The determinants of foreign direct investment in the Greek regions

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THE DETERMINANTS OF FOREIGN DIRECT INVESTMENT
IN THE GREEK REGIONS

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Abstract: This study investigates the determinants of FDI in the Greek regions. The aim of the study is to understand whether and to what extent the presence of localization economies in the Greek regions, has an impact on FDI locational decisions. We use a pooled cross-section dataset of FDI stock and we study the effect of localization economies and of other basic determinants, on the attraction of FDI. We find the most significant influences to be market size, human capital, geographic position and the presence of localization economies.

Introduction

Foreign Direct Investment (FDI) has become a fundamental aspect of the global economy since 1990s (UNCTAD 2003 in Bevan and Estrin 2004). Multinational Enterprises (MNEs) play an essential role in promoting economic growth by contributing to the transfer of new technologies and to the diffusion of new knowledge to the domestic economy (Kinoshita 2006). Several studies have shown that FDI can contribute positively to the economic growth of the recipient country by creating productivity gains, technology transfers, know-how diffusion in the domestic market and increasing managerial skills (Schoors and Tol 2002). The local economy can benefit from positive externalities related to FDI which relate to the capturing of technological and knowledge spillovers as well as adoption of efficient production methods and practices (Pike et al. 2006).

Moreover, FDI attraction can be increasingly important for the development of small economies, by allowing them to benefit from the external knowledge provided by the foreign firms, absorb new knowledge and finally catch up with the leading countries. The attraction of FDI in a rather small economy of the European South like Greece, can be a vital tool for enhancing economic development and increasing productivity. In addition the establishment of foreign subsidiaries in the subnational Greek market can be of greater importance due the fact that foreign firms pay attention to locational specificities when they decide where to locate. Hence, the attraction of FDI at the regional level can potentially boost the economic development of these areas and therefore, it can play an important role for the implementation of regional development policy.

In this study, we focus on analyzing the factors that affect FDI location in the Greek regions. Greece is currently examining the support of policies aiming to attract foreign investors in order to revitalize the economy and tackle the consequences of the financial crisis and thus it is vital

to analyze the parameters that contribute best to this process. There has already been some discussion about FDI inflows in the Greek market and particularly about the main dynamics which influence FDI location (Bitzenis et al. 2007, Pantelidis et al. 2008, Georgopoulos et al. 2006, Dimelis 2004). The previous studies conclude that the most decisive FDI motives are market growth, market size and human capital. In this paper we will also examine the effect of regional sectoral specialization on FDI locational strategies. The industrial concentration generates important agglomeration economies and spatial externalities arising from the sectoral specialization of the region. We will prove that foreign investors in Greece don't only prefer to reap the benefits of geographical proximity to urban centers but they also pay attention to industrial clustering and wish to benefit from this type of agglomeration economies. Therefore this shapes their locational decisions accordingly. Moreover the sectoral specialization of the Greek regions has not been analyzed as FDI determinant in previous studies so it is important to learn the potential impact of industrial specialization on FDI location patterns because it could be used as an effective policy measure in the future.

The next section is devoted in briefly revising the theoretical and empirical literature of the determinants of FDI. The third section describes the results from the data analysis and provides information for the regional and sectoral distribution of FDI. It also presents the results of the econometric model and provides the most significant FDI determinants. The last section provides conclusions and policy implications.

Literature Review and Empirical Studies

A brief review of the determinants of FDI location

Several studies have focused on outlining the MNEs' motives to internationalize their production capacities. Dunning (2000) refers to the Owneship-Localisation-Internalisation (OLI) triangle and argues that a firm internationalizes its production because of ownership, location and internalization advantages. Hence, the firm aims to keep its ownership advantages (property rights, patents or technology) rather than selling them to another firm. Moreover a firm prefers to internalize its activities in order to minimize the transaction costs associated with the market mechanism and avoid any uncertainties (Dunning 2000). Lastly the multinational company seeks for locational advantages which might be related to low labor costs, market size, natural resources or cultural specificities (Bevan and Estrin 2004).

According to Dunning's theory, the locational decisions of MNEs depend on the type of strategy they want to follow. Dunning (2002) states three main decisive factors that encourage MNEs to establish their affiliates in the domestic market. Firstly if the motives of the MNE are resource-seeking or if the company follows a supply-oriented approach, the locational decisions depend on factor endowments differences and they seek either to benefit from natural resources or from cheap labor. On the other hand a market-seeking investment or a market oriented strategy refers to the aim of serving a foreign market by locating within this market (Dunning and Lundan 2008). Hence, FDI are encouraged by the host country's market size and market growth (Dunning 2002). For example large regional market size and good infrastructure seem to play a decisive role on the foreign companies' locational decisions when they invest in China (Cheng and Kwan, 1999). Finally the last type of MNEs comprises the companies that adopt efficiency-seeking strategies and they aim to increase their competitiveness (Dunning 2002).

National or regional market size appears to be a significant FDI determinant in many empirical studies. For instance, Bevan and Estrin (2004) find that the size of the market and the level of market growth remain influential factors of FDI attraction in the Central and Eastern European

Countries (CEECs). Also Resmini (2008) indicates that a high development level, generally measured by GDP per capita, represents the most important motivation for MNEs to locate in CEECs. The above authors stress the influence of the host market's level of development on the FDI attraction and they argue that FDI prefer to locate in more developed regions.

Additionally Nunnenkamp (2002) refers to the significance of other host features for FDI attraction like low production costs and a high level of human capital. A cheap and educated labor force makes the transition economies of Europe an attractive place for foreign investment. Also Bevan and Estrin (2004) demonstrate that proximity to large/central markets (indicated by the relative distance between the home and host country) affect FDI location in the CEECs. Therefore it can be derived that apart from market size and market growth, gravity factors also determine the locational decisions of foreign investors in the Eastern European transition economies. The analysis of the FDI determinants will be analyzed thoroughly in the third section of this paper.

Empirical studies show that the MNEs that have penetrated the Greek market are mostly seeking for attractive national brand names or local supply chain networks (Georgopoulos and Preusse 2006). In other words the foreign firms that engage to direct investment in Greece aim mostly at serving the domestic market. Pantelidis and Nikolopoulos (2008) show that the multinational enterprises that invest in the country are mostly driven by market size and consumer demand which allows us to derive that the Greek economy attracts mostly market-seeking FDI. Furthermore Barrios et al. (2002) find that in comparison with other EMU countries like Ireland and Spain, Greece attracts mainly FDI in traditional and low technology sectors. In the subsequent analysis of our data, this issue will be examined thoroughly.

As confirmed by the theoretical and empirical literature, the domestic characteristics that are related to market size, market growth, human capital and geographic position have a significant impact on FDI attraction. Nevertheless, it is indisputable that in some cases MNEs tend to follow patterns of spatial concentration and hence to cluster in places with locational specificities. Therefore it is important to acknowledge the forces of agglomeration when we discuss MNEs locational strategies.

Localization economies as an FDI determinant

Ottaviano and Puga (1998) argue that firms tend to cluster together and agglomerate spatially. This is attributed to the fact that increasing returns to scale and pecuniary externalities arising from technological spillovers, supply-demand linkages and labor pooling, induce firms to concentrate geographically. In other words forces of agglomeration can influence the firms' locational decisions. Furthermore Ottaviano and Thisse (2004) stress the importance of imperfect competition and economies of scale in explaining the agglomeration of firms in metropolitan areas. The continuous concentration of FDI in urban centers and cities reveals the potential benefits that accrue from the occurrence of urbanization economies. These economies are external to the firms and arise from urban services and from the density of activities that concentrate in metropolitan centers. (Frenken et al. 2007).

Despite the increasing importance of urbanization economies, in this study we examine the impact of localization economies on the FDI locational strategies. Localization economies occur in spatial agglomerations of firms operating in related or similar activities (Cantwell and Iammarino 2001) and the term was initially conceived by Marshall in 1890 (Malmberg 2001). The concentration of firms in the same industry allows the emergence of positive externalities arising from a specialized pool of labour, from lower prices for inputs and outputs and from the

potential occurrence of knowledge spillovers. The benefits are external to the firm but internal to the industry. Historically they were mostly evident in the manufacturing sector and particularly in the textiles industry (Parr 2002).

Consequently the participation in an industrial clustering offers companies the opportunity to have access to information, knowledge and technology (Porter 1998). Hence, this clustering is mainly attributed to the fact that foreign firms can benefit from technology and knowledge spillovers arising from co-location with previously established industrial units operating in the same sector (Campos and Kinoshita 2003). Therefore this kind of industrial clustering induces foreign firms to enter this market because of the potential advantages they can enjoy due to localized skilled workforce or spillovers from cooperation (Parr 2002).

The spatial concentration of activities operating in the same industry promotes the emergence of national and regional specialization patterns. In other words localization economies contribute to the formation of the sectoral characteristics of the region and depend upon the previous local presence of industry related activities (Cantwell and Iammarino 2001). According to the empirical study of Guimaraes et al. (2000) the locational decisions of FDI in Portugal were strongly determined by the existence of this kind of agglomeration economies. The authors observe the concentration of FDI activity to places where the manufacturing and services sectors appear to have a strong share in employment compared to the national average.

In addition, further evidence about the influence of localization economies on FDI strategies, is found in Resmini (2000) where she examines the determinants of MNEs' location in the CEECs from a sectoral perspective. The author finds that the industrial specialization of those countries and the emergence of agglomeration economies (localization and urbanization economies), accordingly shape the geographical and sectoral patterns of FDI location.

Therefore according to the theoretical and empirical literature, the regional and sectoral specialization of the host economy can generate positive localization externalities which subsequently can act as determinant of foreign direct investment. In the next sections we will explore the potential emergence of such kind of external economies in the Greek regions and we will test the hypothesis of a rather positive or negative influence on FDI location in the Greek market. Thus, the research questions that we will pose in this study are the following: first of all we will test whether the sectoral specialization of each subnational unit of analysis has a significant impact on the geographical distribution of FDI. With regard to that we will test the hypothesis which predicts that the regions which achieve high sectoral specialization and localisation economies, manage to attract more FDI. Furthermore we will examine the same hypothesis for other potential determinants of FDI like market size, human capital and level of development.

So far we presented a brief review of the literature regarding the types of FDI strategies and the determinants of FDI. Before we investigate the impact of these dynamics on FDI location in the Greek regions, it is important to examine the geographical and sectoral evidence of MNEs' presence in the Greek economy and analyse the economic structures of the Greek regions that are the hosts of FDI.

Geographical and Sectoral Distribution of FDI

This section is focused on explaining the sectoral and geographical distribution of FDI as well as the sectoral specialization of the home countries and host regions. Table 2 indicates that a

substantial share of foreign direct investment has occurred in the sectors of financial services and manufacturing. In particular we observe a concentration of almost 30% of foreign activity to financial services. The substantial attractiveness of FDI in the banking sector is possibly attributed to the fact that financial companies are sufficiently internationalized and seek to serve foreign markets via direct investments and to expand their activities. In addition the deregulation patterns of the financial industry determined substantially its expansion into foreign markets and subsequently into the Greek market (Athanassopoulos and Labroukos 1999). According to our analysis the foreign subsidiaries that specialize in financial services originate mostly from Luxembourg, Netherlands, Cyprus, France and the United Arab Emirates (Table 1).

The two metropolitan areas of the country, namely Attiki (Athens and the peripheral area) and Thessaloniki, attract 30 and 48 percent of the total foreign financial activities respectively. Moreover 11% of FDI established in Dodekanisos seem to specialise in the financial sector (Table 2). The pronounced concentration of FDI in banking services in the two main urban centres of the country shows the possible influence of urbanization economies and economies of scale on the location decisions of MNEs.

Furthermore Table 2 points out the concentration of activities in the manufacturing sector (34%). In the analysis, we divided the manufacturing sector into 3 classifications: consumer, intermediate and capital industries (Jackson and Petrakos, 2001 in Petrakos et al. 2008). The consumer and intermediate industrial groups have the largest share in the entire sector (19% and 13% respectively), although we observe moderate attraction in the high tech activities. In other words the foreign subsidiaries that enter the Greek market focus mostly on traditional sectors like manufacturing (consumer and intermediate industrial activities) and also on the banking sector. Additionally we observe an important percentage of investment in wholesale trade (13%).

Furthermore, noteworthy is the fact that while the inward investment in the financial sector originates from European and non European countries in an equal basis, in the manufacturing sector non European countries outnumber. In particular the United States is sixth in ranking with regard to the overall investment but 85% of this investment focuses on manufacturing. Finally 15% of all inward investment is directed to transport and communications sector and the main investor countries are Germany and Italy. This uneven distribution of foreign affiliates among sectors indicates that industrial and hence international specialization is an important determinant of FDI. Previously we made the assumption that the large concentration of FDI in the financial sector is attributed to the demand-oriented strategy of the foreign firms and hence to the requirement for large market size and consumer demand.

Geographical patterns reveal a high investment concentration from the host country perspective as well. According to the research analysis, 88% of the foreign investment is directed to Athens and the peripheral regions (Attiki), 8% in Thessaloniki, the second largest prefecture, and the rest of investment is geographically scattered to the rest of Greece (Table 3). In other words Attiki receives the bulk of foreign investment in terms both of number and total value. This implies the formation of a core-periphery FDI pattern. The remarkably high geographical concentration in Attiki allows us to assume that FDI is driven mostly from a large market size and from market growth, regarding the facts that almost 1/3 of the population is gathered in the prefecture of Attiki (Hellenic Statistical Authority 2010) and that it constitutes the most prosperous prefecture (Petrakos et al. 2008). Also we make the assumption that MNEs tend to agglomerate in Attiki in order to benefit from urbanisation economies that arise from the dense co-location of different activities such as industries, universities or trade unions that

FDI inward stock in the EU-27

EU COUNTRIES	FDI per capita	FDI share
1 France	15.53	15.41
2 UK	16.12	15.28
3 Germany	8.53	10.89
4 Netherlands	39.20	10.02
5 Spain	13.93	9.87
6 Belgium	48.84	8.07
7 Italy	5.74	5.34
8 Sweden	27.50	3.94
9 Ireland	39.18	2.70
10 Poland	4.23	2.51
11 Denmark	27.39	2.34
12 Austria	16.71	2.17
13 Czech Republic	10.97	1.78
14 Portugal	9.40	1.55
15 Finland	16.54	1.37
16 Luxembourg	177.82	1.33
17 Romania	3.34	1.12
18 Hungary	6.34	0.99
19 Bulgaria	6.04	0.72
20 Slovakia	8.50	0.71
21 Greece	**3.27**	**0.57**
22 Cyprus	26.41	0.32
23 Estonia	11.91	0.25
24 Slovenia	7.81	0.25
25 Lithuania	3.83	0.20
26 Latvia	5.05	0.18
27 Malta	22.19	0.14
Total		**100.00**

Source: UNCTAD, 2008

generate positive externalities to foreign firms (Frenken et al. 2007).

The majority of the investment that Attiki receives is focused on the financial and manufacturing sector. Almost 60% of the foreign capital invested in the region is specialized in these sectors, which implies that apart from the geographical concentration, a similar pattern for industrial concentration is being observed (Table 2). In other words the banking sector is highly concentrated in the core region of Attiki and in the region of Thessaloniki. It is interesting to notice that although the financial foreign activities are strongly clustered in the two metropolitan centres of Attiki and Thessaloniki, the manufacturing and other activities demonstrate a rather significant dispersion across the country. For example manufacturing investment is strongly evident in peripheral prefectures as in Magnesia or Kilkis (Fig.1). A possible interpretation of this result is the fact that some of the prefectures that attract foreign firms which specialise in a particular sector, are located in close proximity with urban centres. For instance the prefecture of Kilkis is

Table 2

Sectoral distribution of FDI stock in Greece by NACE 1 classification, 2008.

NACE 1 DIGIT	SECTOR	FDI (%)
J	Financial services	30.20
D1	Manufacturing (consumer)	19.01
I	Transport, storage and communications	14.61
D2	Manufacturing (intermediate)	13.69
G	Wholesale and retail trade	12.94
K	Real estate, renting and business activities	2.13
H	Hotels and restaurants	2.11
F	Construction	1.94
O	Other community, social and personal service	1.07
D3	Manufacturing (capital)	0.78
E	Electricity, gas and water supply	0.58
N	Health and social work	0.58
C	Mining and quarrying	0.12
A,B	Agriculture, forestry and fishing	0.02
M	Education	0.00
	Total	100.00

Source: Bank of Greece 2010.

close to the metropolitan area of Thessaloniki. From a different perspective, 100% of investment in Hotels and Restaurants is concentrated in the prefecture of Dodekanisos (a complex of Aegean islands). Obviously this concentration is attributed to the foreign affiliates' operation in touristic business.

Despite the high concentration of foreign affiliates in Attiki and despite the high attraction of both manufacturing and banking sector, the foreign activities are rather diversified sectorally. For instance 16% of the foreign affiliates established in Attiki operate in the sector of transport and communication and 12% in wholesale and retail trade. On other hand in the peripheral prefectures we notice an evident sectoral specialisation pattern. For instance 11 out of 25 regions examined, attract foreign affiliates that operate only in manufacturing and 4 out of 25, attract firms that operate only in Hotels and Restaurants (Fig.1). Hence, foreign direct investment in Greek regions follows a pattern of high sectoral specialization.

In the next section it will be examined if the sectoral specialization of the foreign subsidiaries is correlated with the sectoral specialization of the subnational units of analysis and if yes, what kind of correlation it is observed. In addition we will test the impact of some more "traditional" variables such as regional income, regional market size, human capital and geographical position on the investment strategies of MNEs.

Independent variables and Definitions

| Symbol	Independent variable	Definition
GDP/CAP	Development level	Regional Development level
POPPOT	Population Potential	Market size and Accessibility
GRAV	Gravity index	Regional Accessibility
HC	Human capital	Share of population with Tertiary Education
RCAEMPL	Specialisation index in terms of employment	Localisation economies
UNITS/AREA	Specialisation index in terms of clustering firms	Localisation economies

Data and Methodology

The econometric model

This study aims to determine the motives for inward FDI in 25 Greek prefectures for the year 2008 (employing stock data from 2004). It is going to be examined whether the location decisions of foreign firms are being positively affected by the sectoral specialization of each region as well as by other traditional determinants like market size, regional accessibility, regional level of development and human capital. To test these hypotheses we have analyzed a cross-section dataset for foreign FDI in ten NACE 1 digit sectors. The analysis is carried out via quantitative methods and in particular via regression analysis. The option of regression analysis is related to the attempt to measure the direction and the significance of the impact of the host regions' locational characteristics on FDI attractiveness. The dependent variable is FDI per capita stocks measured in Euros, for each region for each sector for the year 2008. This provides a total of 510 observations given the fact that in the regression analysis we incorporated variables that were constructed by data employed from all the 51 NUTS III regions (prefectures) of Greece. The explanatory variables are the host regions' features which determine mainly the attractiveness of the Greek prefectures for foreign direct investment. More specifically we include variables to capture the effects of the development level, regional market size, geographic position, human capital and regional specialization.

First and foremost most of the theoretical literature identifies GDP per capita (GDP/CAP) as the appropriate proxy to measure the *development level* of a region. GDP per capita reflects both demand and supply in a region. On the demand side it shows the local potential demand and on the supply side it reflects the region's absorptive capacity of FDI (Resmini 2008). We are going to examine the hypothesis that FDI is mostly attracted by relatively developed regions. Therefore the coefficient of GDP/CAP is expected to be positive and significant.

Moreover a significant strand of empirical literature identifies *regional market size* as an important FDI determinant in the sense that the larger the market size the greater the foreign investment inflows. (Campos et al. 2003, Braunerhjelm et al. 1996, Janicki et al. 2004 and Petrochilos 1989). Resmini (2000) states that the larger the domestic market the more prospects it offers to foreign investors. The FDI attractiveness for a region is being enhanced when the foreign investors aim to benefit from increased regional demand and supply
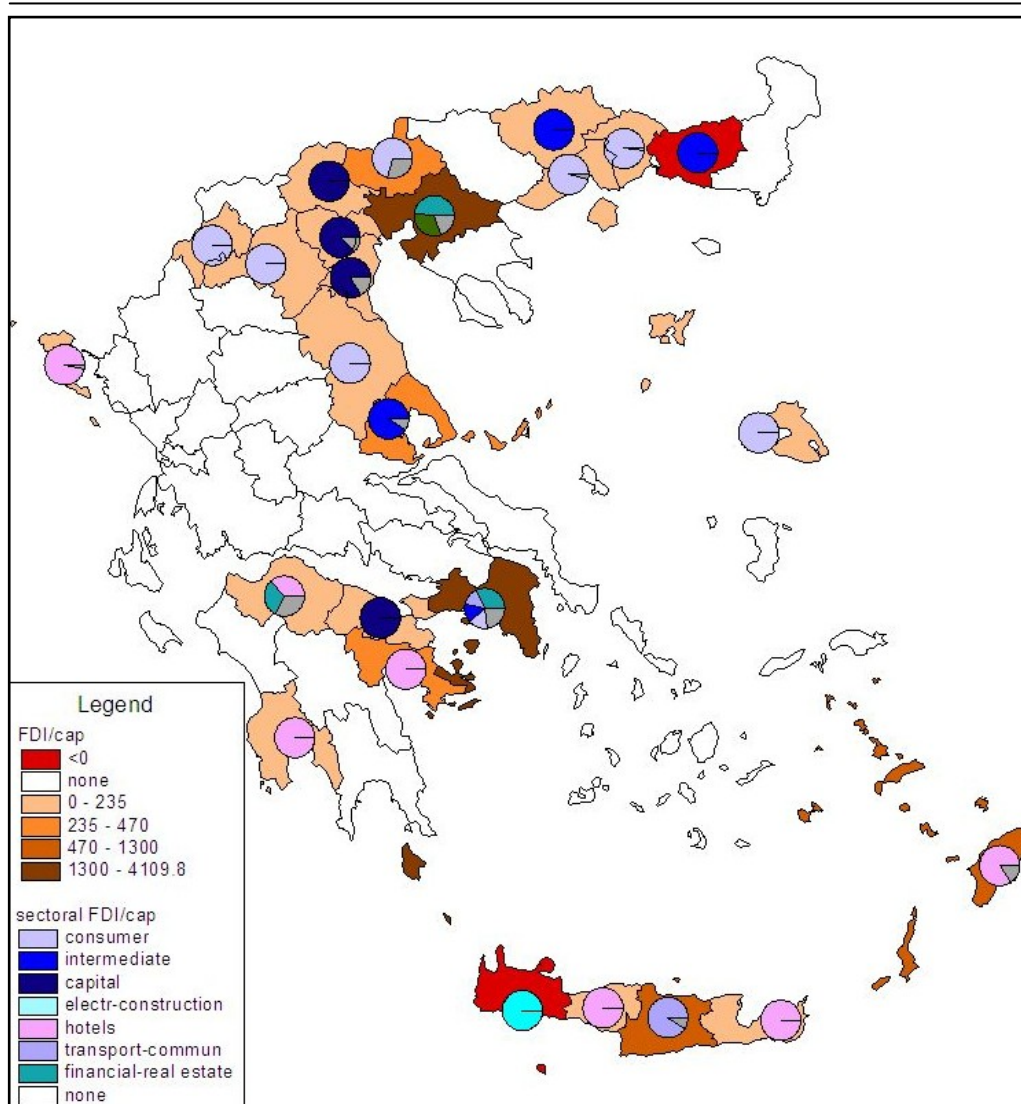
Fig.1 - **FDI/capita in total and by sector in the Greek regions (NUTS 3 level), 2008**
The prefectures drawn in red colour indicate that the particular regions have experienced
divestment policies which in 2008 seemed to be cumulatively more intensified compared to
inward investment policies.

(Braunerhjelm et al, 1996). The locational decisions of multinational enterprises in the transition
economies of Central and Eastern Europe are driven in a great extent by market size (Campos
et al. 2003). However, despite the significant impact of regional market size especially in labour
intensive sectors (manufacturing), many argue that the importance of this determinant starts to
decline in favour of other factors such as agglomeration economies (Cho 2004).

In this study the variable we employ as proxy for regional market size is the Population Potential index (POPPOT) and is defined as:

$$Z_i = \sum_{j=1}^{N-1} (P_i * P_j / d_{ij}^k)$$

where *Pi* is the population of this region, *Pj* is the population of all the other NUTS III regions, *dij* is the distance between this region and all the other regions and *k* is an exponent that takes the values *k*=1 or *k*=1.2. This index is a measure of the regional market size (approximated by population) and of the relative accessibility of the centre of this region to the other regions. In other words this variable is being used as a proxy for the region's market size and of its strategic position in comparison to the other regions (Petrakos 1996). It depicts market access as an increasing function of market size measured by regional population and a decreasing function of trade costs, proxied by the distance between regions and it takes values greater than 0 (Petrakos et al. 2011). We expect the coefficient of the variable to be positive and significant.

Regional accessibility is also measured by the Gravity index (GRAV). We use the Gravity index (GRAV) as a geographical indicator in order to estimate the geographical position of each NUTS III Greek region regarding the location of all other regions in the country, on a pan-European scale. In particular the gravity index indicates whether a region has a central or peripheral position in a given geographic economic space (Petrakos, 2003). We use this index in order to show whether a Greek region's central or peripheral position in the national economic space, has a positive or negative influence on FDI locational decisions. The formula for this index is:

$$G_i = \Sigma \frac{\frac{P_j}{d_{ij}} + P_i}{}$$

where P is the population of regions *i* and *j* and *d* is the air-travel distance between them. It indicates the sum of distances among the centroids of each pair of regions weighed by their populations (Topaloglou et al. 2005). If the index has high value it means that the region possesses a more central place in the Greek territory and thus has greater accessibility than more peripheral regions, and if it has low value, it possesses a more peripheral position (Petrakos, 2003). The expected sign of the coefficient of this variable is expected to be positive and significant.

Furthermore the theoretical and empirical literature supports the influence of *human capital* on the location decisions of foreign firms (Noorbakhsh et al. 2001, Doring et al. 2006, McCann 2008, Fine 2000, Cho 2004, Agiomirgianakis et al. 2003). Hanson (1996) in Noorbakhsh et al. (2001), claims that human capital can have a significant impact on the geographical distribution of foreign activity in the host country. Multinational enterprises, especially if they specialize in high tech production, seek for locations endowed with a skilled workforce. This is attributed to the fact that human capital can improve the quality of labour because it reflects work experience and education and hence it enhances a region's productivity (Agiomirgianakis et al. 2003 and Fine 2000). Therefore foreign firms tend to cluster in urban areas where they can take advantage of the pool of skilled people essentially with tertiary education level (McCann 2008). The availability of a skilled labor force attracts foreign firms because they can benefit from knowledge spillovers which can subsequently improve regional growth (Doring et al, 2006). We measure the level of human capital accumulated in a region by the level of tertiary education of the workforce. Noorbakhsh et al. (2001) define tertiary education as "*the number of accumulated years of secondary and tertiary education in the working age of the*

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population" (pp. 1597). The expected sign of the coefficient is positive and significant.

Moreover a large part of the academic literature recognizes the significance of agglomeration economies as a motivation for foreign investors to establish their affiliate plants in a region. Many authors (Campos et al. 2003, Braunerhjelm et al. 1996, Filippaios et al. 2004, Agiomirgianakis et al. 2003, Frenken et al. 2007, Iammarino et al. 2006, Cantwell et al. 2001, Porter 1998) support that foreign firms choose to locate in places where they can benefit from the presence of already existing firms operating in the same sector as the foreign affiliates. The industrial specialisation of the host region (indicated by a large production industry in a particular sector), appears strong motivation for MNEs. In other words the presence of localisation economies (spatial clustering of previously sectorally related activities) allows the foreign firm to benefit from external economies of scale and from potential knowledge spillovers and hence increases the FDI attractiveness (Iammarino and Cantwell 2001, Frenken et al. 2007). In other words we make the assumption that the location decisions of FDI are affected by the sectoral specialisation of each prefecture and therefore they tend to concentrate in already specialised regions where they can benefit from a concentrated employment ratio in one industry or from other firms in the same industry clustered together.

The variables that we have employed in order to estimate the impact of localisation economies on the FDI attractiveness are:

1. A Revealed Comparative Advantage Index (RCAEMPL), which is a sectoral indicator and represents the degree of sectoral specialisation of each region in terms of employment. This index was primarily used in order to show how strong exporting performance a country or region has and hence to test the possibility of comparative advantage. In this study the formula we used in order to construct this variable is: RCAEMPL = (Xir/Xr) / (Xi/X) where i is the industrial sector, r the region and X is employment (Petrakos et al. 2008). If RCA>1 it means that the region specializes in one sector more than the national average. We calculated the RCAEMPL for 51 regions and for 10 sectors (Table 4). We expect RCAEMPL to have a positive and significant impact on FDI. Therefore we expect the coefficient of RCAEMPL to be positive and significant.

2. A spatial clustering indicator (UNITS/AREA) which demonstrates the number of pre-existing firms operating in each sector in each region. We constructed this variable in order to capture the effect of agglomeration economies/localisation economies (firms benefit from economies that arise when they are co-located with one or more firms in the same sector). The coefficient is expected to be positive and significant.

On the basis of the literature and on our analysis we estimated the following model explaining FDI location in the Greek regions:

$$1)\ FDI_{ij} = a + b_1 RCAEMPL_{ij} + b_2 HC_{ij} + b_3 POPPOT_{ij} + b_4 GDP/CAP_{ij} + e_{ij} ,$$

where FDIij represents the FDI per capita stock in 51 regions and in 10 sectors, where i = regions and j = sectors. Our hypothesis for the first explanatory variable is Ho=0: b1=0 or H1: b1>0 because we expect RCAEMPL to have a positive and significant impact on FDI. We assume the same for the rest of the coefficients (b2, b3, b4).

We run the model 1 three times using alternative variables to capture accessibility and localisation economies.

2) $FDI_{ij} = a + b_1GRAV_{ij} + b_2HC_{ij} + b_3RCAEMPL_{ij} + b_4GDP/CAP_{ij} + e_{ij}$ and

3) $FDI_{ij} = a + b_1GRAV_{ij} + b_2HC_{ij} + b_3UNITS/AREA_{ij} + b_4GDP/CAP_{ij} + e_{ij}$

The database for this study was provided by the Bank of Greece (Statistics Department) and includes data for inward FDI stock invested in 25 Greek prefectures from the year 2004 to the year 2008. In other words we summed the time series of FDI inflows data during the period 2004-2008 and we run our model using FDI stock data. The geographic unit used in the analysis is regions at NUTS (Nomenclature of Territorial Units for Statistics) 3 level. In this paper we use information for the sectoral specialization of the regions we examine and we account for all sectors at NACE 1 digit (United Nations 2010).

Our sample consists of 583 observations of foreign direct investments from 51 foreign countries in 25 NUTS 3 Greek regions. The data we employed come from the database constructed by the International Investment Division of the Statistics Department of the Bank of Greece and include the stock of foreign capital invested in Greece for the period 2004- 2008. Our sample consists of 51 investor countries from which 21 are EU members. We used data for 25 regions (out of the 51 Greek regions of the sample, 25 showed FDI attraction data) that attract FDI in 10 sectors. However the initial database contained data including the value of investment in 25 regions in 40 NACE 2 digit sectors. In order to be able to run our model (using the pool method) we modified the primary database and we controlled for 10 NACE 1 digit

Table 4

Determinants of FDI in Greece: the econometric model

Model	(1)	(2)	(3)
C	-23.754**	-107.105**	-96.601**
	(-4.28)	(-14.19)	(-12.82)
RCAEMPL	8.768**	6.736*	
	(3.73)	(1.95)	
GDPCAP	0.0006	0.001*	0.001*
	(1.56)	(2.49)	(2.39)
HC	0.183*	0.9999**	0.885**
	(1.87)	(6.37)	(5.65)
POPPOT	0.1772**		
	(30.3)		
GRAV		0.359**	0.356**
		(10.93)	(10.84)
UNITS/AREA			2.199**
			(4.40)
R^2 ADJ	0,80	0,53	0,56
N	510	510	510
Fstat	518,74	144,52	151,18

Notes: The dependent variable is the locational choice of FDI. Columns (1) (2) and (3) contain the coefficients of the independent variables and their level of significance. The parentheses contain the *t*- statistics.
* Significance at the 10% level
** Significance at the 1% level

sectors. This modification helped us construct our dependent variable (FDI per capita) which will be used in the model.

The empirical results

The database we used in order to construct our dependent variable contained both regional and sectoral data. As mentioned above we obtained data regarding the foreign investment value for 25 NUTS 3 regions and in 10 NACE 1 digit sectors. Nevertheless, when we constructed our explanatory variables we accounted for 51 regions (total number of Greek prefectures) and for 10 sectors. Therefore the regression analysis is comprised by cross-sectional data or in other words "*data describing each of different units at a single point in time*" (Dielman 1983, pp. 112). Furthermore due to the fact that we estimate our model for regions and sectors at the same time, we used pooled cross-section data in the analysis. But instead of accounting for each number of regions across a sequence of time periods (Dielman 1983) we accounted for each number of 51 regions across a sequence of 10 sectors. Therefore we estimated our model using E-Views (version 6.0) and the Generalised Least Squares (GLS) method correcting for Heteroscedasticity. Our sample contains 510 observations (51 NUTS 3 regions and 10 NACE 1 digit sectors).

Table 4 presents the estimation results concerning the determinants of FDI attraction in the Greek prefectures. In order to check for robustness of our results and estimate more precisely the relative importance of each hypothesis, we deploy alternative specifications. The model with the highest explanatory power and the one on which we base our hypotheses is depicted in column (1) in Table 4.

In the first model we test for some standard variables related to market conditions like market size, GDP per capita and human capital but also for some non traditional variables related to industrial factors like the sectoral specialisation of each region in terms of employment (RCAEMPL) or in other words for localisation economies. Furthermore we included the Population Potential Index (POPPOT). Therefore we seek to assess the role of the development level, the regional market size and its accessibility, the availability of human capital and of localisation economies as FDI determinants.

It is clearly obvious that investors are being strongly motivated by the existence of a high share of locally specialised workforce, with the relevant coefficient being positive and significant at 1% level. This finding indicates that foreign affiliates are mostly interested in locating in places where they can benefit from external economies arising from a high percentage of employment in their broad sector of activity. In other words they are interested in investing in locations where the relative size of the sector is large. Therefore we assume that they seek to benefit from the increased labour productivity that is caused by this specialisation (Frenken et al. 2007). This result corresponds to the one obtained by Resmini (2000) who investigated the effect of the size of the manufacturing sector of the CEECs in attracting European investments. Nevertheless the author found this impact significant only in the traditional sectors. Furthermore, Guimaraes et al. (2000) find similar evidence about the locational decisions of FDI in Portugal. In particular they discover that the most important motivation for foreign direct investment in Portugal is the achievement of agglomeration economies and especially localisation economies.

The positive and significant value of the RCAEMPL coefficient points out that foreign investors establish their affiliates in the Greek prefectures which obtain a high level of industrial specialisation in the same sector with the foreign enterprise. For instance the prefecture of

Magnesia has a high RCA ratio (1.97) in the manufacturing sector indicating a high specialisation relative to the national average, and 100% of the FDI are in the manufacturing sector (Table 2). The econometric model supports this correlation (significant at 1% level) and therefore the regional sectoral specialisation is found to be an important FDI determinant for the Greek prefectures.

In contrast to previous studies (Resmini 2000, 2008), in the first model the variable of GDP per capita doesn't appear significant, although the probability is slightly above the 0.1 level (p=0.1189). Therefore in this model the income level of the Greek prefectures doesn't appear to have as a strong effect on the locational decisions of fdi compared to the rest of the variables.

The third variable of the Model (1) is a proxy for human capital. The human capital variable has a positive and significant effect (in the 10% level of statistical significance) on FDI attraction. Therefore the hypothesis we made above regarding the strong influence of human capital on FDI locational decisions, is being confirmed by the analysis. This result coincides with the findings of Noorbakhsh et al. (2001) and Agiomirgianakis et al (2003) who acknowledge the fact that an economy with a highly educated and skilled workforce can be more productive and more appealing to investors. Above all if the foreign affiliate operates in the high tech manufacturing sector (capital-intensive industry), the pool of skilled labor gains importance for the FDI attraction (Agiomirgianakis et al. 2003). However, as Table 2 shows, the Greek regions managed to attract a small amount of FDI in the high tech manufacturing sector (0,78%) in the year 2008. For example the prefecture of Attiki (Athens and the suburbs) has a high percentage of human capital and a high specialisation ratio in high tech manufacturing activities (Table 4). Further investigation could possibly help us draw a correlation between the RCA in manufacturing (consumer) activities, the human capital endowments and the degree of attractiveness in this sector for each region. But this is not within the aim of this study to discover.

Finally the variable we included in the first model in order to test both the effect of market size and of accessibility on FDI location, has a positive and significant value in 1% level of significance (p=0.0000). The positive and significant value of POPPOT reflects the fact that foreign investors prefer large markets with high accessibility.

Therefore foreign investors are responding to a high demand of the host region. As a result foreign investors are motivated by traditional factors or "*classical sources of comparative advantage*" implying the market-seeking nature of FDI in Greece (Campos and Kinoshita 2003, pp. 9). Our result is in line with the research outcome of the above authors when they examined the determinants of FDI in European transition economies and they conclude that a large size of the domestic market drives foreign capital. Consequently FDI in the Greek regions as well as in the transition economies of Europe, is determined in a high degree by the potential to serve a large domestic consumer market.

Furthermore the positive and significant value of POPPOT indicates that MNEs choose to locate their subsidiaries in regions with easy access to metropolitan centres. For instance the relative high attraction of FDI in the prefecture of Kilkis can be partially attributed to the fact that it has geographical proximity to the region of Thessaloniki which is the second largest recipient prefecture of FDI (Table 3). This result corresponds to the one found by Campos and Kinoshita (2003) regarding the fact that the European transition economies that were in closer proximity with the Western European countries, had bigger possibility of attracting FDI.

According to our results presented in the first model, FDI in the Greek regions is determined mainly by a significant degree of local sectoral specialisation, a high level of human capital, a large regional market size and a high level of accessibility. The regional level of growth and development doesn't appear to have a robust effect on FDI location decisions in this model.

The second model has lower explanatory power than the first one. This is clear by the fact that R^2 adj is 0.53 which means that the explanatory variables account for 53% of the variation of the dependent variable. In the second model we incorporated the same variables as in the first model apart from the POPPOT index which we replaced with the gravity index (GRAV). As mentioned above the gravity index is a proxy for accessibility and centrality.

In this specification the coefficients of human capital and gravity obtain high significant value (at 1% level). The gravity factor continues to have a strong effect on FDI attraction and hence constitutes a robust FDI determinant. Nevertheless the statistical significance of the coefficient of RCAEMPL, which is the proxy that we used for occurrence of localisation economies, is being reduced to the 10% level which means that there is a 10% possibility that FDI are not motivated by the sectoral specialisation of each region. However RCA still proves to be an important determinant for FDI location. Finally Table 4 shows that the significance of the coefficient of GDP per capita (GDP/CAP) increases to the 10% level in comparison with the first model where it was not significant. Therefore in the second model the level of regional development is considered a good motivation for foreign investors to locate in the Greek prefectures.

These results are consistent with the findings of Bevan and Estrin (2004) who conclude that the main determinants of foreign investment in the economies of Eastern Europe are basically the development level and gravity factors. In other words, GDP per capita and proximity to the countries of Western Europe determines their level of attractiveness. By the same token and in line with the second specification of analysis, FDI in the Greek regions are strongly determined by gravity factors and by the development level.

The third econometric model (3) provides some interesting results as well. Instead of the RCA indicator we included the variable UNITS/AREA which we used as a proxy for localisation economies and particularly as a measure of the establishment of clustering firms in a region. The initial hypothesis was that firms that operate in a particular sector and agglomerate in a geographical space, constitute a strong determinant for FDI location due to the benefits that arise from co-location and agglomeration. The high significant value of the coefficient of UNITS/AREA (p = 0.0000) provides strong support to this hypothesis. Therefore foreign firms choose to locate in places where they can benefit from the presence of other similar production units and from externalities arising from knowledge spillovers or specialised labour. It can be assumed that when foreign firms know that other companies have invested in the area earlier, they consider it safer and thus are more encouraged to engage in foreign investment. According to Campos and Kinoshita (2003) this can be explained by the fact that foreign investors can benefit from technology spillovers or from serendipitous contacts with former investors. This finding is in line with the research results of Cantwell and Iammarino (2001) where it is being argued that locational decisions of multinational enterprises are determined by the occurrence of localisation economies and hence by preceding firms operating in the same industry.

Therefore the last alternative specification reveals the following patterns of FDI attraction: A strategic position of the region in the domestic geo-economic space is considered a basic FDI determinant because it facilitates market accessibility. In addition, a high level of educated

workforce and a high level of regional development encourage foreign firms for investing in the Greek regional market. Finally the accomplishment of localisation economies in the region constitutes a motive for FDI.

The three models provide similar findings and therefore our results can be considered to be robust. Despite differences in the levels of significance of particular variables and the overall explanatory power they provide, all three models support the idea that specialization/ concentration, geography, human capital and development level are important drivers of FDI location at the regional level.

Conclusion

In this study we initially explored the sectoral and geographical distribution of foreign affiliates in the Greek regions and we observed a concentration activity in the region of the capital city (Athens) and the suburbs (Attiki prefecture). Furthermore, apart from the high geographical concentration of FDI and evident agglomeration in metropolitan centres, we also analysed the prominent sectoral specialisation patterns of the foreign affiliates as well as the high industrial concentration of FDI in prefectures other than the two metropolitan centres.

This uneven distribution of FDI leads us to explore the basic factors that exert influence on the MNEs' locational decisions and to test a number of hypotheses about the determinants of FDI location in the Greek regions. Following the theoretical and empirical literature, we accounted first for traditional FDI determinants like market size, development level, human capital and geographic position of the regions under examination. In addition we tested for the hypothesis that foreign affiliates *ceteris paribus* prefer to locate in places that appear to be specialised in the same industrial sector with them and thus we accounted for the regions' sectoral specialisation.

The empirical analysis revealed the following patterns: FDI locational strategies in the Greek regions are determined significantly by market size, in the sense that they choose to locate in regions with larger consumer demand and larger population. Furthermore the analysis showed that the locational strategies of MNEs depend upon the geographical position of each region, in the sense that they prefer to locate in central areas or in areas having relative proximity to large urban centres. Hence, access to metropolitan areas proves to be an important location determinant for FDI. In addition the development level of the host regions was found to be an important determinant of FDI location in two out of the three models that we presented. Although evidence is not as robust as in the case of the other variables, it is still likely that, *ceteris paribus,* FDI will tend to locate more often to advanced regions compared to less advanced ones. Moreover human capital appeared in a robust way to be a significant determinant of FDI location at the regional level and leads us to the conclude that MNEs consider a high regional educational level as an important factor determining their location decisions.

Finally the analysis provided us with evidence to claim that MNEs are strongly motivated by the existence of localisation economies in the region where they decide to locate. The positive influence of an industrial clustering of existing firms which operate in related sectors and a pool of specialised labour, allows us to argue that foreign capital is increasingly interested in locations that exhibit specialisation in similar sectors. In other words foreign companies want to benefit from spatial externalities arising from the sectoral specialization of the region because they can potentially create backward/forward linkages with the existing domestic firms and increase their profitability. This has significant advantages for the host economy as well since

the local workforce can increase its productivity and benefit from knowledge spillovers. Therefore it is safe to conclude that industrial clustering and sectoral specialization can become an important regional development policy tool for attracting FDI.

Overall, our empirical findings provide evidence that FDI attraction to the Greek regions is determined by gravity factors related to market size and geographic position, by the quality of regional human capital and by the occurrence of localisation economies. Hence, these results allow us to draw some policy implications about the methods of strengthening these effects at the subnational level and thus encourage the attraction of FDI.

First of all state interventions could improve regional accessibility and remove distance-related barriers by investing in infrastructure and in the development of adequate regional transport network. In addition policies aiming to improve the quality of human capital of the less attractive regions should be designed and implemented because apart from the positive effect it exerts on FDI attraction, it also enhances the absorptive capacity of the area. A highly skilled labour force can potentially understand better the practices and technologies followed by the foreign firms and hence spread new knowledge to the region. Consequently, encouraging the building of learning capacity can potentially enhance the FDI attractiveness.

Finally the encouragement of regional specialisation, through the formation of regional clusters of related activities may turn out to be a decisive strategy for the Greek regions. The positive externalities and knowledge spillovers that arise from the co-location of sectorally similar activities may improve the attractiveness of the region to FDI. Thus the encouragement of this kind of industrial clustering combined with initiatives promoting the development of linkages and communication among the local firms, can make the emergence of localisation economies more sustainable and hence more appealing to the foreign investors. Additionally the concentrated pool of specialised and skilled labour and the subsequent knowledge spillovers, might allow for the emergence of innovations or new activities which might lure more foreign enterprises in the future.

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