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The Sraffian Multiplier and the Key-Commodities for the Greek Economy: Evidence from the Input-Output Tables for the Period 2000-2010

NIKOLAOS NTEMIROGLOU*

The scope of this paper is to specify the 'key-commodities' for the Greek economy through the estimation of the 'static' Sraffian multiplier and the related employment multipliers for the years 2000, 2005 and 2010. Although a positive trend in the output multiplier was found over time, the employment multipliers declined. It was found that a management of effective demand shall target on the primary and service sector in short term, but in the long run structural changes and strengthening of inter-sectoral relations are necessary in the industry.

INTRODUCTION

The Greek GDP decreased by 25% during the 6 year period from 2009 to 2015 due to the global economic recession observed between 2008 and 2009 and the domestic fiscal crisis, which broke out in 2010. Within the same period, a significant sharpening of income inequality and an increase in the unemployment rate were also observed, while a significant number of Greeks passed below the poverty threshold (Koutsogeorgopoulou, V. *et al*, 2014). The inflation remained negative (-1.1%) in 2015, despite the small increase in its magnitude in the last five months of the year due to the change of indirect taxes (Bank of Greece, 2016, pp. 72).

More specifically, the Greek governments applied restrictive fiscal policy in the extent of the prerequisite measures imposed by Troika in order to ensure the debt refinancing. Structural reforms had a more negative impact on the GDP than initially estimated by IMF, resulting in the Fund's admission that the fiscal multiplier for Greece was underestimated at 0.5 from 0.9 to 1.7 which was its real magnitude (IMF, 2012, pp 41-43). In addition, the IMF attributed the extremely negative effects to the high internal devaluation and rigidities that

* Department of Public Administration, Panteion University, Athens, Greece; *E-mail: demirogl@gmail.com*

existed in good and labour markets which made the adjustment more 'painful' (IMF, 2013, pp. 3-6).

Nonetheless, fiscal multipliers came back in the spotlight because it has been investigated that fiscal policy plays an important role during recession periods when multipliers' value increases (Auerbach and Gorodnichenko, 2012). Moreover, Delong and Summers (2012) argued that austerity policies, despite the existence of high debt, may be counterproductive and can eventually erode the long-term fiscal balance. In the same direction, the IMF (April 2015) stated that in such a demanding environment, fiscal policy continues to play a significant role (in combination with monetary policy and structural reforms) in maintaining aggregate demand. However, the IMF does not refer to specific interventions but notes that fiscal policy should be used flexibly for supporting growth and debt sustainability in the medium term. Also, an earlier study of IMF (October 2014, pp 21-48) supports that in prolonged recession periods, the structural reforms lead to adverse impacts on employment compared to similar reforms applied during growth phases of an economy, concluding that it is very important to augment public expenditure for the enforcement of employment.

The 'static' Sraffian multiplier constitutes an autonomous demand multiplier expressed in its full form by a $n \times n$ matrix, where n denotes the number of produced commodities. Regarding the theoretical approach, the concept of a matrix multiplier was initially introduced by Goodwin (1949) attempting to extent the Keynesian multiplier by sector. The Sraffian multiplier was essentially introduced by Metcalfe and Steedman (1981), focusing on devaluation and trade balance effects on the long-run equilibrium, introducing a model with the following characteristics: open economy of single production with circulating capital, non-competitive imports, homogeneous labour, and uniform rates of profits (and growth), propensity to save and composition of consumption. A few years later, Kurz (1985) developed a different multiplier, which depended on the (i) technical conditions of production; (ii) income distribution; (iii) savings ratios out of wages and profits; and (iv) consumption patterns associated with the two types of income. Other assumptions of the model were that the economy under consideration has no transactions with other economies (closed economy), has only two types of income (wages and profits), the production is single with only circulating capital and homogeneous labour. Mariolis (2008a) made a significant contribution to multiplier analysis showing the equivalence between the Sraffian multiplier(s)

derived from Kurz (1985) and Metcalfe and Steedman (1981), and extending the investigation to the case of pure joint production.

The present paper provides an estimation of the Sraffian multiplier for years 2000, 2005 and 2010 on the basis of a joint production model, according to which each commodity may be produced by more than one industry and, in the same time, each industry may produce more than one commodity (Neumann, 1945; Sraffa 1960). Joint production is the empirically relevant case (Steedman, 1984; Faber *et al.*, 1998; Kurz, 2006), therefore Supply-Use Tables (SUTs) constitute a more realistic representation of the economic system (Mariolis and Soklis, 2010, Soklis, 2011). However, the estimation results of the Sraffian multiplier, based on single production and Input-Output Tables (SIOTs), are provided in the Appendix A of this paper for comparative purposes.

The structure of this paper is as follows: The first section includes the assumptions and the analytical framework of the static Sraffian multiplier and the methodology adopted for calculating the relative employment multipliers. The second section elaborates on the empirical results of the multiplier and some basic conclusions regarding the evolution of its values. In the final section, some concluding remarks are summarized and general guidelines for the management of effective demand are provided.

THE ANALYTIC FRAMEWORK

The analytic framework was established in Mariolis and Soklis (2016), therefore the current paper includes the basic assumptions and equations of this model. More analytically, consider a capitalist economy producing n commodities by n industries of pure joint production, using only circulating capital and one type of labour in each process. The price of a commodity obtained as an output at the end of the production period is the same as the price of the same commodity used as an input at the beginning of that period ('stationary prices'). Moreover, all imports are considered as competitive[1] and the net product is distributed to profits and wages, paid at the end of the common production period.

The price side of the system is described by[2]

$$\mathbf{pB} = \mathbf{pA}[\mathbf{I} + \hat{\mathbf{r}}] + \mathbf{w}\hat{\mathbf{l}} \tag{1}$$

where $\mathbf{B}$ ($\geq \mathbf{0}$) denotes the $n \times n$ output coefficients matrix, $\mathbf{A}$ ($\geq \mathbf{0}$) the $n \times n$ input coefficients matrix, $\mathbf{I}$ the $n \times n$ identity matrix, $\hat{\mathbf{l}}\,(l_j > 0)$ the $n \times n$ diagonal matrix of direct labour coefficients, $\mathbf{p}$ ($>\mathbf{0}$) the $1 \times n$ vector of commodity prices, $\hat{\mathbf{r}}\,(r_j > -1 \, and \, \hat{\mathbf{r}} \neq 0)$ the $n \times n$ diagonal matrix of

the sectoral profit rates, and $\mathbf{w}(w_j > 0)$ the $1\times n$ vector of money wage rates.

Provided that is non-singular, equation (1) can be rewritten as

$$\mathbf{p} = \mathbf{p}\tilde{\mathbf{H}} + \mathbf{w}\rangle \tag{2}$$

where $\tilde{\mathbf{H}} \equiv \mathbf{A}\hat{\mathbf{r}}[\mathbf{B}-\mathbf{A}]^{-1}$ may be considered as the '$\hat{\mathbf{r}}$–vertically integrated technical coefficients matrix', and $\mathbf{\Lambda} \equiv \hat{\mathbf{l}}[\mathbf{B}-\mathbf{A}]^{-1}$ denotes the matrix of 'additive labour values' (Steedman 1975, 1976).

A part of the net product is consumed and the composition of the consumption is considered uniform (for wage and profit receivers) and exogenously given. The remaining net product is saved with saving rates s_w and s_p for wages and profits respectively. In addition, consider that $\mathbf{Im}^{\mathrm{T}}$ is the import demand vector and $\hat{\mathbf{m}}$ the diagonal matrix of imports per unit of gross output of each commodity. The Sraffian multiplier is given by

$$\mathbf{M_m} \equiv [\mathbf{I} + \hat{\mathbf{m}}\mathbf{B}[\mathbf{B}-\mathbf{A}]^{-1} - (\mathbf{pc}^{\mathrm{T}})^{-1}\mathbf{c}^{\mathrm{T}}[\mathbf{p} - (s_w\mathbf{w}\rangle + s_p\mathbf{p}\tilde{\mathbf{H}})]]^{-1}$$

It shall be noted that this multiplier constitutes a generalized multiplier formula because, if we assume $\hat{\mathbf{m}} = \mathbf{0}$, homogeneous labour and $s_w = 0$ and $s_p = 1$, we get a Marxian approach multiplier as defined by Trigg and Philp (2008). Moreover, for $s_w = s_p = s$ we get

$$\mathbf{M}_0 = \mathbf{I} + (s^{-1} - 1)(\mathbf{pc}^{\mathrm{T}})^{-1}\mathbf{c}^{\mathrm{T}}\mathbf{p}$$

which, in an one-commodity world, simplifies to the textbook equation $\mathbf{M}_0 = s^{-1}$, the simple Keynesian case.

Regarding the employment effect, is given by:

$$\mathbf{L}^{\mathrm{T}} = \mathbf{\Lambda}\,\mathbf{M}\mathbf{d}^{\mathrm{T}}$$

Thus, the total effect of autonomous demand on employment can be decomposed (*à la* Kahn, 1931) into 'primary employment' effects, i.e.

$$\mathbf{L}_{\mathrm{I}}^{\mathrm{T}} \equiv \mathbf{d}^{\mathrm{T}}$$

and 'secondary employment' effects, i.e.

$$\mathbf{L}_{\mathrm{II}}^{\mathrm{T}} \equiv \mathbf{L}^{\mathrm{T}} - \mathbf{L}_{\mathrm{I}}^{\mathrm{T}} = [\mathbf{M}-\mathbf{I}]\mathbf{d}^{\mathrm{T}}$$

which show the direct and indirect effects of autonomous demand on employment levels respectively.[3]

EMPIRICAL RESULTS

The Sraffian multiplier is estimated for the years 2000, 2005 and 2010. These years were selected due to the different phases of the Greek business cycle and for the examination of the impact of the currency change (from drachma to euro).

The SUTs for the Greek economy for the years 2000, 2005 and 2010 were downloaded from the EUROSTAT database and the reference currency is Euro (current prices). The actual price vector, **p**, is identified with **e**, i.e. the physical unit of measurement of each product is that unit which is worth of a monetary unit. The tables are 65x65 and thus describe the production processes of 65 commodities (the described commodities and their correspondence to CPA (Classification of Products by Activity) are reported in the Appendix B).[4] However, all elements relating to 'Activities of extra-territorial organisations and bodies' were equal to zero, so the line and the corresponding column 65 were deleted. In addition, the line and column 45 ('Imputed rents of owner-occupied dwellings') were zero for 2010, thus, in order to achieve temporal comparability, horizontal and vertical aggregation to commodity 44 ('Real estate activities – excluding imputed rent') was carried out for all years under review. After the above mentioned adjustments, the calculations were based on 63x63 tables. Regarding the employment, labour inputs by industry were received from Hellenic Statistical Authority (www.statistics.gr).

The application of the analytic framework to the SUTs of the Greek economy for the years 2000, 2005 and 2010 provides us with the following results:[5]

(i) The matrix $[\mathbf{B}-\mathbf{A}]$ is non-singular for all years under examination and the matrix $[\mathbf{B}-\mathbf{A}]^{-1}$ contains 261 negative elements for 2000, 399 for 2005 and 442 for 2010, while its diagonal elements are all positive. Hence, the economic system is not 'all-productive' and, therefore, it does *not* have the properties of a single-product system (see Schefold 1971, 1978). Observing the matrix of additive labour values $\mathbf{\Lambda}$, its diagonal elements, $\mathbf{\Lambda}_{ii}$, are in the range of 0.21 (i = 44; 'Real estate services (excluding imputed rent)') to 211.92 (i = 23; 'Repair and installation services of machinery and equipment'). Concerning the previous years under consideration, the commodity 44 had the lowest diagonal value for 2000 and 2005, amounting to 0.09 and 0.16 respectively. The commodity 2 ('Products of forestry, logging and related services') was at the upper limit of the range ($\Lambda_{22}(2000) = 92.23$ and $\Lambda_{22}(2005) = 65.84$).

(ii) The sectoral profit rates are determined by

$$1 + r_j = [(\sum_{j=1}^{n} b_j) - w_j l_j](\sum_{j=1}^{n} a_j)^{-1}$$

The matrix $\hat{\mathbf{r}}$ contains one negative element that corresponds to industry 31 'Land transport services and transport services via pipelines' for 2000, while all sectoral profit rates were positive in 2005. It is worth noting that 4 industries (13, 47, 57 and 59) presented a negative rate of profit in 2010. The sectoral profit rate of industry 63 was set equal to zero because this industry has no intermediate inflows. The vector $\mathbf{p}\tilde{\mathbf{H}}(=\mathbf{e}\tilde{\mathbf{H}})$ contains elements that are semi-positive and less than 1.

(iii) Let $\mathbf{c}^{*\mathrm{T}}(\geq \mathbf{0}^{\mathrm{T}})$ be the *actual* consumption pattern as received by the Use Table. This vector contains four zero elements that correspond to commodities 4 ('Mining and quarrying'), 15 ('Basic Metals'), 29 ('Wholesale trade services, except of motor vehicles and motorcycles', 30 ('Retail trade services, except of motor vehicles and motorcycles') and 49 ('Advertising and market research services') for all years under consideration.

(iv) Let $\hat{\mathbf{m}}^{*}(\geq \mathbf{0})$ be the *actual* diagonal matrix of imports per unit of gross output of each commodity. There are twelve commodities (commodities 25, 28, 29, 30, 36, 43, 44, 51, 57, 60, 62 and 63) that are not imported into the economy and, therefore, the corresponding cells of this matrix are all equal to zero.

(v) The changes on the money value of net output, Δ_y^i ('output multiplier'), and imports Δ_{Im}^i ('import multiplier') induced by the increase of one unit of the autonomous demand for commodity *i*, are given by:

$$\Delta_y^i \equiv \mathbf{pMe}_i^{\mathrm{T}}$$

and

$$\Delta_{Im}^i \equiv \mathbf{p}\hat{\mathbf{m}}^{*}\mathbf{B}[\mathbf{B}-\mathbf{A}]^{-1}\mathbf{Me}_i^{\mathrm{T}},\ \mathbf{p}=\mathbf{e}$$

respectively.

Table 1 reports the estimations for Δ_y^i and Δ_{Im}^i for the years 2000, 2005 and 2010, under the assumption that s_w = 0 and s_p = 1. The last

two rows provide us with the arithmetic mean, *AM*, and the standard deviation, *SD*.

Table 1
Output and import multipliers for the period 2000 -2010; $s_w = 0$, $s_p = 1$

Commodities	Δ_y^i			Δ_{Im}^i		
	2010	*2005*	*2000*	*2010*	*2005*	*2000*
1	0.93	0.92	0.92	0.32	0.25	0.21
2	1.23	1.18	0.85	0.36	0.37	0.57
3	1.00	0.98	0.97	0.22	0.24	0.23
4	0.70	0.74	0.71	0.64	0.62	0.59
5	0.90	0.90	0.87	0.41	0.42	0.39
6	0.71	0.75	0.77	0.62	0.60	0.57
7	0.93	0.91	1.08	0.47	0.52	0.51
8	0.71	0.72	0.69	0.65	0.62	0.61
9	1.14	1.06	1.12	0.38	0.26	0.39
10	0.60	0.61	0.63	0.65	0.67	0.59
11	0.59	0.58	0.65	0.69	0.70	0.63
12	0.71	0.60	0.59	0.55	0.67	0.67
13	0.61	0.70	0.72	0.72	0.63	0.57
14	0.99	0.94	0.93	0.42	0.46	0.45
15	0.76	0.64	0.65	0.57	0.64	0.65
16	0.73	0.62	0.64	0.56	0.55	0.65
17	0.64	0.58	0.51	0.66	0.52	0.65
18	0.59	0.62	0.63	0.62	0.62	0.66
19	0.73	0.60	0.62	0.65	0.63	0.69
20	0.58	0.52	0.44	0.69	0.70	0.75
21	-0.20	0.67	0.86	1.08	0.65	0.65
22	0.74	0.74	0.79	0.63	0.59	0.56
23	3.59	1.34	0.79	-0.61	0.57	0.69
24	0.94	1.13	1.08	0.35	0.31	0.26
25	1.40	1.50	1.33	0.31	0.27	0.29
26	1.09	1.24	1.45	0.39	0.43	0.34
27	1.09	1.05	1.02	0.34	0.32	0.33
28	1.20	1.20	1.14	0.19	0.18	0.15
29	1.32	1.27	1.28	0.26	0.22	0.21
30	1.43	1.35	1.24	0.27	0.21	0.19
31	1.08	1.18	1.41	0.36	0.31	0.42
32	0.96	0.97	0.85	0.30	0.26	0.38
33	0.90	0.93	1.15	0.46	0.48	0.51
34	0.82	0.85	0.75	0.59	0.55	0.55
35	1.52	1.61	1.21	0.37	0.34	0.22
36	1.10	1.08	1.04	0.18	0.24	0.20
37	1.04	1.03	1.10	0.26	0.42	0.39

contd. table 1

Commodities	Δ_y^i			Δ_{Im}^i		
	2010	*2005*	*2000*	*2010*	*2005*	*2000*
38	1.14	1.20	1.02	0.37	0.28	0.27
39	1.10	1.20	1.20	0.18	0.23	0.23
40	1.11	1.25	1.08	0.31	0.34	0.30
41	1.34	1.35	1.20	0.32	0.23	0.25
42	1.00	1.29	1.34	0.35	0.38	0.30
43	1.25	1.50	1.60	0.13	0.23	0.27
44	1.01	1.02	1.00	0.01	0.03	0.04
45	1.12	1.17	1.23	0.20	0.20	0.20
46	1.16	1.19	1.14	0.25	0.24	0.26
47	1.29	1.16	1.33	0.48	0.38	0.43
48	1.14	1.16	1.17	0.32	0.29	0.24
49	1.11	1.09	1.23	0.30	0.27	0.21
50	1.03	1.10	1.04	0.25	0.23	0.19
51	1.32	1.81	1.23	0.13	0.31	0.17
52	1.25	1.27	1.27	0.26	0.26	0.26
53	1.42	1.48	1.13	0.28	0.27	0.27
54	1.63	1.57	1.34	0.30	0.33	0.39
55	1.71	1.76	1.61	0.26	0.29	0.24
56	1.22	1.21	1.29	0.28	0.32	0.36
57	1.55	1.59	1.27	0.40	0.37	0.37
58	1.08	1.11	1.15	0.09	0.11	0.21
59	1.45	1.41	1.19	0.36	0.26	0.15
60	1.36	1.34	1.40	0.30	0.32	0.26
61	1.03	1.06	1.10	0.15	0.09	0.33
62	1.54	1.43	1.30	0.24	0.21	0.17
63	1.98	1.99	1.99	0.33	0.35	0.33
AM	1.10	1.10	1.05	0.37	0.38	0.38
SD	0.50	0.34	0.30	0.23	0.17	0.18

Between the years 2005 and 2010, there is a slight increase in the average output multiplier of about 0.1%, but the largest increase of 4.2% is observed in the decade range (2000 to 2010). The output multiplier of the commodity 21 presents the biggest decrease over time (-123.5%), taking a negative value in 2010. Significant reductions (over 20%) are calculated for output multipliers of commodities 25, 31, 33, 42 and 43, while the output multiplier 51 declines mainly in the 5-year period from 2005 to 2010. By contrast, the largest increase is observed in the multiplier of the commodity 23 (355.7%). The multipliers of the commodities 2, 12, 17, 20, 35, 53, 54, 57 and 59 also show a remarkable increase by at least 20%.

The average import multiplier declined by 2.64% from 2000 to 2010 showing a lower dependence on imports for the Greek economy. The most significant drop in imports multiplier is observed for the commodity 23 and the largest rise for the commodity 59. The imports multipliers of commodities 1, 21, 30, 35, 38, 48, 49, 50 and 62 increased by more than 30%; on the other hand the commodities 2, 37, 43, 44 and 58 presented an equal reduction in the same magnitude. The number of commodities with import multiplier greater than 0.5 was 20 in 2000, 18 in 2005 and 16 in 2000, the majority of which are produced in the industrial sector.

(vi) A significant negative linear correlation between the output and import multipliers exists and is depicted in the following graphs (see Figures 1, 2 and 3).

(vii) The effect on the total employment, Δ_L^i ('employment multiplier'), and its decomposition into 'primary' employment (primary employment multiplier), Δ_{LI}^i , and 'secondary' employment, Δ_{LII}^i , are given by the following equations:

$$\Delta_L^i \equiv \mathbf{e}\boldsymbol{\Lambda}\mathbf{M}\mathbf{e}_i^{\mathrm{T}}$$

$$\Delta_{LI}^i \equiv \mathbf{e}\boldsymbol{\Lambda}\mathbf{e}_i^{\mathrm{T}}$$

$$\Delta_{LII}^i \equiv \mathbf{e}\boldsymbol{\Lambda}[\mathbf{M}-\mathbf{I}]\mathbf{e}_i^{\mathrm{T}}$$

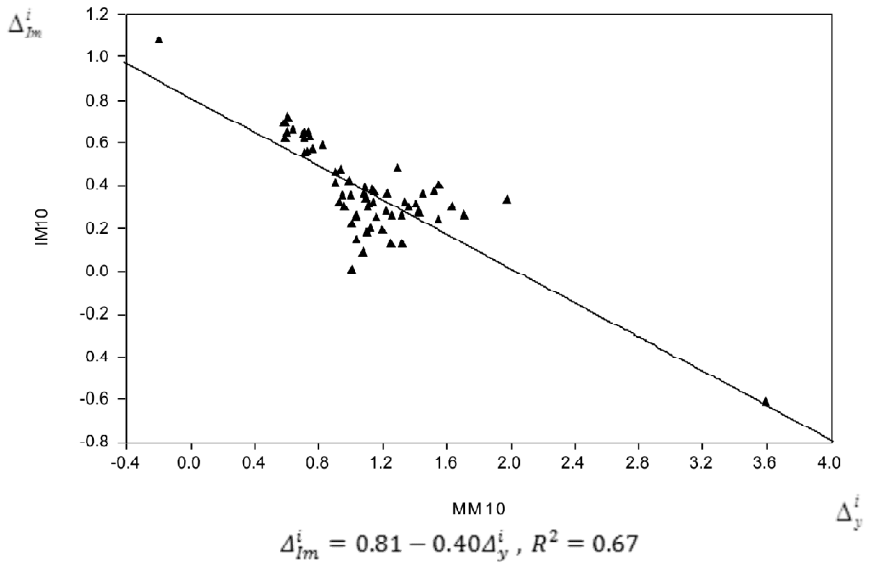

Figure 1: Output vs .import multipliers; year 2010

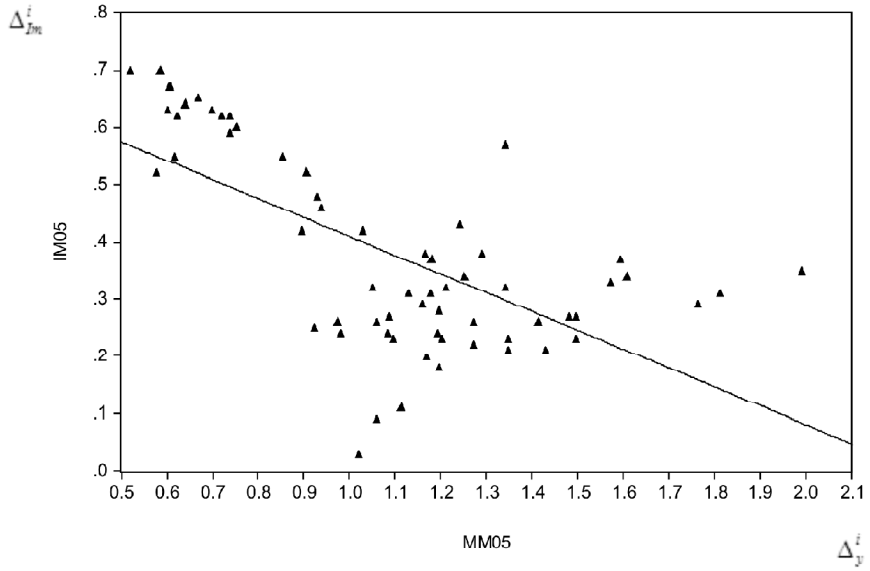

Figure 2: Output vs. import multipliers; year 2005

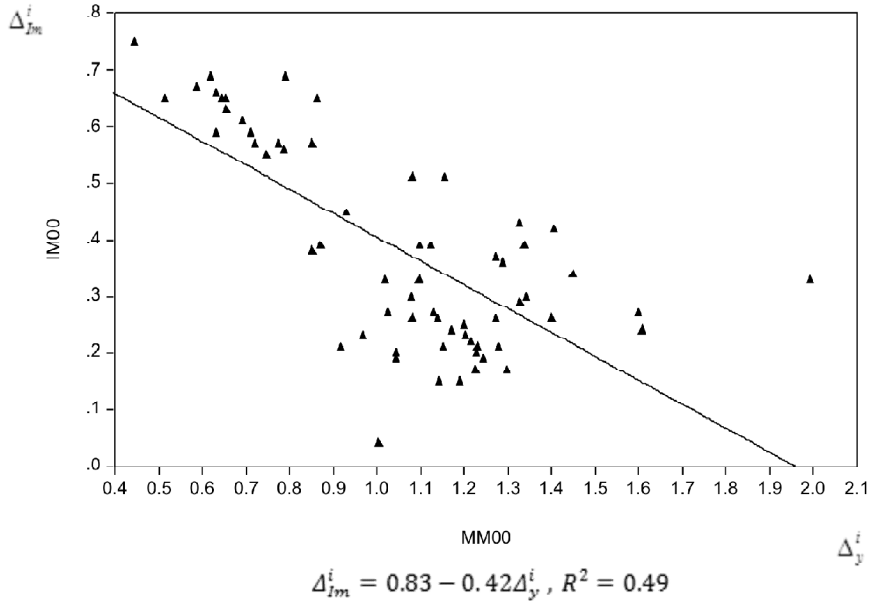

Figure 3: Output vs. import multipliers; year 2000

Table 2 includes the estimations for the aforementioned multipliers for the years 2000, 2005 and 2010 ($s_w = 0$ and $s_p = 1$).

Table 2
Employment multipliers for the period 2000-2010; $s_w = 0$, $s_p = 1$

Commodities	Δ_L^i			Δ_{LI}^i			$\Delta_{LII}^i(\Delta_L^i)^{-1}$		
	2010	*2005*	*2000*	*2010*	*2005*	*2000*	*2010*	*2005*	*2000*
1	14.9	5.1	15.51	16.6	5.27	17.09	-11.8%	-4.1%	-10.2%
2	69.4	58.0	56.63	79.1	66.63	93.37	-13.9%	-14.8%	-64.9%
3	11.5	12.1	15.96	11.8	12.65	16.84	-2.7%	-4.6%	-5.5%
4	10.3	10.8	13.70	15.9	15.11	19.81	-54.7%	-40.1%	-44.5%
5	12.9	12.5	16.91	15.1	13.89	20.02	-17.3%	-10.9%	-18.4%
6	14.4	18.3	22.18	23.6	28.12	32.20	-63.4%	-53.7%	-45.2%
7	19.1	24.1	42.47	23.7	31.84	52.22	-23.8%	-32.3%	-22.9%
8	12.7	13.3	14.81	20.4	20.21	22.78	-60.4%	-52.2%	-53.8%
9	18.8	13.2	38.36	18.6	13.07	38.28	1.2%	0.9%	0.2%
10	7.0	7.7	10.05	13.4	13.52	17.20	-90.8%	-74.8%	-71.2%
11	9.2	10.1	11.85	16.7	18.17	19.69	-82.6%	-79.6%	-66.2%
12	8.7	11.6	16.25	12.5	21.04	29.39	-43.6%	-81.3%	-80.9%
13	13.9	12.9	14.36	23.5	19.61	21.38	-68.6%	-52.0%	-48.9%
14	12.7	14.5	18.65	13.5	15.92	20.92	-6.4%	-10.0%	-12.1%
15	9.9	9.1	16.09	14.1	14.45	26.40	-42.5%	-59.6%	-64.1%
16	11.7	6.5	17.83	17.1	11.37	30.15	-45.7%	-73.7%	-69.1%
17	15.7	2.3	6.65	29.1	0.51	12.55	-85.1%	77.5%	-88.7%
18	6.8	9.5	14.36	12.7	15.67	24.69	-86.1%	-64.6%	-71.9%
19	13.5	10.2	16.89	20.7	17.53	30.06	-53.2%	-72.0%	-78.0%
20	9.6	8.2	10.76	18.0	16.32	25.77	-88.0%	-98.8%	-139.4%
21	-25.6	8.2	21.55	-29.5	12.04	29.74	-15.3%	-46.0%	-38.0%
22	16.4	17.5	22.49	25.5	27.09	32.88	-55.0%	-54.7%	-46.2%
23	101.6	36.3	21.67	64.7	31.90	32.69	36.3%	12.1%	-50.8%
24	6.7	11.0	16.92	7.0	9.25	15.62	-4.6%	16.2%	7.7%
25	21.9	26.2	33.68	17.3	19.41	28.29	21.3%	25.9%	16.0%
26	15.2	19.5	41.76	14.7	16.83	34.28	2.9%	13.8%	17.9%
27	19.8	18.0	21.27	19.5	17.79	22.27	1.8%	1.2%	-4.7%
28	15.0	16.4	20.97	12.8	13.81	18.69	14.7%	15.7%	10.9%
29	20.9	21.0	24.77	17.5	17.43	19.82	16.4%	16.9%	20.0%
30	33.2	29.5	36.36	28.2	24.84	31.88	15.0%	15.8%	12.3%
31	16.1	18.1	41.07	16.0	16.00	34.12	0.3%	11.5%	16.9%
32	8.5	8.4	13.04	10.2	9.53	17.29	-20.2%	-13.7%	-32.6%
33	12.0	14.1	27.25	14.3	15.92	26.89	-19.0%	-13.0%	1.3%
34	14.7	15.3	20.59	21.1	20.27	30.46	-43.1%	-32.3%	-47.9%
35	30.6	36.0	48.84	24.9	28.26	46.04	18.5%	21.5%	5.7%
36	15.1	15.6	17.52	14.3	14.59	17.18	5.6%	6.3%	2.0%
37	10.5	16.6	26.11	9.9	17.29	25.64	5.2%	-4.2%	1.8%

contd. table 2

Commodities	Δ_L^i			Δ_{LI}^i			$\Delta_{LII}^i(\Delta_L^i)^{-1}$		
	2010	*2005*	*2000*	*2010*	*2005*	*2000*	*2010*	*2005*	*2000*
38	18.5	17.2	22.99	17.8	14.57	23.33	3.6%	15.2%	-1.5%
39	7.8	11.5	12.37	6.6	8.35	7.44	15.5%	27.5%	39.9%
40	14.6	19.5	24.84	13.5	16.49	24.26	7.7%	15.6%	2.3%
41	14.8	15.4	18.19	10.6	10.50	13.91	28.7%	31.8%	23.5%
42	9.4	23.5	24.04	8.6	20.69	17.40	8.7%	11.8%	27.6%
43	14.9	30.5	31.73	11.9	23.67	20.37	20.3%	22.4%	35.8%
44	0.5	2.0	2.61	0.4	1.78	2.67	11.9%	12.5%	-2.5%
45	13.2	17.6	19.67	11.8	15.59	15.47	10.5%	11.6%	21.3%
46	14.2	17.4	22.41	12.7	15.01	20.07	11.0%	13.7%	10.5%
47	21.7	21.1	28.23	19.8	19.68	23.04	9.0%	6.5%	18.4%
48	18.7	18.6	19.72	17.8	16.72	16.53	4.8%	10.2%	16.2%
49	15.9	14.5	23.78	15.7	13.26	19.67	1.4%	8.2%	17.3%
50	11.9	13.7	14.13	11.6	12.35	13.52	2.4%	9.8%	4.4%
51	27.2	56.3	29.24	23.3	45.09	25.16	14.4%	19.9%	13.9%
52	20.1	20.4	28.66	17.3	16.93	24.29	13.7%	17.1%	15.2%
53	25.8	34.0	52.41	21.0	27.71	53.75	18.7%	18.5%	-2.6%
54	30.0	31.2	37.22	22.5	23.50	32.65	25.1%	24.8%	12.3%
55	34.6	40.7	46.99	25.8	30.19	35.64	25.3%	25.8%	24.2%
56	19.8	22.7	36.21	17.7	20.89	31.81	10.7%	7.8%	12.1%
57	46.0	51.5	70.66	39.9	43.52	66.53	13.3%	15.5%	5.8%
58	8.4	11.2	23.11	7.4	9.62	20.53	12.7%	14.0%	11.2%
59	39.6	33.6	28.91	34.6	28.18	25.54	12.7%	16.3%	11.7%
60	44.3	44.9	65.77	40.4	40.49	58.55	9.0%	9.8%	11.0%
61	5.4	5.8	16.67	4.8	4.79	14.46	9.8%	16.8%	13.3%
62	23.1	26.0	25.77	16.5	20.15	20.37	28.7%	22.4%	20.9%
63	72.1	66.9	85.02	59.9	53.19	66.09	16.9%	20.5%	22.3%
AM	19.2	20.1	26.3	19.0	19.6	27.4	-9.7%	-6.1%	-12.4%
SD	17.7	13.6	15.5	14.6	11.4	15.0	34.0%	35.7%	37.7%

Contrary to the output multiplier, the employment multiplier declines over time and the aggregate reduction is approximately 27%. Only the commodities 2 and 23 presented an increase in the employment multiplier from 2000 to 2010 and commodities 2, 17, 22, 23, 30, 35, 55, 57, 59 and 60 had the highest impact on direct employment. The secondary employment effect is negative for all commodities of primary and secondary production sector, except for commodities 9, 25, 26 and 27. On the other hand, the corresponding multipliers are positive for the service sector, with the exception of products 32, 33 and 34.[6]

(viii) There exist commodities that are simultaneously characterized by a 'high' output multiplier, 'low' import multiplier and 'high' employment multiplier (hereafter, the term 'high' ('low')

shall mean 'higher (lower) than the arithmetic mean of the economy'). These "*key*-commodities" (Mariolis and Soklis, 2016) are reported in Table 3.

Table 3
The key-commodities for the period 2000-2010

Commodity	*2010*	*2005*	*2000*
2	✓	✓	x
23	✓	x	x
25	✓	✓	✓
29	✓	✓	x
30	✓	✓	✓
31	x	x	✓
35	✓	x	✓
43	x	✓	✓
51	✓	✓	✓
52	✓	✓	✓
53	✓	✓	✓
54	✓	✓	✓
55	✓	✓	✓
56	✓	✓	✓
57	✓	✓	✓
59	✓	✓	✓
60	✓	✓	✓
62	✓	✓	x
63	✓	✓	✓
Total	17	16	15

Based on Table 3, it is noted that the number of key-commodities increases over time from 15 to 17. Commodities 3, 30, 51 to 60 and 63 remain key-commodities for all years under consideration. Commodity 2 and commodities 23 and 25 are the only key-commodities produced by the primary sector and industry respectively. It is noted that commodities 31 and 43 are not featured as key-commodities in 2010 despite their previous key-commodity status.

(ix) By contrast, there exist commodities that are simultaneously characterized by a 'low' output multiplier, 'high' import multiplier and 'low' employment multiplier. These "*anti-key*-commodities" (Mariolis and Soklis, 2016) are reported in Table 4.

Table 4
The anti-key-commodities for the period 2000-2010

Commodity	*2010*	*2005*	*2000*
3	x	✓	x
4	✓	✓	✓
5	✓	✓	✓
6	✓	✓	✓
7	✓	x	x
8	✓	✓	✓
9	x	x	x
10	✓	✓	✓
11	✓	✓	✓
12	✓	✓	✓
13	✓	✓	✓
14	✓	✓	✓
15	✓	✓	✓
16	✓	✓	✓
17	✓	✓	✓
18	✓	✓	✓
19	✓	✓	✓
20	✓	✓	✓
21	✓	✓	✓
22	✓	✓	✓
23	x	x	✓
24	✓	x	x
33	✓	✓	x
34	✓	✓	✓
Total	21	20	19

According to Table 4, the number of anti-key-commodities was 19 in 2000, 20 in 2005 and 21 in 2010, showing an upward trend. Only 3 commodities derive from the primary and service sector, while all the other anti-key-commodities are produced by industry.

(x) Alleviating the assumption that $s_w = 0$ and $s_p = 1$, the estimations for the opposite polar (and *non*-realistic) case are included in the following summary Table 5.

Table 5
Sectoral multipliers for $s_w = 1$ and $s_p = 0$

	Δ_y^i			Δ_L^i		
	2010	*2005*	*2000*	*2010*	*2005*	*2000*
Primary sector	2.6	2.6	2.4	51.1	45.9	57.8
Industry	2.2	2.1	2.1	31.7	30.6	43.8
Services	3.3	3.2	3.2	46.1	49.5	68.6
AM	2.8	2.8	2.7	40.9	42.1	58.7
SD	1.0	0.8	0.8	21.5	14.5	18.9

Table 6 reports the sectoral output and employment multipliers for $s_w = 0$ and $s_p = 0.30$, as estimated by Naastepad (2003) for the period 1960-2000.

Table 6
Sectoral multipliers for $s_w = 0$ and $s_p = 0.30$

	Δ_y^i			Δ_L^i		
	2010	*2005*	*2000*	*2010*	*2005*	*2000*
Primary sector	1.9	1.9	1.8	43.0	37.1	45.9
Industry	1.5	1.4	1.4	22.8	21.6	31.4
Services	2.2	2.2	2.2	32.3	36.0	48.3
AM	1.9	1.9	1.9	29.2	30.6	41.7
SD	0.7	0.5	0.5	19.8	14.4	17.0

Finally, Table 7 reports the sectoral output and employment multiplier for $s_w = 0.05$ and $s_p = 0.80$, which correspond to estimated saving propensities for actual developed economies (see Naastepad and Storm, 2007; Hein and Vogel, 2008; Onaran and Galanis, 2012).

Table 7
Sectoral multipliers for $s_w = 0.05$ and $s_p = 0.80$

	Δ_y^i			Δ_L^i		
	2010	*2005*	*2000*	*2010*	*2005*	*2000*
Primary sector	1.2	1.2	1.1	33.8	27.0	32.1
Industry	1.0	0.9	0.9	16.5	15.1	22.0
Services	1.4	1.4	1.4	22.8	25.8	33.3
AM	1.2	1.2	1.2	20.9	21.8	29.0
SD	0.5	0.4	0.3	18.0	13.6	15.6

It then follows that the estimations reported in Tables 1 and 2 (where $s_w = 0$, $s_p = 1$) can be considered as sufficiently representative.

CONCLUDING REMARKS

It was found that almost all industrial products present an output multiplier below unity. The same results hold for storage services (logistics), sea and air transports. A positive trend is observed in the output multiplier of primary and service sectors' products. On the other hand, the employment multipliers decline significantly over time except for the employment multipliers of commodities 2, 17, 23 and 59.

A growth oriented policy should be targeted to the key-commodities of the Greek economy. Key-commodities derive mainly from the service sectors (wholesale and retail trade, employment and training services etc.) with the exception of the commodity 'Treatment and supply of water', which constitutes an industrial commodity. It shall be noted that an increase in autonomous demand by public spending requires much attention (also see Mariolis and Soklis, 2016). More specifically, the tax burden on labour income in Greece is quite high, therefore, the financing of public investment with further labour taxation would have negative short-term impact on GDP (Bom and Lighthart, 2014a).

The funding of industrial commodities without any major restructuring of the relative sectors does not seem to contribute to the increase of the net product due to the high dependence on imports (also see Mariolis and Soklis, 2016). This finding is in contrast with several researches (see Mc Kinsey & Co, 2012 and 2015) indicating that manufacturing is a key-sector which can ignite growth. As a result, a reconstruction of the Greek economy, in the extent of strengthening the intersectoral dependencies, is considered as necessary. This prospect may assist the growth of an industry to diffuse to other sectors of the economy through the mechanism of intersectoral trade. A focused industrial policy program for the Greek economy is also in line with European Commission's call for raising the contribution of industry to GDP to as much as 20% by 2020. It is mentioned that this reconstruction is directly assisted by public quality investments (core public capital), in infrastructure projects such as airports, railways, etc. In the short run, this kind of investments can create new jobs reducing the high unemployment and in the long run may attract private investment, thereby reinforcing new economic activity (Bom and Lighthart, 2014b).

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Notes

1. When estimating the multiplier, the use of non-competitive imports contributes to more accurate findings. However, this magnitude is not included in the available input-output tables.
2. Matrices (and vectors) are delineated in boldface letters. The transpose of a $1\times n$ vector $\mathbf{x}\equiv[x_j]$ is denoted by $\mathbf{x}^{\mathrm{T}}$, and the diagonal matrix formed from the elements of $\mathbf{x}$ is denoted by $\hat{\mathbf{x}}$. Finally, $\mathbf{e}$ denotes the summation vector, i.e. $\mathbf{e}\equiv[1,1,...,1]$, and $\mathbf{e}_j$ the $j-$th unit vector.
3. It is noted that a change in relative commodity prices, induced by changes in income distribution, alters the multiplier. In that case, the total effects on net output and, therefore, on employment levels become a priori ambiguous (consider Metcalfe and Steedman, 1981, and Mariolis, 2008a).
4. The commodities 1 to 3 belong to 'Primary production'. The commodities 4 to 27 belong to 'Industry' and, finally, the commodities 28 to 63 belong to 'Services'.
5. Regarding the year 2010, the observed (but not so remarkable) differences between the empirical results of the present paper and those of Mariolis and Soklis (2016) are due to the fact that the present paper (i) aggregates the industry 45 with the industry 44; and (ii) takes into account *ad valorem* taxes (see Mariolis and Soklis, 2016, footnotes 5 and 14, and Appendix I).
6. As Mariolis and Soklis (2016) remark, "[t]he commodity 21 is characterized by negative output and employment multipliers, while the commodity 23 is characterized by a negative import multiplier [for the year 2010]. Since the system under investigation does not have the properties of single-product systems, this is not an unexpected finding and its rationale is that an increase in the autonomous demand for the commodity 21 (23) could be met only by the operation of some processes on a lower level, which in turn results in a negative change in total net output and employment (in total imports)."

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APPENDIX A: EVIDENCE FROM THE SYMMETRIC INPUT-OUTPUT TABLES FOR THE YEARS 2005 AND 2010

The analytic framework

The analytic framework was established in Mariolis (2008b). Now, we consider a profitable economy of single production.

In this case (**B** = **1**), the price side of the system is given by

$$\mathbf{p} = \mathbf{pA}[\mathbf{I} + \hat{\mathbf{r}}] + \mathbf{w}\hat{\mathbf{l}}$$

where all variables have the same meaning as in equation (1), except **A** which denotes the (Leontief) technical coefficients matrix.

The output multiplier is estimated by:

$$\mathbf{M} \equiv [\mathbf{I} + \hat{\mathbf{m}}\,\mathbf{I}[\mathbf{I} - \mathbf{A}]^{-1} - (\mathbf{pc}^{\mathrm{T}})^{-1}\mathbf{c}^{\mathrm{T}}[\mathbf{p} - (s_w\,\mathbf{w}\boldsymbol{\Lambda} + s_p\mathbf{p}\tilde{\mathbf{H}})]]^{-1}$$

where $\tilde{\mathbf{H}} \equiv \mathbf{A}\hat{\mathbf{r}}[\mathbf{I} - \mathbf{A}]^{-1}$ and $\boldsymbol{\Lambda} \equiv \hat{\mathbf{l}}[\mathbf{I} - \mathbf{A}]^{-1}$.

Empirical results

The Sraffian multiplier is estimated only for the years 2005 and 2010, due to the unavailability of the SIOT, based on NACE Rev. 2 classification, for the year 2000.

The application of the analytic framework provides us with the following results:

(i) The highest sectoral profit rate is observed for industries 44 and 61 (5.24 and 5.18 respectively), while industry 60 presents the lowest profit rate (0.05).

(ii) Table A.1.1 includes the estimations for Δ_y^i and Δ_{Im}^i, under the assumption that s_w = 0 and s_p = 1, using data from SIOTs. The columns with the name 'diff%' present the percentage difference from the results of Table 1 (output and import multipliers calculated on the basis of SUTs).

Table A.1.1
Output and import multipliers for the years 2005 and 2010; SIOTs

	Δ_y^i				Δ_{Im}^i			
Commodities	*2010*	*Diff%*	*2005*	*Diff%*	*2010*	*Diff%*	*2005*	*Diff%*
1	1.17	-20.6%	1.06	-12.8%	0.29	8.3%	0.23	9.2%
2	1.28	-4.3%	1.18	-0.2%	0.31	13.3%	0.31	15.8%
3	1.20	-16.2%	1.18	-16.9%	0.21	2.5%	0.21	11.4%
4	0.87	-19.3%	0.89	-17.6%	0.60	5.8%	0.58	7.0%
5	1.13	-19.7%	1.06	-15.3%	0.36	11.3%	0.35	15.6%
6	0.92	-23.5%	0.95	-21.3%	0.56	10.1%	0.53	11.3%
7	1.21	-23.0%	1.15	-21.3%	0.38	18.5%	0.43	17.1%
8	0.98	-27.3%	0.92	-21.3%	0.55	16.1%	0.52	15.5%
9	1.45	-21.9%	1.29	-17.9%	0.28	25.4%	0.21	18.3%
10	0.83	-28.1%	0.83	-26.9%	0.57	11.8%	0.57	14.4%

contd. table

	Δ_y^i				Δ_{Im}^i			
Commodities	*2010*	*Diff%*	*2005*	*Diff%*	*2010*	*Diff%*	*2005*	*Diff%*
11	0.85	-30.2%	0.81	-28.2%	0.60	12.5%	0.62	12.0%
12	0.86	-17.3%	0.82	-26.4%	0.53	4.3%	0.59	11.6%
13	0.98	-38.1%	0.94	-25.5%	0.56	22.4%	0.54	14.7%
14	1.21	-18.4%	1.18	-20.2%	0.36	14.1%	0.39	14.6%
15	1.01	-25.0%	0.89	-27.9%	0.48	15.0%	0.53	17.1%
16	1.04	-30.2%	0.91	-32.6%	0.46	17.0%	0.50	8.5%
17	0.82	-22.0%	0.77	-24.9%	0.61	7.5%	0.60	-14.7%
18	0.87	-32.3%	0.84	-26.0%	0.53	14.2%	0.55	11.6%
19	0.92	-20.6%	0.76	-20.9%	0.57	13.0%	0.60	5.3%
20	0.83	-29.9%	0.74	-29.4%	0.60	12.8%	0.63	9.4%
21	0.84	-124.0%	0.84	-20.4%	0.61	43.8%	0.62	5.2%
22	0.96	-22.7%	0.92	-20.2%	0.55	13.0%	0.53	11.0%
23	1.54	133.7%	1.35	-0.8%	0.26	142.6%	0.29	48.4%
24	1.17	-19.0%	1.36	-17.2%	0.31	10.8%	0.25	19.9%
25	1.65	-15.0%	1.71	-12.4%	0.25	18.2%	0.21	23.7%
26	1.29	-15.6%	1.45	-14.1%	0.34	12.4%	0.36	15.7%
27	1.39	-21.5%	1.35	-22.2%	0.26	22.2%	0.24	24.8%
28	1.41	-15.2%	1.40	-14.7%	0.14	27.6%	0.14	20.9%
29	1.54	-14.4%	1.45	-12.5%	0.22	16.5%	0.18	17.2%
30	1.62	-11.6%	1.52	-11.2%	0.21	23.3%	0.17	17.1%
31	1.42	-23.9%	1.46	-19.4%	0.29	19.4%	0.24	21.7%
32	1.16	-17.4%	1.14	-14.8%	0.26	11.7%	0.23	9.8%
33	1.19	-24.2%	1.22	-23.6%	0.39	14.5%	0.38	20.1%
34	0.86	-5.0%	0.85	0.5%	0.57	3.1%	0.55	-0.7%
35	1.74	-12.7%	1.80	-10.7%	0.29	20.5%	0.26	22.1%
36	1.35	-18.7%	1.34	-19.0%	0.15	14.5%	0.19	22.8%
37	1.29	-19.7%	1.22	-15.9%	0.26	1.6%	0.37	11.9%
38	1.39	-17.7%	1.39	-14.1%	0.32	12.7%	0.25	11.0%
39	1.30	-15.3%	1.41	-14.9%	0.17	4.6%	0.20	11.3%
40	1.29	-13.8%	1.44	-13.2%	0.29	7.1%	0.30	12.3%
41	1.54	-13.2%	1.53	-11.7%	0.28	12.5%	0.20	12.9%
42	1.13	-12.0%	1.46	-11.5%	0.34	2.9%	0.34	11.5%
43	1.41	-11.2%	1.72	-13.0%	0.11	12.7%	0.19	18.4%
44	1.14	-11.5%	1.15	-11.5%	0.04	-317.2%	0.06	-84.9%
45	1.30	-13.3%	1.37	-14.8%	0.18	10.5%	0.18	9.7%
46	1.39	-16.4%	1.40	-15.0%	0.21	14.5%	0.20	15.6%
47	1.53	-15.7%	1.34	-13.3%	0.39	18.2%	0.31	19.2%
48	1.41	-19.1%	1.40	-17.3%	0.28	13.1%	0.26	11.7%
49	1.32	-16.5%	1.29	-16.0%	0.26	11.7%	0.23	14.9%
50	1.22	-15.6%	1.27	-13.6%	0.24	3.2%	0.22	4.9%
51	1.48	-10.9%	2.07	-12.3%	0.11	13.2%	0.24	23.4%
52	1.50	-16.3%	1.50	-15.4%	0.22	17.1%	0.21	19.7%
53	1.65	-13.8%	1.67	-11.1%	0.24	14.0%	0.22	17.8%

contd. table

	Δ_y^i				Δ_{Im}^i			
Commodities	*2010*	*Diff%*	*2005*	*Diff%*	*2010*	*Diff%*	*2005*	*Diff%*
54	1.86	-12.2%	1.83	-14.3%	0.23	22.6%	0.24	25.9%
55	1.95	-12.2%	1.99	-11.5%	0.21	19.9%	0.22	24.1%
56	1.48	-17.8%	1.48	-18.2%	0.22	21.9%	0.24	26.0%
57	1.89	-18.2%	1.88	-15.4%	0.30	25.2%	0.27	25.7%
58	1.19	-9.2%	1.25	-10.7%	0.09	-0.2%	0.10	7.1%
59	1.73	-16.2%	1.63	-13.3%	0.27	24.2%	0.21	19.0%
60	1.66	-18.0%	1.63	-17.7%	0.25	17.6%	0.25	23.3%
61	1.17	-11.4%	1.18	-10.3%	0.13	11.6%	0.09	-2.9%
62	1.78	-13.4%	1.64	-12.8%	0.19	21.5%	0.17	20.9%
63	2.27	-12.9%	2.26	-11.8%	0.26	21.7%	0.26	25.7%
AM	1.30	-15.5%	1.30	-15.6%	0.33	13.4%	0.32	17.1%
SD	0.32	-	0.35	-	0.15	-	0.16	-]

It is clear that using data from SIOTs, the output multiplier for the whole economy is over-estimated by 15.5%. Focusing on specific commodities, the commodities 2, 23 and 34 have almost the same output multiplier, which does not depend on the fact that the data derive from SUTs or SIOTs for 2005. However, this finding does not constitute a rule because these small differences sharpened in 2010. T h e average import multiplier for the Greek economy is over-estimated by 13.4% and 17.1% for 2010 and 2005 respectively when it is measured using data from SUTs instead of SIOTs. The commodities 34, 50 and 61 for 2005 and the commodities 3, 12, 34, 37, 39, 42, 50 and 58 for 2010 present the lowest divergence (below 5%).

(iii) The employment multipliers are also estimated and the key-commodities are specified. There were 18 key-commodities found for the year 2005 and 16 key-commodities for the year 2010 (see Table A.1.2).

Table A.1.2
The key-commodities for the years 2005 and 2010; SIOTs

Commodity	*2010*	*2005*	*Commodity*	*2010*	*2005*
27	✓	✓	53	✓	✓
29	✓	✓	54	✓	✓
30	✓	✓	55	✓	✓
31	✓	✓	56	✓	✓
35	✓	✓	57	✓	✓
36	✓	✓	59	✓	✓
41	✓	✓	60	✓	✓
43	✓	x	62	✓	✓
51	✓	x	63	✓	✓

It is noted that products 27, 36 and 41 were featured as key-commodities using data only from SIOTs and products 2, 23, 25 and 52 were characterized as key-commodities using data only from SUTs. All the other commodities are common to both approaches.

APPENDIX B: PRODUCT CLASSIFICATION

No	*CPA*	*Nomenclature*
1	A01	Products of agriculture, hunting and related services
2	A02	Products of forestry, logging and related services
3	A03	Fish and other fishing products; aquaculture products; support services to fishing
4	B	Mining and quarrying
5	C10-C12	Food products, beverages and tobacco products
6	C13-C15	Textiles, wearing apparel and leather products
7	C16	Wood and of products of wood and cork, except furniture; articles of straw and plaiting materials
8	C17	Paper and paper products
9	C18	Printing and recording services
10	C19	Coke and refined petroleum products
11	C20	Chemicals and chemical products
12	C21	Basic pharmaceutical products and pharmaceutical preparations
13	C22	Rubber and plastics products
14	C23	Other non-metallic mineral products
15	C24	Basic metals
16	C25	Fabricated metal products, except machinery and equipment
17	C26	Computer, electronic and optical products
18	C27	Electrical equipment
19	C28	Machinery and equipment n.e.c.
20	C29	Motor vehicles, trailers and semi-trailers
21	C30	Other transport equipment
22	C31-C32	Furniture; other manufactured goods
23	C33	Repair and installation services of machinery and equipment
24	D35	Electricity, gas, steam and air-conditioning
25	E36	Natural water; water treatment and supply services
26	E37-E39	Sewerage; waste collection, treatment and disposal activities; materials recovery; remediation activities and other waste management services
27	F	Constructions and construction works
28	G45	Wholesale and retail trade and repair services of motor vehicles and motorcycles
29	G46	Wholesale trade services, except of motor vehicles and motorcycles
-30	G47	Retail trade services, except of motor vehicles and motorcycles
31	H49	Land transport services and transport services via pipelines
32	H50	Water transport services
33	H51	Air transport services
34	H52	Warehousing and support services for transportation
35	H53	Postal and courier services
36	I	Accommodation and food services

contd. table

No	*CPA*	*Nomenclature*
37	J58	Publishing services
38	J59-J60	Motion picture, video and television programme production services, sound recording and music publishing; programming and broadcasting services
39	J61	Telecommunications services
40	J62-J63	Computer programming, consultancy and related services; information services
41	K64	Financial services, except insurance and pension funding
42	K65	Insurance, reinsurance and pension funding services, except compulsory social security
43	K66	Services auxiliary to financial services and insurance services
44	L68B	Real estate services (excluding imputed rent)
45	M69-M70	Legal and accounting services; services of head offices; management consulting services
46	M71	Architectural and engineering services; technical testing and analysis services
47	M72	Scientific research and development services
48	M73	Advertising and market research services
49	M74-M75	Other professional, scientific and technical services; veterinary services
50	N77	Rental and leasing services
51	N78	Employment services
52	N79	Travel agency, tour operator and other reservation services and related services
53	N80-N82	Security and investigation services; services to buildings and landscape; office administrative, office support and other business support services
54	O84	Public administration and defence services; compulsory social security services
55	P85	Education services
56	Q86	Human health services
57	Q87-Q88	Social work services
58	R90-R92	Creative, arts and entertainment services; library, archive, museum and other cultural services; gambling and betting services
59	R93	Sporting services and amusement and recreation services
60	S94	Services furnished by membership organisations
61	S95	Repair services of computers and personal and household goods
62	S96	Other personal services
63	T	Services of households as employers; undifferentiated goods and services produced by households for own use