INVESTMENT PATTERNS AND THE COMPETITIVENESS

OF GREEK REGIONS

Fragkiskos Filippaios♦

Athens University of Economics and Business

Department of International and European Economic Studies

&

Kent Business School, University of Kent

and

Constantina Kottaridi*♦

Athens University of Economics and Business

Department of International and European Economic Studies

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Abstract

The present paper aims at mapping and analyzing the determinants of industrial activity in Greek regions in order to assess current investment patterns. For this purpose, we estimate a conditional logit model of 226 new established firms for 1996 and 1997. Results give interesting insights that are likely of particular importance to regional policy makers. Noteworthy is the spatial concentration of firms in different prefectures whilst the large metropolitan cities, Athens and Thessalonica, although with declining shares, prevail as the dominant hosts. European regional policy seems to enhance firms' entry via its effect on economic development variables, in contrast with the Greek Development Law, which turns out non-influential.

Keywords: clusters, agglomeration effects, investment patterns, Greek regions

JEL classification: D2, C25, R3, R58

1. Introduction and Related Literature

Mapping investment patterns is of crucial importance to local, national and European policy makers whose one of primary aims is to help the development of lagging behind regions. Public authorities, having full information on economic conditions and, thus, the needs of regions, design and provide particular incentives in order to influence investors' location decisions. Well documented is the spatial clustering of firms, generating in this way externalities that spill over to the wider economic area, giving a boost to its development (Krugman, 1991, Krugman and Venables, 1995, Venables, 1996, Markusen and Venables, 1998, Fujita *et al.,* 2001). The ultimate goal then narrows down to creating the initial conditions, which will attract a sufficient number of investments at the first place constituting, in turn, the centripetal forces for subsequent entrants.

Greece represents a particular case, being the most peripheral country in Europe and besieged by internal problems for many years. On the other hand, political instability due to contingency with countries that have faced serious conflicts in the past -with the subsequent negative effects- and geographical isolation from the rest of the developed world -and particularly with the core of EU-, impact negatively on investment decisions in the hinterland.

Nevertheless, significant steps have been taken lately by local authorities in providing investment motives parallel to the enhancement of the Community Structural Funds (CSF) and Cohesion Funds (CF). The assistance to Greece increased from a 2.65% of GDP in 1989-1993 to 3.67% in 1994-1999, the largest part of which directed to the improvement of infrastructure whilst a smaller part financed training (Paliginis, 2001). However, a necessary condition for designing any regional policy would be an analytical mapping of economic activity internally, revealing the relative strengths and weaknesses of different regions.

The present paper is unique in its twofold scope: it maps economic activity and at the same time analyzes the location choices of investors in Greece. Our extensive database allows us to differentiate the determinants at the NUTS 2 (The Nomenclature of Territorial Units for

Statistics)[1] level. Relevant studies are scarce in the field due to data limitation, whilst the limited ones that have been carried out deal either with multinational activity in Greece focused on a national level (Papanastassiou *et al.*, 2000) or relate to the decade of eighties[2]. In particular, Louri (1988) assesses the relative effects of regional policy on investment in Greek manufacturing industry during 1971-1982, the results of which stress the positive role of investment incentives and infrastructure expenditures. An attempt to evaluate the effect of sectoral policy in manufacturing entry (1982-1988) was then made (Anagnostaki and Louri, 1995), focusing on features of already built-up firms as explanatory variables. Finally, closer in perception to the present paper are Louri and Anagnostaki (1995) who examine entry decisions in Greek manufacture in the 1984-1987 period, providing useful hints on differences between Athens vs. the rest of Greece (i.e., depicting a broad core-periphery investment pattern in Greece – which according to our study, holds until the late nineties).

Most of the relevant empirical literature analyzes the determinants of industrial activity, with a particular emphasis on firms' clustering, at a national level (Wheeler and Mody, 1992, Devereux and Griffith, 1998) or within US states (Carlton, 1983, Friedman *et al.*, 1992). Head *et al.* (1995) examine Japanese manufacturing investments in the US and provide at the same time a map of their geographical distribution among the states. Nevertheless, there are a few exemptions that deal with thinner geographical analyses within countries. Hansen (1987) examines the economic determinants of interurban location behavior of 360 branch and transfer plants in Sao Paolo, Brazil, providing evidence of the role played by both factor inputs and agglomeration economies. In an analogous study, Henderson and Kuncoro (1996) explore manufacturing activity in Java, Indonesia. Their results suggest that firm location decisions respond to typical market variables as well as to the existence of local historical industrial environment in order to benefit from the built-up stock of local information in regards to institutions, linkages and technology. China was examined in Head and Ries (1996) who investigated investment decisions for 54 cities and a similar work belongs to Cheng and Kwan

(2000) who estimated 29 Chinese regions confirming the self-reinforcing effect on foreign direct investment (FDI) on itself.

Very close analyses to the present paper, though regarding foreign investments, were carried out by Guimaraes *et al*. (2000) and by Crozet *et al*. (2002). The former paper presents a spatial distribution of FDI start-ups in Portuguese concelhos. The latter maps location choices by foreign investors in France focusing especially on agglomeration effects and on the impact of French and European regional policies. Whilst the agglomeration hypothesis is strongly supported, investment incentives do no seem to have raised the attractiveness of French regions.

The present study illustrates total manufacturing establishments in the Greek territory, both domestic and foreign. It then tries to answer vital questions for policy makers: Which are those regional characteristics that attract investors? Do firms agglomerate in particular regions and why? Do all industries depict the same pattern of geographic concentration? What are the reasons underlying their clustering in particular regions? Have both Greek and European regional policies played any role on location choice?

The following section presents the methodology followed and discusses the underlying hypotheses. Section 3 illustrates and comments on the estimated results and, finally, section 4 summarizes the main findings and concludes.

2. Econometric Setup and Underlying Hypotheses

In this paper we adopt the econometric methodology developed by Crozet et al., (2002), Head et al., (1999) and Friedman et al., (1992). Thus, the present model assumes that investors maximize an intertemporal profit function subject to uncertainty in regards to location selection once they have already decided to build a manufacturing plant in Greece. The nature of location choice is a discrete one among several alternatives. Models with a qualitative endogenous variable are often used in the empirical literature. Based on the above, the model

assumes that once an investor decides to open a manufacturing plant in Greece, she maximizes a profit function subject to uncertainty of its location. On the other hand, the random component comes from maximization errors, other unobserved characteristics of choices or measurement errors in the exogenous variables. We can then write the profit function of an investor i, locating in region j as:

$$\pi_{ij} = U_{ij} + \varepsilon_{ij} \qquad (3.1)$$

where $U_{ij} = (\ln X_{i1}, \ln X_{i2}, ..., \ln X_{ik})$ with X_{im} represents the set of m observable characteristics of location i, and ε_{ij} is a random variable. The investor i will choose to locate in region j rather that location k if the following expression holds:

$$\pi_{ij} > \pi_{ik}, \forall k, k \neq j \qquad (3.2)$$

Since the profit function has a stochastic part, the probability that location j is selected by investor i can be defined as:

$$P_{ij} = \mathrm{Pr}ob(\pi_{ij} > \pi_{ik}), \forall k, k \neq j \qquad (3.3)$$

Under the assumption that the error terms are distributed independently and according to a Weibull distribution, the probability takes the following form (McFadden, 1984):

$$P_{ij} = \frac{e^{U_{ij}}}{\sum_{k=1}^{n} e^{U_{ik}}} \qquad (3.4)$$

This is the conditional logit model or McFadden's choice model. Using equation (3.4) and assuming that U_{ij} is a linear combination of the explanatory variables, we can estimate the coefficient of each variable using maximum likelihood. To further test the validity of our results, we performed a test for controlling the Independence of Irrelevant Alternatives (IIA) property. This property states that the ratio of probabilities of choosing two locations is independent of the characteristics of any third location, in other words the choices must be equally substitutable to the investors.

From the analysis mentioned above, it is evident that we model the probability that a given region receives a plant location at period t as a function of a set of explanatory variables. These are characteristics of the specific region and can be broadly classified in five large groups: Demand conditions on the chosen location, production factors' costs, agglomeration factors such as the number of active firms in that same location, public policies designed to attract firms or improve local infrastructure and finally the already built-up infrastructure of the location choice.

Those determinants can be incorporated in a simple framework yielding an estimable equation that can describe the profitability of choosing a specific location, assuming a Cournot type competition of firms that use quantity as their strategic variable. The description of variables and the respective sources are provided in Table 1 of Appendix 1.

We now proceed to a more analytical description of the factors that enter firms' profit function. A well-founded hypothesis in the relevant literature is the market potential as captured by the respective region's market size (RMS). Although more relevant within national boundaries, regional income has an important role to play especially if goods produced are costly to transport. It provides a good measure of the respective local demand. Local GDP is used here in order to capture the effect of regional market on location choices.

Taking advantage of endowment availability is a major concern of investors and an established corollary in traditional localization theories. Firms require a set of primary inputs in order to operate, with labor being the most important one. Wage considerations would, thus, impulse on investors' choices within the framework of profit maximization. We segment labor into unskilled and skilled force and use the average wage bill of blue-collar (LC) and white-collar workers respectively (HK). The average cost of skilled labor (white collar) is used as a proxy for the availability of human capital, in line with new growth theories (Lucas, 1988, Barro and Sala-i-Martin, 1995) and the need for upgraded and elaborated inputs in production[3] emerging from increased competition induced by globalization forces.

Related to these are expenditures on Research and Development (R&D) by already located firms. R&D expenses provide an indication both of the existence of a technological base and the potential for positive externalities arising from the interaction through upstream and downstream networks (Krugman, 1991, Venables, 1996). Manufacturing R&D expenditures over the total number of located firms is employed as a measure of the current knowledge creation of regions (KC) and is expected to exhibit a positive sign unless a centripetal force would enact due to fear of competition[4].

Local infrastructure[5] to facilitate production and transportation both of input and output goods is undoubtedly a prerequisite for establishing a production plant. Road availability and highways are the most common used indicators for proxying infrastructure. However, due to data limitation, we implore the number of private cars per capita as the most relevant measure for our purposes. It is expected to affect positively location choices and a positive effect is expected (LI).

Existence of regional clusters (RC) is captured by the cumulated counts of firms belonging to the same sector, following Head *et al*. (1995, 1999), and Crozet *et al*. (2002)[6]. A positive significant sign would indicate the existence of agglomeration forces and would, thus, confirm new economic geography theories.

Assistance from the EU (CSF) and motives provided by the Greek government through the Development Law (DL) are then examined to assess their effect on production location. The amount of CSF received by each region is the one measure used, whilst funds (a particular percentage of start-up costs) available to investors for regions eligible to be included in the Development Law capture the influence of Greek regional policy[7].

The factors that influence a firm's decision over its location regard those that vary across regions. Hence, firm characteristics, which are stable across regions, drop out of the location decision (Deveraux *et al.,* 2003). Nevertheless, and in order to control for differential firm behavior, we interacted the region with two firm features. A commonly tested factor entails the

size of the firm making the decision. Firm size is perceived to represent firm-specific advantages such as easier exploitation of scale economies (Veugelers, 1996), better access to credit or more efficient production of goods (Kinoshita, 1998). The second measure relates to firm's profitability as a sign of its economic 'health'; this could potentially make a difference in selecting a particular region as again, this captures firm-specific advantages. We measure firm size by the number of employees[8], while for the profitability we use the gross profits over turnover[9].

Of particular interest would also be to check for the ownership of new manufacturing plants, i.e., whether these are of Greek or foreign origin. The majority of the sample consists of Greek firms and it is noteworthy that only 12 of the 226 total are foreign. So, the most plausible way to check for a differential location strategy is to drop out those 12 non-Greek firms and test solely for the domestic ones.

Next, a significant question that arises asks whether the same locational pattern affects similarly all sectors. Unfortunately, the limited number of observations for each sector does not allow for separate tests, however exploring heterogeneous strategic location decisions is feasible between traditional and modern sectors[10].

Finally, given the concentration of firms in the large metropolitan areas of Athens and Thessaloniki, we proceed by investigating investment location patterns excluding in a first step Athens, then Thessaloniki and lastly both of them, in order to eliminate any biases caused by these large centres.

3. Data Sample Description

Our study uses a sample of manufacturing firms operating in Greece. Individual firm information is part of the ICAP directory, which is published annually and provides data based on published accounts of all Plc. and Ltd. firms in Greece. The firms included have at least 10 employees and are considered to be medium and large-sized[11]. These firms account though for

almost 85% of the total manufacturing value added in 1997. We proceed in two ways: At a first step, we map industrial activity in different Greek regions[12].

Insert Figure 1 here.

It is obvious that the majority of firms in our sample are located near the two large metropolitan centers i.e. Athens (GR30)[13] and Thessaloniki (GR12). Over 70% of the firms participating in our database are located in these two regions. The lowest share is allocated to the islands i.e. Ionia Nisia (GR22) and Notio Aigaio (GR41). Regarding the absolute number of new establishments, the two large metropolitan regions concentrate above 50% of new firms. Ionia Nisia (GR22) and Notio Aigaio (GR41) still attract only a small part of new investments. Interesting is also the case of Peloponnisos (GR25) which attracts a small fraction of new investments, although the number of already established firms is quite large.

Insert Figure 2 here.

Our next step is to test whether some regions are more dynamic, in attracting new investments, than others. To accomplish this, we mapped the new investments relative to the total number of firms already in the region. The underlying assumption is that the larger this fraction is, the more dynamic is the region in attracting new investors.

Insert Figure 3 here.

The picture one gets is quite different than the previous two. Peripheral regions show more dynamism than the metropolitan areas. The creation of competitive advantages through specific regional policies and EU funding, seems to attract new investors. Dytiki Macedonia

(GR13) and Notio Aigaio (GR41) lead the race, followed by Anatoliki Macedonia, Thrace (GR11) and Ionia Nisia (GR22).

Another dynamic element one may wish to exploit regards the ratios of new establishments belonging to the modern and traditional sectors respectively over the total number of new plants. This will enrich the picture we have up to now as to the competitiveness of Greek regions to distinctive industrial groups.

Insert Figure 4 here

Insert Figure 5 here

Indeed, the illustration manifests a variation in the dynamism of traditional versus modern sectors. In what regards the first, the majority of new establishments are gathered in Kriti (GR 43) followed by Ipeiros (GR 21) in Kentriki Ellada. On the contrary, Kriti and Ipeiros are the least preferred regions of modern new establishments, which are concentrated in Voreio Aigaio, Dytiki Ellada and Dytiki Makedonia. Obviously, the Greek Development Law and the EU regional funds favor the modern sectors the most, whereas it appears that entrepreneurs who set up a firm in Kriti and Ipeiros exploit the regions' comparative advantage in terms of raw materials for the Food and Beverages sector.

Bearing in mind these facts we tested for the locational determinants that attract new investments. We used data on new establishments during 1996 and 1997 for which we were able to find consistent regional data on Greek regions. Our sample consists of 226 newly established firms, 161 of which were established in 1996 and 65 in 1997.

Testing for locational choices is not an easy task due to regional data limitations. We obtained data for the NUTS 2 Greek regions mainly from two sources, the National Greek Statistical Agency and the Regiostat database of Eurostat. The description of NUTS 2 regions and other information may be found in Appendix 1.

4. Overview of the Results

In order to check for robustness of results and evaluate more accurately the relative importance of each hypothesis, we deploy alternative specifications. The basic model on which we build is depicted in column (1) of Table 1.

Insert Table 1 here.

We first test for standard variables related to market conditions by estimating location choice on market size, labor costs, human capital, technological sophistication and infrastructure (column 1). Results provide strong support to the hypotheses posed above, with the market size (RMS) and infrastructure development (LI) exerting the most powerful force.

Next we attempt to assess the role of agglomeration economies by including the number of pre-existing firms in the same sector (RC, column 2). It is clearly evident that investors are mostly interested in dynamic externalities arising from the interaction among firms of the same sector, with the relevant coefficient being significant at the 1% level. This finding contradicts the one obtained by Anagnostaki and Louri (1995) who used the share of four largest firms of the sector in terms of employment as a degree of concentration for 1982-1988. Nonetheless, the two results are not necessarily contradictory *per se*; they rather depict a reorientation in firms' decisions between the decade of eighties and the decade of nineties.

Turning now to regional policies, funds available to investors by the Greek Development Law and the EU are included in the model (DL and CSF, columns 3 and 4[14]). Though it should be expected that they exert influence on investors' location choices, results indicate a negative and significant effect in the third specification and a negative non-significant one in the fourth[15]. An interpretation for this contradictory outcome lies on the nature of these funds. On the one hand, the Law predicts that a fixed amount of funds would be available to eligible investors in order to cover a specific percentage of the fixed cost of a new branch. Important as this may be

to start-up a business, it still constitutes a small fraction of total investment cost. Thus, investors appear to be more concerned with local conditions, which weigh more heavily in the profit function of firms (which may explain the negative non-significant sign). On the other hand, funds may also be perceived as a deterrent for investments aiming at compensating for the lack of necessary local conditions, such as demand, infrastructure etc (thus, the negative significant sign).

CSF constitute a rather different type of assistance than funds available by the Development Law. Greek regions are eligible under objective 1, which regards infrastructure development, economic competitiveness, human resources and employment, improvement in reduction of regional disparities, and technical assistance. Column 4 is illustrative of the effect caused in results by the inclusion of European assistance. It is evident that this variable dominates the rest of the variables, except for the agglomeration effect, which continues to indicate a highly statistical significance. This does not weaken our previous results. Instead, CSF may be conceived as the umbrella under which existence and development of local influences depends on. Hence, EU's assistance ensures availability of necessary pre-conditions for a potential investor on top of ensuring stability and further development.

Finally, a last specification assesses the impact of established firms irrespective of the sector they belong (TF, column 5). Existence of prior investments in general could be a signal for potential future investors of at least a minimum level of an influx of factors necessary to start up and operate a business efficiently. It appears that this is not what investors would rely on to make their decisions; they would rather be concerned with the existence of particular elements according to their specific production interest. Reinforcing to this argument stands the robustness of regression, with all other variables maintaining their sign and significance.

Additional specifications are next carried out so as to check for potentially diverse results when examining particular sub-samples[16].

In order to check whether the concentration of firms in the large metropolitan cities of Athens and Thessaloniki distort our overall picture of location decisions in Greek regions, we estimate three different sub-samples, comparing them with the full model.

Insert Table 2 here

The first sub-sample excludes Athens leaving us with 129 new establishments in the rest of Greece. Results are indeed the same as the full sample with the only difference that in this case local infrastructure seems to matter more. The 182 number of observations continue to maintain their signs and significance when dropping out Thessaloniki, with RMS as the only exception as it looses its significance. In the last specification (last column, excluding Athens plus Thessaloniki), we are left only with 85 observations and, not surprisingly, with HK, LI and KC affecting to a lesser extent the location choice (5%, 10% and 10% respectively).

Next, estimating only the domestic new establishments and contrasting it with the whole sample, we explore the potential differentiated firm strategic behavior[17].

Insert Table 3 here

Notwithstanding the fact the foreign new establishments amount only to 12 observations, the pattern is somewhat dissimilar. Knowledge creation (KC), regional clusters (RC) and the regional market size (RMS) give exactly the same results. What is noteworthy though, refers to the two variables capturing human capital (HK) and labor cost (LC) which do not emerge significant for domestic entrepreneurs. This manifests the high interest of foreign (multinational) firms to the labor force they employ, especially when it comes to the qualitative aspects of it.

Finally, Table 5 distinguishes between traditional and modern sectors' regional choices.

Insert Table 4 here

A main observation is the numerical dominance of traditional sectors (132 new establishments) relative to the modern ones (amounting to 94). The traditional sample performs pretty well whilst the modern sub-sample fails to achieve significance for its explanatory

14

variables except for the RMS which emerges as strongly and positively significant. These results are illustrative of diverse strategic needs of entrepreneurs between the two with the latter obviously entailing more complex needs and requirements.

Although as already mentioned in the beginning, firm characteristics normally are not encountered in location decisions since they don't vary across regions, we interacted the firm specific attributes with the identification number of regions so as to be able capture their effect. Results are slightly modified with respect to CSF, which do not exert a significant sign. However, the rest of the variables remain robust[18].

Insert Table 5 here

Both incorporated internal to the firm factors, i.e. size and profitability turn out to be significant for the selection of location site. What might seem odd though in the first place is the negative sign of our size variable, however on second thought, it is sensible to believe that the larger the firm, the smaller the probability to set up a plant in any given Greek region. Usually, larger firms are more flexible and at a given point in time, they decide to become international, entering new foreign markets rather than stay in the limited Greek territory. On the other hand, firm's profitability is positively significant for the location selection, showing that the more profitable the enterprise, the more likely it is to choose a particular region in the sense that it may not be dramatically affected by the lack of necessary facilities[19].

Overall, the investment profile across the Greek regions is in accordance with motivations previously discussed in related literature, placing particular emphasis on agglomeration economies and human capital availability. As evidenced by the baseline full model (Table 1), European funds do seem to have exerted a significant impact on investors' decision for their production location, whilst the Greek Development Law not only hasn't been enhancing, but it has acted in the opposite direction, reducing the probability for a new establishment in any given region. Firm-specific attributes are also of particular significance when added to the models, witnessing the effect of internal, to the firms, characteristics for any given decision of

theirs. Slightly differentiated patterns are finally detected between domestic and foreign owned firms as well as between traditional versus modern sector behavior.

5. Concluding Remarks

This article mapped economic activities in Greece and presented an empirical formulation of investors' decision-making. A McFadden's conditional logit model was incorporated to test for the model's predictions, based on location decisions of 226 new manufacturing plants in the prefectures of Greece for the years 1996 and 1997. Estimation results suggest that firms' choices can be modeled in terms of economic factors prevailing locally. The consensus in regards to the nowadays empirically and theoretically established notion of spatial clusters is confirmed for the case of Greece, with firms of the same sector locating close to each other in order to benefit from positive externalities. Typical market variables such as market size and labor costs as well as advanced infrastructure, human capital and knowledge creation constitute an influx of necessary conditions that induces undertaking production in a particular place.

On the other hand, the picture of the influence exerted by public incentives is mixed. Greek co-financing of a new plant is of no interest to potential investors at the first place, whilst European assistance plays its role through its effect on the wider environment. This is of particular interest to national and European authorities concerned with regional integration, as the provision of aid is not a reinforcing power by itself, unless it boosts development.

Future research may explore more thoroughly regional location determinants for an expanded time span or for the new establishments in recent years in order to be able to compare the evolution of location preferences through the time. Another interesting extension would be to investigate regional attractiveness focusing on specific sectors besides the wide classification of traditional versus modern sectors. This would allow us for more concrete implications especially in regards to European and national policies.

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TABLES AND FIGURES

Figure 1. Distribution of Industrial Activity in Greece (1997), Number of Established Firms

Legend:
- 17 - 23
- 24 - 59
- 60 - 213
- 214 - 862
- 863 - 2069
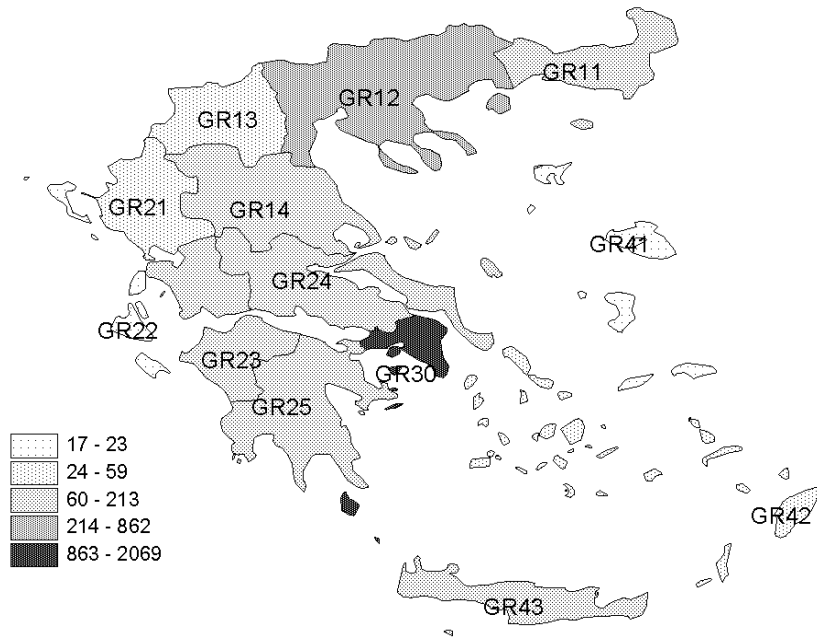
Figure 2. Number of New Establishments (1996-1997)

Legend:
- 2 - 4
- 5 - 7
- 8 - 21
- 22 - 44
- 45 - 97
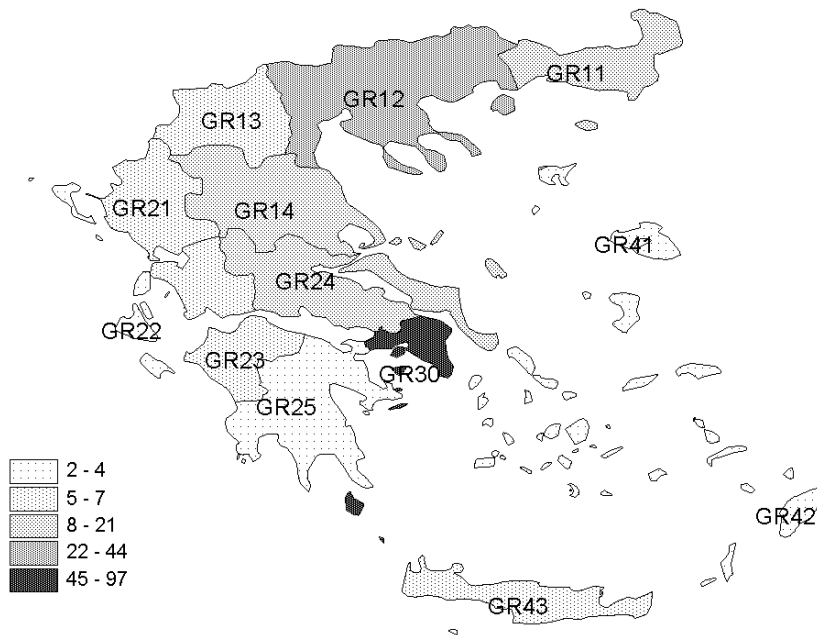
Figure 3. Agglomeration Economies. New Establishments over already established Firms.

0% - 4%
4.01% - 6%
6.01% - 10%
10.01% - 14%
14.01% - 17%
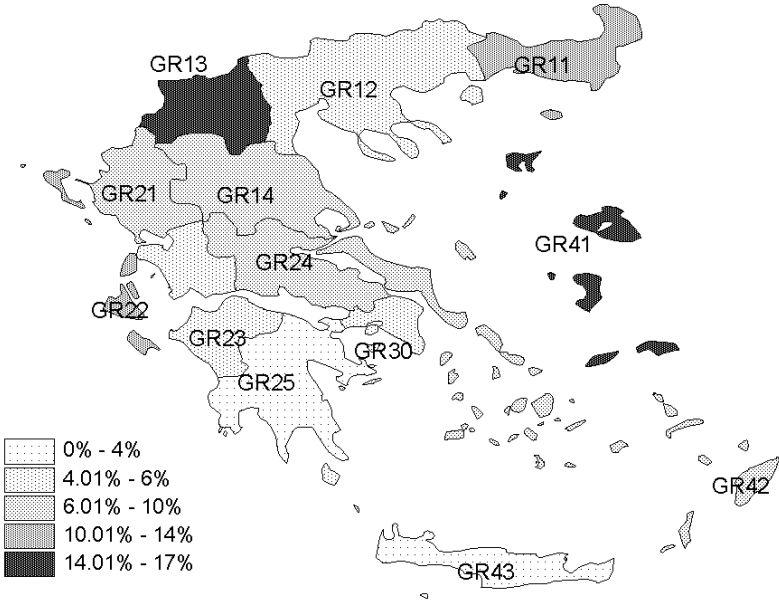
Figure 4. Percentage of new traditional firms over total new Firms

28% - 33%
33% - 50%
50% - 68%
68% - 80%
80% - 100%
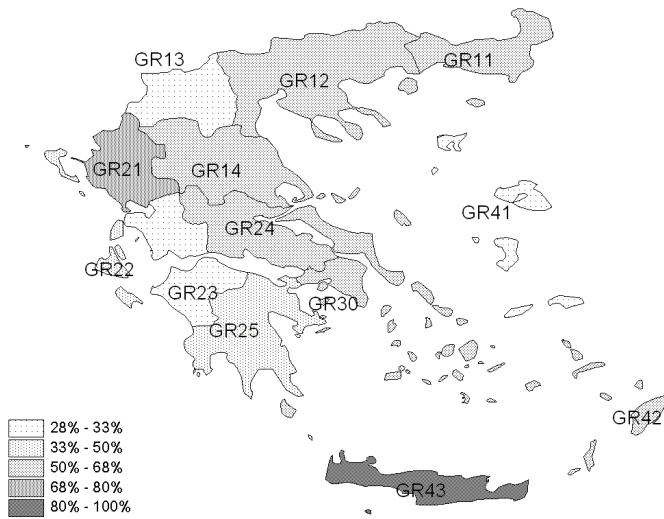
Figure 5. Percentage of new Modern firms over total new Firms.

0% - 10%
10% - 20%
20% - 40%
40% - 50%
>50%
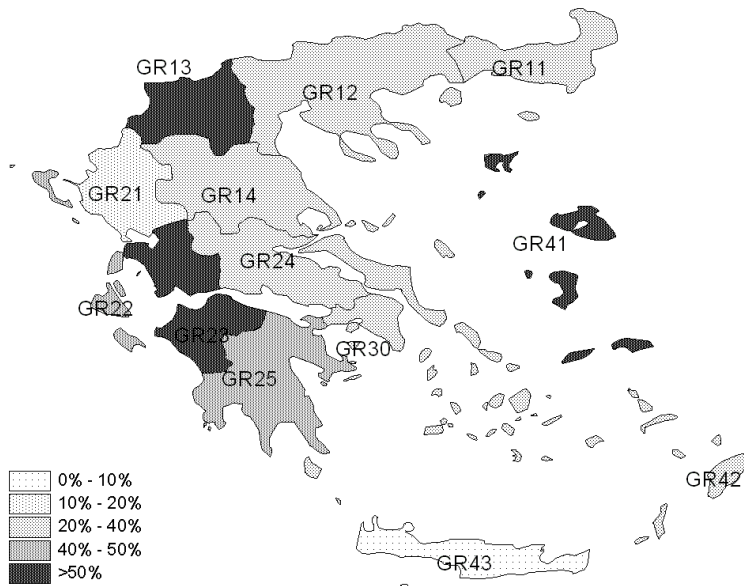
Table 1. Results of location choice determinants. Dependent Variable: Choice of Region *i*.

| Variable	Column 1	Column 2	Column 3	Column 4	Column 5
RMS	1.714***	1.109**	-1.467	-2.118*	1.657**
	(0.405)	(0.459)	(1.275)	(1.250)	(0.701)
HK	8.938**	8.271*	19.288***	8.068	9.871**
	(4.303)	(4.288)	(6.855)	(7.628)	(4.642)
LC	-4.245**	-4.370**	-9.481***	-1.405	-4.067**
	(1.990)	(1.989)	(3.058)	(3.752)	(1.969)
LI	2.152***	1.374	4.207**	1.886	2.459*
	(0.817)	(0.864)	(1.635)	(1.739)	(1.350)
KC	27.919*	31.023**	62.915***	26.753	28.294*
	(15.040)	(14.999)	(21.861)	(22.643)	(15.350)
RC		0.006***	0.006***	0.006***	0.006***
		(0.002)	(0.002)	(0.002)	(0.002)
DL			-0.040**	-0.027	
			(0.018)	(0.018)	
CSF				2.441***	
				(0.760)	
TF					-0.001
					(0.001)
N	226	226	226	226	226
Pseudo R	0.262	0.270	0.275	0.284	0.271
LR chi2	304.19	312.81	318.49	328.91	313.95

Standard Errors are in parentheses
*** p < 0.01   ****** p < 0.05   ***** p < 0.10

Table 2. Results of location choice determinants
Dependent Variable: Choice of Region *i*.

Variable	Total Sample	Without Athens	Without Thessaloniki	Without Athens and Thessaloniki
RMS	1.109**	0.965*	0.458	0.266
	(0.459)	(0.533)	(0.555)	(1.005)
HK	8.271*	13.240***	13.757***	12.093**
	(4.288)	(4.930)	(5.153)	(5.464)
LC	-4.370**	-3.606**	-3.649**	-2.953
	(1.989)	(1.843)	(1.790)	(2.070)
LI	1.374	2.984**	2.906***	2.376*
	(0.864)	(1.255)	(1.088)	(1.317)
KC	31.023**	30.412**	40.481**	29.661*
	(14.999)	(15.029)	(16.126)	(18.073)
RC	0.006***	0.009***	0.006**	0.019
	(0.002)	(0.003)	(0.002)	(0.013)
N	226	129	182	85
Pseudo R	0.270	0.163	0.312	0.077
LR chi2	312.81	104.46	282.28	31.32

Standard Errors are in parentheses
*** p < 0.01   ****** p < 0.05   ***** p < 0.10

Table 3. Results of location choice determinants for domestic establishments
Dependent Variable: Choice of Region *i*.

Variable	Total Sample	Only Domestic
RMS	1.109**	1.177***
	(0.459)	(0.475)
HK	8.271*	5.907
	(4.288)	(4.451)
LC	-4.370**	-3.053
	(1.989)	(2.034)
LI	1.374	0.970
	(0.864)	(0.894)
KC	31.023**	31.748**
	(14.999)	(15.999)
RC	0.006***	0.006***
	(0.002)	(0.002)
N	226	214
Pseudo R	0.270	0.267
LR chi2	312.81	293.45

Standard Errors are in parentheses
*** p < 0.01   ** p < 0.05   * p < 0.10

Table 4. Results of location choice determinants – Traditional vs. Modern sectors
Dependent Variable: Choice of Region *i*.

Variable	Traditional	Modern
RMS	0.618	2.286***
	(0.617)	(0.751)
HK	9.082*	8.473
	(5.443)	(7.420)
LC	-6.884***	-0.446
	(2.724)	(2.961)
LI	1.984**	1.561
	(1.085)	(1.596)
KC	57.195**	1.097
	(24.266)	(20.501)
RC	0.007***	-0.003
	(0.002)	(0.005)
N	132	94
Pseudo R	0.317	0.211
LR chi2	235.61	87.74

Standard Errors are in parentheses
*** p < 0.01   ** p < 0.05   * p < 0.10

Table 5. Results of location choice determinants with firm-level characteristics incorporated
Dependent Variable: Choice of region *i*.

Variable	Column 1´	Column 2´	Column 3´	Column 4´	Column 5´
RMS	2.282***	1.663***	0.916	-1.000	-0.384
	(0.465)	(0.495)	(1.446)	(3.317)	(0.884)
HK	10.742**	9.570**	12.455*	1.215)	2.640
	(4.753)	(4.748)	(7.182)	(19.051)	(5.184)
LC	-0.941	-0.777	-2.346	3.429	0.753
	(1.800)	(1.793)	(3.382)	(9.722)	(1.864)
LI	1.954**	0.717	1.515	-0.835	-6.017**
	(0.926)	(0.994)	(1.775)	(4.107)	(2.784)
KC	9.485	12.148	21.325	17.640	17.356
	(15.780)	(15.625)	(23.008)	(23.260)	(15.203)
RC		0.007***	0.007***	0.007***	0.006***
		(0.002)	(0.002)	(0.002)	(0.002)
DL			-0.011	-0.017	
			(0.020)	(0.022)	
CSF				0.045	
				(0.071)	
TF					0.003***
					(0.001)
SIZE	-2.520**	-3.034***	-2.851**	-2.084	-7.133***
	(1.113)	(1.115)	(1.155)	(1.636)	(2.010)
PROF	0.104*	0.131**	0.123**	0.124**	0.335***
	(0.060)	(0.060)	(0.061)	(0.061)	(0.103)
N	226	226	226	226	226
Pseudo R	0.283	0.295	0.296	0.296	0.302
LR chi2	307.17	319.78	320.08	320.49	326.75

Standard Errors are in parentheses
*** $p < 0.01$ ** $p < 0.05$ * $p < 0.10$

Appendix 1

Table 1. Variable Description and Source of data.

Variable Name	Variable Description	Source
RMS	Market Potential of the region, local GDP.	Eurostat Regional Statistics
HK	Human Capital, monthly wage bill of white collar employees.	Greek National Statistics Service
LC	Labor Cost, hourly wage of workers.	Greek National Statistics Service
LI	Local Infrastructure, private cars per capita.	Eurostat Regional Statistics
KC	Knowledge creation, Manufacturing R&D expenditures per firm.	Eurostat Regional Statistics, ICAP Directory and author's calculations
RC	Regional Clusters, cumulated number of firms belonging to the same sector.	ICAP Directory and author's calculations
DL	Development Law, grants to new investors.	Ministry of Economy and Finance
CSF	Community Structural Funds, Objective 1.	Annual Report of European Commission
TF	Total Firms, cumulated number of firms irrespectively of sector.	ICAP Directory and author's calculations
SIZE	Total number of employees per firm.	ICAP Directory
PROF	Gross Profits over Turnover	ICAP Directory and author's calculations

Table 2. Greek NUTS 2 Regions

Region Code	Broad Region	Sub Regions
GR	Ellada	
GR1	Voreia Ellada	
GR11		Anatoliki Makedonia, Thraki
GR12		Kentriki Makedonia
GR13		Dytiki Makedonia
GR14		Thessalia
GR2	Kentriki Ellada	
GR21		Ipeiros
GR22		Ionia Nisia
GR23		Dytiki Ellada
GR24		Sterea Ellada
GR25		Peloponnisos
GR3	Attiki	
GR4	Nisia Aigaiou, Kriti	
GR41		Voreio Aigaio
GR42		Notio Aigaio
GR43		Kriti

Source: Eurostat Regional Statistics

Table 3. Greek NUTS 2 Regions and Prefectures

Prefecture	NUTS	Population	Area (km.²)	Area (mi.²)	Capital
Achaea	GR232	297,318	3,209	1,239	Patras (Patrai)
Aitolia and Akarnania	GR231	230,688	5,447	2,103	Missolongi (Mesolongion)
Arcadia	GR252	103,840	4,419	1,706	Tripolis (Tripolitza)
Argolis	GR251	97,250	2,214	855	Nauplion
Arta	GR211	78,884	1,612	622	Arta
Attica	GR3	3,522,769	3,808	1,470	Athens (Athenai)
Boeotia	GR241	134,034	3,211	1,240	Levadeia
Corfu	GR222	105,043	641	247	Corfu (Kerkyra)
Corinth	GR253	142,365	2,290	884	Corinth (Korinthos)
Cyclades	GR422	95,083	2,572	993	Hermoupolis (Ermoupole)
Dodecanese	GR421	162,439	2,705	1,044	Rhodes (Rodos)
Drama	GR114	96,978	3,468	1,339	Drama
Euboea	GR242	209,132	3,908	1,509	Khalkis (Chalkida)
Evritania	GR243	23,535	2,045	790	Karpenissi (Karpenesion)
Evros	GR111	143,791	4,242	1,638	Alexandroupolis
Florina	GR134	52,854	1,863	719	Florina
Fokis	GR245	43,889	2,121	819	Amfissa
Fthiotis	GR244	168,291	4,368	1,686	Lamia
Grevena	GR131	37,017	2,338	903	Grevena
Heraklion	GR431	263,868	2,641	1,020	Heraklion (Candia, Megalokastron)
Ilia	GR233	174,021	2,681	1,035	Pyrgos
Imathia	GR121	138,068	1,712	661	Veroia
Ioannina	GR213	157,214	4,990	1,927	Ioannina (Yannina)
Karditsa	GR141	126,498	2,576	995	Karditsa
Kastoria	GR132	52,721	1,685	651	Kastoria
Kavala	GR115	135,747	2,109	814	Kavala (Cavalla)
Kefallinia	GR223	32,314	935	361	Argostoli (Argostolion)
Khalkidiki	GR127	91,654	2,945	1,137	Polygyros
Khania	GR434	133,060	2,376	917	Khania (Canea)
Khios	GR413	52,691	904	349	Khios
Kilkis	GR123	81,845	2,614	1,009	Kilkis
Kozani	GR133	150,159	3,562	1,375	Kozani
Laconia	GR254	94,916	3,636	1,404	Sparta (Sparte)
Larisa	GR142	269,300	5,351	2,066	Larisa (Larissa)
Lasithi	GR432	70,762	1,823	704	Agios Nikolaos
Lesvos	GR411	103,700	2,154	832	Mytilene
Levkas	GR224	20,900	325	125	Levkas (Leucadia)
Magnesia	GR143	197,613	2,636	1,018	Volos (Nea Ionia)
Messinia	GR255	167,292	2,991	1,155	Kalamata (Kalamai)
Mount Athos	GR127	1,472	336	130	Karyai (Karyes)
Pella	GR124	138,261	2,506	968	Edessa
Pieria	GR125	116,820	1,506	581	Katerini
Preveza	GR214	58,910	1,086	419	Preveza
Rethymnon	GR433	69,290	1,496	578	Rethymnon (Rethymni)
Rodopi	GR113	103,295	2,543	982	Komotini
Samos	GR412	41,850	778	300	Samos (Limin Vatheos, Vathy)
Serrai	GR126	191,890	3,970	1,533	Serrai (Serres)
Thesprotia	GR212	44,202	1,515	585	Hegoumenitsa
Thessaloniki	GR122	977,528	3,560	1,375	Thessaloniki (Salonica)
Trikala	GR144	137,819	3,367	1,300	Trikala (Trikkala)
Xanthi	GR112	90,450	1,793	692	Xanthi
Zakynthos	GR221	32,746	406	157	Zakynthos (Zante)

Source: Eurostat Regional Statistics

Table 4. Greek Manufacturing Sectors

Sector Number	Sector Description	Modern or Traditional
20	Food and Agricultural Products	Traditional
21	Beverages	Traditional
22	Tobacco and Tobacco Products	Traditional
23	Textile Products	Traditional
24	Fabric and Leather Products	Traditional
25	Wood and Cork	Traditional
26	Furniture	Traditional
27	Paper and Products	Traditional
28	Newspapers, Magazines and Publishing	Traditional
29	Leather and Fur	Traditional
30	Rubber and Plastics	Modern
31	Chemicals, Gases, Medicines and Cosmetics	Modern
32	Petroleum and Coal Products, Gas Bottling	Modern
33	Non-Metallic Mineral Products	Modern
34	Primary Metal Products	Traditional
35	Metal Products and Structures	Modern
36	Machinery	Modern
37	Electric Equipment	Modern
38	Transportation Means	Modern
39	Miscellaneous Manufactured Products	Traditional

Source : Greek National Statistics Service.

Appendix 2. Diagnostic tests on the econometric specification.

Table 1. Independence of Irrelevance Alternatives test

Category	N. of groups	Hausman	Degrees of Freedom	Probability
12	205	-9.60	5	1.000
23	182	4.57	5	0.471
25	219	9.61	5	0.087
43	212	0.07	5	1.000
42	221	0.45	5	0.994
30	224	0.19	5	0.999
41	220	0.35	5	0.997
22	211	-1.08	5	1.000
24	222	5.18	5	0.395
13	129	0.70	5	0.983
11	223	0.65	5	0.986
14	223	0.98	5	0.964
21	221	-18.01	5	1.000

Refers to the probability of accepting the H_0: IIA holds.

Table 2. Collinearity Diagnostics

	VIF	Eigenvalue	Condition Index	R-square
RMS	4.83	2.3665	1	0.7928
HK	1.82	1.7897	1.1499	0.452
LC	1.8	1.0509	1.5007	0.4432
LI	2.36	0.4069	2.4116	0.5761
KC	2.65	0.2639	2.9945	0.6224
TF	2.92	0.1221	4.4032	0.6574
Mean VIF : 2.73	Condition Index : 4.40			

Table 3. Correlation Matrix

	RMS	HK	LC	LI	KC	TF
RMS	1.000					
HK	0.094	1.000				
LC	-0.011	0.620	1.000			
LI	0.465	-0.169	-0.052	1.000		
KC	0.598	0.193	0.169	-0.141	1.000	
TF	0.743	-0.045	-0.058	0.618	0.237	1.000

Notes

[1] The NUTS classification has been used since 1988 in Community legislation and it distinguishes 3 levels. Form information on the NUTS classification, see http://europa.eu.int/comm/eurostat/ramon/nuts/home_regions_en.html

[2] However, these studies use a completely different methodology than the one incorporated here.

[3] Guimaraes *et al*. account for the quality of work force by using the proportion of workers with a secondary education level.

[4] Firms' R&D expenditure may also serve as a measure for their competitiveness, hindering the entrance of new comers, who, besides the start up costs of a new plant would have to face competition from already established firms with more efficient production functions.

[5] Louri, 1995, relates the provision of infrastructure to urbanization economies and incorporates urban population as a variable to capture this effect.

[6] Anagnostaki and Louri, 1995, and Louri and Anagnostaki, 1995, use a concentration measure, given by the share of four largest firms of the sector in terms of employment.

[7] Nevertheless, as Paliginis (2001) mentions, Community and local transfers, important as they are, do not fully address peripherality, especially in a case like Greece where reallocation and restructuring of industries due to globalization and the creation of the Single European Market create negative dynamic effects.

[8] Total assets as a measure of firm size does not alter the results.

[9] The use of net profits (instead of gross) provide a lower significance.

[10] The classification of the sectors may be found in Appendix 1, Table 4.

[11] Our data covers firms established back in 1860.

[12] The data corresponding to Figures 1-3 can be found in Appendix 1.

[13] GR30 is the NUTS 2 classification according to European standards for Attiki, which basically consists of the capital, Athens. See, Tables 1 and 2 of Appendix 1 for regions' classification in Greece. Also, see http://europa.eu.int/comm/eurostat/ramon/nuts/codelist_en.cfm?list=nuts

[14] We also experimented with an alternative specification, incorporating the R&D and excluding per capita private cars. Results are almost the same as in column 4.

[15] This is contradictory to Louri (1988) who estimated a positive and significant influence of Greek regional investment incentives. Nevertheless, she used a computation of the present value of regional policy including up to four different investment incentives.

[16] In the sub-samples examined henceforth, the Greek Development Law and the Community Structural Funds are not included for simplicity. However, even with their inclusion, results remain the same and as shown in the baseline model, only the European assistance seems to enhance the probability of choosing a particular location. These results are available upon request.

[17] Checking for foreign new establishments is not feasible due to the small number of observations which amount to 12.

[18] The only exception is associated to column 5´ where LI gives a totally reversed than previously effect and the fact that herein TF, i.e. the existence of already established firms irrespective of their sector seems to increase the probability of choosing a particular region.

[19] With respect to sub-samples discussed earlier (i.e. excluding Athens and Thessaloniki, traditional versus modern sectors and domestic firms) results comply with the ones without the firm-specific attributes, only that now both of these firm-specific factors are both significant as shown in Table 6. These results are available upon request.