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National Technical University of Athens

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MULTIPLIERS: THE CASE OF GREECE
(1988-1998)

Athena Belegri-Roboli, Panayotis G. Michaelides *and* Maria Markaki

Laboratory of Applied Economics
National Technical University of Athens
Faculty of Applied Mathematics and Physical Sciences
Department of Humanities, Social Sciences and Law
belegri@central.ntua.gr, pmichael@central.ntua.gr
fax: +30 2107721618, tel: +30 2107721607

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Labour Cost and Employment Multipliers: The Case of Greece (1988-1998) *

Athena Belegri-Roboli, Panayotis Michaelides and Maria Markaki

ABSTRACT

The present paper measures the labour multipliers in the Greek economy by means of input-output analysis. The purpose of the paper is to study the interdependencies between the labour structure changes and economic growth in Greece, by measuring the backward and forward multipliers by industry. The backward multipliers measure the structural changes in the total labour cost and employment, respectively, due to variations in the final demand. The forward multipliers measure the impact of the variations of employment and labour cost on the final demand categories. The data are obtained from the Greek input-output tables (1988-1998). The empirical results show that the total (labour cost and employment) backward multipliers, have generally increased over the 1988-1998 period. On this basis, some policy implications are discussed, regarding the country's priority to reshape the labour market and to increase employment.

Keywords: employment, labour cost multipliers, input-output framework, Greece

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1. INTRODUCTION

Since the late 70s, unemployment has created worldwide severe economic and social problems (Dedousopoulos 2000, p. 30-37; Dimoulas *et al.* 2003, p. 77). Despite the efforts of the European Union (E.U.), unemployment is still playing a very crucial role in the E.U. territory (European Economy, 2000). The relationship between (un)employment and the social and economic targets of its member-states is now strongly linked with the determining factors of the economies' development, and signifies the entrance to a "new phase of production" based on new production technologies (Dimoulas *et al.*, 2003, p. 79).

In the conditions of the new production technologies, the differentiation in the input ratio of the production function is the result of the various linkages among industries and of the total macroeconomic figures' formation. In this context, the investigation of such linkages requires, on the one hand, the determination of the economy's inter-industry relations and, on the other hand, the estimation of the relevant multipliers, which determine the formation of the total macroeconomic figures.

In view of the above, the present paper measures the total labour cost and employment multipliers, by industry, in the Greek economy, for the time period 1988-1998. More precisely, the present paper attempts to answer the following two questions:

(a) *An increase in an industry's demand for output, what increase in the economy's total amount of labour cost and employment, respectively, will generate?*

(b) *An increase in an industry's amount of labour cost and employment, respectively, what increases in the economy's final demand categories (e.g. exports, investments) will generate?*

This kind of inter-industry study is traditionally analyzed in the context of input-output matrices (e.g. Livas, 1983; Terleckyj, 1980). The first question will be answered by means of backward multipliers (e.g. Miller and Blair, 1985; Dietzenbacher and Los, 2000) and the second question will be answered by means of forward multipliers (e.g. Jones, 1976; Dietzenbacher and Los, 2000), which are considered to be suitable for the purpose of our investigation, as Dietzenbacher (1997) has demonstrated.

To this end, we investigate the case of Greece for the period 1988–1998, when data are available. The total employment in Greece in 1998 was equal to 3.976 millions, while the labour force was equal to 4.446 millions implying an unemployment rate of 11%, which is considered as very high among the E.U. countries. The active population (aged 15-64) was equal to 6.936 millions indicating an employment ratio equal to 64,1%. Finally, the total population of the country was 10.835 millions implying an active population percentage equal to 64%. At this point it is interesting to note that the unemployment rate, as well as the employment ratio have increased significantly when compared with their 1988 values (8% and 61,8% respectively). Meanwhile, the active population rate remained constant and equal to 64%.

The measurement of labour cost and employment multipliers for the Greek economy is of great interest since real Gross Domestic Product (G.D.P.) growth in Greece, in 1999, exceeded the E.U. average for the fourth consecutive year (European Commission, 2000, p. 30), placing Greece first among E.U. countries with an average annual growth rate in current prices of 11.8% (2.3% in 1995 market prices) over the 1991-2000 period (European Commission, 2000, p. 172). Furthermore, during the period

1993–1997, while an increase in production and productivity¹ is observed, we also note an increase in unemployment and a decrease in competitiveness², a thing that gives credit to the view that the Greek economy is belatedly entering into a phase, which for most of the economies of the E.U. member states has already ended.

More specifically, “The evolution of employment levels in the E.U. after the decline of the 1985–1995 period, increased rapidly during the current economic recovery. This phenomenon possibly marks a new phase of expanding production, based on new technological, organizational and institutional foundations [...]. [T]he decrease in employment levels³ in most of the E.U. countries was considered a permanent phenomenon, while it was held that economic expansion did not create new jobs. The most recent developments, the increase in employment levels and the creation of new jobs due to economic expansion contradict this theory” (Labour Institute, 1999, p. 74–5).

However, according to the European Commission (2000, p. 31) the Greek labour market performance “has not benefited by as much as might have been expected from the prolonged economic recovery”. Steps have been taken towards structural reforms of the labour market but the results of the reforms have been limited, so far. This is why “Greece should give high priority to [...] taking *measurable* action to prevent [...] unemployment” (European Commission 2000, p. 32, emphasis added).

1 Greek labour productivity had a time lag in the beginning of the 1990s, and though subsequently improved, Greece continues, along with Spain and Luxembourg to hover at around 50% of the equivalent E.U. average. Specifically, during the period 1990–1993, when the 15 E.U. member states faced an annual productivity growth rate equal to 1,6%, that of Greece was –0,1%, that of Spain 1,4%, Portugal 1,9% and Ireland 3,2%. During the period 1995–1996, productivity in Greece remained at very low levels and stood at around 66% of the community average. This recent period though, labour productivity in the Greek economy has reached 88% of the average EU labour productivity (Labour Institute, 1999, 2001).

2 Greek exports’ penetration is experiencing a continuous decline. As a result, the percentage of import expenses covered by export revenues fell from 24,1% in 1996, to 22,9% in 1997. On the contrary, in the other “cohesion” countries, their sales to the other E.U. countries, as well as their degree of penetration, rose (Labour Institute, 1999).

³ In 1990 unemployment in the EU member states was 8%, in 1994 it rose to 11%, and went down again to 8,8% in February 2000 (Eurostat, 2000a).

In view of the above, our investigation can have significant and measurable policy implications for Greece. For example, *the backward multipliers can be used to pinpoint the industries, which create the largest effects in the economy in terms of compensation of the employees/employment hiring, in case the Greek government decides to stimulate employment by creating extra (final) demand for the output of some industries.*

On the other hand, the forward multipliers can have, as well, direct relevance for policy implications. *The Greek government may, for example, wish to subsidize employment in a certain industry and in this case, the forward multipliers indicate the increase in the economy's final demand categories, e.g. exports, that such an increase will generate* (Dietzenbacher and Los, 2000).⁴

The paper is organised as follows: Section 2 discusses the methodological framework, section 3 presents the empirical results for the case of Greece, while section 4 concludes the paper.

2. METHODOLOGY

2.1 Backward Multipliers

The methodology for constructing such indicators builds on the seminal work of Terleckyj (1974), who used input-output data to measure inter-sectoral flows of technology. The employment indicators have been formulated on the basis of a modified version of the Leontief inverse (Leontief, 1986), while our discussion benefits from the work of Dietzenbacher and Los (2000).

⁴ Our investigation, as far as the forward multipliers are concerned, focuses on exports and investments, which constitute the crucial factors related to the economy's competitiveness and productivity.

The variables are defined as follows: let \mathbf{Z} be the matrix of intermediate deliveries, \mathbf{X} the vector of gross outputs, and \mathbf{Y} vector of the final demands. Then:

$$(1) \quad \mathbf{Y} = \mathbf{C} + \mathbf{i} + \mathbf{G} + (\mathbf{E} - \mathbf{M})$$

where \mathbf{C} denotes private consumption, \mathbf{i} denotes gross fixed capital investment, \mathbf{G} denotes government consumption, \mathbf{E} denotes the exports and \mathbf{M} denotes the imports.

The input coefficients matrix is obtained as follows:

$$(2) \quad \mathbf{A} = \mathbf{Z} \mathbf{x}^{-1}$$

where $\mathbf{x} = \text{diag}\mathbf{X}$ denotes the diagonal matrix whose elements consist of vector \mathbf{X} .

The balance equations can be written as:

$$(3) \quad \mathbf{X} = \mathbf{A}\mathbf{X} + \mathbf{Y}$$

Solving the balance equation for \mathbf{X} , we obtain:

$$(4) \quad \mathbf{X} = (\mathbf{I} - \mathbf{A})^{-1} \mathbf{Y}$$

where $(\mathbf{I} - \mathbf{A})^{-1}$ denotes the Leontief inverse.

For each industry i , we then define the labour cost intensity as labour costs (\mathbf{R}) per gross output (\mathbf{X}) and the employment intensity as number of employees (\mathbf{L}) per gross output (\mathbf{X}), respectively:

$$(5) \quad r_i = \frac{R_i}{X_i} \quad \text{and} \quad l_i = \frac{L_i}{X_i} \quad (i = 1, 2, \dots, n), \quad \text{or:}$$

$$(6) \quad \mathbf{r}' = \mathbf{R}' \mathbf{x}^{-1} \quad \text{and} \quad \mathbf{l}' = \mathbf{L}' \mathbf{x}^{-1}$$

where an accent denotes transposition.⁵

Summation over industries i , yields the total amount of labour costs per monetary unit of final demand for industry j , and can be obtained as:

$$(7) \quad \mathbf{D}' = \mathbf{r}'(\mathbf{I} - \mathbf{A})^{-1}$$

which expresses the backward multipliers in vector notation.

Analogously, the employment backward multiplier are obtain as:

$$(8) \quad \mathbf{N}' = \mathbf{l}'(\mathbf{I} - \mathbf{A})^{-1}$$

2.2 Forward Multipliers

The supply driven model presented by Ghosh (1958), which constitutes the basis for the application of forward multipliers, has been viewed as implausible and Oosterhaven (1988) showed its flaws. Recently, Dietzenbacher (1997) demonstrated that Ghosh's model should be considered as a price model instead of as a quantity model – which was the until then common practise (Los, 2001) – and this way all implausibility vanishes. Significant contributions measuring forward multipliers were introduced by Jones (1976) and Beyers (1976). The output coefficients matrix is obtained as follows:

$$(9) \quad \mathbf{B} = \mathbf{x}^{-1} \mathbf{Z}$$

and the inverse matrix as follows:

$$(10) \quad \mathbf{J} = (\mathbf{I} - \mathbf{B})^{-1}$$

The export intensities are obtained as:

$$(11) \quad \mathbf{\epsilon} = \mathbf{x}^{-1} \mathbf{E}$$

The investment intensities are obtained as:

$$(12) \quad \mathbf{l} = \mathbf{x}^{-1} \mathbf{i}$$

The unit of the labour cost or employment, respectively, of industry i , implies an increase in the value of all exports, which can be obtained by the forward multiplier:

⁵ Note that the inverse ratio (X/L) denotes labour productivity.

$$(13) \quad \mathbf{F}_{\text{exp}} = \mathbf{J}\boldsymbol{\varepsilon}$$

Also, the unit, increase of the labour cost or employment, respectively, of industry i , implies an increase in the value of all investments, which can be obtained by the forward multiplier:

$$(14) \quad \mathbf{F}_{\text{inv}} = \mathbf{J} \mathbf{u}$$

As can be seen from equations (9) – (14), the forward multipliers with respect to labour cost and employment, respectively, are identical.

3. EMPIRICAL ANALYSIS

3.1 Data

In this section, we investigate empirically the case of the Greek economy for the period 1988–1998 by applying the methodology presented in the previous section. The domestic input-output table for the Greek economy for the year 1994 comes from Eurostat (2000b), is the only one available and is used for the whole period, under the assumption that production technology for the Greek economy remains constant.⁶ Because the figures on labour costs and output obtained from the National Statistical Service of Greece and the Statistical Office of the European Communities (Eurostat 2000b), are in current prices, following Dietzenbacher and Los (2000), we used the input-output table in current prices as well. As for the employment multipliers, the output used is in constant 1994 prices, in order to be consistent with the production technology of the reference year 1994. For the

⁶ The utilisation of the domestic input – output table of the year 1994 for the period 1988-1998, causes over- and under-estimations of the values of the multipliers that have been measured (see e.g. Livas, 1983). Practically, the estimated changes in the values of the multipliers, in the specific time period, is the result of a change in the labour cost intensities, since the domestic input-output table remains practically unchanged.

industry classification, which is not identical to the classification used by O.E.C.D., see Table 5 (Appendix).

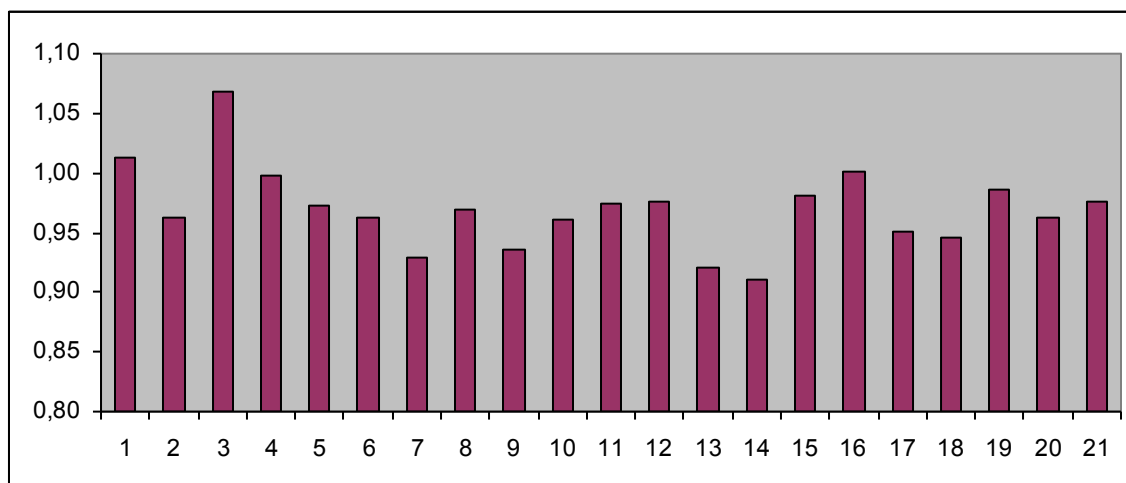
3.2 Results

This section presents the empirical results for the Greek economy. Table 1 presents the backward labour cost multipliers for the Greek case, while Figure 1 illustrates the average value of backward labour cost multipliers for the period 1988-1998.

Table 1: Backward labour cost multipliers, Greece (1988-1998)

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
1	1,00	1,03	1,03	1,01	1,01	1,01	1,02	1,02	1,01	1,00	1,02
2	0,98	0,98	0,98	0,97	0,96	0,95	0,95	0,95	0,95	0,95	0,96
3	1,04	1,06	1,06	1,06	1,05	1,06	1,07	1,09	1,07	1,08	1,09
4	1,02	0,97	1,01	1,00	1,00	1,00	1,01	0,99	0,99	0,99	1,00
5	1,00	0,93	0,99	0,98	0,97	0,96	0,97	0,99	0,99	0,97	0,97
6	0,99	0,97	0,98	0,97	0,95	0,96	0,96	0,96	0,96	0,95	0,96
7	0,95	0,95	0,94	0,93	0,92	0,91	0,91	0,92	0,93	0,93	0,95
8	1,04	1,02	0,98	0,97	0,95	0,95	0,95	0,96	0,96	0,94	0,95
9	0,96	0,95	0,96	0,94	0,92	0,92	0,92	0,93	0,93	0,93	0,94
10	0,98	1,02	0,98	0,96	0,95	0,95	0,95	0,95	0,95	0,95	0,95
11	0,99	1,02	0,98	0,97	0,96	0,97	0,96	0,96	0,97	0,97	0,97
12	0,99	0,96	0,99	0,98	0,97	0,97	0,98	0,98	0,98	0,97	0,97
13	0,94	0,93	0,95	0,93	0,91	0,89	0,90	0,92	0,92	0,92	0,92
14	0,93	0,93	0,92	0,91	0,90	0,91	0,91	0,91	0,91	0,90	0,90
15	0,99	0,99	0,99	0,98	0,98	0,98	0,98	0,98	0,98	0,98	0,98
16	1,01	1,02	1,01	1,01	0,99	0,99	1,00	1,01	1,00	0,99	0,99
17	0,97	0,98	0,96	0,94	0,94	0,94	0,94	0,95	0,94	0,95	0,95
18	0,95	0,97	0,95	0,95	0,95	0,92	0,93	0,92	0,93	0,96	0,96
19	0,99	1,00	0,99	0,99	0,98	0,98	0,99	0,99	0,99	0,98	0,98
20	0,97	0,96	0,98	0,97	0,97	0,96	0,96	0,95	0,96	0,96	0,96
21	0,98	0,98	0,98	0,98	0,97	0,97	0,97	0,97	0,97	0,98	0,98

Figure 1: Average value of backward labour cost multipliers, Greece (1988-1998)



In general, as illustrated in Table 1, the total backward multipliers have increased over the time period 1988-1998, with very few exceptions, indicating that more compensation of employees is “embodied” in an industry’s final output in 1998, than in 1988.

At this point we should note that the backward multipliers, as well as the forward multipliers, are not affected by the rate of inflation and are, thus, appropriate for time series analyses and comparisons. The only industries that are characterized by decreasing backward multipliers are the “hotels and restaurants” (No. 16), “finance and insurance” (No. 18) and “national defense and public administration” (No. 20) industries. The “communication, social and personal services” (No. 21) industry presents the highest backward linkages, whereas the backward linkages for “real estate and business services” (No. 19) are the lowest.⁷

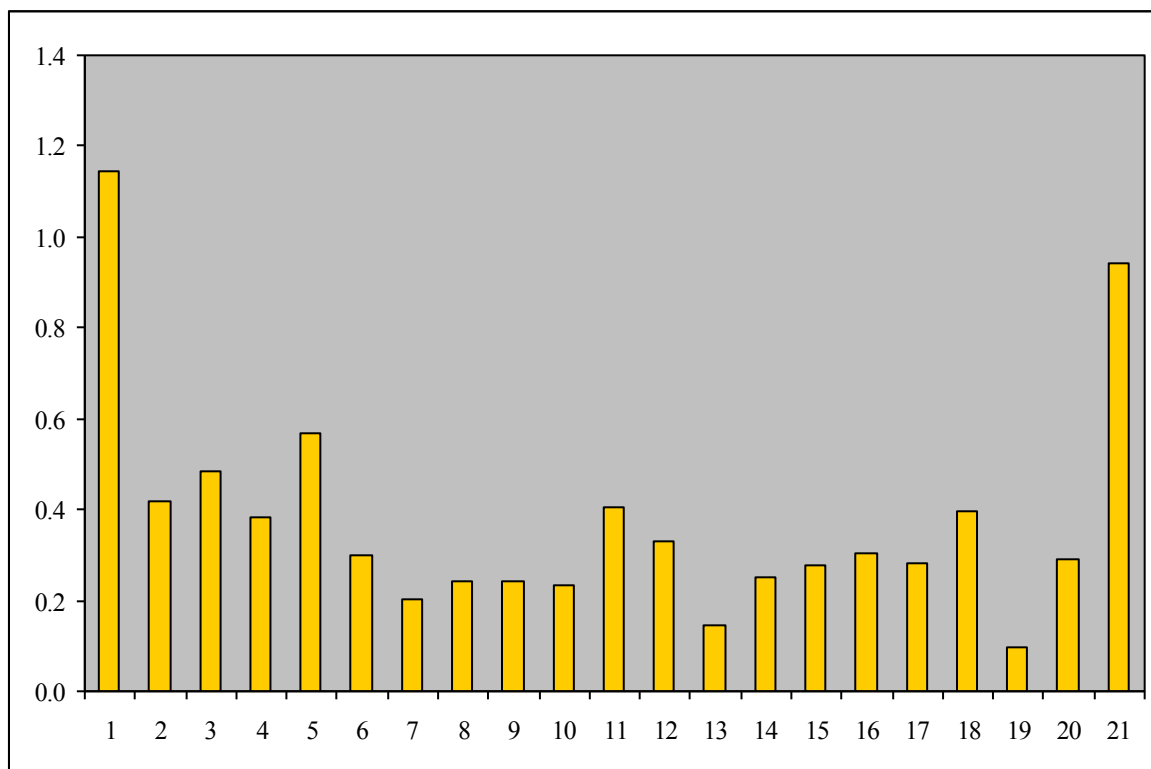
⁷ The total backward multiplier for e.g. industry 10 in 1995 is equal to 0.63, and means that an increase in demand for output of sector 10 by 1,000,000 drs would result in an increase in the total economy’s labour cost by 630.000 drs.

Table 2 shows the backward employment multipliers while Figure 2 illustrates the average value of backward employment multipliers for the period 1988-1998.

Table 2: Backward employment multipliers, Greece (1988-1998)

Industry	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98
1	0.69	0.73	0.90	0.87	1.06	1.22	1.25	1.31	1.46	1.52	1.61
2	0.22	0.26	0.33	0.36	0.40	0.45	0.44	0.47	0.53	0.54	0.63
3	0.28	0.30	0.37	0.37	0.44	0.52	0.54	0.57	0.62	0.66	0.69
4	0.21	0.25	0.31	0.33	0.37	0.41	0.43	0.45	0.47	0.50	0.50
5	0.44	0.47	0.54	0.66	0.70	0.46	0.47	0.54	0.60	0.66	0.72
6	0.15	0.17	0.20	0.25	0.27	0.34	0.36	0.35	0.37	0.43	0.42
7	0.10	0.12	0.15	0.17	0.19	0.21	0.22	0.24	0.25	0.26	0.30
8	0.12	0.14	0.17	0.21	0.23	0.25	0.27	0.28	0.30	0.33	0.34
9	0.13	0.14	0.17	0.20	0.22	0.25	0.28	0.30	0.31	0.32	0.36
10	0.11	0.13	0.16	0.20	0.22	0.26	0.26	0.29	0.29	0.30	0.33
11	0.22	0.25	0.30	0.34	0.36	0.42	0.48	0.49	0.50	0.52	0.56
12	0.20	0.22	0.27	0.31	0.34	0.31	0.36	0.38	0.40	0.42	0.43
13	0.08	0.09	0.11	0.12	0.13	0.16	0.17	0.18	0.19	0.20	0.19
14	0.14	0.15	0.18	0.21	0.24	0.26	0.29	0.30	0.31	0.32	0.35
15	0.13	0.15	0.19	0.22	0.24	0.30	0.32	0.35	0.36	0.37	0.40
16	0.18	0.19	0.22	0.24	0.27	0.31	0.34	0.37	0.39	0.39	0.42
17	0.16	0.18	0.23	0.27	0.28	0.31	0.33	0.33	0.35	0.33	0.33
18	0.23	0.26	0.31	0.32	0.34	0.46	0.49	0.49	0.48	0.50	0.46
19	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13	0.13	0.14
20	0.17	0.19	0.21	0.25	0.28	0.31	0.35	0.33	0.38	0.37	0.37
21	0.59	0.61	0.71	0.79	0.87	0.95	1.02	1.11	1.20	1.21	1.27

Figure 2: Average value of backward employment multipliers, Greece (1988-1998)



The total backward employment multipliers have increased over the 1988-98 time span, for all industries.⁸ The “agriculture, forestry and fishing” (No.1) industry presents the highest backward linkages, whereas the backward linkages for “real estate and business services” (No. 19) are the lowest.⁹

The forward multipliers, concerning labour cost and employment are identical, and are documented in the following tables with respect to gross fixed capital investments and exports (Table 4 and Table 5).

Table 4: Forward multipliers: Greek investment (1988-1998)

⁸ In case we use nominal prices for the estimation of backward employment multipliers, we note a slight decrease in the period 1988-1998, which is consistent with the findings by various researchers on the Greek economy.

⁹ The total backward multiplier for e.g. industry 21 in 1994 is equal to 1.02, and means that an increase in demand for output of sector 21 by 1,000,000 drs would result in an increase in the economy’s number of employees by 1.02 persons.

Industry	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98
1	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.03	0.02	0.02	0.03
2	0.73	0.74	0.75	0.76	0.76	0.76	0.74	0.73	0.75	0.78	0.81
3	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
4	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
5	1.12	1.14	1.17	1.18	1.18	1.17	1.15	1.13	1.16	1.22	1.26
6	0.15	0.16	0.16	0.17	0.17	0.17	0.16	0.16	0.18	0.19	0.20
7	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.14	0.15	0.16	0.16
8	0.43	0.45	0.46	0.47	0.47	0.47	0.45	0.45	0.47	0.49	0.52
9	0.69	0.69	0.69	0.69	0.69	0.68	0.67	0.66	0.67	0.70	0.70
10	1.04	1.08	1.11	1.13	1.14	1.12	1.09	1.06	1.12	1.18	1.24
11	0.82	0.83	0.85	0.86	0.87	0.86	0.84	0.82	0.84	0.87	0.90
12	1.18	1.34	1.43	1.48	1.52	1.48	1.40	1.35	1.55	1.65	1.88
13	0.19	0.19	0.20	0.20	0.20	0.20	0.20	0.19	0.20	0.21	0.22
14	0.90	0.89	0.89	0.89	0.89	0.88	0.87	0.86	0.86	0.90	0.89
15	0.11	0.12	0.12	0.12	0.13	0.13	0.12	0.13	0.14	0.14	0.14
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18	0.19	0.20	0.21	0.21	0.22	0.21	0.21	0.20	0.22	0.23	0.24
19	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09
20	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	0.01	0.01	0.02	0.02	0.03	0.03	0.02	0.03	0.03	0.03	0.03

Except for the “construction” (No. 14) industry, all other forward multipliers with respect to gross fixed capital investment have increased in the period 1988-1998. The “shipbuilding and other transport, motor vehicles, aircraft, electrical apparatus, non electrical apparatus, professional goods, other manufacturing” (No. 12) industry has the highest forward linkages, while the lowest, practically negligible, forward linkages are to

be found for the “food, beverages and tobacco” (No. 3), “hotels and restaurants” (No. 16) and “national defense and public administration” (No. 20) industries.

Table 5: Forward multipliers: Greek exports (1988-1998)

Industry	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98
1	0.28	0.34	0.30	0.31	0.35	0.33	0.36	0.41	0.42	0.32	0.33
2	1.84	1.87	1.91	1.61	1.68	1.63	1.61	1.68	1.59	1.43	1.44
3	0.20	0.23	0.23	0.20	0.27	0.25	0.23	0.33	0.32	0.22	0.22
4	0.42	0.39	0.35	0.38	0.41	0.39	0.37	0.38	0.38	0.42	0.41
5	0.13	0.14	0.15	0.16	0.16	0.19	0.20	0.23	0.24	0.22	0.23
6	0.22	0.24	0.20	0.21	0.22	0.23	0.22	0.34	0.33	0.25	0.25
7	0.61	0.59	0.63	0.57	0.64	0.57	0.61	0.59	0.59	0.53	0.55
8	0.47	0.46	0.42	0.44	0.48	0.51	0.52	0.59	0.62	0.60	0.65
9	0.23	0.21	0.19	0.19	0.23	0.23	0.29	0.30	0.31	0.28	0.23
10	0.62	0.77	0.68	0.78	0.82	0.73	0.79	0.84	0.88	0.89	0.88
11	0.29	0.34	0.32	0.34	0.36	0.37	0.38	0.44	0.46	0.44	0.45
12	0.26	0.30	0.33	0.37	0.35	0.39	0.40	0.44	0.49	0.46	0.52
13	0.17	0.18	0.17	0.18	0.19	0.18	0.19	0.25	0.25	0.20	0.20
14	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.05	0.05	0.04	0.04
15	0.13	0.13	0.12	0.13	0.14	0.13	0.13	0.16	0.16	0.14	0.14
16	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.39	0.37	0.01	0.01
17	0.29	0.29	0.27	0.29	0.27	0.27	0.26	0.29	0.28	0.30	0.31
18	0.17	0.17	0.17	0.17	0.18	0.18	0.18	0.23	0.21	0.24	0.23
19	0.06	0.06	0.06	0.06	0.07	0.06	0.06	0.12	0.13	0.13	0.14
20	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
21	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.01	0.02

In general, the forward multipliers with respect to exports increase over time. The highest total forward multipliers are to be found for the “mining” (No. 2) industry. The

“national defense and public administration” (No. 20) and “communication, social and personal services industries” (No. 21) have the lowest, practically negligible, forward linkages.

4. CONCLUSIONS

An important conclusion that can be drawn from the present paper is that the total backward (labour cost and employment) multipliers have generally increased over the 1988-1998 period. More precisely, in the 1988-1998 period the backward multipliers for the Greek economy have increased by 10.2% on average, or in other words, with an average growth rate of about 1.15% per year. This means that in *1998 a larger amount of compensation of the employees in the Greek Economy is embodied per monetary unit of an industry’s final output, than in 1988*, which is consistent with the findings of the Greek Labour Institute (2003, p. 101-2) for the 1990-1998 period. In other words, the economy’s internal capability to expand the income of labour is increasing.

Similarly, the employment multipliers have increased in the 1988-1998 time span, and indicate that in *1998 a larger number of employees in the Greek Economy is embodied per drachma of an industry’s final output, than in 1988*, which is also consistent with the findings of the Labour Institute (2003, p. 101-2; 2004, p. 110) and Milios and Ioakimoglou (2005). In other words, the economy’s internal capability to expand employment is increasing.

Also, the forward multipliers with respect to gross fixed capital investment and exports, respectively, have in general increased considerably in the 1988-1998 period,

indicating that an increase in the compensation of employees in an industry, yields *larger effects in the final demand categories, i.e. investments and exports, in 1998, than in 1988.*

The present paper could have, as well, significant policy implications for Greece. More precisely, in case the Greek government decides to stimulate employment – following the European Commission’s advice (2000, p. 32) – by e.g. creating extra (final) demand for the output of some industry, it could, for example, choose the “agriculture, fishing and forestry” (No. 1) industry, which presents the highest backward linkages. However, it should, by all means, avoid the “real estate and business services” (No. 19) industry, which ranks last.

On the other hand, the forward multipliers can have direct relevance for policy implications, as well. The Greek government may, for example, wish to subsidize employment in a certain industry. In this case, the forward multipliers indicate the increase in the value of the final demand categories that this act will generate.

Increasing, for instance, labour cost or employment in the industry with the largest forward multiplier, namely the “shipbuilding and other transport, motor vehicles, aircraft, electrical apparatus, non electrical apparatus, professional goods, other manufacturing” (No. 12) industry, yields the largest effects on the value of gross fixed capital investment. Finally, the “mining” (No. 2) industry has the largest effects on the value of all exports.

Conclusively, on the basis of the empirical results, it is evident that the total backward labour cost and employment multipliers, respectively, as well as the total forward multipliers (with respect to exports and fixed capital investments), have generally increased over the 1988-1998 period. However, we believe that still “Greece

should give high priority to [...] taking *measurable* action to prevent [...] unemployment” (European Commission 2000, p. 32, emphasis added).

The present paper provides an approach towards the measurement of the relevant multipliers for the Greek economy; however research and further investigation in the future is certainly needed. In terms of employment, the multipliers, as far as the professions and the educational level of the employees are concerned, are being investigated. The measurement of labour productivity in an input-output context as well as the estimation of the impact of production technology on labour cost or employment provides another example of useful material for future investigation.

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Appendix

Table 5: Industry Classification

Industry	Description	I.S.I.C. rev.2
1	Agriculture, forestry and fishing	1
2	Mining	2
3	Food, Beverages and Tobacco	31
4	Textiles, apparel and leather	32
5	Wood products and furniture	33
6	Paper, paper products and printing	34
7	Petroleum and coal products	353+354
8	Industrial chemicals, Rubber and Plastic Products	351+352-3522+355+356
9	Non-metallic mineral products	36
10	Iron and steel, non-ferrous metals	371+372
11	Metal products	381
12	Shipbuilding and other transport, motor vehicles, aircraft, electrical apparatus, non electrical apparatus, professional goods, other manufacturing	382-3825+383+3832+3841+3842+3844+3849+3843+3845+385+39
13	Electricity, gas and water	4
14	Construction	5
15	Wholesale and retail trade	61
16	Hotels and restaurants	62
17	Transport, storage and communication	71+72
18	Finance and insurance	81
19	Real estate and business services	82
20	National defense and public administration	-
21	Communication, social and personal services	9