Regional multipliers and economic crisis: the case of Greek economy

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Abstract
The recovery of an economy in crisis is directly related to the strengthening of its key-sectors. Input-output multipliers constitute an important tool used for the identification of the important sectors in an economy. The aim of this paper is the estimation of the multipliers' changes at NUTS III level during the period 2005-2010 (pre-crisis and in-crisis period) in order to highlight the dynamic sectors of the Greek economy. These sectors should compose the growth engines for the achievement of the economic recovery. Moreover, a regression analysis is implemented in order to examine the relationship among spatial/socio-economic characteristics of each prefecture and the dynamics of its economic sectors.

Keywords: Input-Output Analysis, Regional Multipliers, Regional Development, Tobit Regression, Greece

JEL classification: R15, O33, O52, R58, C24

Introduction

The negative growth rates of the Greek economy, which are observed in the last years, as well as its inability to respond effectively to the economic recession, remain critical factors that form a negative growth environment for all the economic sectors of the country. However, the growth prospects of the economic sectors and firms vary considerably because, on the one hand, the recession's effects are different among the sectors and, on the other hand, their resilience in the external and internal pressures diverges significantly (Rigby, 2001; Srinivasan et al., 2005).

The process of recovery should be primarily based on the strengthening of the most competitive sectors. The competitive position of Greek sectors is affected by the way they respond to the new challenges that they face in the crisis period. The identification of the most competitive sectors remains a crucial issue, as these sectors should constitute the growth engines of the Greek economy.

The present paper constitutes an introductory analysis of the growth potentials of Greek economic sectors. Analysis focuses both on the

pre-crisis and in-crisis period as the estimations concern the years 2005 and 2010. For the identification of sectors' dynamics, an input – output analysis is adopted and the size of regional multipliers for the Greek prefectures (NUTS III) is estimated. Then, the observed differences and the changes amongst the multipliers for the prefectures and the most dynamic sectors are analyzed and evaluated. By doing so, analysis is able to capture sectors' growth trends both at the national and regional level. Additionally, the values of regional multipliers of the most dynamic sectors are implemented as the dependent variable in a regression analysis, whereas a set of socio-economic and spatial factors of Greek prefectures are used as the independent variables. The regression results highlight the relationship among the characteristics of each prefecture and the dynamics of its economic sectors.

The structure of the paper is as follows: in the next section, the structure of Input-Output analysis is briefly presented. Also, an analytical review of the methods of I-O tables' regionalization is conducted. Then, the Input – Output technical coefficients are estimated by using the FLQ technique for the 51 Greek prefectures. Moreover, an analysis of multipliers' changes is performed and the values of multipliers are regressed with a set of socio-economic and spatial factors of each prefecture. The paper concludes by drawing some general remarks derived from the preceding analysis.

The methodology of Input-Output Analysis

General features

Input-output analysis is an economic modeling technique that aims at understanding the interactions among productive sectors within an economy. It is a powerful tool for the estimation of magnitude of transactions occurred among different sectors of an economy, providing useful overview of its structure. An input-output table includes the flows of products from each sector considered as a producer to each of the sectors considered as a consumer. Several I-O techniques have been developed and are widely used worldwide for measuring diverse elements and entities such as gross regional product, household consumption and employment generation (Stone, 1984).

Other analytical techniques such as shift-share and location quotient analyses, econometric and statistical models have also been developed for measuring relevant regional economic aspects. These tools provide useful insights into the structure of regional economies and their trajectories of changes over time. The various analytical techniques rely heavily upon quantitative methods and their use for analyzing regional economies has certain limitations (Polyzos and Sofios, 2008).

By using Input-Output (I-O) Analysis we can study the structural changes within a national or regional economy, since it provides the tools that are necessary in order to evaluate industries, including their relationships to the rest of the economy and the effects of international or interregional trade on those relationships. Moreover, it provides the scientific base for the product and employment multipliers estimation and thereby the evaluation of each applied economic policy.

The general equation of the I-O analysis for n productive sectors of an economy is the following:

$$X=(I-A)^{-1}f \quad (1)$$

where, X is the total output of economy, A denotes the technical coefficients matrix, and f is the final demand of economy. For more information about I-O analysis, see Miller and Blair (2009) and Leontief (1986).

Input - Output regionalization techniques of technical coefficients

Although the applications of the input-output model were firstly applied at a nation-wide level, interest in regional economic analysis led to the modification of the model in order to cover different spatial units, such as regions. The extension of the national-level models led to the creation of a set of regional input-output models. The common methods that are used to develop a regional I-O table can be distinguished in three basic categories: (a) The survey methods, (b) the non-survey methods and (c) the partial survey or hybrid methods. The central task of these methods, mainly of the two last ones, is the adaptation of the technical coefficients of a national I-O table in order to highlight features of the analyzed regional economy. With the survey method, primary data concerning the regional intra-sectoral transactions are used for the construction of the regional I-O table. This procedure is rarely used at the regional level since it is costly and time-consuming.

The non-survey methods, based on the application of various techniques for the modification of the national technical coefficients of I-O table in regional ones, are used more frequently. A number of non-survey techniques for regionalization of national coefficients through adjustments are based entirely on published regional statistical data about employment, output, added value and income.

The third category includes the hybrid techniques which combine the survey and non-survey methods through superior statistical data and information obtained from small scale surveys. The methods of this category have expanded beyond the limitations of non-survey approaches and the prohibitive costs of survey methods assuring a compromise between accuracy and required recourses (Miller and Blair, 2009).

In this paper a non-survey method is implemented in order to estimate the regional technical coefficients of I-O analysis for Greek prefectures (NUTS III). Before applying the method to the Greek case, a brief description of the main techniques that belong to the second category will be preceded.

The assumptions made by non-survey methods concern existing differences between a regional and a national economy, despite the commonly assumed similarity of the production technology. These techniques focus on the estimation of input and trade coefficients and less on technical coefficients because of the assumption of identical technology. According to many empirical findings, the regional purchase coefficients used to scale down the inputs are more important in determining the accuracy of the model than is the assumption of similarity of the production technology (Kuhar et al., 2009). The basic data or regional indices used by these methods concern location quotient, regional supply percentages, supply-demand pool approach, regional purchase coefficients, etc. The majority of these methods are

based on the location quotient index. A brief description of the most important approaches belonging in this category takes place below.

(a) A way to modify the national coefficients in regional ones is by using Simple Location Quotients (SLQ). The SLQ for sector i in region r is defined as:

$$SLQ_i^r = \frac{Q_i^r / Q^r}{Q_i^N / Q^N} \quad (2)$$

where Q_i^r and Q^r denote output (or alternatively employment) of sector i in region r and total output of all sectors in region r respectively, whereas Q_i^N and Q^N denote these totals at the national level. When $SLQ_i^r > 1$, the sector i is more localized or concentrated in region r than in the nation as a whole, and it is able to satisfy the regional demand requirements for its products. In this case, the regional coefficient is assumed $\alpha_{ij}^r = \alpha_{ij}^N$ and the same assumption holds if $SLQ_i^r = 1$. Conversely, if $SLQ_i^r < 1$, then the sector i is less localized or less concentrated in region r than in the nation as a whole. Consequently, the region needs to import products from other regions in this sector in order to satisfy the whole regional demand requirements and $\alpha_{ij}^r = \alpha_{ij}^N SLQ_i^r$ (Miller and Blair, 2009).

(b) The above modification has been improved by using the Cross-Industry Location Quotient (CILQ). The CILQ compares the share of the selling industry's output of the region to the national with that of the purchasing industry in the region to the national and it is formulated as (Morrison and Smith, 1974; Flegg and Webber, 2000):

$$CILQ_{ij} = \frac{SLQ_i}{SLQ_j} \quad (3)$$

When $CILQ_{ij} > 1$, the regional selling sector i can supply all the requirements of the regional purchasing sector j and the sector i has a greater share in sectoral national output than the sector j. In this case, no adjustment is needed and the regional technical coefficient and the regional imports coefficient are identical with the national ones. Similarly, no adjustment is needed when $CILQ_{ij}=1$. If $CILQ_{ij}<1$, the regional technical coefficient is adjusted downward with the product of the national coefficient and the computed $CILQ_{ij}$.

(c) Round (1978) proposed a new formula using the semilogarithmic quotient (RLQ). In this new location quotient, the selling and purchasing sectors are considered as in the case of CILQ, whereas the relative sizes of region and nation are also added. The RLQ is formulated as:

$$RLQ_{ij} = \frac{SLQ_i}{\log_2(1 + SLQ_j)} \quad (4)$$

Thus, $\alpha_{ij}^r = \alpha_{ij}^N RLQ_i^r$.

(d) Another formula has been developed by Flegg et al. (1995) and Flegg and Webber (1997), in order to overcome some weaknesses of the previous ones. They had as starting point the fact that the SLQ and

CILQ provide an alternative way of estimating the relevant trading coefficients. Trading coefficients measuring the proportion of a commodity supplied from within the region depend on the next variables: (a) the relative size of the supplying sector, (b) the relative size of the purchasing sector, (c) the relative size of the region (Kuhar et al., 2009).

In the formula proposed by Flegg et al. (1995), the three variables are captured and the formula is defined as follows:

$$FLQ_{ij} = CILQ_{ij}\lambda \tag{5}$$

In equation (5), λ is the weighting measure of the regions' relative size and it is estimated as follows:

$$\lambda = [\log_2(1 + \frac{\sum Q_i^r}{\sum Q_i^N}]^\delta \text{ with } 0 \leq \delta \leq 1 \text{ and } 0 \leq \lambda \leq 1 \tag{6}$$

where, δ is the weighting parameter based on the size of region. Then,

$$\begin{aligned} \alpha_{ij}^r &= FLQ_{ij}^r \alpha_{ij}^n \quad \text{for } FLQ_{ij}^r < 1 \\ \alpha_{ij}^r &= \alpha_{ij}^n \quad \text{for } FLQ_{ij}^r \geq 1 \end{aligned} \tag{7}$$

Flegg and Weber (2000) developed another augmented formula, which allows for $\alpha_{ij}^r > \alpha_{ij}^N$ and it is defined as:

$$\begin{aligned} AFLQ_{ij} &= FLQ_{ij}[\log_2(1 + SLQ_j)] \quad \text{for } SLQ_j > 1 \\ AFLQ_{ij} &= FLQ_{ij} \quad \text{for } SLQ_j \leq 1 \end{aligned} \tag{8}$$

(e) Purchases-Only Location Quotient (PLQ) is another non-survey method and it takes the following form:

$$PLQ_i = \frac{Q_i^R / Q^{*R}}{Q_i^N / Q^{*N}} \tag{9}$$

where, Q^{*R} and Q^{*N} are total regional and national output of only those sectors that use i as an input. The logic of this method is that if input i is not used by sector k, then the size of this sector's output is not relevant in determining whether or not the region can supply all of its needs for input i.

(f) Regional purchase coefficients are proportions of regional demand for sector outputs that are satisfied by regional production. This method can be expressed as (Stevens et al., 1983):

$$RPC_i^R = \frac{z_i^r}{\left(z_i^r + m_i^r\right)} \tag{10}$$

where, z_i^r represent sales of good i from producers in r to buyers in r, whereas m_i^r are imports from outside region r to local buyers.

Regional multipliers in Greek prefectures for the years 2005 and 2010

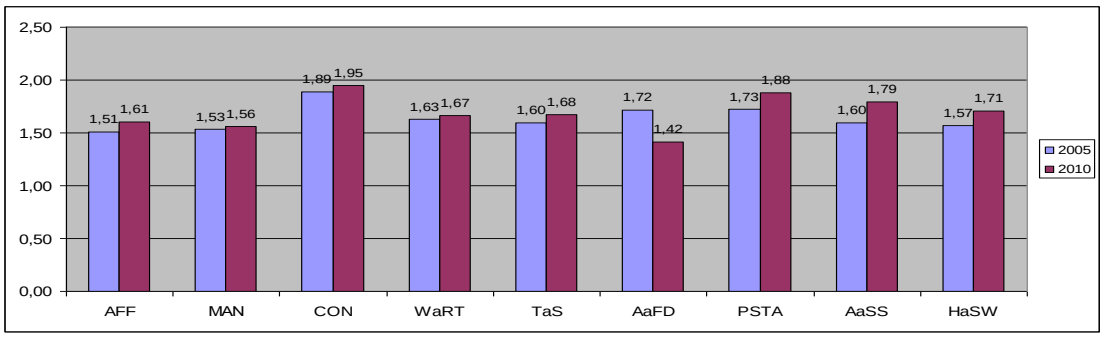
This section focuses on the measurement of the technical coefficients for the Greek prefectures at years 2005 and 2010 using the FLQ method described by the equations (5), (6) and (7).

According to the references (Flegg and Webber, 2000; Miller and Blair, 2009), the coefficient δ is usually defined arbitrarily and its value is specified close to 0.3. In this article, the technical coefficients were calculated by using δ = 0.1, 0.2 and 0.3. The results show that δ=0.1 is the most suitable value in order to calculate technical coefficients and multipliers at prefecture level.

By using the matrices of technical coefficients, we estimate the product multipliers for the industries of the Greek prefectures according to the equation, $OM_j = \sum_{i=1}^{n} b_{ij}$, where OM_j is the product multiplier of the industry j and b_{ij} are the elements of Leontief inverse matrix. The changes of the multipliers will show which industries have been affected most by the economic crisis and which industries may constitute the growth engines for the economic recovery of the Greek economy.

The results indicate that the industries that present the highest product multipliers in Greece at 2005 are the following: constructions, professional, scientific and technical activities, and accommodation and food service activities. At 2010, industries of Greek economy such as constructions, professional, scientific and technical activities, administrative and support service activities, and human health and social work activities have the highest product multipliers.

The examination of the basic productive industries at national level (Figure 1) shows that industries such as professional, scientific, technical activities (PSTA), administrative and support service activities (AaSS) and human health and social work (HaSW) present the largest increase at multipliers values between 2005 and 2010. On the contrary, the only basic industry that shows decrease is the accommodation and food services (AaFD).



Source: EL. STAT., 2013 (own elaboration)

Figure 1: Multipliers in basic productive industries of Greece (2005 and 2010)[1]

[1] AFF: Agriculture, forestry and fishing, MAN: Manufacturing, CON: Construction, WaRT: Wholesale and retail trade, TaS: Transportation and

By examining the dominant industries at prefecture level, it is evident that in 2005, the product multipliers in the constructions industry show high values in prefectures such as Attiki, Thessaloniki, Kavala, Evoia and Imathia. In 2010, the most important product multipliers in the constructions industry are observed in prefectures of Drama, Serres, Fthiotida, Attiki and Thessaloniki. The professional, scientific and technical activities constitute a growing industry of the Greek economy that presents high values of product multipliers in prefectures such as Attiki, Thessaloniki, Achaia, Ioannina, Kavala, Voiotia, Fthiotida.

As far as the accommodation and food service activities, it is realized that prefectures of Attiki, Larisa, Voiotia, Thessaloniki and Imathia get major multiplier effects both in 2005 and 2010. It is worth noting that there is important reduction at the product multipliers values in 2010. Moreover, the island prefectures appear low product multipliers values in this industry.

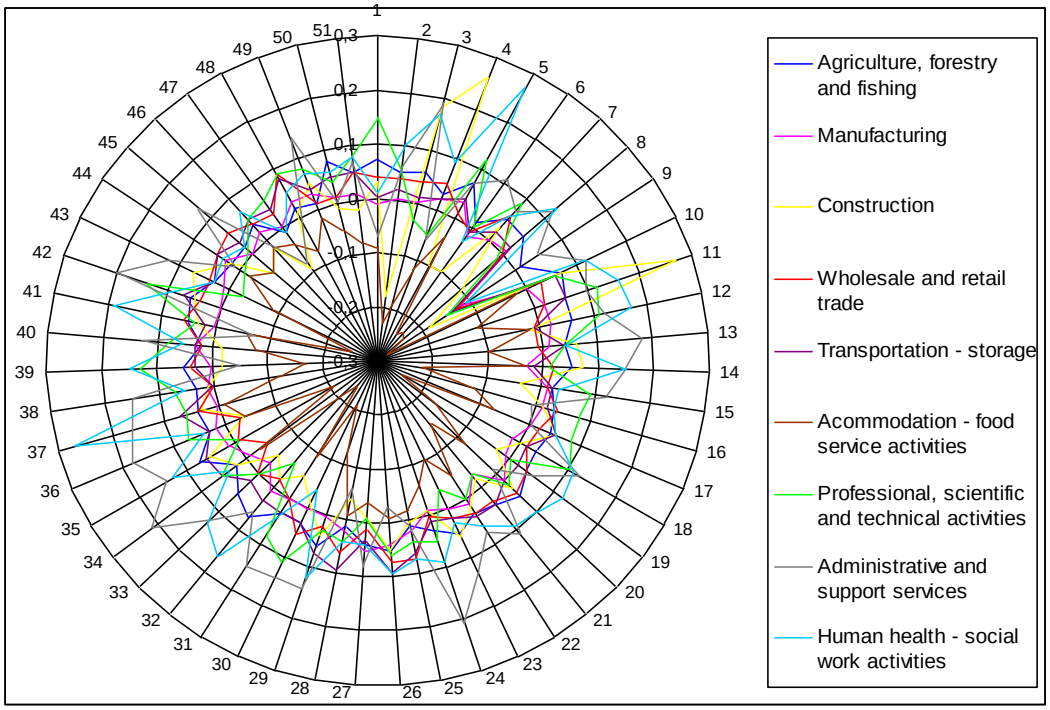
Prefectures including major urban centers (Attiki, Thessaloniki, Larissa, Achaia, Serres, Fthiotida, Korinthia, Evoia etc.) show high product multipliers values in industries of the tertiary sector such as administrative and support service activities and human health and social work activities both in 2005 and 2010. Finally, prefectures of Magnisia, Thessaloniki, Korinthia, Attiki and Kavala get the highest product multipliers in the primary sector (agriculture, forestry and fishing).

By analysing the changes of the product multipliers per industry in the Greek prefectures between 2005 and 2010, it is concluded that the most positive changes are observed in the industries of administrative and support service activities (Preveza, Evritania, Attiki), constructions (Drama, Serres) and human health and social work activities (Argolida, Kavala). In contrast, accommodation and food service activities get the most negative changes among the industries of Greek economy in the prefectures of Pella, Kilkis, Larisa, Voiotia, Attiki, Xanthi and Imathia (see in Appendix).

The industries that show a positive change in almost all the Greek prefectures between 2005 and 2010 are the following: agriculture, forestry and fishing (except Kyklades), transportation and storage (except Evros, Imathia, Pella, Halkidiki and Kastoria), financial and insurance services (except Pella), education (except Pella), human health and social work activities (except Imathia, Pella, Achaia and Kyklades).

On the other hand, it is observed a negative change in almost all of the Greek prefectures in industries such as mining and quarrying (except Kastoria and Arta), water supply, sewerage, waste management and remediation activities (except Evros, Drama, Pieria, Fthiotida and Attiki), and accommodation and food service activities.

storage, AaFD: Accommodation and food services, PSTA: Professional, scientific, technical activities, AaSS: Administrative and support service activities, HaSW: Human health and social work



Source: EL. STAT., 2013 (own elaboration)

Figure 2: Changes of multipliers in basic productive industries of Greek prefectures during the period 2005-2010[2]

Further analysis and interpretation of multipliers

In this section, the relation between several indicators and the multipliers of the key-industries of Greek economy is examined. Analysis focuses on the NUTS III level in order to capture the effect of spatial and socio-economic factors of each prefecture on its industries' dynamics. Thus, the estimated multipliers values (OM) of each industry for the 51 prefectures is used as the dependent variable in a regression analysis. These values constitute a reliable indicator of each industry dynamics (Polyzos, 2009; Polyzos, 2011). Moreover, as mentioned above, the independent variables are selected in a manner of adequately representing the socio-economic and spatial characteristics of Greek Prefectures. These variables are:

(a) GDP per capita (*GDP*) which constitutes an indicator used to measure wealth and development, despite the weaknesses at the process of calculation in the case of Greek economy.
(b) The Education Index (*EI*) which shows the education and training level of each prefecture. Prefectures presenting high values of this indicator get high quality of human resources and favourable growth prospects.
(c) The Centrality Index (*CI*) which depicts the relative position of each prefecture compared to the others. High index values indicate favourable accessibility of the prefectures in relation to the transport networks, whereas low index values show limited accessibility. The prefectures are divided into two groups based on the value of their Centrality Index creating a dummy variable. The

[2] The numbers of the figure correspond to the 51 Greek prefectures (see Table 3 - Appendix).

variable gets the price 0 for index value lower than 100 and the price 1 for index value higher than 100.
(d) The Population of Capital Cities (*CP*) which reflects the growth dynamics of the prefectures. Urban areas with high population are associated with great growth potentials in activities of secondary or tertiary sector as well as with high incomes (Polyzos and Sofios, 2008; Polyzos et al., 2011).

Since multipliers values are constrained from the left to the value (1), Ordinary Least Squares (OLS) regression may lead to a censorship bias. To avoid this bias, the present paper implements Tobit regression technique which leads to more accurate estimations when the depended variable of a regression is censored (Niavis and Tsekeris, 2012). The Tobit model represents the potential (expected) value of the dependent variable OM as a latent variable, $\hat{O}M$, which can only be partially observed within the feasible range of multiplier values (>1), as follows (Tobin, 1958):

$$\hat{O}M_j = \begin{cases} 0, & \text{if} \quad \hat{O}M_j \leq 1 \\ \hat{O}M_j, & \text{if} \quad \hat{O}M_j > 1 \end{cases} \tag{11}$$

The specification of the Tobit model for Greek industrial sectors can be expressed as follows:

$$OM_i = \beta_1 + \beta_2 GDP_i + \beta_3 EI_i + \beta_4 CI_i + \beta_5 CP_i + \varepsilon_i \tag{12}$$

where,

OM_i = Sector's multiplier value of i prefecture ($i = 1, 2, \ldots, 51$)
β_i = The regression coefficients ($i = 1, 2, \ldots, 5$)
GDP_i = GDP per capita in 2010 constant prices of i prefecture (000€)
EI_i = Education Index of i prefecture (0-100)
CI_i = Dummy variable of Centrality Index. 0 for low centrality index values (<100) and 1 for high centrality index values (>100).
CP_i = Capital's Population of i prefecture (0.000 habitats)
ε_i = the error term

The model (12) will be applied to several sectors of Greek economy. The selection of sectors is based on the criterion of their overall growth potential, as it was reflected on their relative multiplier values. The sectors examined in the model are the following: (a) agriculture, forestry and fishing (AFF), (b) constructions (CON), (c) transportation and storage (TaS), (d) wholesale and retail trade (WaRT), (e) human health and social work activities (HaSW), (f) accommodation and food service activities (AaFD), and (g) administrative and support service activities (AaSS).

The results of the Tobit model for the seven selected sectors of Greek economy are presented in Table 1. The results show that the fitting of the seven different Tobit models to the Greek data is quite satisfactory. More specifically, the values of Likelihood Ratio Tests

for all the models exceed the critical values of the X^2 distribution. Thus, the null hypothesis that the constant-only models perform better than the models with the four selected variables is rejected for all models at the 0,01 significance level.

Table 1: Tobit Model Estimations

	OM_{AFF}	OM_{CON}	OM_{TaS}	OM_{WaRT}	OM_{HaSW}	OM_{AaFD}	OM_{AaSS}
β_1	1,1858*** (0,0286)	1,3029*** (0,0664)	1,2525*** (0,0219)	1,17*** (0,0223)	1,154*** (0,068)	1,1969*** (0,0422)	1,5603*** (0,054)
$\beta_2(GDP)$	0,0009 (0,0018)	-0,0041 (0,0041)	0,0008 (0,0014)	0,0031** (0,0014)	0,0086** (0,0042)	-0,0027 (0,0026)	-0,0092*** (0,0033)
$\beta_3(EI)$	0,0017** (0,0008)	-0,0008 (0,0019)	0,0007 (0,0006)	0,0017** (0,0006)	-0,003 (0,0019)	-0,0031** (0,0012)	-0,0012 (0,0015)
$\beta_4(CI)$	0,0403*** (0,0144)	0,0876** (0,0333)	0,0258** (0,011)	0,0039 (0,0112)	0,0966*** (0,0341)	0,0818*** (0,0212)	0,0503* (0,0271)
$\beta_5(CP)$	0,0003 (0,0014)	0,011*** (0,0032)	0,0032*** (0,001)	0,0024** (0,0011)	0,0062* (0,0032)	0,0079*** (0,002)	0,0049* (0,0026)
σ	0,0461 (0,0046)	0,1071 (0,0106)	0,0354 (0,0035)	0,0359 (0,0036)	0,1097 (0,0109)	0,068 (0,0067)	0,0871 (0,0086)
Log Likelihood	84,55	41,55	98,09	97,25	40,35	64,73	52,08
LR Test Chi2(4)	27,98***	40,65***	53,78***	64,26***	16,84***	36,44***	19,53***

Std. Error Estimates are shown in parenthesis
Statistical Significance Levels: ***0,01; **0,05; *0,1

The statistical significance and the signs of the estimated coefficients across the different sectors' models present significant variations. The sign of the relationship between independent and dependent variables is depicted in the rows of Table 2. The green bullet indicates a positive estimated relationship, the red bullet denotes a negative estimated relationship and the black dash indicates estimation without statistical significance.

Table 2: The Relationship between Regional Multipliers and Local Factors

	OM_{AFF}	OM_{CON}	OM_{TaS}	OM_{WaRT}	OM_{HaSW}	OM_{AaFD}	OM_{AaSS}
$\beta_2(GDP)$	–	–	–	●	●	–	●
$\beta_3(EI)$	●	–	–	●	–	●	–
$\beta_4(CI)$	●	●	●	–	●	●	●
$\beta_5(CP)$	–	●	●	●	●	●	●

●	Positive Sign	●	Negative Sign	–	Lack of Statistical Significance	

The results show a positive correlation between multipliers and GPD per capita in industries such as wholesale - retail trade and human health - social work activities. The estimation for both sectors is statistically significant at the 0,05 confidence level. In the other sectors, the estimation of the regressor coefficients of GPD per capita is statistically non-significant. Moreover, it is evident that prefectures with high levels of education have high multipliers in industries such as wholesale and retail trade and agriculture,

forestry and fishing. In contrast, there is negative correlation between multipliers and education level in accommodation and food service activities. This may be explained by the fact that the tourist sector attracts a significant number of low-skilled employees who cover the high demand for employment of one of the most active economic sectors in Greece.

The centrality and the capital population of each prefecture are two variables that are positively correlated with the multipliers of almost all the sectors. Prefectures with high accessibility in relation to the transport networks get high multipliers values in almost all the sectors. Moreover, prefectures including cities with large population show positive correlation with industries' multipliers that belong to the secondary and the tertiary sector. This fact means that these regions have favourable growth prospects.

Conclusions

The aim of this article was the evaluation of multipliers changes in productive industries of Greek economy at prefecture level during the period 2005-2010. Generally, construction industry, as well as, industries of the tertiary sector (professional scientific and technical activities, administrative and support service activities, human health and social work activities), present the highest multipliers. At prefecture level, in most cases, higher multipliers are observed in prefectures including dynamic urban centers, such as Attica, Thessaloniki, Achaia, Fthiotida, Larissa, Evia, etc.

By examining the changes of the product multipliers per industry in the Greek prefectures between 2005 and 2010, it is concluded that the most positive changes are observed in the industries of administrative and support service activities and human health and social work activities. In contrast, accommodation and food service activities get the most negative changes among the industries of Greek economy. Additionally, the results of the regression analysis of multipliers to four factors show that the growth dynamics of different sectors seems to be influenced in a complex way by various socio-economic and spatial characteristics of Greek prefectures. The multipliers of almost all the sectors are highly related with factors such as centrality and capital population of Greek prefectures. On the other hand, factors such as the GDP per capita and the education level of the prefectures seem to affect the multipliers of each sector in different ways.

Finally, the multipliers constitute an important tool that should be taken into account during the formulation of regional policy, because they can contribute to the achievement of the policy goals. The present paper is an introductive analysis to the dynamics of Greek sectors at regional level and the specific local factors that may influence it. As Greece moves towards to the exit of the crisis, even with small steps, the dynamics of each sector should be an issue of consideration, as the strengthening of the most dynamic sectors may be crucial for the attainment of economic recovery. Moreover, the local authorities should be able to recognize the competitive advantages of their area, which are shaped by the dynamics of the local economic sectors. Also, authorities have to form an adequate strategic plan for the strengthening of their economic growth. To achieve that, the factors and the way in which they influence the dynamics of each

sector should be clear, both at local authorities and central government, as these administrative bodies are responsible for the structuring and implementation of the regional policy.

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Appendix

Table 3: Changes of multipliers in basic productive industries during the period 2005-2010

	Agriculture, forestry and fishing	Manufacturing	Construction	Wholesale and retail trade	Transportation and storage	Accommodation and food services	**Professional, scientific, technical activities**	**Administrative and support service activities**	**Human health and social work**
1.Evros	0,07	-0,01	0,03	0,04	0,00	-0,09	0,15	-0,07	0,01
2.Xanthi	0,05	0,00	-0,18	0,04	0,02	-0,23	0,05	0,06	0,10
3.Rodopi	0,06	0,00	0,18	0,04	0,01	-0,20	-0,03	0,19	0,17
4.Drama	0,03	0,02	0,26	0,05	0,02	-0,12	-0,05	-0,06	0,09
5.Kavala	0,07	0,03	-0,10	0,01	0,04	-0,04	0,12	0,07	0,27
6.Imathia	0,01	-0,02	-0,10	-0,01	-0,01	-0,24	0,00	0,11	-0,03
7.Thessaloniki	0,05	0,00	0,03	0,06	0,02	-0,23	0,09	0,07	0,06
8.Kilkis	0,05	0,01	-0,09	0,00	0,02	-0,24	-0,01	0,12	0,13
9.Pella	0,01	-0,12	-0,19	-0,13	-0,14	-0,28	-0,15	0,05	-0,11
10.Pieria	0,07	0,00	0,07	0,03	0,06	-0,02	0,06	0,12	0,12
11.Serres	0,06	0,02	0,27	0,02	0,06	-0,11	0,12	0,10	0,16
12.Chalkidiki	0,06	0,02	-0,02	-0,01	-0,01	-0,02	0,11	0,12	0,17
13.Grevena	0,04	0,01	0,06	-0,01	0,04	-0,10	0,04	0,18	0,04
14.Kastoria	0,05	-0,03	0,07	0,02	-0,02	-0,03	0,01	0,15	0,15
15.Kozani	0,02	0,01	-0,04	0,01	0,02	-0,22	0,09	0,12	0,03
16.Florina	0,03	0,01	0,01	0,04	0,02	-0,12	0,08	-0,01	0,03
17.Karditsa	0,04	0,00	0,05	0,02	0,05	-0,07	0,08	0,00	0,05
18.Larisa	0,03	-0,02	0,00	0,01	0,01	-0,25	0,10	0,12	0,11
19.Magnisia	0,04	-0,01	-0,03	0,04	0,02	-0,17	0,00	0,05	0,12
20.Trikala	0,06	0,02	0,04	0,05	0,02	-0,08	0,03	-0,01	0,10
21.Arta	0,04	-0,03	-0,02	0,03	0,04	-0,15	-0,03	0,11	0,09
22.Thesprotia	0,03	0,01	0,02	0,03	0,04	-0,05	0,00	0,07	0,06
23.Ioannina	0,05	0,00	0,06	0,02	0,02	-0,10	-0,04	0,13	0,03
24.Preveza	0,03	-0,01	-0,01	0,00	0,01	-0,06	0,05	0,21	0,09
25.Zakynthos	0,01	0,02	0,00	0,07	0,06	-0,02	0,04	0,01	0,07
26.Kerkyra	0,05	0,04	0,05	0,07	0,09	-0,01	0,06	-0,03	0,09
27.Kefallonia	0,04	0,05	-0,01	0,01	0,03	-0,04	-0,01	0,08	0,04
28.Lefkada	0,01	0,02	-0,04	0,06	0,09	-0,01	0,04	-0,06	0,04
29.Aitoloakarnania	0,06	0,00	0,04	0,02	0,07	-0,12	0,03	0,14	0,12
30.Achaia	0,03	0,00	-0,01	0,05	0,03	-0,21	0,11	0,14	-0,04
31.Ileia	0,03	0,00	-0,05	0,00	0,03	-0,09	0,08	0,15	0,04
32.Voiotia	0,07	0,01	-0,02	-0,02	0,03	-0,24	-0,06	0,06	0,16
33.Evoia	0,05	-0,03	-0,05	0,00	0,02	-0,20	0,00	0,12	0,13
34.Evritania	0,02	-0,01	0,02	-0,05	0,05	-0,03	0,05	0,21	0,04
35.Fthiotida	0,07	0,01	0,05	-0,01	0,06	-0,21	-0,01	0,14	0,13
36.Fokida	0,03	0,02	-0,04	-0,03	0,03	-0,04	0,07	0,18	0,04
37.Argolida	0,04	0,00	0,03	0,04	0,07	-0,01	0,06	0,16	0,27
38.Arkadia	0,03	0,01	0,01	0,00	0,00	-0,12	0,07	0,15	0,05
39.Korinthia	0,05	0,00	-0,02	0,04	0,03	-0,17	0,13	-0,05	0,15
40.Lakonia	0,02	0,03	-0,02	0,02	0,03	-0,08	0,08	0,13	0,05
41.Messinia	0,05	0,00	0,03	0,06	0,02	-0,06	0,04	-0,07	0,19
42.Attica	0,06	0,00	0,05	0,04	0,07	-0,25	0,14	0,20	0,09
43.Lesvos	0,03	0,01	0,07	0,04	0,03	-0,09	-0,03	0,12	0,03
44.Samos	0,02	0,03	0,02	0,05	0,05	-0,02	-0,01	0,01	0,04
45.Chios	0,02	0,00	-0,05	0,06	0,03	-0,05	0,01	0,13	0,02
46.Dodekanisos	0,04	0,02	-0,02	0,04	0,05	-0,02	0,05	-0,01	0,07
47.Kyklades	-0,01	0,00	-0,09	0,03	0,04	-0,04	0,06	-0,08	-0,01
48.Irakleio	0,02	0,03	0,01	0,09	0,08	-0,07	0,09	-0,01	0,05
49.Lasithi	0,01	0,03	0,05	0,01	0,04	-0,02	0,08	0,14	0,07
50.Rethimno	0,08	0,01	-0,01	0,01	0,05	-0,05	0,04	0,00	0,06
51.Chania	0,05	0,01	-0,02	0,05	0,05	-0,08	0,08	0,07	0,08

Source: EL. STAT., 2013 (own elaboration)