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The macroeconomic impacts of the Attiki Odos motorway in the Greek Economy: An Input–Output Analysis

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This paper estimates ex-post the macroeconomic impacts of the high-speed toll motorway investment of Attiki Odos, in the Athens Metropolitan Area in Greece. Attiki Odos is incorporated in the Trans-European Networksand it is a priority project aimed at developing the greater area of Athens and the Greek economy as a whole. The investment vector was assembled from figures calculated ex-post. The input-output model was used to estimate relative changes in output, employment and occupations by sector of economic activity. We show that the construction of the Attiki Odos grid has significantly affected the broader area.

Keywords: Athens Area, input-output, macroeconomic impacts, motorway.

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1. Introduction

The idea for constructing a peripheral ring in Athens and its metropolitan area (AMA) was introduced in 1960. However, the first feasibility study for a peripheral ring road creating a bypass of Athens, was conducted 1995 and the construction was completed in the time period 1999-2004.

This peripheral ring is called *Attiki Odos* (AOD). The AOD is incorporated in the Trans-European Networks (TEN) and is a priority project aimed at developing the greater area of Athens and Greece as a whole. The AOD motorway has assisted in easing traffic congestion in the greater area of Athens, reducing the traffic in the central arteries (see Figure 1). Also, it forms an important node between the transport infrastructure such as airports, suburban train stations, metro, logistic centres and freight villages. It forms a backbone for the transport network, moreover assisting the strategic layout of Attica's energy and communication networks and contributing to the integrated physical and urban planning of Attica.

It is important to note that the relief of congestion in the road axis of Attica causes a significant reduction of air emissions in the greater area, since the cars on the motorway circulates at constant speed, reducing their fuel consumption and the amount of exhaust fumes.

The motorway has approximately 300,000 users per day or 65 millions per year. The total cost is approximately ∈2 billions. The project was financed as follows: 40% from cohesion funds; 25% from the government; 10% from private funds and 25% from structural funds (AOD, 2004).

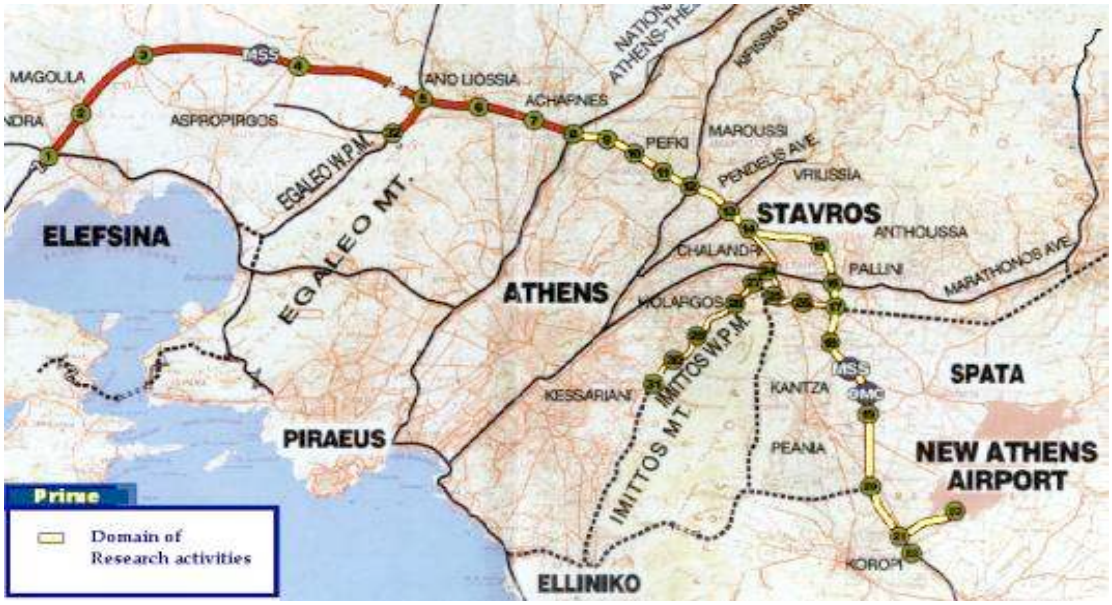

Figure 1 AOD Transportation System
Source: AOD, 2004

This paper calculates the impacts of investment expenditures in the Greek economy, during the construction phase (1999-2004). Input –output analysis has been applied to assess the macroeconomic impacts (direct – indirect – induced) of the investments expenditures, by sector of economic activity. The variables, typically examined in this approach, are output, employment and occupations. The remainder of this paper is structured as follows: section 2 presents some stylized facts on the Greek economy; section 3 sets out the methodological framework; section 4 presents the data; section 5 analyzes the empirical results; section 6 concludes the paper.

2. The Greek Economy: Stylized Facts

Agriculture has traditionally been the driving force behind the Greek economy. During the first half of the 20th century, the economy depended on the export of agricultural products and had a performing shipping industry. Also, remittance sent home from Greeks working abroad was a major source of income. Natural resources are limited and there are some deposits only in the case of nonferrous metals. Fossil fuels are in short supply, expect for lignite, whereas oil production is limited. The country became more industrialized after World War II and the government policies were conducive for industrialization, while foreign aid grew considerably. Also, the country's heritage is well preserved and tourism has become a booming industry.

The Greek economy performed poorly from about 1970 to 1995, during which it was the poorest in the E.U. Part of the explanation lies with the collapse of macroeconomic policy that took the form of large fiscal deficits and high inflation rates. Also, reduced rates of capital formation, the shock of entry in the E.U. and the presence of structural rigidities are regarded as contributors to the economic slowdown. But the deteriorating performance is also attributed to the country's poor economic institutions (Bosworth and Kollintzas, 2001).

Now, Greece has a mixed capitalist economy with a relatively strong participation of the public area. The country became a full member of the E.U. in 1981 and its economy has improved over the last decades in the run-up to its entry into the Economic and Monetary Union (E.M.U.) in 2001. Also, Greece benefits from E.U. funds. Major challenges remaining include the reduction of unemployment and restructuring of the economy.

The area of greater Athens situated on the southern coast of mainland Greece is 3,200 square kilometers including the port of Piraeus. It concentrates roughly one third of the population of Greece on about 2.8% of the country's total area. More precisely, over the 1991-2001 period, the population of Greece increased by 6.8%, to reach 10,940,000 inhabitants, while the Athens (Metropolitan) Area grew also at 6.8%, to 3,761,810, inhabitants thus maintaining its share of about one third of the total Greek population and was mainly due to suburbanization driven by new infrastructure projects in outer areas confirming its dominant position as the main urban center of Greece.

Also, migration has played a decisive role in overall population growth during the past decade. The number of legally registered migrants, mainly from Albania, Bulgaria and other Eastern European countries, but also Pakistanis, Filipinos and Africans, in Greece is increasing with about the same number of unregistered immigrants. Almost half of them live in the Athens Region representing about 10% of the total population of the area, while the economic benefit from illegal migrant labor was estimated to about 1% of Greek G.D.P. (O.E.C.D., 2004). Migration impacts upon the local economy significantly because the informal economy accounts presently for 20-40% of the economic output of the Athens region, with social and economic costs and implications.

Moreover, the Athens region contributed more than 38% to the Gross National Product (G.N.P.) of Greece (N.S.S.G., 2001). More precisely, the primary sector in the Athens Region accounted for 0.6% compared with the 8.2% for Greece as a whole; the secondary sector accounted for 18.3% versus 21.6% for Greece; and the tertiary sector accounted for 81.1% with 70.2% for Greece, as a whole. Consequently, the Athens region has a sectoral structure which corresponds to a relatively modern local economy (O.E.C.D., 2004). Also, labour market participation in the Athens region is low: The employment rate is 54.8%, which is below both the Greek national average (57.8%) and, of course, the European average (73.8%). In addition, the proportion of the population under 15 years of age is less than the European average. Athens scores well in almost all "social" indicators, has a very low crime rate in Europe and a low income disparity. Business is mainly composed of small and medium size enterprises and the educational level of the Athenian labour force is high (O.E.C.D., 2004).

Since the late 90's, the Athens region was benefiting from a period of exceptional financing and promotion related to the Olympic Games of 2004 and the EU Support Funds (M.o.F., 2004), which had boosted investment in infrastructure facilities (i.e. hotel sector, sports facilities, etc) and a modern region-wide transport network. This included a brand new international airport, urban highways and ring roads to decrease congestion, upgraded rail links, a new metro, a non-polluting bus fleet, and tramway lines which connect the city centre and the suburbs.

In terms of general economic development, Athens had been enjoying favorable macroeconomic conditions (high growth rates, greater stability in the Euro area, lower levels of inflation, etc). At the same time, however, Athens faces complex inter-related problems. Its population is ageing; immigration is increasing in a previously homogenous society; parts of the urban area suffer from poor housing, environmental degradation and lack of green space, and the impacts of climate change are cause for concern; unemployment in the capital is high; imbalances in employment opportunities may well arise between the east and west of the region as well as among the different sectors, since new developments locate around the international airport, while old industrial sites in the west require redevelopment; investment finance may become scarce in the medium term as the EU Community Support Funds diminish. Moreover, the share of high productivity small and medium companies appears to be low; the economy faces a substantial debt burden; the trade

deficit is sizeable; the size of the unofficial economy is very big and competition from other European cities and economies is likely to intensify.

However, against this background Athens has considerable potential for growth in a number of areas. Specifically, it cites the health sector, including the fitness and health industry; the sports sector with hosting of major international events; education as an economic sector attracting foreign students which stimulates the housing and construction sectors as well as consumer products; the legal sector; the year-round conference industry; and new forms of tourism such as archaeological parks, eco-tourism, and high-quality cultural tourism.

All of these opportunities, however, require the Attica region to be well planned, accessible and socially agreeable. Like many metropolitan areas, Athens requires new institutional arrangements or reinforced co-operative arrangements in order to improve integration across administrative areas and between the policies and programmes of infrastructure agencies and service delivery.

Athens needs clear strategic planning to take advantage of the opportunities that globalisation and eastward expansion of the European Union is bringing. In fact, Athens has considerable potential for development in its role as international gateway to Greece, the eastern part of the enlarged European Union and the Middle East. However, fulfilling this role will require strategic responses from the Greek government and the authorities of Athens and the surrounding region of Attica to a number of specific challenges (O.E.C.D., 2004). In particular, there is a need for developing a strategic vision for the region linking economic, social, and environmental planning. The government should monitor the impact of E.U. enlargement on the Greek and Athens economies, and develop a clear analysis of the best roles for Athens to play within Europe.

Thus, it is an important challenge for the economy's authorities to determine, as closely as possible, the impact of Public Works on the Greek economy and, more precisely, the macroeconomic impacts of the high-speed toll motorway investment of Attiki Odos. It should be noted that, to date, there has been no specific study that has investigated relevant issues for the Athens region in Greece, by sector of economic activity. Therefore, such an investigation is of paramount importance.

3. Methodology

The significance of infrastructure in the process of economic growth has been recognised for a long time. It derives from the characteristics of infrastructure output as both, a final good providing service directly to consumers, as well as an intermediate input that enters into the production of other sectors and raises the productivity of factors employed there. Additionally, there are two ways for the association between growth of output and of economic infrastructure works. Growth of infrastructure can result from the demand of other sectors and improve the facilities of industrial investment (Hirschman, 1958; Weiss, 1999).

Actually, in the 1990s infrastructure investments became one of the most frequent topics for economic research. These researches are to be connected with the new growth theory (Barro, 1990 and King and Rebelo, 1990). Of course, there is a large range of analytical approaches to estimate the economic and social effects of infrastructure investments like: Input-Output approach e.g. Spatial Computable General Equilibrium (SCGE) models (Shoven and Whally 1992), Economic Input Output – Life Cycle Assessment (EIO-LCA) models (Levine et *al.* 2007), Regional Economic Modelling (REMI), Impact Analysis for Planning (IMPLAN), Regional Industrial Multipliers System (RIMS-II) (Lynch, 2000), or the traditional production function approach (Aschauer, 1989; Gramlich, 1994).

On the other hand, microeconomic analysis attempts to isolate a specific market and examine critical factors that affect the equilibrium point without taking into account impacts on other markets. However, in a modern economy, every market responds directly or indirectly to changes occurring in other markets. General equilibrium methods are suitable for application as they simultaneously define prices and quantities at the equilibrium point. As is well known, input-output analysis is one of many general equilibrium methods that have been widely applied in the last decade.

Input-Output (IO) models contain information on inter-industry relationships, including “multipliers” that are used to forecast impacts as the euros spent on a transportation investment ripple through the economy. IO models are best suited for measuring the impacts of expenditures for the construction and operation of transportation facilities. They can also be used with exogenous inputs to calculate how changes in accessibility and transportation costs induce changes in levels of

economic activity. There are many examples that illustrate the application of IO models to transportation investments (Resi 1998**;** Batey et *al.* 1992).

Input - output analysis is the most common method used to estimate the short-term effects of construction spending (which mainly include construction jobs and the secondary impacts of construction). Thus, the IO model will be used to calculate relative changes in output for the entire economy, employment and occupations. We choose the widely used IO model because its implementation is straightforward, the derived results directly interpretable and the data are, usually, easy to access. However, a major limitation of the IO model is that it is static and, thus, does not account for long-term changes. In this context, the analysis is based on the typical assumption that production technology for the Greek economy remains constant.

Generally speaking, there are two types of input-output analyses: (i) the closed model technique and (ii) the open model technique. In the open model technique, final demand is considered to be an exogenous variable. Quantities and prices for the vector of final demand are given and the model evaluates sectoral production to satisfy the given demand. Thus, an open model examines only the influence of demand on supply. We use the open model technique due to insufficient data for disaggregation of private consumption.

To calculate direct macroeconomic impacts, technological coefficients were derived from the original input-output table by dividing each element of the intermediate demand sub-table by the total production. Whenever the final demand of the *j*th product changes by one unit and the demand of all other products remains constant, the *j*th sector will change its production level by one unit to satisfy this new demand. This change in production level will affect the level of primary inputs which is measured by the direct coefficients.

Varying the final demand of a sector also causes indirect changes to all other sectors because production in one sector is, usually, an input for other sectors. Estimation of these indirect impacts is one of the main goals of input-output analysis and is done by using the Leontief matrix:

$$X = (I-A)^{-1} F \qquad (1)$$

where

X is the vector of total production,

I the unit matrix,

A the technology matrix,

$(I-A)^{-1}$ the so-called Leontief inverse matrix, and

F the vector of final demand.

Furthermore, output also changes and the direct and indirect impacts are measured by using the Leontief matrix:

$$X_{AOD}=(I-A)^{-1}F_{AOD} \quad (2)$$

where,

X_{AOD} expresses both the direct and indirect (i.e. total) impacts on the output and

$F_{AOD\ is}$ the vector of investments (final demand) for the construction of AOD.

The induced effect, which is the value of the increased spending by households that results from the increased economic activity. The calculation of the induced effect is captured by including households as a column and row in the Leontief matrix.

$$X_{AOD}' = (I-CVB)^{-1} F_{AOD} \quad (3)$$

where

C is the vector of private consumption by sector as share of Gross Value Added (GVA),

V is the vector of GVA as share of gross output and

B is the Leontief inverse matrix.

The technology matrix changes and this poses a constraint for the use of input-output analysis in the long-run. However, one may safely assume that over a period of five years, the technology matrix remains unchanged. Since all investment expenditures for the construction of the AOD have been estimated in 2000 prices, we may use the input-output table of the Greek economy for the year 2000. For the estimated changes e.g. in employment, similar direct coefficients have been calculated:

$$L_{AOD}= l(I-A)^{-1} F_{AOD} \quad (4)$$

where,

l is the direct coefficient vector of employment, expressing the employment per unit of sectoral output

L_{AOD} is the vector of the direct and indirect employment required for construction of AOD.

The induced impacts on employment are calculated as follows:

$$L_{AOD}' = l(I-CVB)^{-1} F_{AOD} \quad (5)$$

where L_{AOD} is the vector induced employment caused by the construction of AOD.

We, also estimate direct and indirect multipliers by occupations, using a transformation of equation (4). We replace the vector of direct employment with a matrix containing the required employment by occupation per unit of output (direct coefficient).

$$M_{AOD} = m(I-A)^{-1} F_{AOD} \quad (6)$$

Where

m is the matrix of direct employment coefficient by sector and occupation

M_{AOD} is a matrix of the required employment by sector and occupation for the construction of AOD.

4. Data

Figure 2 depicts the methodological approach for calculating the AOD vector of investment (final demand vector). To apply input-output analysis the input-output table and a vector of final demand are needed. Thus, a 25x25 domestic input-output table for year 2000 has been estimated by the authors. The use of a domestic input-output table for the estimation of the impact of a local infrastructure usually overestimates the results. But, in the case of AOD the domestic table has been selected because the source of a significant percentage of raw materials was "imported" to the region of Attica from other regions.

Matrix m has been calculating by the authors using the Labor Force Survey of the greek economy for the year 2000. It contains the number of employess for 25 sectors and 46 occupations (the dimensions of the matrix is 46x25). All other data come from the National Statistical Service of Greece (NSSG).

Next, we develop the final demand vector that handles data about investment expenditures for constructing the highway network and the civil engineering works. In the first step (i) we used the original elements of AOD Highway originating in internal sources to calculate the total quantity of materials and related projects needed for each task. In the second step (ii) the materials and projects from step one were arranged according to the corresponding economic sectors using the *mak*e

matrix (123 x 123) and the input-output table (59 x 59). In the third step (iii), from step two we have the sectoral vector of demand (1x59) in physical units. In the fourth step (iv), the elements of vectors (1x59) were expressed in monetary units in constant 2000 prices. In the fifth step (v) the 1x59 vector of the fourth step applying Pareto analysis is aggregated in a 1x25 vector according to the 25x25 input–output table (see Table 1 and Table 3 for the classification). This vector (1x25) is equal to about 70% of total cost investment expenditures. Finally, in the sixth step (vi) according to the schedule of public work the expenditures for the time period under survey (1999-2004) are allocated. Here, it should be noted that studies of this type need to be implemented by empirical evidence from *ex-post* evaluation, given that it is extremely difficult to measure the exact relationship between infrastructure and development (OECD, 2002).

5. Empirical Analysis

The highway investment produces economic benefits of many kinds. The most obvious benefits are the time savings, enhanced safety, and vehicle operating cost reductions experienced by highway users. Highway investments reduce congestion and improve the levels of service that can boost the productivity of firms by lowering their shipping and logistics costs. However, construction and maintenance of highway facilities also help local, regional, and national economies grow by attracting new businesses and by providing access to new markets.

Increase in public and local highway capital investment helps to generate employment in the highway construction industry as managers, engineers, specialists, and semi- and unskilled labourers are called upon to construct new roads, resurface existing ones, or perform capital improvements to enhance highway service levels.

These investments also generate jobs and income in many other industries. For instance, industries that supply materials to highway construction are met with increased orders. Increased orders require firms in these “supplying” industries to hire more labour and income in order to process and deliver materials to construction sites. Also, individuals who work in the highway construction and supplying sectors earn incomes which are subsequently spent within the local, state, and regional economies, generating jobs across many industries and geographic areas.

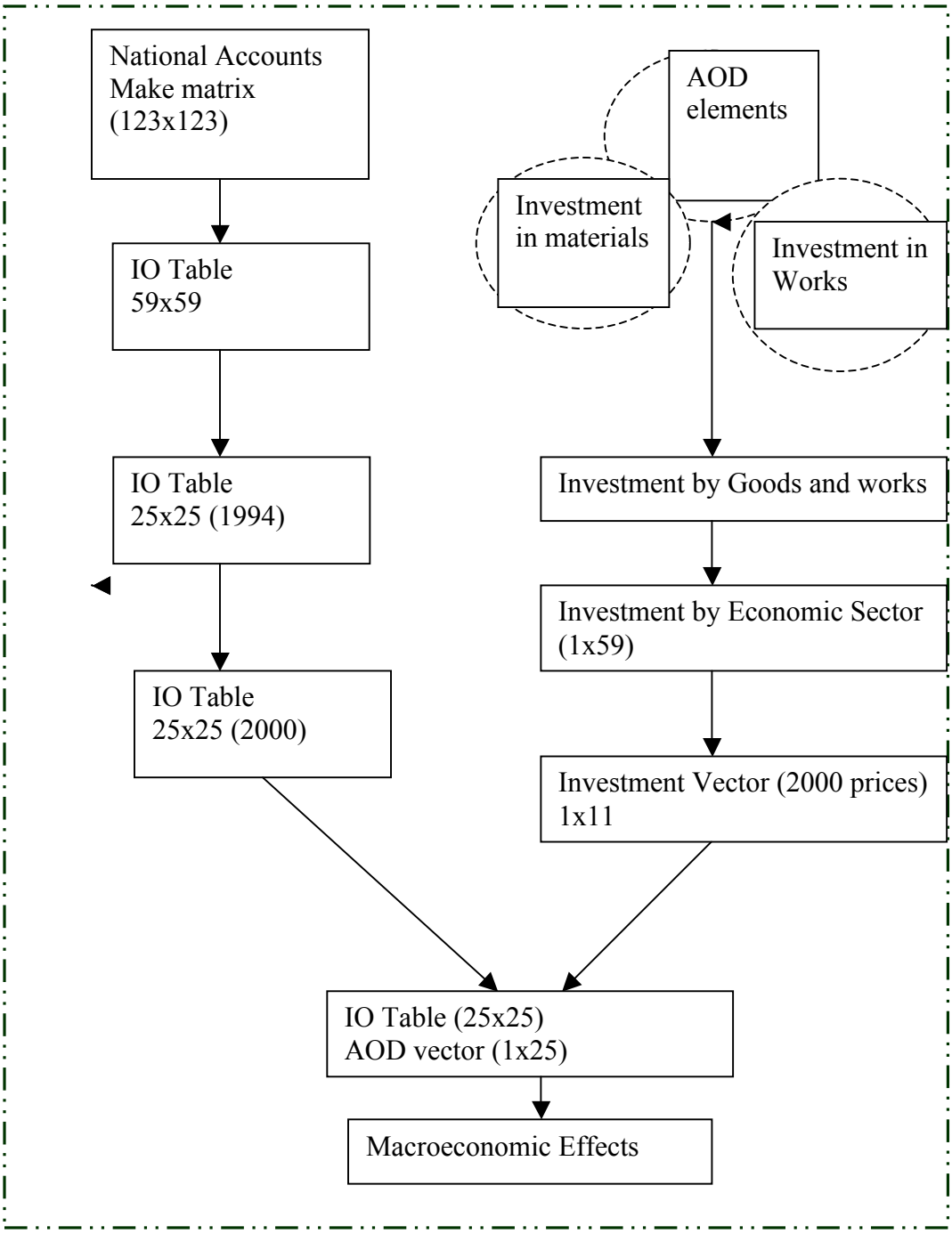

Figure 2: Flow Chart of Investment Vector

Table 1: Investment expenditures for highway construction

No	Industry Classification *(see Table 5)*	Industries	Cost (*million euros –2000 prices*)
A	4	Mining of metal ores, other mining and quarrying products etc	123,42
B	7	Wood and wood products	0,02
C	9	Manufacture of coke: refined petroleum products etc	271,64
D	10	Manufacture of chemicals and chemical products, manufacture of rubber and plastic products	183,33
E	11	Manufacture of other non-metalic mineral products	349,24
F	12	Basic metals and fabricated metal products	275,33
G	13	Fabricated metal products except machinery and Equipment.	1,07
H	14	Machinery and equipment, office machinery and computers, electrical machinery and apparatus, radio, television and communication equipment and apparatus, medical precision and opticle instruments, Watches and clocks, motor vehicles trailers and semi-traile	10,17
I	15	Electricity, gas, steam and hot water, collection pureflication and distribution of water.	43,67
J	19	Transports, water transport services, air transport services,post and telecommunications	17,36
K	21	Real estate services, renting services of machinery and equipment, computer and related services, Research and development services, other business services.	725,53
		Summation	2.000,80

Source: AOD Highway, 2004 (authors' elaboration)

However, economic activities associated with transportation funds do not end with construction and procurement. This analysis quantifies the multiplier that is generated when new employment is added in one sector (direct impact), but generates additional employment in other sectors that supply goods and services (indirect impact) and consumer services to employees (induced impact).

Following the steps in Fig. 1 the total cost of the investment is equal to ∈2.000,80 in 2000 prices (Table 1). This amount accounts for about 70% of the project's total cost. It is evident from Table 1 that the sectors of the Greek economy that supply directly materials and services for the project are eleven (11). Among them sectors 9, 10, 11 and 12 account for 54% of the materials, while sectors 15, 19 and 21 account for 39% of the services that are needed, including electricity.

From the application of the input – output analysis the results are presented for the year 2000, and then according to the project's schedule (Tables 2 and 3, Appendix). For the industry classification see Table 5 (Appendix). In the total economy (Table 2, appendix), the GTP that was created directly in the year 2000 was equal to ∈2001 10^6, while the direct and indirect (total) was equal to ∈2.408.10^6. In other words, the direct results are equal to the cost of investment. However, the total results are 20% higher than the direct. What is also important is the ratio of indirect results to the total. This ratio is an expression of the internal dynamics of the economy and its capability to expand the economy's production capacity (and income), related to this investment. Finally, the induced effects account for about 12% of direct effect representing the consumption of households.

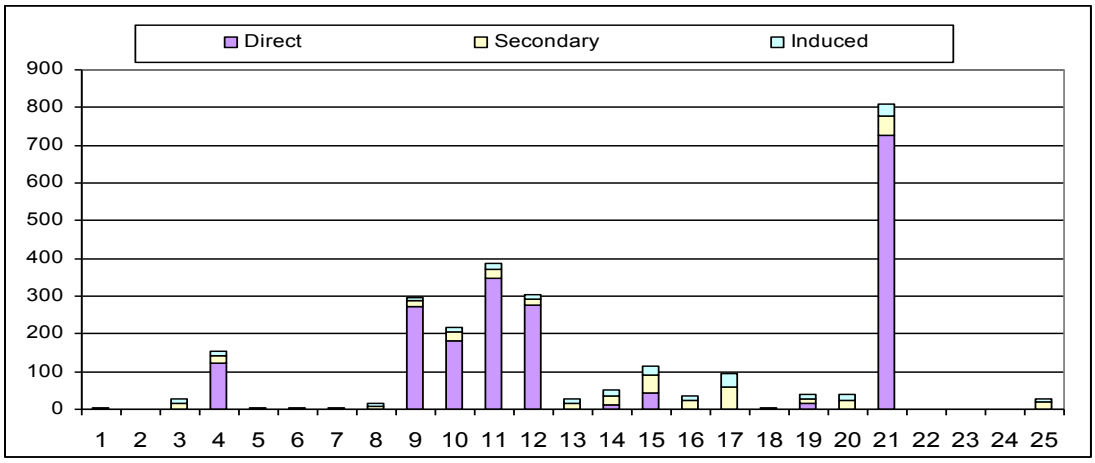

Figure 3. Total Output created from the construction of AOD (million ∈)

At the sectoral level, as was expected the sectors experiencing the highest direct results are the sectors included in Table 1 which satisfy the demand for investment. However, from Table 2 (Appendix) it is evident that the indirect effects of the investment are transmitted, to a certain extent, to all the sectors of the economy.

More precisely, sectors: construction works (16), whole sale and retail sale of motor vehicles, whole sale and retail sale except vehicles, retail trade (17) and financial intermediation services, insurance and pension funding services, Services auxiliary to financial intermediation (20), while not contributing directly to the realization of the investment, they create greater indirect results. These are the positive effects produced by the investment in the Greek economy. The allocation of these effects during the construction period under survey (1999-2004) shows that in 2001 and 2002, we have a realization of approximately 51% of effects (see Table 3).

Table 3: Distribution according to the schedule

	1999	2000	2001	2002	2003	2004
Output (million€)	270	449	598	627	419	45
Employment (persons)	3.133	5.215	6.942	7.277	4.860	517

Regarding employment, the direct employment is equal to about 20.200 persons, the total equal to about 27.947, while the indirect employment equal to about 7.747. We note that the sectoral linkages created in the Greek economy for the construction of the project contribute indirectly to the employment by about 27%. This results in the transmission of employment (Table 2, Appendix) to all the sectors of the Greek economy e.g. whole sale and retail sale of motor vehicles, whole sale and retail sale except for vehicles, retail trade (17), transports, water transport services,air transport services, post and telecommunications (19) and fabricated metal products except machinery and equipment (13) despite the fact that direct employment is practically negligible they experience significant positive results. This finding is very important for the Greek and Athens economies, given the relatively unemployment rates they are both still facing (around 8%). The allocation of employment is depicted in Table 4 (Appendix). Moreover, the induced effects account for about 23.5 % of direct output representing the consumption of households.

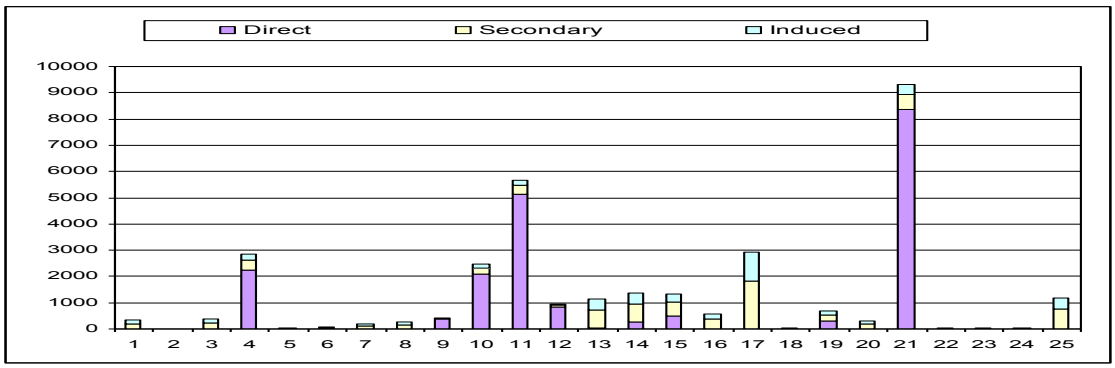

Figure 4. Total Employment created from the construction of AOD

The allocation of employment by occupation provides us with the critical professions that are needed for the realization of this particular investment. From Table 4 (Appendix) is evident that 30 occupations in the time period 1999-2000 were indispensable for the completion of the project. Among them 25% were scientific occupations of high technological level, while 75% were technical occupations of intermediate or low technological level (OECD, 1996).

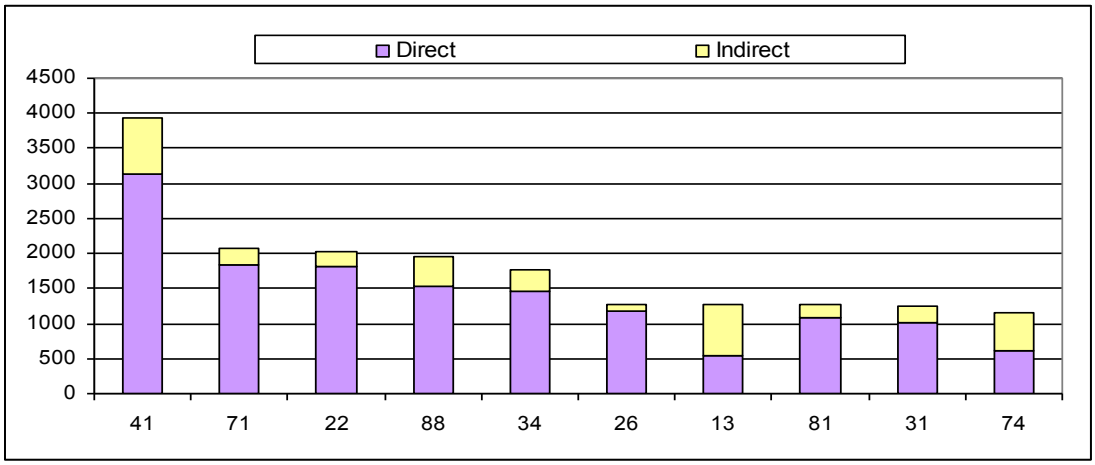

Figure 5. Employment by occupations created from the construction of AOD (first 10)

However, ten (10) occupations account for 64.3% of employment, of which office clerks (41), managers of small enterprises (13), machinery and related trades workers (74), drivers and mobile plant operators (88), and extraction trade workers (71) had the highest indirect effects. Meanwhile, there are seven (7) occupations whose indirect effects are higher that their direct (Table 4, Appendix). More precisely, managers of small enterprises (13), metal and related trades workers (73), building trade workers (72), salespersons and demonstrators (53), personal services workers (51), wood technicians (77) and agricultural workers - multiple growers (63). In other words, there are occupations in the Greek economy which are needed indirectly for the realization of the project. At this point, it should be noted that in Greece the last decades the phenomenon of immigration to the country has intensified and as a result the great majority of immigrants in Greece is with the construction and infrastructure industry.

6. Conclusion

This paper applied IO analysis to calculate the macroeconomic impacts of the Attiki Odos motorway investment in the Athens metropolitan area, a matter of great importance for the Athens and the Greek economy, respectively. Attiki Odos is a cutting edge motorway in Europe, meeting the highest design standards for high-speed toll motorways. The IO model was used to calculate relative changes in output for the entire economy, employment and occupations. We chose the widely used IO model because its implementation is straightforward, the derived results

directly interpretable and the data are, usually, easy to access. The investment vector was assembled from figures estimated *ex-post.* We showed that the construction of the Attiki Odos grid created significant direct, indirect and induced results in the Greek economy as a whole in the 1999-2004 time span. Based on our findings, we believe that Greece should give high priority to taking measures to increase infrastructure financing. Although numerous European and local economies have investigated relevant issues, the lack of comparability in methodology and time period hampers multi-country analyses. The measurement of changes in output, employment and occupations due to large infrastructure projects for other European countries is of great interest and is a fine example for future investigation.

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Appendix

Table 2: Total Effects of the Project

	Changes in output				Changes in employment			
Industry	Direct	Secondary	Total	Induced	Direct	Secondary	Total	Induced
1	0	3	3	3	0	180	180	166
2	0	0	0	0	0	0	0	0
3	0	16	16	10	0	244	244	148
4	123	21	144	11	2256	383	2639	207
5	0	2	2	1	0	19	19	15
6	0	2	2	2	0	40	40	30
7	0	3	3	2	1	115	116	91
8	0	9	9	5	0	168	168	106
9	272	15	287	9	383	22	405	13
10	183	22	205	13	2073	250	2323	152
11	349	23	373	13	5131	344	5475	190
12	275	17	292	11	849	51	900	33
13	1	16	17	10	46	693	739	416
14	10	25	35	15	281	686	967	420
15	44	45	88	25	511	522	1032	294
16	0	22	22	12	0	367	367	204
17	0	60	60	36	0	1814	1814	1107
18	0	2	2	1	0	33	33	20
19	17	12	30	9	306	219	525	165
20	0	22	22	16	0	176	176	129
21	726	51	776	32	8365	586	8951	366
22	0	1	1	1	0	19	19	15
23	0	1	1	1	0	31	31	18
24	0	1	1	1	0	27	27	18
25	0	18	18	10	0	759	759	412
Sum	**2.001**	**407**	**2.408**	**249**	**20.200**	**7.747**	**27.947**	**4.738**

Table 4: Occupations' impact

Code	Description	Direct	Indirect	Total	Induced
	Total	20200	7747	27947	4738
41	Office clerks	3129	811	3941	499
71	Extraction trade workers	1841	242	2083	134
22	Architects, engineers and related professionals	1825	192	2017	118
88	Drivers and mobile plant operators	1534	419	1953	260
34	Finance and sales associate professionals etc	1464	309	1773	192
26	Legal professionals	1183	92	1275	57
13	Managers of small enterprises	532	732	1263	445
81	Stationary plant and related operators	1094	169	1263	99
31	Physical and engineering science technicians	1022	230	1252	140
74	Machinery and related trades workers	620	523	1143	314
73	Metal and related trades workers	276	652	928	393
82	Mining and mineral-processing-plant operators	819	102	921	59
91	Sales and services elementary occupations	513	372	885	210
75	Craft printing and related trades workers	681	166	846	100
83	Rubber- and plastic-products machine operators	609	99	708	60
25	Accountants	590	102	692	63
12	Corporate managers	528	131	659	81
72	Bulding trade workers	197	458	655	279
53	Models, salespersons and demonstrators	40	604	644	369
93	Labourers in mining, construction, manufacturing and transport	474	151	626	90
21	Physical, mathematical and engineering science professionals	304	50	354	31
27	Archivists, librarians, social science, writers and creative or performing artists and related professionals	225	121	346	73
51	Personal services workers	49	237	286	132
42	Customer services clerks	95	154	249	97
52	Protective services workers	203	36	240	22
87	Assemblers	125	71	196	44
77	Wood treaters, cabinet-makers and related trades workers	50	127	176	78
23	Life science and health professionals	115	46	161	28
63	Agricultural workers - multiple growers	0	102	102	94
78	Textile, garment and related trades workers	13	60	72	40
32	Life science and health associate technicians	28	15	43	9
85	Textile-, fur- and leather-products machine operators	7	33	40	19
61	Market gardeners and crop growers	1	36	37	30
84	Wood-products machine operators	8	20	28	13
64	Animal producers and related workers	0	26	26	24
62	Field crop and vegetable growers	0	18	18	16
24	Teaching professionals	0	15	15	9
92	Agricultural, fishery and related labourers	5	6	11	4
76	Food processing and related trades workers	0	7	7	6

33	Teaching associate professionals	0	5	5	3
100	Other services	0	2	2	2
86	Food and related products machine operators	0	2	2	2
65	Forestry and related workers	0	1	1	1
66	Fishery workers and related workers,	0	0	0	0
11	Legislators and senior officials	0	0	0	0
67	Hunters and trappers and related workers,	0	0	0	0

Table 5: Industry Classification

1	Agriculture, Hunting and related service activities, Products of Forestry: logging related services.
2	Fish and other Fishing products
3	Mining of coal and lignite; Extraction of peat, extraction of crude oil and natural gas, mining of nuclear materials
4	Mining of metal ores, other mining and quarrying products
5	Manufacture of food products and beverages, tobacco products
6	Manufacture of textiles, manufacture of clothes process and Dyeing of fur, manufacture of tanning and dressing of leather
7	Wood and wood products
8	Pulp, paper and paper products publishing printing and reproduction of recorded media
9	Manufacture of coke: refined petroleum products and nuclear fuel
10	Manufacture of chemicals and chemical products, manufacture of rubber and plastic products
11	Manufacture of other non-metallic mineral products
12	Basic metals and fabricated metal products
13	Fabricated metal products except machinery and Equipment.
14	Machinery and equipment, office machinery and computers, electrical machinery and apparatus, radio, television and communication equipment and apparatus, medical precision and opticle instruments, Watches and clocks, motor vehicles trailers and semi-traile
15	Electricity, gas, steam and hot water, collection purification and distribution of water.
16	Construction Works
17	Whole sale and retail sale of motor vehicles, whole sale and retail sale except vehicles, retail trade
18	Hotel and Restaurant Services
19	Transports, water transport services,air transport services,post and telecommunications
20	Financial intermediation services, insurance and pension funding services, Services auxiliary to financial intermediation
21	Real estate services, renting services of machinery and equipment, computer and related services, Research and development services, other business services.
22	Public administration and defence services, Sewage and refuse disposal services sanitation
23	Membership organization services n.e.c
24	Membership organization services n.e.c
25	Recreational, cultural and sporting services, other services n.e.c, domestic services