European Research Studies
Volume XVII, Issue (1), 2014 *pp. 101-118*

Estimation of Interregional Trade Coefficients and Multipliers in the Context of An Interregional Model

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Abstract:

The main purpose of this study is to construct a complete three region interregional input-output model which can be applied as a tool for regional analysis. In addition the model is applying to calculate the interregional trade coefficients and multipliers on the basis of 2010 data for 3 regions and 10 sectors of the Greek economy. The methodology used in this study is based on an interregional analysis of input-output. Besides, the interregional input-output matrix provides a complete description of the relations between industries and regions. In the procedure of estimating the interregional flows and trade coefficients the method of Chenery-Moses model was used. The results obtained show that the multipliers derived in the interregional matrices appear generally realistic. It is important to note that the empirical findings are first presented as well as the constructed interregional model for Greece. So, the construction of an applicable and reliable model was needed to bridge the existing statistical gap. With respect to the research limitations, the input-output analysis presupposes a rigid production technology away of adaptability to a changing environment. This limitation is well known and unavoidable in an input-output model. Concluding, the important characteristic of interregional analysis is to establish a base upon which future projections can be made about the role in driving one region's economic growth. Therefore, the interregional input-output model reported by this study provides an indication to the policy makers how and which productive sectors have contributed to the growth of the regions.

Key Words: *Interregional Trade Coefficients, Interregional Multipliers, Input-Output Analysis*

JEL Classification :

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1. Introduction

In recent years there has been an increased interest in input-output analysis and its multiple applications to regional and interregional analysis. The purpose of this study is to provide a cursory description of the results of estimating trade coefficients and interregional multipliers by means of a statistical implementation of the Chenery – Moses model for Greece. In order to carry out the study in this field, the estimation of interregional trade coefficients by commodities is the fundamental work and is an important part for the compilation of interregional input-output table (Thalassinos 2007). But as most countries in the world, even developed countries, Greece does not have enough statistical data to build such matrix.

The author has constructed by own forces an interregional model for the year 2010 of the Greek economy, which fill the gap of official regional statistics.
The evaluation of the impacts of an exogenous change on a regional system would require a model that incorporates the industrial interrelations of a region with another region. The impacts were simulated considering three producing regions for the Greek economy, North Greece, Center Greece and Aegean Islands and Crete. The constructed interregional input-output matrix was used considering a set of three regions and ten aggregated sectors.

From this matrix interregional-interdependence matrix was computing to show the direct and indirect relationships between producing sectors and regions. Finally, interregional multipliers were computed for each sector and region measured the impact on regions and on the economy as a whole. The above procedure revealed the major producing sector in the nations. In this regard the attempt of the present study to introduce regional input-output tables and regional technical coefficients would be beneficial to interregional model. The rest of the paper is organized as follows: In the second section a short overview of the literature review was provided. In section three we will describe the research methodology of interregional model. Section four is devoted to an empirical illustration. We apply the estimation procedures and data sources in the empirical implementation of the model. A concluding section finalized the paper.

2. Literature Review

Isard (1951) was the first writer who developed the interregional input-output model with an analytical interregional trade coefficient matrix. This model requires an extent size of basic data. As a result one of the most powerful model was put forward by Chenery (1953) and then Moses (1955) independently and it is called Chenery-Moses model. The relative advantage of this model due to the fact that the technical input structure of production in each region and interregional trade

structure of various products are separately stated. Therefore, the primary data needed to implement such a model, are usually less than the Isard model.
Wassily Leontief in collaboration with Alan Strout evaluated a gravity trade model for different commodity shipments.
New interregional input-output models have been constructed, Kilkenny and Rose (1995) and Hewings (1995).

3. The Model

The Greek economy is divided into three regions: North, Middle and Aegean Islands and Crete. The model contains ten intermediate sectors after aggregation. The solution of the model can be obtained by using two sets of structural constants.
The first set describes the structure of production or input requirements in each region.

$$\begin{bmatrix} A_{ij} & & \\ & A_{ij} & \\ & & A_{ij} \end{bmatrix}$$

A second category of structural constants is a set of trade coefficients. The trade coefficients may also be presented as a diagonal block matrix.
From the above two sets of structural constants a new matrix is obtained named regional input-output coefficient matrix and is given by the matrix **A**.

$$A = \begin{bmatrix} A^{I\,I} & A^{I\,II} & A^{I\,III} \\ A^{II\,I} & A^{II\,II} & A^{II\,III} \\ A^{III\,I} & A^{III\,II} & A^{III\,III} \end{bmatrix}$$

In the case of Greece with three regions **I, II, III** the terms $\mathbf{A^{I\,I}}$, $\mathbf{A^{II\,II}}$, $\mathbf{A^{III\,III}}$ indicate the regional input coefficients for regions **I, II, III** respectively.
The terms $\mathbf{A^{I\,II}}$, $\mathbf{A^{I\,III}}$, $\mathbf{A^{II\,I}}$, $\mathbf{A^{II\,III}}$, $\mathbf{A^{III\,I}}$, $\mathbf{A^{III\,II}}$ respectively show the interregional trade coefficients for the three regions. The regional input-output coefficients matrix is based directly on the structure of trade in each industry and the technical structure of industry in each region. This matrix has, therefore, both technical and trade characteristics.
From the above matrix **A** , we obtain the Leontief inverse matrix, B:
$\mathbf{B = (I - A)^{-1}}$
whose structure is similar to that described for matrix **A** ,

$$B = \begin{bmatrix} B^{I\,I} & B^{I\,II} & B^{I\,III} \\ B^{II\,I} & B^{II\,II} & B^{II\,III} \\ B^{III\,I} & B^{III\,II} & B^{III\,III} \end{bmatrix}$$

The inverse matrix provides us with direct and indirect requirements for intraregional and interregional production. Multipliers depicting the amount of each industry's activity can be obtained by means of the above interindustry-interregional matrix B.

4. Results

All the calculations of this paper are based on Greek interregional model for 2010 constructed by the author using non survey approach. The interregional model is a 3-region 10-sector model and consists an effective tool to quantitatively study since interregional tables have not been provided in an official way. Having obtained the interindustry and the interregional flows for the interregional system of three regions technical and trade coefficients can be obtained. These can be used to derive impact multipliers in the manner developed by Moses and Chenery.

Firstly, the construction of the interregional model was accomplished by estimating the technical coefficients for all industries in each region. These coefficients were defined as indicating the amount of each good required by each industry in each region to produce a unit of output. On the other hand the trade coefficients are presented below in Table 1 and in **Table A-1** (Appendix) and represent the amount of each commodity required from each region per unit of demand for that commodity in the indicative region.

A matrix having both technical and trade elements matrix **A** , can be derived and is the matrix of direct interindustry requirements, Table A-2 (Appendix). This matrix combines the structure of production and the structure of regional trade. From the matrix **A** we obtain the Leontief inverse matrix of the interindustry interregional matrix or total requirements matrix of the form $\mathbf{(I-A)^{-1}}$ **Table A-3** (Appendix) whose structure is similar to that described for matrix A.
A set of interindustry-interregional multipliers can be derived for each of the three regional system, **Table 2**, indicating the direct and the indirect interindustry effect that a unit of each sector's production in each region, generates on the level of the economic activity.

By summing each column of the interindustry-interregional multipliers for each of the three regions we have an insight about the regional production generated per unit of each industry's output on the production of the country as a whole.

Ranking sectors on the basis of their interindustry-interregional multipliers the indication is that some sectors which occasion the greatest amount of activity are common to the three regions.

At the other extreme, the sectors which indicate the smallest multipliers are also common, for example Agriculture, forestry and fishing and Constructions only for the regions **II** and **III**. This indicates that per unit the total national effect of a sector is invariant to production location.

According to the results of **Table 3, 4** and **5**, **Figure 1, 2, 3** and **4** reflect the rank order of sectors in each region and in all regions. By the way of illustration the differences are indicated.

TABLE 1 Interregional Trade Coefficients Greece 2010

CODE	SECTORS	REGIONS	I	II	III
1	Agriculture, forestry and fishing	I	0.3445	0.0461	0.3299
		II	0.5103	0.3786	0.4002
		III	0.1452	0.1597	0.2699
2	Mining, quarrying, manufacturing Electricity, gas, water supply	I	0.4580	0.7438	0.2181
		II	0.4969	0.1291	0.4069
		III	0.0451	0.1271	0.3750
3	Constructions	I	0.0807	0.6642	0.0753
		II	0.8822	0.0134	0.8486
		III	0.0371	0.3224	0.0779
4	Wholesale and Retail trade Repair of motor vehicles	I	0.3957	0.4015	0.1815
		II	0.5976	0.5847	0.5552
		III	0.0067	0.0138	0.2633
5	Information and communication	I	0.2670	0.2581	0.0975
		II	0.6977	0.6561	0.6525
		III	0.0353	0.0858	0.2500
6	Financial and insurance activities	I	0.1981	0.7103	0.1689
		II	0.0563	0.1102	0.5668
		III	0.7456	0.1795	0.2643
7	Real estate activities	I	0.1924	0.4209	0.1665
		II	0.7346	0.4196	0.6608
		III	0.0730	0.1595	0.1727
8	Professional, scientific and technical activities	I	0.0120	0.7190	0.3401
		II	0.8311	0.0204	0.6512
		III	0.1569	0.2606	0.0087

9	Public administration, defense, education and social security	**I** **II** **III**	0.0046 0.8718 0.1236	0.6967 0.0552 0.2481	0.2785 0.6997 0.0218
10	Arts, entertainment, recreation Other service activities	**I** **II** **III**	0.1529 0.7635 0.0836	0.4286 0.3702 0.2012	0.1624 0.6980 0.1396

TABLE 2 Inter-industry – Interregional Multipliers Region I, II, III of Greece, Year 2010

CODE	SECTORS	REGIONS	**I**	**II**	**III**
1	Agriculture, forestry and fishing	**I**	1.1670	0.1564	0.0882
		II	0.1861	1.1158	0.1584
		III	0.0514	0.0402	1.0888
			1.4045	**0.3125**	**0.3354**
2	Mining, quarrying, manufacturing Electricity, gas, water supply	**I**	1.5884	0.9538	0.3169
		II	0.6055	1.6985	0.5661
		III	0.1515	0.2571	1.3158
			2.3453	**2.9094**	**2.1988**
3	Constructions	**I**	1.8023	0.0836	0.2429
		II	1.1316	1.0577	0.4571
		III	0.2453	0.0235	1.2017
			3.1793	**1.1648**	**1.9017**
4	Wholesale and Retail trade Repair of motor vehicles	**I**	1.3402	0.3360	0.3769
		II	0.4348	1.2919	0.7988
		III	0.0975	0.0859	1.3415
			1.8724	**1.7138**	**2.5172**
5	Information and communication	**I**	1.5564	0.5519	0.6859
		II	0.7660	1.5592	1.3466
		III	0.1798	0.1620	1.5466
			2.5022	**2.2730**	**3.5791**
6	Financial and insurance activities	**I**	1.1605	0.2859	0.3687
		II	0.2219	1.2666	0.5519
		III	0.1388	0.0976	1.2074
			1.5212	**1.6501**	**2.1280**
7	Real estate activities	**I**	1.6642	0.8910	0.5382
		II	1.0338	1.8020	1.0722
		III	0.1848	0.2922	1.3895

			2.8829	**2.9852**	**2.9999**
8	Professional, scientific and technical activities	**I**	1.3618	0.8037	0.2401
		II	0.4563	1.7131	0.4752
		III	0.0970	0.2051	1.2090
			1.9151	**2.7220**	**2.9243**
9	Public administration, defense, education and social security	**I**	1.4104	0.2783	0.1599
		II	0.5215	1.2027	0.2839
		III	0.1127	0.0673	1.1532
			2.0445	**1.5483**	**1.5970**
10	Arts, entertainment, recreation Other service activities	**I**	1.2628	0.2273	0.0958
		II	0.3840	1.1925	0.2293
		III	0.1063	0.0686	1.0846
			1.7531	**1.4878**	**1.4097**

FIGURE 1
Rank order of interindustry-interregional multipliers Region I – Greece 2010

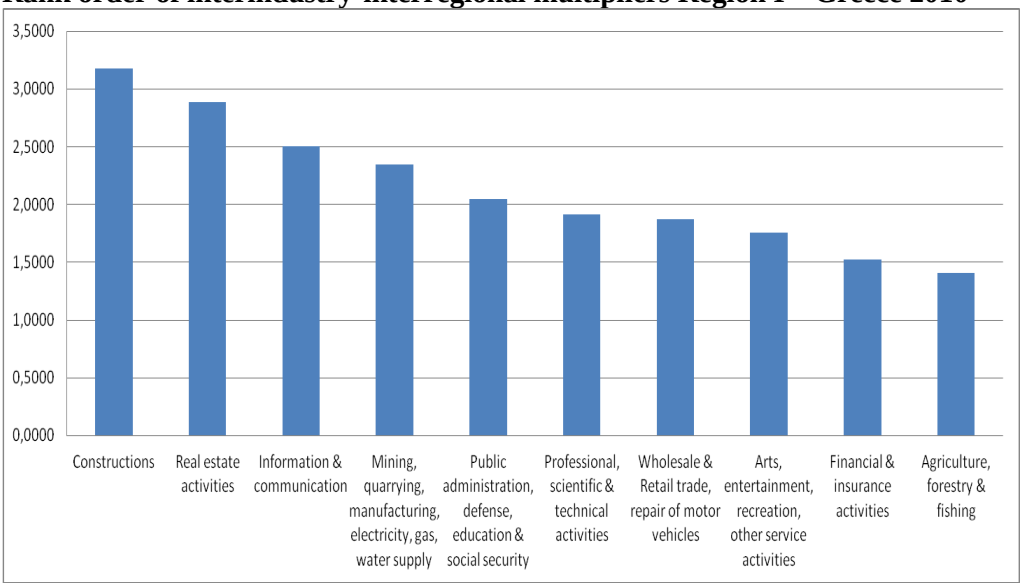


FIGURE 2 Rank order of interindustry-interregional multipliers Region II – Greece 2010

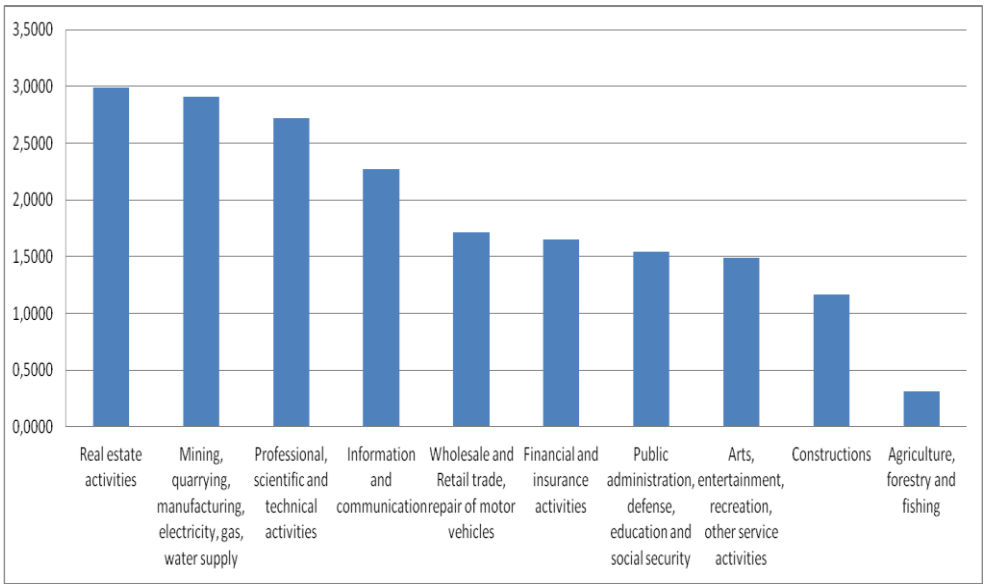


FIGURE 3 Rank order of interindustry-interregional multipliers Region III – Greece 2010

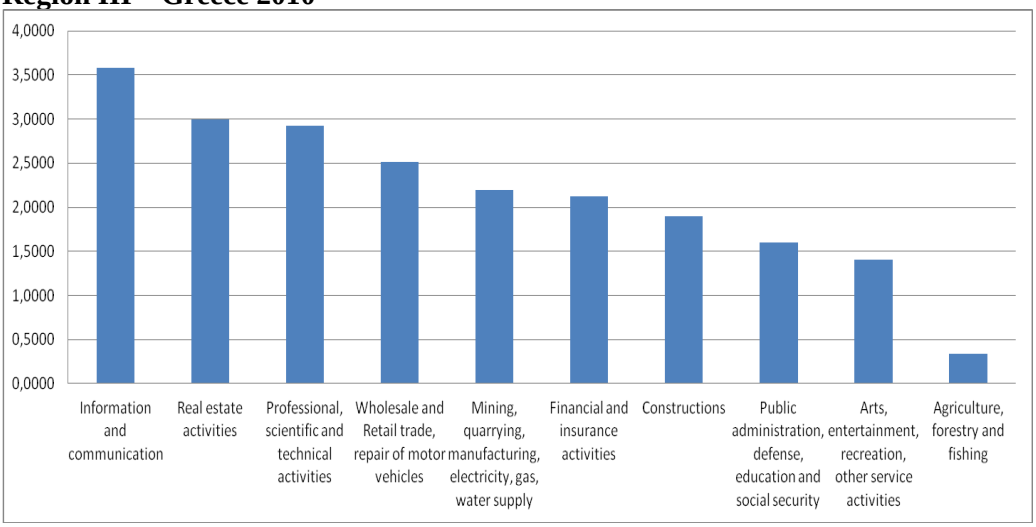
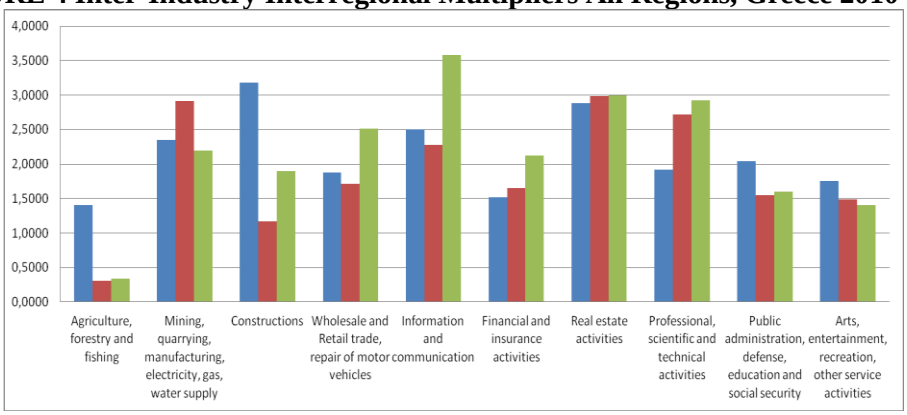


FIGURE 4 Inter-Industry Interregional Multipliers All Regions, Greece 2010



5. Conclusion

The main objective of this paper was to study the interregional trade estimation methodology and make an empirical evaluation of interregional multiplier effects. The work of compilation of regional and interregional tables for the Greek economy has not been provided in an official way. So, since the development of an interregional model for the year 2010 is not provided by Greek National Statistical Service, the author has constructed by own forces regional and interregional tables.

The basic practical contribution of this paper consists of the conclusions that can be drawn from the analytical derivation of trade coefficients estimation and comparison of multiplier effects among different regions. The multipliers presented in this study are the first interindustry interregional multipliers for the regions in the Greek economy for the year 2010.

The multipliers could be used to show what producing sector and in what proportion could give the maximum economic growth within the region. Interregional multipliers values are related to the size and diversity in the regional economy. The tendency is the multiplier effects of production would be greater in the larger and more autonomous regions.

A subsequent analysis could be useful for economic planners to have an insight of how multipliers are determining the effects of economic growth. The analytical framework and the results in this paper offer an important tool to the planning and development process of regions. The policy implications of the results for regions in Greece must be further investigated, given the concern and importance of the regional policy.

References

Bradle, I. and Sandler, J.P. (1969), "Input-Output Multipliers: Some Theoretical Comments", Journal of Regional Science, Vol. 9, No 2.

D.C. Uno, K. (1989) , "Measurement Services in an Input-Output Framework", North Holland.

Dierzenbacher Eric (2005), "More on Multipliers", Journal of Regional Science, 45, 421-426.

Grammanski Stantislaw and Emil Malizia (1969), "Applicability and Limitations in the use of National Input-Output Tables for Regional Studies", Papers and Proceedings of the Regional Science Association, pp. 65-67.

Hewings G. and R.C. Jensen (1986), "Regional, Inter-regional and Multiregional Analysis", Handbook of Regional and Urban Economics, Vol. 1, P. Nijkamp edition, Amsterdam, Free University, pp. 295-335.

Isard W. (1998), "Gravity and Spatial Interaction Model", Methods of Inter-regional and Regional Analysis, W. Isard et al. editions, Bookfield, VT, Ashgate, Publishing, pp. 243-280.

Kurz, Heinz D. and Nere Salvadori (2000), "Classical roots of Input-Output Analysis: a short Account of his Long Prehistory", Economic System Research, 12, pp. 153 – 179.

Leontief, W. and A. Strout (1966), "Multiregional input-output analysis", Input-Output Economics, Oxford University Press, New York, pp. 223-257.

Meng, B. and A. Ando (2005), "An economic derivation of trade coefficients under the framework of multi-regional IO analysis", IDE Discussion Paper, 29.

Miller R.E. and Blair P.D. (2009), "Input-Output Analysis Foundations and Extensions", Cambridge University Press, Second Edition.

Moses L. (1955), "The stability of Interregional Trading patterns and Input-Output Analysis", American Economic Review, vol. XLV.

Patrick Canning and Zhi Wang (2004), "A flexible modeling framework to estimate interregional trade ad input-output accounts", World Bank Policy Research Working Paper 3359.

Polenske K.R. (1970), "Empirical implementation of a multiregional input-output gravity model", Contributions to Input-Output Analysis, Carter and A. Brody editions, North-Holland, Amsterdam.

Polenske K.R. (1980), "The U.S. Multiregional input-output accounts and model". Lexington, Mass: Lexington Books.

Raa, T.T. (2005), "The Economics of Input-Output analysis", Cambridge University Press.

Robinson D. and Z. Liu (2006), "The Effects of Interregional Trade Estimation Procedures on Multiregional Social Accounting Matrix Multipliers", The Journal of Regional Science, 83, pp. 339-362.

Round, Jeffery I. (2001), "Feedback Effects in Interregional Input-Output Models: What Have We Learned?" in Michael L.Lahr and Erik Dietzenbacher, Input-Output Analysis Frontiers and Extensions. London: Macmillan.

Sargento A. (2009), "Regional Input-Output Tables and Models: Inter-regional Trade Estimation and Input-Output Modeling based on Total Use Rectangular Tables

Sawyer, Charles and Ronald Miller (1983), "Experiments of Regionalization of a National Input-Output Table", Environment and Planning A. 15, pp. 1501-1520.

Thalassinos, I.E. (2007), "Trade Regionalization, Exchange Rate Policies and EU-US Economic Cooperation", European Research Studies Journal Vol. X(1-2), 111-118.

United Nations (1999), "System of National Accounts", Washington.

U.S. Department of Commerce (1997), "Regional Multipliers: A user handbook for regional input-output system", Bureau of Economic Analysis, third Edition. Washington, D.C.: U.S. Government Printing Office.

West G.R., Morrison J.B. and Jensen R.C. (1982), "An Interregional Input-Output Table for Queensland 1978/1979", GRIT III Report to the Department of Commercial and Industrial Development, Department of Economics, University of Queensland.

West G. (1990), "Regional Trade Estimation: A Hybrid Approach", International Regional Science Review 13.

APPENDIX

Table A-1 Trade Coefficients (Greek Economy 2010)

AGRICULTURE, FORESTRY AND FISHING			
	I	II	III
I	$t_1^{11} = 0.3445$	$t_1^{12} = 0.4617$	$t_1^{13} = 0.3299$
II	$t_1^{21} = 0.5103$	$t_1^{22} = 0.3786$	$t_1^{23} = 0.4002$
III	$t_1^{31} = 0.1452$	$t_1^{32} = 0.1597$	$t_1^{33} = 0.2699$

MINING AND QUARING MANUFACTURING ELECTRICITY, GAS, WATER SUPPLY			
	I	II	III
I	$t_2^{11} = 0.4580$	$t_2^{12} = 0.7438$	$t_2^{13} = 0.2181$
II	$t_2^{21} = 0.4969$	$t_2^{22} = 0.1291$	$t_2^{23} = 0.4069$
III	$t_2^{31} = 0.0451$	$t_2^{32} = 0.1271$	$t_2^{33} = 0.3750$

CONSTRUCTIONS			
	I	II	III
I	$t_3^{11} = 0.0807$	$t_3^{12} = 0.6642$	$t_3^{13} = 0.0735$
II	$t_3^{21} = 0.8822$	$t_3^{22} = 0.0134$	$t_3^{23} = 0.8486$
III	$t_3^{31} = 0.0371$	$t_3^{32} = 0.3224$	$t_3^{33} = 0.0779$

WHOLESALE AND RETAIL TRADE, REPAIR OF MOTOR VEHICLES			
	I	II	III
I	$t_4^{11} = 0.3957$	$t_4^{12} = 0.4015$	$t_4^{13} = 0.1815$
II	$t_4^{21} = 0.5976$	$t_4^{22} = 0.5847$	$t_4^{23} = 0.5552$
III	$t_4^{31} = 0.0067$	$t_4^{32} = 0.0138$	$t_4^{33} = 0.2633$

INFORMATION AND COMMUNICATION			
	I	II	III
I	$t_5^{11} = 0.2670$	$t_5^{12} = 0.2581$	$t_5^{13} = 0.0975$
II	$t_5^{21} = 0.6977$	$t_5^{22} = 0.6561$	$t_5^{23} = 0.6525$
III	$t_5^{31} = 0.0353$	$t_5^{32} = 0.0858$	$t_5^{33} = 0.2500$

FINANCIAL AND INSURANCE ACTIVITIES			
	I	II	III
I	$t_6^{11} = 0.1981$	$t_6^{12} = 0.7103$	$t_6^{13} = 0.1689$
II	$t_6^{21} = 0.0563$	$t_6^{22} = 0.1102$	$t_6^{23} = 0.5668$
III	$t_6^{31} = 0.7456$	$t_6^{32} = 0.1795$	$t_6^{33} = 0.2643$

REAL ESTATE ACTIVITIES			
	I	II	III
I	$t_7^{11} = 0.1924$	$t_7^{12} = 0.4209$	$t_7^{13} = 0.1665$
II	$t_7^{21} = 0.7346$	$t_7^{22} = 0.4196$	$t_7^{23} = 0.6608$
III	$t_7^{31} = 0.0730$	$t_7^{32} = 0.1595$	$t_7^{33} = 0.1727$

PROFESSIONAL SCIENTIFIC AND TECHNICAL ACTIVITIES			
	I	II	III
I	$t_8^{11} = 0.0120$	$t_8^{12} = 0.7190$	$t_8^{13} = 0.3401$
II	$t_8^{21} = 0.8311$	$t_8^{22} = 0.0204$	$t_8^{23} = 0.6512$
III	$t_8^{31} = 0.1569$	$t_8^{32} = 0.2606$	$t_8^{33} = 0.0087$

PUBLIC ADMINISTRATION AND DEFENCE			
	I	II	III
I	$t_9^{11} = 0.0046$	$t_9^{12} = 0.6967$	$t_9^{13} = 0.2785$
II	$t_9^{21} = 0.8718$	$t_9^{22} = 0.0552$	$t_9^{23} = 0.6997$
III	$t_9^{31} = 0.1236$	$t_9^{32} = 0.2481$	$t_9^{33} = 0.0218$

ARTS, ENTERTAINMENT, RECREATION, OTHER SERVICE ACTIVITIES ACTIVITIES OF HOUSEHOLDS AS EMPLOYERS			
	I	II	III
I	$t_{10}^{11} = 0.1529$	$t_{10}^{12} = 0.4286$	$t_{10}^{13} = 0.1624$
II	$t_{10}^{21} = 0.7635$	$t_{10}^{22} = 0.3702$	$t_{10}^{23} = 0.6980$
III	$t_{10}^{31} = 0.0836$	$t_{10}^{32} = 0.2012$	$t_{10}^{33} = 0.1396$

Table A-2

MATRIX OF INTERREGIONAL INTERINDUSTRY INPUT COEFFICIENT, Greece 2010

	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
1	0,0249	0,0190	0,0000	0,0018	0,0000	0,0000	0,0006	0,0000	0,0001	0,0002	0,0273	0,2373	0,0000	0,0024	0,0000	0,0000	0,0009	0,0000	0,0001	0,0021
2	0,0337	0,1815	0,0872	0,0383	0,0567	0,0086	0,0588	0,0523	0,0677	0,0234	0,0448	0,2744	0,0259	0,0627	0,0865	0,0202	0,0962	0,1833	0,0904	0,0255
3	0,0000	0,0000	0,0029	0,0004	0,0006	0,0014	0,0115	0,0002	0,0004	0,0026	0,0003	0,0001	0,0044	0,0035	0,0046	0,0165	0,0954	0,0033	0,0028	0,0142
4	0,0163	0,0106	0,0220	0,0676	0,0449	0,0080	0,0495	0,0498	0,0341	0,0422	0,0136	0,0503	0,0041	0,0558	0,0429	0,0116	0,0507	0,1090	0,0285	0,0289
5	0,0002	0,0021	0,0015	0,0046	0,0580	0,0126	0,0562	0,0143	0,0390	0,0045	0,0002	0,0000	0,0003	0,0058	0,0529	0,0174	0,0548	0,0299	0,0027	0,0029
6	0,0027	0,0042	0,0019	0,0053	0,0102	0,0241	0,0020	0,0035	0,0046	0,0102	0,0080	0,0142	0,0012	0,0193	0,0346	0,0122	0,0717	0,0271	0,0136	0,0246
7	0,0005	0,0078	0,0969	0,0147	0,0199	0,0015	0,0367	0,0140	0,0052	0,0097	0,0009	0,0159	0,0096	0,0324	0,0408	0,0524	0,0810	0,0664	0,0093	0,0143
8	0,0000	0,0000	0,0000	0,0001	0,0001	0,0000	0,0001	0,0000	0,0001	0,0000	0,0005	0,0001	0,0001	0,0028	0,0032	0,0001	0,0052	0,0055	0,0037	0,0004
9	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0002	0,0000	0,0003	0,0015	0,0037	0,0018	0,0017	0,0040	0,0024
10	0,0001	0,0004	0,0006	0,0003	0,0028	0,0036	0,0024	0,0000	0,0006	0,0090	0,0002	0,0009	0,0002	0,0009	0,0074	0,0145	0,0066	0,0001	0,0012	0,0171
1	0,0369	0,0282	0,0000	0,0026	0,0000	0,0000	0,0009	0,0000	0,0002	0,0004	0,0224	0,1946	0,0000	0,0019	0,0000	0,0000	0,0007	0,0000	0,0001	0,0017
2	0,0366	0,1969	0,0946	0,0415	0,0615	0,0093	0,0638	0,0567	0,0734	0,0254	0,0078	0,0476	0,0045	0,0109	0,0150	0,0035	0,0167	0,0318	0,0157	0,0044
3	0,0004	0,0002	0,0318	0,0045	0,0065	0,0154	0,1255	0,0019	0,0045	0,0281	0,0000	0,0000	0,0001	0,0001	0,0001	0,0003	0,0019	0,0001	0,0001	0,0003
4	0,0247	0,0161	0,0332	0,1021	0,0678	0,0121	0,0748	0,0752	0,0516	0,0637	0,0198	0,0733	0,0060	0,0813	0,0624	0,0170	0,0739	0,1587	0,0415	0,0421
5	0,0006	0,0054	0,0038	0,0120	0,1517	0,0329	0,1469	0,0375	0,1020	0,0119	0,0005	0,0001	0,0007	0,0148	0,1344	0,0442	0,1393	0,0760	0,0068	0,0075
6	0,0008	0,0012	0,0005	0,0015	0,0029	0,0068	0,0006	0,0010	0,0013	0,0029	0,0012	0,0022	0,0002	0,0030	0,0054	0,0019	0,0111	0,0042	0,0021	0,0038
7	0,0020	0,0298	0,3701	0,0560	0,0758	0,0056	0,1400	0,0536	0,0198	0,0370	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
8	0,0007	0,0002	0,0002	0,0036	0,0037	0,0000	0,0060	0,0029	0,0053	0,0008	0,0000	0,0000	0,0000	0,0001	0,0001	0,0000	0,0001	0,0002	0,0001	0,0000
9	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0001	0,0003	0,0001	0,0001	0,0003	0,0002
10	0,0004	0,0018	0,0028	0,0017	0,0140	0,0182	0,0118	0,0002	0,0027	0,0450	0,0001	0,0008	0,0002	0,0008	0,0064	0,0125	0,0057	0,0001	0,0011	0,0148
1	0,0105	0,0080	0,0000	0,0007	0,0000	0,0000	0,0003	0,0000	0,0000	0,0001	0,0095	0,0821	0,0000	0,0008	0,0000	0,0000	0,0003	0,0000	0,0000	0,0007
2	0,0033	0,0179	0,0086	0,0038	0,0056	0,0008	0,0058	0,0052	0,0067	0,0023	0,0077	0,0469	0,0044	0,0107	0,0148	0,0034	0,0164	0,0313	0,0155	0,0044
3	0,0000	0,0000	0,0013	0,0002	0,0003	0,0006	0,0053	0,0001	0,0002	0,0012	0,0001	0,0001	0,0021	0,0017	0,0022	0,0080	0,0463	0,0016	0,0014	0,0069
4	0,0003	0,0002	0,0004	0,0011	0,0008	0,0001	0,0008	0,0008	0,0006	0,0007	0,0005	0,0017	0,0001	0,0019	0,0015	0,0004	0,0017	0,0037	0,0010	0,0010
5	0,0000	0,0003	0,0002	0,0006	0,0077	0,0017	0,0074	0,0019	0,0052	0,0006	0,0001	0,0000	0,0001	0,0019	0,0176	0,0058	0,0182	0,0099	0,0009	0,0010
6	0,0101	0,0160	0,0071	0,0201	0,0385	0,0906	0,0074	0,0130	0,0173	0,0383	0,0020	0,0036	0,0003	0,0049	0,0087	0,0031	0,0181	0,0068	0,0034	0,0062
7	0,0002	0,0030	0,0368	0,0056	0,0075	0,0006	0,0139	0,0053	0,0020	0,0037	0,0004	0,0060	0,0037	0,0123	0,0155	0,0199	0,0307	0,0252	0,0035	0,0054
8	0,0001	0,0000	0,0000	0,0007	0,0007	0,0000	0,0011	0,0005	0,0010	0,0002	0,0002	0,0001	0,0000	0,0010	0,0012	0,0000	0,0019	0,0020	0,0014	0,0002
9	0,0000	0,0000	0,0000	0,0000	0,0003	0,0004	0,0003	0,0001	0,0001	0,0006	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
10	0,0000	0,0002	0,0003	0,0002	0,0015	0,0020	0,0013	0,0000	0,0003	0,0049	0,0001	0,0004	0,0001	0,0004	0,0035	0,0068	0,0031	0,0001	0,0006	0,0080

1	2	3	4	5	6	7	8	9	10
0,0101	0,0074	0,0000	0,0016	0,0000	0,0000	0,0003	0,0000	0,0000	0,0001
0,0032	0,0164	0,0084	0,0083	0,0101	0,0012	0,0058	0,0057	0,0078	0,0016
0,0000	0,0000	0,0013	0,0004	0,0005	0,0009	0,0053	0,0001	0,0002	0,0008
0,0003	0,0008	0,0004	0,0020	0,0014	0,0002	0,0008	0,0009	0,0005	0,0005
0,0000	0,0002	0,0002	0,0017	0,0137	0,0023	0,0075	0,0021	0,0004	0,0004
0,0097	0,0147	0,0069	0,0040	0,0687	0,1285	0,0745	0,0147	0,0149	0,0022
0,0002	0,0027	0,0090	0,0122	0,0134	0,0089	0,0140	0,0059	0,0002	0,0025
0,0001	0,0000	0,0000	0,0013	0,0010	0,0000	0,0011	0,0006	0,0008	0,0001
0,0000	0,0000	0,0000	0,0002	0,0008	0,0007	0,0033	0,0001	0,0007	0,0005
0,0000	0,0002	0,0002	0,0003	0,0028	0,0028	0,0012	0,0000	0,0003	0,0034
0,0278	0,0203	0,0000	0,0044	0,0000	0,0000	0,0009	0,0000	0,0001	0,0003
0,0288	0,1480	0,0760	0,0748	0,0910	0,0108	0,0523	0,0515	0,0708	0,0141
0,0004	0,0002	0,0301	0,0092	0,0111	0,0211	0,1208	0,0020	0,0036	0,0188
0,0220	0,0687	0,0303	0,1679	0,1132	0,0158	0,0695	0,0776	0,0413	0,0406
0,0005	0,0046	0,0035	0,0320	0,2532	0,0429	0,1378	0,0390	0,0071	0,0077
0,0074	0,0112	0,0053	0,0031	0,0522	0,0977	0,0566	0,0112	0,0113	0,0016
0,0016	0,0246	0,0812	0,1108	0,1217	0,0809	0,1267	0,0537	0,0015	0,0229
0,0005	0,0001	0,0002	0,0053	0,0043	0,0000	0,0045	0,0023	0,0035	0,0005
0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
0,0002	0,0015	0,0018	0,0029	0,0230	0,0235	0,0104	0,0000	0,0022	0,0283
0,0188	0,0137	0,0000	0,0029	0,0000	0,0000	0,0006	0,0000	0,0001	0,0002
0,0266	0,1364	0,0700	0,0690	0,0839	0,0100	0,0482	0,0475	0,0652	0,0130
0,0000	0,0000	0,0028	0,0008	0,0010	0,0019	0,0111	0,0002	0,0003	0,0017
0,0105	0,0326	0,0143	0,0796	0,0537	0,0075	0,0329	0,0368	0,0196	0,0192
0,0002	0,0018	0,0013	0,0123	0,0970	0,0164	0,0528	0,0149	0,0027	0,0030
0,0034	0,0052	0,0025	0,0014	0,0243	0,0455	0,0264	0,0052	0,0053	0,0008
0,0004	0,0064	0,0212	0,0289	0,0318	0,0212	0,0331	0,0140	0,0004	0,0060
0,0000	0,0000	0,0000	0,0001	0,0001	0,0000	0,0001	0,0000	0,0000	0,0000
0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
0,0000	0,0003	0,0004	0,0006	0,0046	0,0047	0,0021	0,0000	0,0004	0,0057

Table A-3
INTERREGIONAL-INTERINDUSTRY INVERSE MATRIX, Greece 2010

	I - I										I – II									
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
1	1,0441	0,1051	0,0626	0,0275	0,0408	0,0084	0,0472	0,0316	0,0390	0,0178	0,0383	0,3083	0,0057	0,0200	0,0282	0,0119	0,0419	0,0468	0,0190	0,0118
2	0,0750	1,3593	0,2985	0,1187	0,1946	0,0401	0,2272	0,1442	0,1767	0,0821	0,0748	0,4572	0,0437	0,1261	0,1978	0,0707	0,2615	0,3476	0,1492	0,0625
3	0,0014	0,0068	1,0506	0,0100	0,0157	0,0053	0,0352	0,0096	0,0070	0,0106	0,0012	0,0053	0,0054	0,0076	0,0121	0,0218	0,1108	0,0126	0,0052	0,0175
4	0,0276	0,0479	0,0964	1,0999	0,0968	0,0207	0,1130	0,0826	0,0697	0,0669	0,0215	0,0947	0,0087	0,0802	0,0845	0,0326	0,1122	0,1666	0,0447	0,0445
5	0,0025	0,0116	0,0505	0,0174	1,0898	0,0209	0,0954	0,0291	0,0572	0,0148	0,0020	0,0096	0,0023	0,0155	0,0787	0,0314	0,0926	0,0552	0,0081	0,0092
6	0,0094	0,0260	0,0638	0,0262	0,0496	1,0462	0,0462	0,0244	0,0274	0,0304	0,0123	0,0374	0,0040	0,0328	0,0628	0,0268	0,1156	0,0593	0,0226	0,0346
7	0,0061	0,0283	0,1680	0,0367	0,0587	0,0124	1,0885	0,0366	0,0284	0,0274	0,0049	0,0371	0,0131	0,0475	0,0699	0,0693	0,1343	0,1024	0,0190	0,0252
8	0,0003	0,0008	0,0035	0,0012	0,0021	0,0005	0,0027	1,0012	0,0013	0,0008	0,0007	0,0011	0,0002	0,0035	0,0047	0,0008	0,0073	0,0072	0,0041	0,0009
9	0,0001	0,0004	0,0015	0,0004	0,0009	0,0004	0,0011	0,0005	1,0005	0,0005	0,0001	0,0005	0,0001	0,0006	0,0022	0,0041	0,0029	0,0024	0,0042	0,0026
10	0,0005	0,0021	0,0068	0,0022	0,0074	0,0057	0,0076	0,0021	0,0031	1,0115	0,0005	0,0026	0,0005	0,0023	0,0110	0,0165	0,0119	0,0035	0,0021	0,0185
	1.1670	1.5884	1.8023	1,8023	1,3402	1,5564	1,1605	1,6642	1,3618	1,4104	0,1564	0,9538	0,0836	0,3360	0,5519	0,2859	0,8910	0,8037	0,2783	0,2273

	II - I										II – II									
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
1	0,0549	0,1066	0,0576	0,0263	0,0375	0,0077	0,0439	0,0290	0,0357	0,0165	1,0335	0,2672	0,0055	0,0190	0,0271	0,0112	0,0398	0,0451	0,0184	0,0110
2	0,0619	0,3058	0,2194	0,0892	0,1426	0,0290	0,1621	0,1113	0,1381	0,0605	0,0308	1,1893	0,0186	0,0569	0,0926	0,0398	0,1368	0,1518	0,0609	0,0313
3	0,0023	0,0074	0,0677	0,0135	0,0217	0,0217	0,1464	0,0108	0,0122	0,0362	0,0015	0,0090	1,0029	0,0104	0,0165	0,0154	0,0360	0,0221	0,0048	0,0075
4	0,0434	0,0782	0,1571	0,1546	0,1537	0,0350	0,1793	0,1287	0,1100	0,1045	0,0335	0,1508	0,0142	1,1227	0,1345	0,0540	0,1815	0,2570	0,0695	0,0687
5	0,0078	0,0338	0,1440	0,0495	0,2433	0,0604	0,2586	0,0801	0,1544	0,0429	0,0060	0,0291	0,0069	0,0442	1,2122	0,0869	0,2536	0,1526	0,0230	0,0265
6	0,0035	0,0089	0,0185	0,0088	0,0169	0,0193	0,0138	0,0079	0,0092	0,0112	0,0029	0,0107	0,0012	0,0081	0,0157	1,0075	0,0277	0,0159	0,0055	0,0076
7	0,0098	0,0579	0,4503	0,0826	0,1219	0,0247	0,2003	0,0804	0,0477	0,0604	0,0064	0,0359	0,0074	0,0255	0,0443	0,0330	1,1055	0,0581	0,0165	0,0207
8	0,0009	0,0008	0,0025	0,0044	0,0051	0,0003	0,0078	0,0038	0,0062	0,0015	0,0002	0,0011	0,0002	0,0009	0,0015	0,0009	0,0024	1,0021	0,0006	0,0005
9	0,0000	0,0000	0,0001	0,0000	0,0001	0,0000	0,0001	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0002	0,0003	0,0002	0,0002	1,0003	0,0002
10	0,0016	0,0059	0,0145	0,0057	0,0233	0,0238	0,0216	0,0044	0,0080	0,0503	0,0011	0,0053	0,0009	0,0042	0,0147	0,0176	0,0184	0,0082	0,0033	1,0185
	0,1861	0,6055	1,1316	0,4348	0,7660	0,2219	1,0338	0,4563	0,5215	0,3840	1,1158	1,6985	1,0577	1,2919	1,5592	1,2666	1,8020	1,7131	1,2027	1,1925

	III - I										III – II									
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
1	0,0177	0,0397	0,0233	0,0103	0,0151	0,0031	0,0176	0,0117	0,0144	0,0066	0,0138	0,1106	0,0022	0,0076	0,0108	0,0045	0,0159	0,0179	0,0073	0,0044
2	0,0117	0,0529	0,0547	0,0206	0,0352	0,0090	0,0420	0,0242	0,0291	0,0152	0,0143	0,0876	0,0086	0,0251	0,0410	0,0163	0,0580	0,0685	0,0284	0,0131
3	0,0007	0,0035	0,0252	0,0051	0,0080	0,0028	0,0172	0,0048	0,0035	0,0053	0,0006	0,0027	0,0027	0,0039	0,0062	0,0109	0,0544	0,0065	0,0026	0,0086
4	0,0016	0,0048	0,0094	0,0044	0,0067	0,0025	0,0079	0,0043	0,0045	0,0035	0,0016	0,0086	0,0009	0,0051	0,0077	0,0038	0,0115	0,0116	0,0033	0,0031
5	0,0011	0,0044	0,0197	0,0060	0,0205	0,0065	0,0227	0,0079	0,0124	0,0053	0,0008	0,0041	0,0010	0,0061	0,0289	0,0119	0,0348	0,0209	0,0032	0,0037
6	0,0151	0,0323	0,0399	0,0332	0,0630	0,1037	0,0340	0,0264	0,0328	0,0507	0,0063	0,0256	0,0025	0,0162	0,0307	0,0137	0,0524	0,0328	0,0118	0,0152
7	0,0028	0,0123	0,0679	0,0154	0,0252	0,0071	0,0366	0,0153	0,0124	0,0121	0,0022	0,0158	0,0053	0,0194	0,0292	0,0280	0,0560	0,0420	0,0080	0,0106
8	0,0002	0,0004	0,0016	0,0012	0,0016	0,0002	0,0023	0,0011	0,0015	0,0005	0,0003	0,0005	0,0001	0,0014	0,0019	0,0004	0,0029	0,0029	0,0016	0,0004
9	0,0000	0,0001	0,0001	0,0001	0,0004	0,0005	0,0004	0,0002	0,0002	0,0006	0,0000	0,0001	0,0000	0,0000	0,0001	0,0001	0,0001	0,0001	0,0000	0,0000
10	0,0003	0,0012	0,0037	0,0012	0,0041	0,0034	0,0041	0,0012	0,0017	0,0064	0,0003	0,0014	0,0003	0,0012	0,0055	0,0080	0,0061	0,0020	0,0011	0,0088
	0,0514	0,1515	0,2453	0,0975	0,1798	0,1388	0,1848	0,0970	0,1127	0,1063	0,0402	0,2571	0,0235	0,0859	0,1620	0,0976	0,2922	0,2051	0,0673	0,0680

Estimation of Interregional Trade Coefficientsand Multipliers in the Context of an Interregional Model