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ENTERPRISES' LOCATIONAL DECISIONS AND INTERREGIONAL HIGHWAYS: AN EMPIRIC INVESTIGATION IN GREECE

IZBOR LOKACIJE PODJETJA V ODVISNOSTI OD MEDREGIONALNIH AVTOCEST: EMPIRIČNA RAZISKAVA V GRČIJI

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JURIJ SENEGAČNIK

Highways are important component of contemporary landscape.
Avtomobilske ceste so pomembna sestavina sodobne pokrajine.

Enterprises' locational decisions and interregional highways: an empiric investigation in Greece

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ABSTRACT: The interaction between transportation infrastructures and land uses constitutes one of the most basic phenomena in urban and rural areas. The construction of a highway improves mobility and thus increases the density and value of land uses by creating the necessary conditions for the economic development of the regions that it crosses. In this article the contribution of enterprises located in areas near interregional highways to regional development is examined. Concretely, the contribution of these enterprises to the economic development of the regions in which they are established is investigated using multiple regression analysis and with the completion of questionnaires by enterprises located near interregional areas of the Athens–Thessaloniki national highways and near the cities of Lamia and Larissa.

KEY WORDS: geography, highways, land use, businesses' location, regional development.

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1 Introduction

Both the movements of people and vehicles due to the construction of new transportation infrastructures and land use changes are two elements of human intervention in space that present intense interaction. In the urban space, the type and intensity of urban development near highways are related to the level and type of highway. In addition, the level of use of the highway depends on the building density of the highway's immediate area. In exurban areas, the intensity of the use of the immediate highway areas depends on the category of the highway. It is possible to have traffic burdens due to the establishment of economic activities and enterprises in the immediate highway area.

After the construction of an urban or suburban highway and provided that the general circumstances are suitable (geomorphology, ownership status and legal constraints), it is very likely that the establishment of new enterprises will follow along with the creation of residential areas. Therefore, a highway attracts different kinds of economic activities, which due to the lack of planning prohibitions or other organizational regulations start to appear on the land plots available near the highway area (NTUA 2001). This results in profound land use changes in the areas adjacent to the highway as well as in considerable increases in the demand for and value of land.

The basic concept underlying the relationship between land use and transportation is accessibility. Any significant improvement in the transportation system (for example, a new highway) increases accessibility and reduces transportation cost. In other words, a direct relation exists between the total accessibility of an area and its value, let alone its general uses. The final result is the compilation of economic activities along suburban, national, or rural roads, and of residence along urban roads, the density of which increases as we approach the cities or centers of cities, respectively. A depiction of the changes that are provoked in interregional areas is presented in Figure 1.

There are many cases of interregional conflicts concerning the trailblazing of a new highway. Among the various benefits most anticipated by the districts are those related to the improved attractiveness for the establishment of enterprises due to better accessibility.

In the case of interregional highways, a reasonable question that arises is how much the changes in the enterprises' locational decisions resulting from highway construction and the regional planning of economic activities in interregional areas will enhance the regional economic development. The present

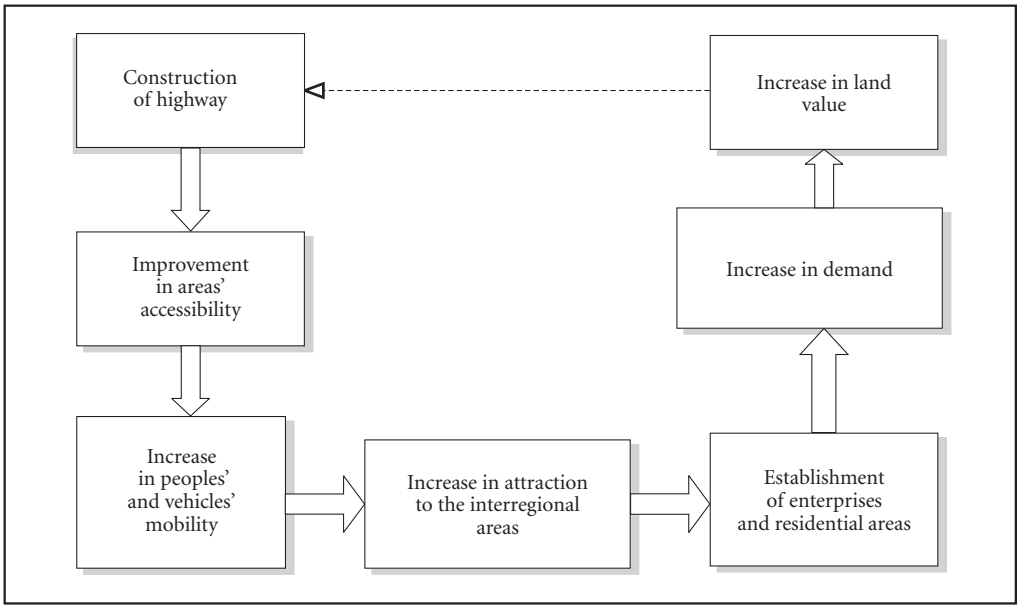

Figure 1: The interaction between highways and land uses.

research deals with this issue. A quantitative investigation is conducted concerning the locations where enterprises are established along the national highways, along with the amount of employment they create. In addition, we investigate the relationships between employment and the general features of the roads.

2 Transport and business location decisions: a general review

The role of transportation has a long tradition in location theory. We can refer to the classical Weberian model, in which location patterns are determined by transport and factor costs, or the Losch's theory, which emphasizes the importance of market size. The importance of transport costs along with imperfect competition, market size, and economies of scale in explaining the location of industry is included in recent new economic geography models (Krugman 1991). If transport costs play an important role in location choice, then transportation improvements should influence location choices. Transport infrastructure improvements work like market integration and can change the relative importance of concentrating (market size and agglomeration economies) and dispersing forces (factor costs and competition) and consequently the spatial distribution of economic activity. Making regions more competitive for attracting businesses is a common argument for upgrading interurban highways. Aside from efficiency gains based on transportation costs, many researchers or local authorities often contend that businesses are drawn to locations well served by high-capacity highways (Forkembrock et al. 1993).

Better transport connections can make areas of lower economic activity more attractive for businesses' locations as they gain better access to markets in the core areas. At the same time, however, competition from businesses in economic agglomerations may increase since they now can more easily supply locations at a distance and benefit from cost and demand linkages. With the mobility of businesses, the distribution of benefits from infrastructure investment is a priori not clear (Venables 1996, Puga 1999). Despite this, there is a reasonable/assumption about the influence of proximity to major highways on businesses' location decisions.

If we apply this reasoning in the examination of the relationship between highways and businesses' location decisions, the types of interregional highways serving various cities are important only to the extent that transportation costs vary among them. The impact of transport infrastructure on businesses' location has been empirically researched, but the final findings are inconclusive. By using aggregate production functions, Aschauer (1989), Mas et al. (1996), and Holtz-Eakin (1994) concluded that there is a positive relationship between the level of infrastructure and the level of economic growth. However, it is questionable whether the positive relationship in such studies is real or is due to the failure to account for the endogeneity of the stock of infrastructure capital. The approaches using aggregate production functions have been criticized for neglecting the role of infrastructure for individual firms (Haughwout 1998). These production function models research national-level relationships and share several characteristics. By definition, an increase in aggregate output can result only from an increase in capital or labour employed, unless productivity is assumed to rise exogenously. Another characteristic of these models is that they are general, because data on detailed types of infrastructure spending is often not available.

With the mobility of activities over space, local markets will capitalize spatial advantages into local prices and this will affect the productivity of individual firms. Mikelbank and Jackson (2000) emphasize differences in impacts over space. Due to its network character, transport infrastructure may lead to positive or negative spillover effects among neighbouring areas. The type and magnitude of spillovers have important implications for the spatial distribution of benefits arising from new transport infrastructure. For Californian counties, Boarnet (1998) shows that with the relocation of economic activity, infrastructure benefits are found to come at the expense of competing regions. Moreover, Stephanedes (1990) investigated the distributional effects of state highway investment in Minnesota by using time-series results and concluded that highways can influence specific regions, for example, regional centers.

In another study of counties in the United States, Haughwout (1999) found that state infrastructure investment affects the distribution of employment within states, leading to a more dispersed pattern of economic activity. Investments are attracted by new infrastructure improvement in one region and the attractiveness of areas that do not benefit directly from the new infrastructure is reduced. The improvement in accessibility will be capitalized in land values and reflected in land use changes responding to the shift in land value.

Another study on earnings impacts of interstate highways in non-metropolitan counties in the United States found that new interstate highways raise earnings in counties receiving a new interstate highway and reduce earnings in adjacent counties (Chandra and Thompson 2000). Evidence of positive spillover effects raising the attractiveness of neighbouring areas is found in Mas et al. (1996) for Spanish autonomous communities. Voith (1993) and Haughwout (1997) provide evidence indicating that investments in transport to and in central cities have positive effects on suburban house values.

While there is evidence of important redistribution effects of transport infrastructure investment at the county and metropolitan level, at the state level Holtz-Eakin and Schwartz (1995) do not find any significant productivity effects on neighbouring states. This suggests that important road infrastructure impacts operate within rather than across regions. A geographically detailed analysis of locational effects of transport infrastructure improvements that can take into account different impacts occurring at different distances from the new infrastructure is therefore important.

3 Land uses near highways and regional development

Despite the lack of firm quantitative evidence, the conviction that highways affect economic development and land use remains. Several descriptive or historical studies have documented land use development along highways, noting the tendency for clustering around major interchanges and for linear development along freeway frontages.

The effect of highways on the creation of comparative advantages for enterprises and on the choice of establishment space, as discussed in the previous section of this paper, does not necessarily relate to interregional land uses. Enterprises choose to be situated in regions whose total accessibility improves, without necessarily choosing a position on a highway. Consequently, their impact on the land use near highways may be unimportant or non-existent.

The relationship between land uses and highways has been studied according to their interaction for urban and suburban regions (Pitsiava-Latinopoulou 1984; Pitsiava-Latinopoulou and Gianopoulos 1985). Moreover, the prediction and calculation of the type and number or the density of multiple enterprises established along suburban roads has been examined (Corsi 1977; Kau 1977; Twark et al. 1980). Investigating the type of these enterprises in the context of their contribution to regional development, we classify them in two basic categories:

- enterprises that serve the highways and the needs of drivers and vehicles that move along them; and
- enterprises that do not relate in any way to the function of the highway or the needs that result from its heavy traffic.

The first category of enterprises has an immediate relationship to the highway's construction itself, the traffic on it, and its general features. These enterprises relate and depend on the highway, and their establishment nearby is based on servicing the needs and demands of anyone moving along it. Consequently, their viability depends on the quantity or needs of the traffic. In highways that are under construction in Greece, (PATHE, Egnatia, etc.) there are already limitations to the use of interregional areas. The establishment of enterprises that serve the needs of the highway users and their vehicles is therefore being implemented according to appropriate legal regulations and specific distances.

In the second category, enterprises that do not relate to the function of the highway just benefit from the right choice of establishment in interregional areas for two basic reasons:

- firstly, they secure their general accessibility due to the proximity of the highway, and thus their easier accessibility to and from the urban centers that usually function as provision centers and consumption centers for the products of the enterprises.
- secondly, the establishment of the enterprises in interregional areas is considered an advantage for their general »image.« Their location serves their exposure, since it is reinforced by everyday visual contact by users of the highway. The everyday visual contact of the enterprise's label and logo diminishes and so is their exposure as the distance of the establishment from the highway increases, which is reflected in the great drop in land values at distances of only 30–40 meters from the highway (Pitsiava-Latinopoulou 1984; Pitsiava-Latinopoulou and Giannopoulos 1985). The exposure is pursued with the arrangement of the buildings and facilities of the enterprises. They are always placed along the highway, and they choose attractive and long side sections in order to project largely and to depict the size of the enterprise.

The contribution of the interregional enterprises to the economic development of these regions cannot always be taken for granted. We will again refer to the classifications above. In particular, the enterprises in the first category contribute positively to and serve regional development only in the case where the highway goes through the region and therefore the vehicles cross the region. In the case where the highway stops in the investigated area and the traffic is produced by it, the enterprises of the first category serve only the region itself, and their contribution to its economic development is insignificant. A national study showed that the contribution of the enterprises to the economic development is just redistributive, since they do not provoke any alterations in the general state of progress (Giannopoulos 1980). If the highway is constructed so as to cross another region and people and vehicles move through this region, new enterprises will be established on land plots near the highway serving the travellers and thus the new region will grasp the benefits.

The enterprises in the second category choose the specific location of establishment as the best choice among areas available in their region. However, the specific location does not necessarily define the region in which they will be established since it concerns only a »local« preference. The choice of region precedes the choice of specific location since the criteria for the first decision are completely different. In this case, the particular place arrangements do not result in additional economic development since, as previously mentioned, these enterprises do not choose a region for locating. Instead, they choose an attractive location in the previously chosen region. If an interregional area is not available for business establishment, they always choose another location in the vicinity of the chosen region. Therefore, while the enterprises in the first category redistribute economic development among regions, enterprises in the second category redistribute economic development among the areas of the same region.

4 Empirical investigation

The following empirical investigation covers enterprises in the first category, as previously defined, that contribute redistributively to regional development. These enterprises, which offer mostly commercial or other kinds of services, are classified in the following categories (in the parentheses are the classification codes by three-number sectors per economic activity of National Statistical Services of Greece, NSSG):

- Service stations for gas and fuels (651.0);
- Car repair enterprises (301.2);
- Road assistance enterprises (716.4);
- Transport enterprises (712.1 and 712.4).

We could add the restaurants and hotels to the above categories, but the available statistical data and the classification method of NSSG do not distinguish them from other enterprises.

The investigation becomes feasible by using two methods:

Multiple regression analysis and the use of cross-section data that refers to the country's total, related enterprises, and the national highway network.

Sampling from the monitoring of businesses where the total rate of people served is recorded since they cross the investigated region.

Another method, which is already used, is the utilization of aerial photographs, from which we can reach conclusions about the density of established interregional enterprises (Corsi 1974; Twark et al. 1980). However, it is not possible to distinguish and define the type of enterprises, their total employment, and their contributions to regional development with this method.

For the present study, a regression model will be used, and the results of the sample survey that gathered the data in the field will be presented. Concretely, the equations (1) and (2) that have linear and non-linear forms will be used. The main difference that differentiates linear from non-linear equations concerns the interdependence between independent variables that exists in the non-linear equations:

$$Yi = a_0 + \left[\sum_{i=1}^{n} a_i (FACT)_{ir}\right] + e_1 \tag{1}$$

$$Yi = b_0 \left[\prod_{i=1}^{n} (FACT)_{ir}^{bi}\right] e_1 \tag{2}$$

The total length of highways in Greece amounts to several thousand kilometers. Statistical data does not exist about enterprises located close to highways at the prefecture level, and it is obvious that the cost and time needed to gather such data (e. g. through surveys) would be high. For this reason we use the total of the previously described enterprises per prefecture as a dependent variable and the factors that we assume influence the number of these enterprises as independent variables.

For the depiction of the dependent variable of the equation, we use the total employment per prefecture in the previously described enterprises. As far as the independent variables are concerned, we assume that the total employment per prefecture in these enterprises is influenced and shaped by the following factors:

- the total population of each prefecture;
- the number of trucks and commercial vehicles of each prefecture;
- the number of private cars of each prefecture;
- the traveller's facilities in every prefecture of the national highway network;
- the level of prosperity of each prefecture.

The relationship of the number of enterprises we described with the total population of every prefecture is obvious. The relationship between them and the total number of trucks and vehicles is also obvious. We expect a positive value for the coefficient of the three first independent variables.

The fourth independent variable will emerge from the combination of the traveller's length of the national road network in every prefecture and the total traffic rate of the highway. We assume that the total length of the network will define the total crossing time of every traveller and, consequently, the need for the services of enterprises. Also, it is logical to assume that the total number of travellers will positively influence employment. Finally, we assume that the level of prosperity influences the number of these enterprises in each prefecture.

While the depictions of the first three independent variables are implemented by their sizes (NSSG 2001), the depiction of the fourth variable is not very easy because the number of passing vehicles in a prefecture is not known and therefore making a distinction between »passing« and »internal« percentages of the total traffic in a network is not feasible. For this reason we did not use the Athens and Thessaloniki prefectures in the sample because they have enormous traffic on their networks (MPW 1990); we therefore used zero values for these prefectures since there is no measurable traffic. For the rest of the prefectures, we classify the network in three categories according to the total highway traffic. Categories I, II, and III have annual vehicle traffic of 0–5,000, 5,000–10,000, and more than 10,000 respectively. For every prefecture we create an indicator of traffic: ROAD = aI + 2aII + 3aIII, where aI, aII, aIII are respectively the rates of the total national road network for each prefecture with traffic levels in categories I, II, and III.

For estimating the values of this variable, we multiply the total length of the national road network that crosses each prefecture by its traffic level indicator. The estimations of these numbers are based on the general assumption that the traffic level of each prefecture is a certain percentage of the network's total traffic volume.

Factors such as the geomorphology and ownership status are not considered to influence significantly the number of enterprises in Greece's case, since the national road network for the most part is routed through normal morphological areas and, apart from specific sections, there are no »closed« highways with bans or lack of use near the highways areas.

Finally, for the depiction of each prefecture's level of prosperity a relevant indicator, which has been estimated in another study (Petrakos and Polyzos 2005), is used. Thus, the general equations (3) and (4) are formulated as follows:

$$Y_i = a_0 + a_1(POP)_1 + a_2(TRUC)_i + a_3(CAR)_i + a_4(ROAD)_i + a_5(PROS)_i + e_i \quad (3)$$

$$\ln Y_i = \ln b_0 + b_1 \ln(POP)_i + b_2 \ln(TRUC)_i + \alpha_3 \ln(CAR)_i + b_4 \ln(ROAD)_i + + \ln(PROS)_i + \ln e_i \quad (4)$$

where:

POP = the population of each prefecture.
TRUC = the number of trucks and commercial vehicles of each prefecture.
CAR = the number of private cars of each prefecture.
ROAD = indicator of road network of each prefecture.
PROS = indicator of prosperity of each prefecture

5 Results

We estimate the equations (3) and (4) by using the OLS method, using statistical data for the thirty-seven mainland prefectures of the country (except the prefectures of Attiki and Thessaloniki). The solution of the model is done separately for each of the four types of enterprises described above. Tables 1 and 2 show the results of the equation estimation:

Table 1: Regression results for equation (3).

Estimates for	Enterprises for car repair	Service stations of gas and fuels	Enterprises of transports	Enterprises of road assistance
Constant	28.30 (1.23/0.229)	–22.85 (–0.36/0.762)	–7.611 (–0.499/0.622)	–132.09 (–0.933/0.35)
POP	-5.34×10^{-2} (–0.28/0.781)	0.529 (0.859/0.397)	3.29×10^{-2} (0.261/0.793)	–1.01 (–0.872/0.39)
TRUC	2.30×10^{-3} (2.28/0.029)	2.38×10^{-4} (0.073/0.942)	3.28×10^{-2} (0.261/0.796)	9.68×10^{-3} (1.56/0.12)
CAR	1.90×10^{-3} (1.58/0.12)	1.17×10^{-2} (2.94/0.006)	3.45×10^{-4} (0.42/0.67)	5.95×10^{-3} (0.785/0.437)
ROAD	2.68×10^{-2} (2.00/0.054)	0.147 (3.37/0.02)	1.18×10^{-2} (1.33/0.192)	0.148 (1.78/0.08)
PROS	–0.619 (–1.813/0.08)	8.66×10^{-2} (3.37/0.02)	8.83×10^{-2} (0.392/0.698)	1.92 (0.92/0.35)
R2	0.822	0.90	0.23	0.55
R2-adjusted	0.792	0.88	0.12	0.47
N	37	37	37	37

Notes: *t*-statistics and statistical significance in parentheses.

Table 2: Regression results for equation (4).

Estimates for	Enterprises of car repair	Service stations of gas and fuels	Enterprises of transports	Enterprises of road assistance
Constant	–4.232 (–2.303/0.028)	–4.247 (–3.512/0.001)	–6.911 (–1.06/0.29)	–9.183 (–1.616/0.11)
POP	0.855 (1.361/0.183)	-2.19×10^{-4} (–0.001/1.00)	2.248 (0.085/0.332)	1.247 (0.640/0.527)
TRUC	0.250 (0.749/0.460)	0.303 (1.42/0.163)	–1.275 (–1.061/0.29)	0.645 (0.626/0.536)
CAR	0.156 (0.856/0.390)	0.821 (3.714/0.001)	-5.70×10^{-2} (–0.05/0.96)	–0.78 (0.740/0.443)
ROAD	2.67×10^{-2} (0.856/0.390)	5.22×10^{-2} (2.547/0.015)	-9.14×10^{-2} (–0.806/0.427)	-9.63×10^{-3} (0.099/0.922)
PROS	-9.54×10^{-2} (–0.146/0.884)	–0.268 (0.622/0.539)	2.377 (0.998/0.326)	2.008 (0.98/0.33)
R2	0.873	0.933	0.21	0.51
R2-adjusted	0.853	0.922	0.10	0.42
N	37	37	37	37

Notes: *t*-statistics and statistical significance in parentheses.

For the control of multicollinearity, the correlation coefficients of the independent variables are estimated. The results in Table 3 show a high correlation between the POP variable and the TRUC and CAR variables in equation (3) and the lnPOP variable with the lnTRUC and lnPROS variables in equation (4). Generally speaking, it is highly impossible that one can find multiple regression models with four or more independent variables that do not present correlations between them. The correlations of the ROAD and lnROAD variables, which mainly interest us, do not have high values with the remaining independent variables.

Table 3: Correlation results for equation (3) and (4).

	POP/lnPOP	TRUC/lnTRUC	CAR/LnCAR	ROAD/lnROAD	PROS/lnPROS
POP/lnPOP	1.000	0.860** (0.000)	0.280 (0.093)	0.547** (0.000)	0.744** (0.000)
TRUC/lnTRUC	0.814** (0.000)	1.000	0.238 (0.156)	0.457** (0.004)	0.644** (0.000)
CAR/lnCAR	0.898** (0.000)	0.648** (0.000)	1.000	0.067 (0.694)	0.278 (0.096)
ROAD/lnROAD	0.415* (0.007)	0.407 (0.013)	0.391 (0.017)	1.000	0.391 (0.017)
PROS/lnPROS	0.327 (0.048)	0.438* (0.002)	0.422* (0.009)	0.124 (0.463)	1.000

** Correlation is significant at the 0.01 level (2-tailed), *correlation is significant at the 0.05 level (2-tailed).

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Figure 2: Higwhays contribute to reginal development.

The interpretive ability of the estimations, as derived from the coefficient of determination (R2 and adjusted R2), is satisfactory in the first two categories of enterprises (service stations of gas and fuels and enterprises of car repair), less satisfactory for enterprises of road assistance, and rejectable for enterprises of transports. The results also show that the estimators of the independent variables are statistically significant and in most cases are positive.

Focusing on the analysis and evaluation of the results that concern the ROAD variable, we can say that they meet our initial expectations. The estimators are positive and statistically significant, apart from two cases, while the low-value coefficients of the correlation with the other variables make the results reliable. Consequently, the establishment of these enterprises in the regions is influenced from the passing of the national road network and they contribute to the regional development.

We have constructed four scatter diagrams for closer scrutiny and ti acquire an improved understanding of the relationships between the indicator of traffic level on the highways and the enterprises of (a) services stations of gas and fuels and (b) transports. These diagrams illustrate the scatter of the coordinates in a normal orthogonal system.

The results of the research, which was done with the completion of the questionnaires and included enterprises located on the Athens-Thessaloniki highway and near the cities of Larissa and Lamia are presented below. The research aimed to collect data about the influence of the highway on the establishment of interregional enterprises and its impact on their viability.

The enterprises included in the research were located on seven- and nine-kilometer lengths of the highway near the cities of Larissa and Lamia. The locations where the research was carried out are shown in Figure 3. Eighty-five enterprises were initially included in the research, but for a number of reasons only sixty-seven replied. The type of enterprises, the total employment per category, and the answers about the importance of the highway are presented in Table 4.

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Figure 3: Highways are important for modern life.

A general appraisal of the results leads us to the conclusion that the first four categories include enterprises linked primarily to the service of drivers and vehicles. To a large extent these enterprises choose their locations in relation to the highway. Thus, the great proportion of the importance of the highway and the clientele rate that stems from passing drivers and vehicles originating outside the prefecture lead to the conclusion that their viability and created employment are closely related to the highway.

Table 4: Results of statistical research

Number	Type of enterprise	Number of enterprises	Direct access to the highway	Indirect access to the highway	Highway's importance to the enterprise		
					Small	Intermediate	Large
1	commercial	9	6	3	1	2	6
2	vehicle service	18	14	4	2	3	13
3	both (a + b)	21	18	3	3	3	12
4	restaurants, etc	8	8	0	0	0	8
5	manufacturers	7	2	5	3	3	1
6	industrial	4	0	4	3	1	0

Number	Total employment	What the highway secures			Customer's percentage outside the prefecture moving on the highway %
		exposure	customers	both	
1	39	–	1	8	58
2	81	–	2	16	70
3	119	2	4	15	60
4	47	1	5	2	63
5	92	3	2	2	24
6	103	4	–	–	6

In contrast, the research results also lead to the conclusion that industrial enterprises place little importance on the highway, while the rates of their customers are insignificant. Their location along the highway is circumstantial or it is targeted on the exposure they gain. We also observe that while the industrial enterprises are small in number, the total employment per enterprise is rather large.

6 Conclusion

In this study, the relationship between highways and the neighbouring enterprises is investigated empirically as well as theoretically. The final conclusion that emanates from the research is that for some enterprises – mostly commercial – the highway has a positive impact on their function, and the existence of the highway supplies the businesses with customers.

It is worth noticing that the employment created from the passing of the national highway through a prefecture is connected to the above enterprises, but although there is a positive correlation it is not significant. The change in the level of employment of a region r after the construction of a highway that crosses it will be equal to dYr = d(ROAD)ra4 for the linear equation (1) and dYr = d(ROAD)rb4(Yr/ROADr) for the non-linear equation (2). Taking into consideration that the values of the coefficients a4 and b4 are relatively low, an increase in the value of the variable ROAD does not increase considerably the level of employment in region r. Moreover, from Table 4 we can observe that the total employment of the enterprises that assign great importance to the »proximity to highway« factor is not very high, considering that the population of the regions (prefectures) that the highway crosses is 280,000 for Larisa and 178,000 for Lamia.

Consequently, the expectations created regarding the general contribution of a national road network to the economic development of a prefecture due to the regional establishment of interregional businesses are unjustifiable. Despite the existence of a positive relationship between the number of businesses and the highway, the employment created by the new business development is not very high. However, this concerns only the interregional businesses. It does not imply that the general contribution of the highway to the establishment of businesses in a prefecture and to the economic development of regions is insignificant. As shown elsewhere (Polyzos and Petrakos 2000), the overall accessibility of a prefecture enhances the attractiveness of the prefecture for the establishment of businesses within its boundaries.

Finally, we should mention that today, when expanding or upgrading the national road network in Greece, the placement of businesses that serve the users of the network on land plots adjacent to the highway requires a special license from the highway authorities (Egnatia Highway S. A., government regulations, etc.) This fact does not limit the value of the present research because the results of the research give an indication of the number of enterprises whose placements may occur in the near future.

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Izbor lokacije podjetja v odvisnosti od medregionalnih avtocest: empirična raziskava v Grčiji

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IZVLEČEK: Medsebojni vpliv med prometno infrastrukturo in rabo tal je eden od najosnovnejših pojavov v urbanih in podeželskih področjih. Izgradnja avtoceste izboljša mobilnost in s tem poveča gostoto in vrednost rabe tal ter ustvari potrebne pogoje za gospodarski razvoj v regijah, ki jih prečka. V tem članku smo raziskali prispevek podjetij, ki so blizu medregionalnih avtocest, k regionalnemu razvoju. Konkretno, raziskovali smo prispevek teh podjetij h gospodarskemu razvoju regij, v katerih ležijo, in sicer z uporabo multiple regresijske analize ter z vprašalniki, ki so jih izpolnila podjetja, ki ležijo ob državni avtocesti Atene–Tesaloniki blizu mest Lamia in Larissa.

KLJUČNE BESEDE: geografija, avtoceste, raba tal, kraji poslovanja, regionalni razvoj.

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Vsebina

1 Uvod

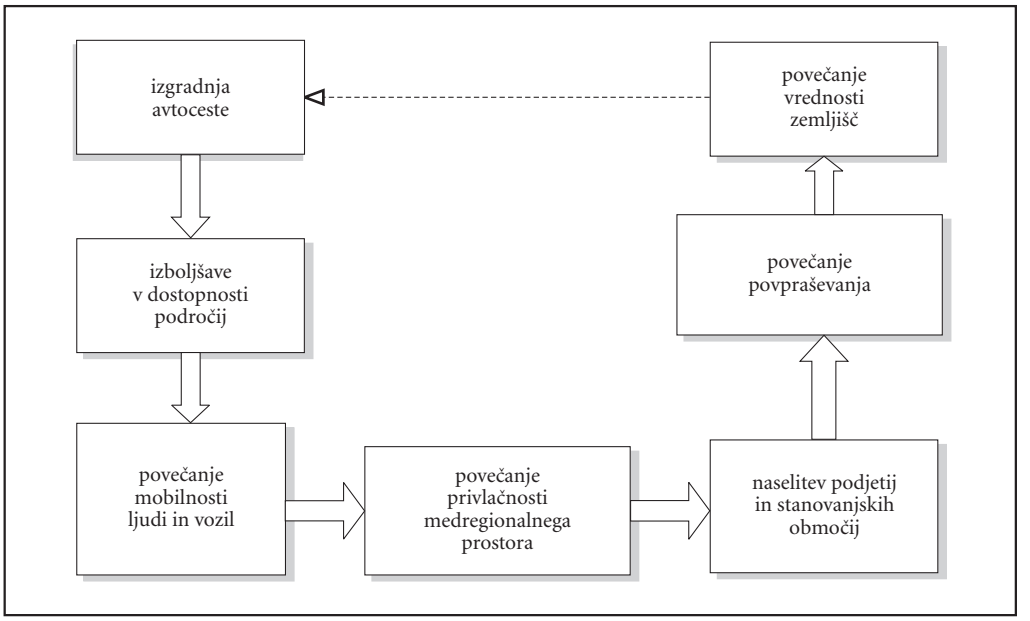
Mobilnost ljudi in vozil zaradi izgradnje nove prometne infrastrukture in zaradi sprememb rabe tal sta med seboj tesno povezana elementa posegov človeka v prostor. V urbanem prostoru sta tip in intenzivnost urbanega razvoja blizu avtocest odvisna od vrste ali tipa avtoceste. Poleg tega je stopnja uporabe avtocest odvisna od gostote poseljenosti blizu avtocestnega območja. Zunaj mest pa je intenzivnost rabe tal blizu avtocestnih območij odvisna od kategorije avtoceste. Zaradi ustanavljanja gospodarskih dejavnosti in podjetij blizu avtocest obstaja možnost prometne obremenitve.

V primernih splošnih razmerah (relief, lastniški status in zakonske omejitve) je po izgradnji mestne ali primestne avtoceste zelo verjetno, da bodo tam nastala nova podjetja in stanovanjska naselja. Avtoceste so privlačne za različne vrste gospodarskih dejavnosti, ki se zaradi pomanjkanja omejevanja s področja prostorskega načrtovanja ali drugih organizacisjkih predpisov naseljujejo na razpoložljiva zemljišča blizu avtocestnih območij (NTUA 2001). To se kaže v temeljitih spremembah rabe tal ob avtocestah ter v precejšnjem porastu povpraševanja po zemljiščih in njihovi vrednosti.

Osnovna ideja, ki poudarja razmerje med rabo tal in prometom, je dostopnost. Vsaka pomembnejša izboljšava transportnega sistema (na primer nova avtocesta) poveča dostopnost in zmanjša stroške prevoza. Z drugimi besedami, popolna dostopnost območja in njegova vrednost sta neposredno povezani, da ne omenjamo večje splošne uporabnosti. Končni rezultat je koncentracija gospodarskih dejavnosti ob primestnih – državnih ali podeželskih cestah in stanovanjskih zgradb ob mestnih cestah. Njihova gostota narašča s približevanjem mestnemu središču. Slika 1 upodablja spremembe, ki zaradi tega nastajajo v medregionalnem prostoru.

Obstajajo številni primeri medregionalnih sporov, ki zadevajo utiranje poti za novo avtocesto. Različne ugodnosti, ki jih regije najbolj pričakujejo, so povezane z izboljšano privlačnostjo za ustanavljanje podjetij zaradi izboljšane dostopnosti.

V primeru medregionalnih avtocest se postavlja logično vprašanje, do kakšne mere bodo spremembe v izboru lokacije podjetij, ki so posledica gradnje avtocest, in regionalno načrtovanje gospodarskih dejavnosti v medregionalnem prostoru, okrepile regionalni gospodarski napredek. Ta raziskava se ukvarja s tem problemom. V teku je kvantitativna raziskava, v kateri preučujemo lego podjetij, ki se ustanavljajo ob državnih avtocestah, skupaj s številom zaposlitev, ki jih ustvarjajo. Poleg tega raziskujemo tudi odnose med zaposlenostjo in splošnimi značilnostmi avtocest.



Slika 1: Medsebojni vpliv avtocest in rabe tal.

2 Transport in izbor lokacije podjetja: splošni pregled

V lokacijski teoriji ima vloga transporta dolgo tradicijo. Lahko se sklicujemo na klasičen Webrov model, kjer so lokacijski vzorci določeni s stroški transporta in faktorjev, ali na Loeschevo teorijo, ki poudarja pomen velikosti trga. Stroški transporta so bili skupaj z nepopolno konkurenco, velikostjo trga in ekonomijami obsega vključeni v nedavne nove ekonomske geografske modele, s katerimi so želeli pojasniti lego industrijskih objektov (Krugman 1991). Če imajo stroški prometa pri izbiri lokacije pomembno vlogo, bi morale izboljšave v prometu vplivati na izbiro lege. Izboljšave v prometni infrastrukturi delujejo podobno kot povezovanje trgov ter lahko spremenijo relativni pomen sil koncentracije (velikost trga in gospodarstvo strnjenega naselja) in sil razpršenosti (faktorski stroški in konkurenca), zato pa vplivajo tudi na prostorsko razporeditev gospodarske dejavnosti. Povečevanje konkurenčnosti regij, s čimer bi postale privlačnejše za podjetja, vpliva tudi na posodobitev medmestnih avtocest. Poleg večje učinkovitosti, ki temelji na stroških transporta, mnogi raziskovalci ali lokalne oblasti pogosto trdijo, da podjetja privlačijo lokacije, ki so blizu visoko zmogljive avtoceste (Forkembrock in ostali 1993).

Boljše prometne povezave lahko pomagajo območjem z manj gospodarskimi dejavnostmi, da postanejo privlačnejša za podjetja. Slednja namreč s tem pridobijo večjo dostopnost do trgov v osrednjem območju določene regije. Istočasno lahko naraste konkurenčnost podjetij v gospodarskih središčih, saj sedaj lahko lažje oskrbujejo svoje bolj oddaljene lege in ugodne povezave uporabijo za znižanje stroškov in povečanje povpraševanja. Toda vpliv večje mobilnosti podjetij na porazdelitev ugodnosti iz investicij v infrastrukturo ni jasen vnaprej (Venables 1996; Puga 1999). Zato kljub temu obstaja upravičen dvom o vplivu bližine večjih avtocest na odločitve o legi podjetij.

Če to razmišljanje uporabimo pri raziskovanju odnosa med avtocestami in odločitvami podjetij o njihovi legi, lahko ugotovimo, da se tipi medregionalnih avtocest, ki služijo različnim mestom, med seboj razlikujejo samo glede na transportne stroške. Vpliv prometne infrastrukture na lokacijo podjetij so empirično raziskovali, vendar končne ugotovitve niso prepričljive. Aschauer (1989), Mas in ostali (1996) ter Holtz-Eakin (1994) so na podlagi agregatnih proizvodnih funkcij ugotovili, da obstaja pozitiven odnos med stopnjo infrastrukture in stopnjo gospodarske rasti. Vendar je vprašljivo, če je pozitiven odnos v teh študijah resničen ali pa je tako zaradi tega, ker niso uspeli razložiti notranjih zalog infrastrukturnega kapitala. Pristope z uporabo agregatnih proizvodnih funkcij so kritizirali (Haughwout 1998), ker naj bi zanemarili vlogo infrastrukture pri določenih podjetjih. Ti proizvodni funkcijski modeli raziskujejo odnose na državni ravni in imajo nekaj skupnih značilnosti. Po definiciji lahko porast v skupni proizvodnji logično sledi le porastu v kapitalu ali vloženem delu, razen če domnevamo, da bo produktivnost rasla eksogeno. Druga značilnost teh modelov je, da so splošni, ker podatki o natančnih tipih porabe v infrastrukturi pogosto niso na voljo.

Lokalni trgi z večjo mobilnostjo dejavnosti v prostoru lahko vnovčijo prostorske prednosti v lokalnih cenah, kar vpliva na produktivnost posameznih podjetij. Mikelbank in Jackson (2000) poudarjata razlike med vplivi v prostoru. Prometna infrastruktura lahko zaradi svojega mrežnega značaja vodi k pozitivnim ali negativnim učinkom prelivanja med najbližjimi območji. Predznak in obseg prelivanja imata pomembne posledice za prostorsko razporeditev ugodnosti, ki izvirajo iz nove prometne infrastrukture. Boarnet (1998) je pokazal, da so s preselitvijo gospodarske dejavnosti pri okrožjih v Kaliforniji ugodnosti iz infrastrukture izhajale iz konkurenčnosti regij. Stephanedes (1990) je raziskoval razporeditvene dejavnike investicij v državno avtocesto v Minesoti z uporabo časovnih nizov in ugotovil, da avtoceste lahko vplivajo na določene regije, na primer regionalne centre.

V drugi študiji je Haughwout (1999) ugotovil, da državno investiranje v infrastrukturo v Združenih državah vpliva na razporeditev zaposlovanja v posameznih zveznih državah, kar vodi v razpršen vzorec gospodarskih dejavnosti. Investicije privlačijo izboljšave v infrastrukturi v eni regiji, privlačnost območij, ki od nove infrastrukture nimajo neposredne ugodnosti, pa se zmanjša. Izboljšana dostopnost vpliva tudi na vrednost zemljišč, to pa se odraža v spremembah rabe tal.

V Združenih državah so v še eni študiji o vplivu meddržavnih avtocest na dohodek ugotovili, da nove meddržavne avtoceste dvigujejo dohodke v okrožjih, ki bodo dobila novo meddržavno avtocesto, zmanjšujejo pa ga pri sosednjih okrožjih (Chandra in Thompson 2000). Dokaze, da pozitivni učinki prelivanja povečujejo privlačnost sosednjih območij na primeru španskih avtonomnih pokrajin, so našli tudi Mas in ostali (1996). Voith (1993) in Haughwout (1997) pa sta dokazala, da v osrednjih mestih investicije v cestni promet pozitivno vplivajo na vrednost hiš v predmestjih.

Medtem ko obstajajo dokazi o pomembnih učinkih prerazporeditve investicij v prometno infrastrukturo na ravni okrožij in velemest, pa Holtz-Eakin in Schwartz (1995) nista našla nobenega pomembnega vpliva na produktivnost sosednjih držav. Sklepamo lahko, da dejavniki infrastrukture pomembnih cest delujejo le znotraj regij in ne prek njihovih meja. Potrebna je torej geografsko natančna analiza lokacijskih dejavnikov izboljšav v prometni infrastrukturi, ki zna upoštevati različne vplive, ki se pojavljajo na različnih oddaljenostih od nove infrastrukture.

3 Raba tal blizu avtocest in regionalni razvoj

Kljub pomanjkanju trdnih kvantitativnih dokazov pa ostaja prepričanje, da avtoceste vplivajo na gospodarski razvoj in rabo tal. Več opisnih ali zgodovinskih študij je dokumentiralo razvoj rabe tal ob avtocestah in upoštevalo tendenci grozdenja okrog večjih križišč in linearnega razvoja zemljišč ob avtocestah.

Učinek avtocest na ustvarjanje primerljivih prednosti za podjetja in na izbiro prostora za naselitev, ki smo ga analizirali v prejšnjem poglavju tega članka, se ne nanaša nujno na medregionalno rabo tal. Podjetja izbirajo lokacijo na območjih, kjer se popolna dostopnost izboljšuje, kar pa ni nujno ob avtocestah. Zato je njihov vpliv na rabo tal blizu avtocest nepomemben ali ga sploh ni.

Razmerje med rabo tal in avtocestami so raziskovali glede na njun vzajemni vpliv na mestne in primestne regije (Pitsiava-Latinopoulou 1984; Pitsiava – Latinopoulou in Gianopoulos 1985). Razen tega so raziskovali tudi napoved in število oziroma gostoto podjetij, ki so bila ustanovljena ob predmestnih cestah (Corsi 1977; Kau 1977; Twark in ostali 1980). Ko smo raziskovali tipe teh podjetij v smislu njihovega prispevka k regionalnemu razvoju, smo jih razdelili v dve osnovni kategoriji:

- podjetja, ki služijo avtocestam in potrebam voznikov in vozil, ki se vozijo po teh cestah;
- podjetja, ki niso na noben način povezana z dejavnostjo avtocest ali potreb, ki izhajajo iz gostega prometa po njih.

Prva kategorija podjetij je neposredno odvisna od gradnje avtocest, prometa po njej in njenih splošnih značilnosti. Ta podjetja so povezana z avtocestami in odvisna od njih in njihova ustanovitev blizu avtoceste je namenjena izvajanju storitev za zadovoljevanje potreb vseh, ki se po tej cesti vozijo. Posledično je njihova sposobnost za preživetje odvisna od gostote in potreb prometa. V Grčiji so za avtoceste v gradnji (PATHE, Egnatia) že uvedli omejitev pri uporabi medregionalnega prostora. Zaradi tega se ustanovitev podjetij, ki služijo potrebam avtocestnih uporabnikov in njihovih vozil, izvaja v skladu z ustreznimi pravnimi predpisi in na določeni oddaljenosti.

Podjetja v drugi kategoriji, ki niso neposredno povezana z avtocestnimi dejavnostmi, pa imajo korist od same pravilne izbire dejavnosti v medregionalnem prostoru iz dveh razlogov:

- svojo splošno dostopnost so si zagotovila zaradi bližine avtoceste, in izkoriščajo lažjo dostopanje v urbane centre in iz njih, zato navadno služijo kot centri za preskrbo in potrošnjo za izdelke podjetij;
- ustanovitev podjetij v medregionalnem prostoru pomeni prednost za njihovo splošno »podobo«. Njihov položaj služi izpostavljanju, kar se potrjuje v vsakodnevnem vizualnem stiku z uporabniki avtoceste. Vizualni stik, ki ga omogočajo napisi in logotipi podjetij, se zmanjšuje z razdaljo med podjetjem in avtocesto (Pitsiava-Latinopoulou 1984; Pitsiava-Latinopoulou in Giannopoulos 1985). Podjetja postanejo vidna tudi s postavitvijo stavb in naprav vzdolž avtoceste. Izbirajo si privlačne in dolge odseke, da bi s tem čim bolj izstopala.

Prispevek medregionalnih podjetij na gospodarski razvoj teh regij pa ni vedno samoumeven. Spet se vračamo v zgornjo kategorizacijo podjetij. Podjetja iz prve kategorije imajo pozitiven vpliv na regionalni razvoj samo v primeru, če je avtocesta speljana »skozi« regijo in vozila regijo prečkajo. Kjer pa se avtocesta ustavi v območju, ki je predmet raziskave in kjer promet poteka lokalno, pa podjetja iz prve kategorije služijo samo temu območju, njihov doprinos h gospodarskemu razvoju regije pa je nepomemben. Doprinos podjetij h gospodarskemu razvoju je samo redistributiven, ker ne povzroča nobenih sprememb splošnega statusa razvoja (Giannopoulos 1980). Če avtocesta prečka drugo regijo, skozi katero potem potujejo ljudje in vozila, pa bo prišlo do ustanovljanja novih podjetij na zemljiščih blizu avtoceste. Podjetja bodo služila preskrbi potnikov, koristi od tega pa bo imela nova regija.

Podjetja iz druge kategorije si za svoje poslovanje izberejo najboljšo lokacijo izmed tistih, ki so na voljo v njihovi lastni regiji. Določena lokacija pa ne opredeljuje vedno regije, v kateri bodo postavili svojo dejavnost, ker se nanaša samo na »lokalno« prednost. Odločitev za regijo ima prednost pred odločitvijo za

določeno lokacijo, ker so merila za prvo odločitev popolnoma drugačna. V tem primeru se posebna prostorska lokacija ne odraža v dodatnem gospodarskem razvoju, ker ta podjetja, kakor smo že omenili, pri iskanju lokacij ne izbirajo regij. Raje si izberejo privlačno lokacijo v že prej izbrani regiji. Če medregionalni prostor ni bil predviden za ustanavljanje podjetij, bodo vedno izbrali drugo lokacijo v bližini izbrane regije. Podjetja iz prve kategorije torej razporedijo gospodarski razvoj med regije, podjetja iz druge kategorije pa razporedijo gospodarski razvoj med območja iste regije.

4 Empirična raziskava

Sledeča empirična raziskava zadeva podjetja prve kategorije, ki prispevajo k regionalnemu razvoju z razporejanjem razvoja. Ta podjetja so povečini trgovska ali pa nudijo različne storitve. Razdelili smo jih v naslednje kategorije (v oklepaju so klasifikacijske kode s tremi številkami za sektorje na gospodarsko dejavnost Državne statistične službe Grčije, NSSG):

- storitvene postaje za goriva (651,0);
- podjetja za popravilo avtomobilov (301,2);
- podjetja za pomoč na cesti (716,4);
- podjetja za transport (712,1 in 712,4).

Dodali bi lahko še restavracije in hotele, razpoložljivi statistični podatki in klasifikacijska metoda NSSG pa ne določajo njihovega razlikovanja od drugih podjetij.

Raziskava postane izvedljiva, če uporabimo dve metodi:

- multipla regresijska analiza in uporaba podatkov iz prereza, ki se nanašajo na skupne podatke, sorodna podjetja in državno cestno omrežje;
- primeri kontrolnih podjetij, kjer beležijo celotno število ljudi, ki so jim nudili storitev.

Naslednja metoda je uporaba letalskih fotografij, s pomočjo katerih lahko opredelimo gostoto medregionalnih podjetij (Corsi 1974; Twark et al. 1980). Vendar s to metodo ni možno razlikovati in določiti tipov podjetij, števila zaposlenih in njihovega doprinosa k regionalnemu razvoju.

Za sedanjo raziskavo bomo uporabili regresijski model, predstavili pa bomo tudi rezultate vzorčne ankete, ki je podatke zbirala na mestu samem. Uporabili smo enačbo, ki ima linearno in nelinearno obliko. Poglavitna razlika med linearno in nelinearno enačbo zadeva soodvisnost med odvisnimi spremenljivkami, ki obstaja v nelinearnih enačbah.

$$Yi = a_0 + \left[\sum_{i=1}^{n} a_i (FACT)_{ir}\right] + e_1 \tag{1}$$

$$Yi = b_0 \left[\prod_{i=1}^{n} (FACT)_{ir}^{bi}\right] e_1 \tag{2}$$

V Grčiji je več tistoč kilometrov avtocest. Statističnih podatkov o podjetjih, lociranih blizu avtocest na ravni prefektur ni. Očitno je tudi, da bi potrebovali veliko sredstev in časa za zbiranje teh podatkov (na primer z raziskavami). Zato smo kot odvisno spremenljivko uporabili skupno število prej omenjenih podjetij na prefekturo, kot neodvisno spremenljivko pa dejavnike, za katere menimo, da vplivajo na število prej omenjenih podjetij.

Za prikaz odvisne spremenljivke v enačbi smo uporabili celotno število zaposlenih na prefekturo v prej omenjenih podjetjih. Kar se tiče neodvisnih spremenljivk, domnevamo, da na celotno število zaposlenih na prefekturo v teh podjetjih vplivajo in jih oblikujejo naslednji dejavniki:

- skupno število prebivalstva v vsaki prefekturi;
- število tovornjakov in vozil v vsaki prefekturi;
- število zasebnih vozil v vsaki prefekturi;
- število potnikov v vsaki prefekturi znotraj državnega cestnega omrežja;
- raven blaginje in napredka v vsaki prefekturi.

Razmerje med številom omenjenih podjetij in celotnim številom prebivalstva v vsaki prefekturi je jasno. Jasen je tudi odnos med njimi in celotnim številom tovornjakov in vozil. Pričakujemo pozitivno vrednost za koeficient prvih treh neodvisnih spremenljivk.

Četrta neodvisna spremenljivka izhaja iz kombinacije med dolžino časa potovanja posameznega potnika v vsaki prefekturi državnega cestnega omrežja in skupnim časom potovanja po celotni avtocesti. Ocenjujemo, da bo celotna dolžina omrežja vplivala na čas prečkanja za vsakega potnika in posledično tudi na potrebo po storitvah teh podjetij. Celotno število potnikov bo seveda tudi pozitivno vplivalo na zaposlovanje. In končno bomo ugotovili tudi stopnjo blaginje in napredka, za katero domnevamo, da vpliva na število teh podjetij v vsaki prefekturi.

Medtem ko je upodobitev prvih treh spremenljivk izpeljana iz njihove velikosti (NSSG 2001), je upodobitev četrte spremenljivke trši oreh. To je zaradi dejstva, ker za prefekture ne poznamo števila vozil, ki vozijo mimo, zato razločevanje med »mimovozečimi« in »internimi« vozili v celotnem prometu omrežja ni izvedljivo. Zaradi tega v vzorcu nismo upoštevali prefektur Atene in Tesaloniki, ker v svojem omrežju prikazujeta zelo velik promet (MPW 1990), in smo tema dvema prefekturama dodali vrednost nič, ker prometa ni. Glede na celoten promet na avtocesti smo omrežja v ostalih prefekturah razvrstili v tri kategorije. Kategorije I, II και/in III imajo letni promet 0–5000, 5000–10.000 oziroma več kot 10.000. Za vsako prefekturo smo ustvarili indikator prometa: CESTA = aI + 2aII + 3aIII, kjer znaki aI, aII, aIII označujejo pretočnost cestnega omrežja za vsako prefekturo s stopnjami prometa kategorij I, II, in III.

Da bi ocenili vrednost te spremenljivke, smo pomnožili celotno dolžino državnega cestnega omrežja, ki prečka vsako prefekturo, z njenim indikatorjem stopnje prometa. Te ocene temeljijo na splošni predpostavki, da stopnja prometa vsake prefekture pomeni določen odstotek celotne količine prometa omrežja.

Ugotavljamo, da v Grčiji relief in lastniški status nimata občutnega vpliva na število podjetij, ker državno prometno omrežje povečini poteka po blagem reliefu, in razen nekaj določenih odsekov, ni »zaprtih« avtocest s prepovedmi ali pomanjaknjem prometa na območjih blizu avtocest.

Končno, za ponazoritev stopenj blaginje in napredka v vsaki prefekturi uporabljamo ustreznega pokazatelja (Petrakos in Polyzos 2005). Tako sta splošni enačbi (1) in (2) podrobneje označeni takole:

$$Y_i = a_0 + a_1(POP)_i + a_2(TRUC)_i + a_3(CAR)_i + a_4(ROAD)_i + a_5(PROS)_i + e_i \quad (3)$$

$$\ln Y_i = \ln b_0 + b_1 \ln(POP)_i + b_2 \ln(TRUC)_i + \alpha_3 \ln(CAR)_i + b_4 \ln(ROAD)_I + + \ln(PROS)_i + \ln e_i \quad (4)$$

kjer je:

POP … prebivalstvo vsake prefekture.
TRUC … število tovornjakov in vozil v vsaki prefekturi.
CAR … število osebnih avtomobilov v vsaki prefekturi.
ROAD … pokazatelj cestnega omrežja v vsaki prefekturi.
PROS … pokazatelj blaginje in napredka v vsaki prefekturi

5 Rezultati

S pomočjo enačb (3) in (4) in z uporabo metode OLS ter na podlagi statističnih podatkov za 37 kopenskih prefektur v državi (z izjemo prefektur Attika in Tesaloniki) smo izračunali omenjene vrednosti. Rezultate smo razložili za vsakega od štirih omenjenih tipov podjetij posebej. Rezultate ocene enačbe prikazujeta Preglednici 1 in 2:

Preglednica 1: Regresijski rezultati za enačbo (3).

ocene za	podjetja za popravilo avtomobilov	storitvene postaje za goriva	podjetja za transport	podjetja za pomoč na cesti
konstanta	28,30 (1,23/0,229)	–22,85 (–0,36/0,762)	–7,611 (–0,499/0,622)	–132,09 (–0,933/0,35)
POP	$-5{,}34\times10^{-2}$ (–0,28/0,781)	0,529 (0,859/0,397)	$3{,}29\times10^{-2}$ (0,261/0,793)	–1,01 (–0,872/0,39)
TRUC	2.30×10^{-3} (2,28/0,029)	2.38×10^{-4} (0,073/0,942)	$3{,}28\times10^{-2}$ (0,261/0,796)	$9{,}68\times10^{-3}$ (1,56/0,12)
CAR	$1{,}90\times10^{-3}$ (1,58/0,12)	$1{,}17\times10^{-2}$ (2,94/0,006)	$3{,}45\times10^{-4}$ (0,42/0,67)	$5{,}95\times10^{-3}$ (0,785/0,437)
ROAD	$2{,}68\times10^{-2}$ (2,00/0,054)	0,147 (3,37/0,02)	$1{,}18\times10^{-2}$ (1,33/0,192)	0,148 (1,78/0,08)
PROS	–0,619 (–1,813/0,08)	$8{,}66\times10^{-2}$ (3,37/0,02)	$8{,}83\times10^{-2}$ (0,392/0,698)	1,92 (0,92/0,35)
R^2		0,822	0,90	0,23 0,55
R^2 – prilagojeno	0,792	0,88	0,12	0,47
N	37	37	37	37

Opomba: v oklepaju sta *t*-test in njegov statistični pomen.

Preglednica 2: Regresijski rezultati za enačbo (4).

ocene za	podjetja za popravilo avtomobilov	storitvene postaje za goriva	podjetja za transport	podjetja za pomoč na cesti
konstanta	–4,232 (–2,303/0,028)	–4,247 (–3,512/0,001)	–6,911 (–1,06/0,29)	–9,183 (–1,616/0,11)
POP	0,855 (1,361/0,183)	$-2{,}19\times10^{-4}$ (–0,001/1,00)	2,248 (0,085/0,332)	1,247 (0,640/0,527)
TRUC	0,250 (0,749/0,460)	0,303 (1,42/0,163)	–1,275 (–1,061/0,29)	0,645 (0,626/0,536)
CAR	0,156 (0,856/0,390)	0,821 (3,714/0,001)	$-5{,}70\times10^{-2}$ (–0,05/0,96)	–0,78 (0,740/0,443)
ROAD	$2{,}67\times10^{-2}$ (0,856/0,390)	$5{,}22\times10^{-2}$ (2,547/0,015)	$-9{,}14\times10^{-2}$ (–0,806/0,427)	$-9{,}63\times10^{-3}$ (0,099/0,922)
PROS	$-9{,}54\times10^{-2}$ (–0,146/0,884)	–0,268 (0,622/0,539)	2,377 (0,998/0,326)	2,008 (0,98/0,33)
R^2	0,873	0,933	0,21	0,51
R^2 – prilagojen	0,853	0,922	0,10	0,42
N	37	37	37	37

Opomba: v oklepaju sta *t*-test in njegov statistični pomen.

Zaradi kontrole izračuna multiple korelacije smo ovrednotili korelacijske koeficiente neodvisnih spremenljivk. Rezultati v Preglednici 3 prikazujejo visoko korelacijo med spremenljivko POP in spremenljivkama TRUCK in CAR v enačbi (1) in spremenljivko lnPOP in spremenljivkama lnTRUCK in lnPROS v enačbi (2). Splošno rečeno je praktično nemogoče najti multiplo regresijo modelov s štirimi ali več neodvisnimi spremenljivkami, ki ne predstavljajo korelacije med njimi. Korelacije spremenljivk ROAD in lnROAD z ostalimi neodvisnimi spremenljivkami, ki nas najbolj zanimajo, nimajo visokih vrednosti.

Preglednica 3: Korealcijski rezultati za enačbo (3) in (4).

	POP/lnPOP	TRUC/lnTRUC	CAR/LnCAR	ROAD/lnROAD	PROS/lnPROS
POP/lnPOP	1,000	0,860** (0,000)	0,280 (0,093)	0,547** (0,000)	0,744** (0,000)
TRUC/lnTRUC	0,814** (0,000)	1,000	0,238 (0,156)	0,457** (0,004)	0,644** (0,000)
CAR/lnCAR	0,898** (0,000)	0,648** (0,000)	1,000	0,067 (0,694)	0,278 (0,096)
ROAD/lnROAD	0,415* (0,007)	0,407 (0,013)	0,391 (0,017)	1,000	0,391 (0,017)
PROS/lnPROS	0,327 (0,048)	0,438* (0,002)	0,422* (0,009)	0,124 (0,463)	1,000

* Korelacija je statistično pomembna pri 0,05 stopnji zaupnosti (dvosmerno).
** Korelacija je statistično pomembna pri 0,01 stopnji zaupnosti (dvosmerno).

Razlagalna sposobnost vrednosti, ki smo jo dobili pri determinacijskem koeficientu (R^2 in prilagojen R^2), je v prvih dveh kategorijah podjetij zadovoljiva (storitvene postaje za goriva in podjetja za popravilo avtomobilov), manj zadovoljiva je za podjetja za pomoč na cesti in negativna za podjetja za transport. Rezultati tudi kažejo, da so ocene neodvisnih spremenljivk statistično pomembne in povečini pozitivne.

Ko se osredotočamo na analizo in ovrednotenje rezultatov, ki zadevajo spremenljivko ROAD lahko rečemo, da izpolnjujejo naša začetna pričakovanja. Ocene so pozitivne in statistično pomembne z izjemo dveh primerov, medtem ko koeficienti z nizko vrednostjo korelacije z drugimi spremenljivkami zagotavljajo zanesljivost rezultata. Ugotovimo lahko, da je ustanavljanje teh podjetij v regijah odvisno od poteka državnega cestnega omrežja skozi regijo in da doprinaša k regionalnemu razvoju.

Razmerje med pokazateljem stopnje prometa na avtocestah in podjetji za (a) storitvene postaje za goriva in (b) transport prikazujejo tudi štirje diagrami v normalnem pravokotnem sistemu na sliki 2.

Figure 2: Avtoceste prispevajo k regionalnemu razvoju.
Glej angleški del prispevka

Kasneje bomo predstavili rezultate raziskave, ki smo jo opravili z izpolnjevanjem vprašalnikov in ki vključujejo podjetja, ki se nahajajo na avtocesti Atene-Tesaloniki in blizu mest Larissa in Lamia. Raziskava služi zbiranju podatkov o vplivu avtocest na ustanavljanje medregionalnih podjetij in pomen avtocest za njihovo preživetje.

Podjetja, vključena v raziskavo, so locirana na dolžini 7 in 9 km avtoceste med mestoma Larissa in Lamia. Lokacije, kjer je potekala raziskava, so prikazane na Sliki 3. Raziskava je sprva vključevala 85 podjetij, ven-

dar se jih je iz različnih razlogov odzvalo samo 67. Tip podjetja, skupno število zaposlenih na kategorijo in odgovor na vprašanje o pomenu avtoceste, so predstavljeni v preglednici 4.

Slika 3: Avtomobilske ceste so pomembne za sodobno življenje.
Glej angleški del prispevka.

Splošna ocena rezultatov nas vodi k zaključku, da prve štiri kategorije vključujejo bolj tista podjetja, ki služijo potrebam voznikov in vozil. V veliki meri ta podjetja določijo svojo lokacijo glede na avtocesto. Tako velik del pomena avtoceste in stopnja strank, ki izvira iz mimovozečih voznikov in vozil iz druge prefekture, vodi k zaključku, da so njihova sposobnost preživetja in ustvarjene zaposlitve v tesni povezavi z avtocesto.

Preglednica 4: Rezultati statistične raziskave

število	tip podjetja	število podjetij	neposreden dostop do avtoceste	posreden dostop do avtoceste	pomen avtoceste za podjetje		
					majhen	srednji	velik
1	trgovine	9	6	3	1	2	6
2	storitve za avtomobile	18	14	4	2	3	13
3	skupaj (a + b)	21	18	3	3	3	12
4	restavracije, itd	8	8	0	0	0	8
5	proizvodnja	7	2	5	3	3	1
6	industrija	4	0	4	3	1	0

število	skupaj zaposlenih	kaj avtocesta zagotavlja			odstotek strank iz drugih prefektur, ki prečkajo regijo po avtocesti %
		vidnost	stranke	oboje	
1	39	–	1	8	58
2	81	–	2	16	70
3	119	2	4	15	60
4	47	1	5	2	63
5	92	3	2	2	24
6	103	4	–	–	6

Nasprotno pa rezultati raziskave vodijo k sklepu, da industrijska podjetja avtocestam posvečajo malo pozornosti, saj je število strank, ki dostopajo z avtocest zanemarljivo. Njihova lokacija ob avtocesti je slučajna ali pa je usmerjena samo na vidnost, ki je pogojena z lokacijo. Opazili smo tudi, da je število industrijskih podjetij majhno, skupno število zaposlenih na podjetje pa je precejšnje.

6 Sklep

V članku smo empirično in teoretično raziskovali razmerje med avtocestami in bližnjimi podjetji. Končni zaključek, ki izhaja iz raziskave je, da imajo avtoceste pozitiven vpliv na nekatera podjetja in njihovo dejavnost – povečini so to trgovska podjetja –, saj prisotnost avtoceste podjetjem zagotavlja stranke.

Opazili smo tudi, da je zaposlovanje v prefekturah, ki jih prečka državna avtocesta, povezano z omenjenimi podjetji. Toda čeprav je korelacija pozitivna, ni statistično pomembna. Sprememba v stopnji zaposlenosti regije r po izgradnji avtoceste, ki jo prečka, bo enaka dYr = d(ROAD)ra4 za linearno enačbo (1) in dYr = d(ROAD)rb4(Yr/ROADr) za nelinearno enačbo (2). Če upoštevamo, da so vrednosti koeficientov a4 in b4 relativno nizke, porast vrednosti spremenljivke ROAD ne povzroči pomembnega dviga zaposlenosti v regiji r. Razen tega lahko iz Preglednice 4 razvidimo, da skupna zaposlenost v podjetjih, ki »bližini avtoceste« pripisuje velik pomen, ni zelo visoka, če upoštevamo, da imajo regije (prefekture), ki jih avtocesta prečka, 280.000 prebivalcev (Larissa) oziroma 178.000 prebivalcev (Lamia).

Posledično so pričakovanja za splošni doprinos državnega cestnega omrežja h gospodarskemu razvoju prefekture zaradi regionalnega ustanavljanja podjetij neupravičena. Čeprav je razmerje med številom

podjetij in avtocesto pozitivno, zaposlenost, ki jo ustvarjajo nova podjetja, ni zelo visoka. Vendar to zadeva samo medregionalna podjetja. Ne pomeni, da je splošni doprinos avtocest k ustanavljanju podjetij v prefekturi in gospodarskemu razvoju regij zanemarljiv. Kot smo videli že drugje (Polyzos in Petrakos 2000), skupna dostopnost prefekture poveča privlačnost prefekture za ustanavljanje podjetij znotraj njenih meja.

Omeniti moramo tudi, da danes, ko se širi oziroma nadgrajuje državno cestno omrežje v Grčiji, podjetja, ki služijo potrebam uporabnikov omrežja in želijo pridobiti zemljišča poleg avtoceste, potrebujejo posebno dovoljenje avtocestnih oblasti (Egnatia Highway S. A., State, etc.). To dejstvo pa ne omejuje vrednosti pričujoče raziskave, saj rezultati raziskave podajajo število podjetij, ki bodo morda v bližnji prihodnosti locirana ob avtocesti.

7 Literatura

Glej angleški del prispevka.