For the purposes of this work, we consider that a region's quality of labor depends on the synthesis of its workforce. Hence, for each group of active employees we calculate the ratio of employees belonging in this group over the total number of active employees. Labor Quality Multiplier is a weighted average of all those ratios.

The **Financial Incentives for Industries Multiplier** expresses the power of the incentives used to attract industries into a specific region. Experience has shown that the most frequently used financial incentives are low interest loans, subsidies, grants and tax reductions. For the purposes of this work, we consider that the effectiveness of an incentives' package depends on the benefits offered by them. Hence, the Financial Incentives for Industries Multiplier is a weighted average of the various types of incentives used and their benefits.

On the basis of all the above, the Specific Image of a region, as perceived by Industries, may be expressed as a function of four multipliers as follows:

$$SPIMI = \sqrt[4]{BIM * LBAVM * LBQLM * FINIM}$$

where

<i>BIM</i> :	Basic Image Multiplier
<i>LBAVM</i> :	Labor Availability Multiplier
<i>LBQLM</i> :	Labor Quality Multiplier
<i>FINBM</i> :	Financial Incentives for Industries Multiplier

2.2.2. Specific Image for Employees

Specific Image for Employees is expressed as a function of four multipliers, corresponding to the region's Basic Image and the three major factors affecting this Specific Image, i.e. Job Availability, Job Prospects and Financial Incentives for Employees. Those four multipliers are discussed below:

The **Basic Image Multiplier** expresses the effect of Basic Image on the region's Specific Image for employees. It is a function of the Basic Image value as it has already been defined.

The **Job Availability Multiplier** expresses the availability of jobs in the region. For the purposes of this work, the job availability for each group of active employees is measured as the ratio of the total

number of jobs available for each group over the total number of economically active persons belonging to that group. Job Availability Multiplier is a weighted average of all those ratios.

The **Job Prospects Multiplier** expresses the job prospects in the specific region. For the purposes of this work, we consider that a region's job prospects depend on the synthesis of its industrial stock. Hence, for each type of industries we calculate the number of industries of this type over the total number of industries in the region. Job Prospects Multiplier is a weighted average of those ratios.

The **Financial Incentives for Employees Multiplier** expresses the power of the incentives used to attract employees in the specific region. Experience has shown that the most frequently used financial incentives are low interest loans and tax reductions. For the purposes of this work, we consider that the effectiveness of an incentives' package depends on the benefits offered by them. Hence, the Financial Incentives for Employees Multiplier is a weighted average of the various types of incentives used and their benefits.

On the basis of all the above, the Specific Image of a region, as perceived by Employees, may be expressed as a function of four multipliers as follows:

$$SPIME = \sqrt[4]{BIM * JBAVM * JBPRM * FINEM}$$

where

BIM : Basic Image Multiplier

JMAVM : Job Availability Multiplier

JBPRM : Job Prospects Multiplier

FINEM : Financial Incentives for Employees Multiplier

For the purposes of this work all Specific Image values of the typical region are equal to 1 and the Specific Image values of any given region lie in the interval [0,2]. Specific Image value, as perceived by a group of prospective movers, greater than 1 indicates a region with high probability of being considered as the best choice by this group of movers.

4. Application of the Model

The methodology presented in the previous section is now used for the estimation of the Basic Image of the thirteen Greek regions (Figure 4.1). Furthermore, the relationship between Basic Image and GDP will be further examined.



Figure 4.1. Regions of Greece

Table 4.1 summarizes the values of Economic Indicator, Social Indicator and Basic Image for the thirteen Greek regions.

Table 4.1. Economic and Social Indicator and Basic Image values

		Economic Indicator	Social Indicator	Basic Image
1	ATTICA	0,6456	0,525	0,5979
2	EAST MACEDONIA & THRACE	0,4638	0,570	-0,3466
3	CENTRAL MACEDONIA	0,5216	0,608	0,3676
4	WEST MACEDONIA	0,5045	0,668	0,3951
5	EPIRUS	0,4894	0,628	0,2905
6	THESSALY	0,5323	0,555	0,2972
7	IONIAN ISLANDS	0,4363	0,624	-0,1682
8	WEST GREECE	0,5166	0,613	0,3558
9	CENTRAL GREECE	0,5533	0,551	0,4240
10	PELOPONNESE	0,5168	0,601	0,2970
11	NORTH AEGEAN	0,3977	0,584	-0,3948
12	SOUTH AEGEAN	0,4328	0,600	-0,2987
13	CRETE	0,4240	0,581	-0,3737

Looking at the Table above the following conclusions may be drawn:

- ✓ Attica, Central Macedonia, West, Macedonia, Epeiros, Thessaly, West Greece, Sterea Ellada and Peloponnisos, all mainland regions, have high Basic Image values.
- ✓ East Macedonian and Thraki, a mainland region which is a rather remote, has negative Basic Image value.
- ✓ Ionian Islands, North Aegean, South Aegean and Crete, all island regions, have negative Basic Image values.

The next step will be to estimate the strength of the relationship between Basic Image and GDP. Table 4.2 summarizes the Basic Image and GDP per capita values for the thirteen Greek regions and Table 4.3 presents their correlations.

Table 4.2: Basic Image values and GDP per capita

	Regions	Basic Image	GDP per capita
1	ATTICA	0,5979	27900
2	EAST MACEDONIA & THRACE	-0,3466	13500
3	CENTRAL MACEDONIA	0,3676	15800
4	WEST MACEDONIA	0,3951	16500
5	EPIRUS	0,2905	14900
6	THESSALY	0,2972	14900
7	IONIAN ISLANDS	-0,1682	16100
8	WEST GREECE	0,3558	13000
9	CENTRAL GREECE	0,4240	18300
10	PELOPONNESE	0,2970	16500
11	NORTH AEGEAN	-0,3948	14500
12	SOUTH AEGEAN	-0,2987	21000
13	CRETE	-0,3737	18300

Table 4.3: Correlations of Basic Image values and GDP per capita

Correlations			
		Basic Image	GDP per capita
Basic Image	Pearson Correlation	1	,250
	Sig. (2-tailed)		,411
	N	13	13
GDP per capita	Pearson Correlation	,250	1
	Sig. (2-tailed)	,411	
	N	13	13

As we can see from Table 4.3, there exists a weak correlation ($r=0.250$) between Basic Image and GDP per capita values. The high p-value ($\text{sig.}=0.411 > 0.05$) suggests that there is not sufficient evidence to reject the null hypothesis stating there is not a statistically significant correlation between the two variables.

The weak relationship is explained by the fact that the Basic Image of a number of regions, as calculated, underestimates their ability to attract specific groups of industries. Such regions are, for example the island regions, which have special characteristics making them unattractive for business and economic activities in general but attractive for selected activities like tourism.

In some previous papers (Doumi, Angelis, Dimaki, 2009) we have suggested alternative measures in order to assist island regions to overcome the development problems they face by focusing on tourism and improve their Basic Image values. Going a step further, we have modified the region's initial Basic Image concept so as to take into account variables related to the specific measures which we proposed and have applied those findings to the 13 Greek regions.

Table 4.4 summarizes the modified Basic Image values and the GDP per capita. At this point we must note that the modified Basic Image values are used only for the case of island regions.

Table 4.4: Basic Image (using tourism only on island regions) and GDP per capita

	Regions	Basic Image	GDP per capita
1	ATTICA	0,8357	27900
2	EAST MACEDONIA & THRACE	-0,3466	13500
3	CENTRAL MACEDONIA	0,3676	15800
4	WEST MACEDONIA	0,3951	16500
5	EPIRUS	0,2905	14900
6	THESSALY	0,2972	14900
7	IONIAN ISLANDS	0,7617	16100
8	WEST GREECE	0,3558	13000
9	CENTRAL GREECE	0,4240	18300
10	PELOPONNESE	0,2970	16500
11	NORTH AEGEAN	0,6938	14500
12	SOUTH AEGEAN	0,7882	21000
13	CRETE	0,7662	18300

Looking at Table 4.4 above we notice that the only region with negative Basic Image value is East Macedonia & Thrace, a rather isolated mainland region whose economy is based on primary sector.

The next step will be to estimate the strength of the relationship between the modified Basic Image values and the GDP per capita. The results are summarized in Table 4.5.

Table 4.5: Correlations of Basic Image (using tourism only on island regions) and GDP per capita

		Correlations	
		Basic Image	GDP per capita
Basic Image	Pearson Correlation	1	,599*
	Sig. (2-tailed)		,031
	N	13	13
GDP per capita	Pearson Correlation	,599*	1
	Sig. (2-tailed)	,031	
	N	13	13

*. Correlation is significant at the 0.05 level (2-tailed).

As we can see from Table 4.5, there is a rather strong correlation ($r=0.599$) between the Basic Image values and GDP per capita. The low p-value ($\text{sig.}=0.031 < 0.05$) suggests that there is sufficient evidence to reject the null hypothesis stating that there is not a statistically significant correlation between the two variables. Therefore, in this case we can say that the redefined Basic Image values are correlated to GDP per capita.

5. Conclusions and Suggestions for Further Research

Greece is a country with noticeable regional disparities. The need to bridge inequalities between regions has been the focus of all regional policies implemented in Greece over the last 40-50 years. During this time, large amounts of money have been spent to improve the infrastructure of certain regions and provide financial incentives for both industries and employees so as to move into selected regions.

The first part of the paper discussed the issue of regional inequalities in Greece, the policies used to bridge them and the results obtained. The limited success of those efforts is, mainly due to the fact that the policies employed were rather ill-designed and addressed to regions unprepared to take full advantage of their benefits. Hence, the second part of the paper introduced Basic Image, i.e. a measure of the region's current state of development and future prospects and suggested ways of measuring it. The methodology was then applied to the 13 Greek regions and their Basic Image values were calculated. Following, the relationship between Basic Image values and GDP have been estimated for several cases, according to the regions' special features.

An area of further research will be to analyze the relationship between the redefined Basic Image for selected group of regions and both the total GDP per capita and the GDP per production sector.

REFERENCES

1. **Angelis, V (1981).** Basic Image. A New Approach in Modelling Growth and Decline in Industrial Cities. *Proceedings Volume, Conference on Dynamic Non-Linear Theory and General Urban/Regional Systems*, Organized by the U.S. National Science Foundation and the U.S. Department of Transportation, Washington D.C. USA. (*Invited Paper*).
2. **Angelis V. (1990).** Factors Affecting the Movement and Location of Both Industrial Units and their Employees, *Proceedings Volume*, J. Karkazis and J. B. Boffey eds., *Meeting IV of the Euro Working Group on Location Analysis*, Chios.
3. **Angelis, V. and Dimopoulou, M. (1991).** A Decision Support System for the Location of Industrial Units. Theoretical Framework and Applications. *Studies in Locational Analysis*, 3.
4. **Berben, C. and Clements, B. (1995).** The European framework for competition in telecommunications, the benefits for peripheral countries, *Telecommunications Policy*, Vol.19, n°4.
5. **Cullingworth, J. B. (1969).** *Housing and Labour Mobility*, OECD, Paris .
6. **De Castro, E. A. and Jensen-Butler, C. (2003).** Demand for Information and Communication Technology-based Services and Regional Economic Development, *Papers in Regional Science*, 82.
7. **Doumi, M., Angelis, V. and Dimaki, K. (2009)** Tourism as a Driving Force for the Development of Islands and Isolated Regions, *Proceedings, 49th Congress of the European Regional Science Association, "Territorial cohesion of Europe and integrative planning"*, 25-29 August, Lodz, Poland.
8. **Gaki, E., Angelis, V.A., Dimaki, K., (2009).** A Region's Spatial Discontinuity and Ways to Overcome it, *Journal of Management Science and Regional Development* (to appear)
9. **Hunter, L. and Reid, G. (1968).** *Urban Worker Mobility*, OECD, Paris.
10. **Perloff, H. S. and Wingo, L. (1971).** Planning and Development in Metropolitan Affairs in Leahy, W. H. et al (eds) *Urban Economics. Theory, Development and Planning*, The Free Press, New York.
11. **Rhodes, J. and Khan, A. (1971).** *Office Dispersal and Regional Policy*, Cambridge University Press.
12. **Thom, R. (1975).** *Structural Stability and Morphogenesis: An Outline of a General Theory of Models*. Addison-Wesley, Reading, MA.
13. **Townroe, P. M. (1971).** *Industrial Location Decisions. A Study in Management Behavior*, Center for Urban and Regional Studies, The University of Birmingham.

14. **Townroe, P. M. (1979).** *Industrial Movement. Experience in the US and UK*, Westmead, Saxon House, England.
15. **van Geenhuizen M. (2000).** ICTs, E-economy and Regional Development: Is Distance Still Alive?, *40th European Congress of the European Regional Science Association*, Barcelona, 19.08-01.09 2000.
16. **Zeeman, E.C. (1973).** Applications of Catastrophe Theory, *Manifolds*, Tokyo.
17. **Zeeman, E.C. (1977).** *Catastrophe Theory - Selected Papers 1972-1977*. Addison-Wesley, Reading, MA.
18. **Zolotas, X. (1981).** *Economic Growth and Declining Social Welfare*, New York, University Press.