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PECULIARITIES AND USEFULNESS OF MULTIPLIERS, ELASTICITIES AND LOCATION QUOTIENTS FOR THE REGIONAL DEVELOPMENT PLANNING: AN OTHER VIEW

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Abstract

In this paper, the peculiarities of type I multipliers and elasticities and their differences on the generated results for the proposed developmental priorities are examined. Moreover the influences of the used non-survey techniques (Simple Location Quotient, Cross Industry Location Quotient and Flegg's Location Quotient) among the sectoral rankings from the type I multipliers and elasticities are scrutinized. For the target of the paper, the economy of Western Macedonia region in Greece has been used as an example for the secondary simulation. The results show that the type I multipliers and elasticities are not end up to same sectoral rankings due to their different definition and are not the same suitable indicators for short-term and long-term developmental planning. Nevertheless, their coexistence could improve the economic prosperity both on short and long period of time. As for the used location quotient, the FLQ technique improves the proximity of the sectoral rankings that are generated from all the used indicators and also reduces the magnitudes of type I multipliers and elasticities.

Keywords: Input-output analysis, regional planning, multipliers, elasticities, non-survey techniques
JEL Classification: R11, R15

1. Introduction

In the absence of necessary input-output data on regional level, non-survey techniques constitute the main source for regional development planning. The prohibitive cost and time-consuming procedure of survey techniques (Boster and Martin, 1972; Morrison and Smith, 1974; Flegg et al., 1995) have shifted analysts' concern towards improving non-survey techniques, in order to succeed upper simulations of the regional I-O tables (Round, 1978; Jensen et al., 1979; Flegg at al., 1995; Flegg and Webber, 1997, 2000). A considerable number of authors have compared survey and non-survey methods, with emphasis to the exposed discrepancies on the depiction of a regional economy. These deviations pertain to differences on the intraregional-intersectoral I-O flows, as well as on the estimates of the individual and the cumulative direct and indirect effects (backward linkages). Therefore the propensity of non-survey methods to produce understated regional imports and overstated regional coefficients has been examined by several authors (Boster and Martin, 1972; Morrison and Smith, 1974; Flegg et al., 1995; Tohmo, 2004).

In practice, the predominant issue for policy-makers regarding developmental prospects of a region is the sectoral rankings. Precise computations of the impact magnitudes, generated by growth of each sector, constitute supplementary information that could be obtained by the used indicators. The non-survey techniques yield these magnitudes only as an approach of the corresponding real magnitudes. Thus, necessary modifications in economic structure, required infrastructure, the way to take advantage from the regional specializations and attain an endogenous development without being a closed economy, are firstly indicated by sectoral rankings.

In the literature there are studies that simultaneously used backward linkages or total impact indicators (initial, direct and indirect effects) and elasticities to define the regional sectoral priorities for the developmental planning. There is no literature about the emerged difference on the sectoral rankings when the type I multipliers and elasticities both are in use, in the framework of this planning. The question is if these indicators generate same sectoral rankings or no and why. It must be clear that the topic of this paper is not to propose one more indicator, but to inquiry the benefits of the coexistence of the type I multipliers and elasticities for the developmental planning on the

basis of the short-term and long-term economic prosperity in an area.

Moreover, in the literature there are no studies for the proximity of the sectoral rankings that are generated from the elasticities (output, income and employment) when are used SLQ, CILQ and FLQ method. The paper studies this proximity, as well.

The economy of West Macedonia region in northwest Greece is simulated with SLQ, CILQ and FLQ techniques as an example for the analysis. In the first session, the applied model and the region of West Macedonia are briefly presented. The following session presents the results and illustrates why the multipliers and elasticities are not both suitable for short-term and long-term planning. The impacts of the non-survey techniques on the sectoral rankings are defined. The last session has conclusions and discusses policy implications on the basis of the paper's logic.

2. Methodology and Data

Model's Demonstration

Input – Output (I-O) analysis within a demand-driven Leontief's static model (Oosterhaven et al. 2001; De Mesnard, 2004) is founded on the following equations:

$$A = Z\hat{X}^{-1} \quad (1)$$

$$X = AX + Y \Rightarrow X = (I - A)^{-1}Y \quad (2)$$

in which : Z is the intersectoral transactions matrix, X denotes the vector of sectoral gross output, $\hat{X}$ constitutes a conversion of the vector X as diagonal matrix, Y depicts the vector of final demand, $(I - A)^{-1}$ is called the Leontief inverse matrix and A reflects the direct requirements matrix (Leontief, 1936, 1937; Miller & Blair, 1985; Dietzenbacher, 2001, 2005).

For better understanding the structure and dynamic of a regional economy, intraregional I-O coefficients could be derived from the corresponding national data (Su, 1970; Boster and Martin, 1972; Morrison & Smith, 1974; Flegg et al., 1995). The regional I-O tables have been simulated by three different non-survey techniques – SLQ, CILQ and FLQ – from the latest available I-O national table for 1999 (National Statistical Service of Greece, 2006). For the analysis a scheme of 29 sectors was used. For each of these non-survey techniques, the output, income and employment type I multipliers and elasticities have been computed.

Location Quotients

The simplest employment-based type of LQ (SLQ) is specified as:

$$SLQ_i = (E_i^R / E^R) / (E_i^N / E^N) \quad (3)$$

in which : E is the employment, the subscript i indicates the selling sector and the superscripts R and N pertain to the region and the nation respectively. SLQ_i is the regional to national employment ratio for the sector i.

The Cross Industry Location Quotient is stipulated as:

$$CILQ_{ij} = (E_i^R / E_i^N) / (E_j^R / E_j^N) \quad (4)$$

in which : the subscript j represents the purchasing sector and $CILQ_{ij}$ expresses the ability of the regional selling sector i to meet the requirements of the regional purchasing sector j.

Flegg's Location Quotient was suggested as an improvement of the previous ratios because it takes into consideration the relative magnitude of the selling and purchasing sectors, as well as the relative magnitude of the region (Flegg et al., 1995).

$$FLQ_{ij} = CILQ_{ij} \lambda_r^\beta \quad (5)$$

In which: λ_r^β is the attendant function:

$\lambda_r^\beta = [(E^R / E^N) / \log_2 [1 + (E^R / E^N)]]^\beta$, $\beta \geq 1$, in order to capture the relative size of the selected region.

Following Brand's criticism (Brand, 1997) on the parameter β of this location quotient, Flegg and Webber (2000) modified the FLQ as follows:

$$FLQ_{ij} = CILQ_{ij} \lambda^* \quad (6)$$

In which: $\lambda^* = \log_2 [1 + (E^R / E^N)]^\delta$, $0 \leq \delta \leq 1$

The previous location quotients have been used for the derivation of the intraregional I-O coefficients of West Macedonia. The derivation is based on two principles. When the LQs' are

greater than one, the national technical coefficients are considered equivalents to the intraregional coefficients. In the opposite case (LQs' are less than one), the intraregional coefficients are:

$$a_{ij}^{R} = usedLQ \text{ x } a_{ij}^{N} \quad (7)$$

It is empirically found that the parameter β of FLQ is preferred to take values between 1 and 2, while the parameter δ to take values between 0.2 and 0.3 (Flegg and Webber, 2000; Tohmo, 2004). According to that, in order to simulate the regional I-O table, because of the relative size of the region as a proportion of the size of the country, the value 2 was chosen for the parameter β and the parameter δ takes the value 0.20894 (δ≈0.2, when β=2).

Multipliers and Elasticities

In this section the indicators in use are described. Type I output (OM_j), income (IM_j) and employment (EM_j) multipliers are calculated from the above fractions (Jensen et al., 1979; West & Jensen, 1980; Miller & Blair, 1985):

OM_j = Impacts on Total Gross Output of an Economy under Study / Due to a 1€ Initial Increase Directly on the Output of a Sector j (8)

IM_j = Impacts on Total Income of an Economy under Study / Due to a 1€ Initial Increase Directly on the Income of a Sector j (9)

EM_j = Impacts on the Total Employment of an Economy under Study / Due to a 1 person Initial Increase Directly on the Employment of a Sector j (10)

From their definition the type I multipliers are differentiated from the backward linkages and the total impact indicators (initial, direct and indirect). Specifically the definition of the type I multipliers is in a such way that are not influenced from the final demand. This means that the type I multipliers are not biased in favour of the sectors with high sales directly to the final demand and this is an advantage for the type I multipliers. However, the type I multipliers have the inherent disadvantage to ignore the relative size of the sectors in an economy, but the ability of a sector to spread growing effects on the economy as a whole depends on its relative size. This means that the type I multipliers captures only the potential ability of sectors to bring about output, income and employment effects on the whole economy due to the sectoral interdependence. Of course this

disadvantage could mislead the policy-makers to define the developmental priorities for the economy.

Elasticity's indicators are attempted to regard the relative magnitude of a sector (in terms of total sales to final demand) as an important factor in the assessment process of the developmental importance of this sector. Elasticities yield sectoral rankings taking the ability of a sector to spread growing effects due to its size in the economy into consideration. The size of a sector (in terms of total sales to final demand) influences its ability to bring about developmental impacts in an economy. Due to the fact that the elasticities are weighted in terms of total sales to final demand, some sectors with important forward and backward linkages without the bulk of their output to being directed to the final demand are possibly presented as less important that indeed they are. However these sectors support intermediate demand and productive chain.

Output (OE_j), income (IE_j) and employment elasticities (EE_j) are defined as (Ciobanu et al., 2004):

$$OE_j = \sum_{i=1}^{n} b_{ij}(Y_j / T) = OM_j(Y_j / T) \quad (11)$$

$$IE_j = [[\sum_{i=1}^{n} b_{ij}(I_i / X_j)]/(I_j / X_j)](Y_j / T) \quad (12)$$

$$EE_j = [[\sum_{i=1}^{n} b_{ij}(E_i / X_j)]/(E_j / X_j)](Y_j / T) \quad (13)$$

In which: T indicates the total gross output of the economy as a whole. These indicators denote the gradual changes on the gross output, total income and total employment magnitudes of an economy, respectively, due to a one percent change in sales to final demand of a sector j.

Value added multipliers on the base of direct and indirect value added coefficients (backward linkages) are founded in literature (Dietzenbacher, 2005). Apparently, the elasticities can be weighted in terms of sectoral value added to total gross output, as well. In this case the revealed sectoral rankings will be different and the emphasis on another point. The topic of the paper is not to propose one more indicator, but to compare the differences on the sectoral rankings that are produced from the type I multipliers and elasticities and then to underline the necessity of their coexistence for the definition of the developmental priorities.

The Region under Study

The most important sectors, regarding their participation both on the regional gross output and the employment magnitudes, are presented in table 1. The agriculture-livestock-hunting-forestry, the trade, the constructions and the textiles-clothes-fur products are the sectors with the higher contribution on the formation of the total regional employment. Approximately 49% of total regional employment are engaged in the above four sectors. The energy sector seems to be more significant in terms of gross output (10.4% of the total regional gross output) rather than in terms of employment (5.5% of the total regional employment). The region of West Macedonia produces approximately 75% of the total energy produced in Greece, but the regional employment in the energy sector constitutes only 14.4% of the national employment in the same sector.

Table 1. Sectors with important contribution both on the total gross output and employment magnitudes of the region

Sectors	Proportion of the sectoral employment to the total employment in the region.	Proportion of the sectoral gross output to the total gross output in the region, based on data generated by the SLQ method.	Proportion of the sectoral gross output to the total gross output in the region, based on data generated by the CILQ method.	Proportion of the sectoral gross output to the total gross output in the region, based on data generated by the FLQ method.
Agriculture, Livestock, Hunting and Forestry	19.27%	6.95%	6.95%	6.92%
Mining / Energy's Materials	4.91%	6.87%	6.87%	6.84%
Foodstuff - Beverages and Tobacco Products	1.73%	4.15%	4.15%	4.13%
Textiles, Clothes and Fur Products	8.41%	11.98%	11.98%	11.92%
Energy	5.51%	10.45%	10.44%	10.39%
Constructions	9.46%	10.86%	10.86%	10.81%
Trade	11.38%	7.20%	7.20%	7.16%
Hotels and Restaurants	4.73%	5.39%	5.38%	5.36%
Transportations and Communications	4.14%	4.15%	4.15%	4.13%
Real Estate Management	2.92%	5.48%	5.47%	5.45%
National Safety and Insurance	7.78%	5.52%	5.52%	5.50%
Education	7.78%	3.42%	3.42%	3.40%

Notes: 1. Obtained by calculations.
2. The employment proportions are obtained from available data of the National Statistical Service of Greece.
3. The gross output proportions are revealed by the simulations data (by SLQ, CILQ and FLQ method).

As far as the technique part of the table 1, a fundamental observation is that the used no survey techniques (SLQ, CILQ or FLQ) do not seem to bias the participation of each sector in the

formation of the total gross output of the region.

3. Results and Discussion

Table 2 indicates that the foodstuff-beverages and tobacco products, the textiles-clothes and fur products, the oil products, the metal and non-metal products are on the top of type I multipliers derived rankings. Besides the banking sector, hotels and restaurants there are no other service sector which expose high magnitudes for type I multipliers. The estimated magnitudes of type I multipliers are reduced when the FLQ technique is used. The CILQ technique has provided the higher type I multipliers.

The challenge is whether the above sectors can be considered critical for the selected region. Under the main disadvantage of type I multipliers it is clear that the determination of some sectors as more significant for the developmental planning of the region is risky.

Elasticities indicators mostly emphasize on the virtual impacts that could be induced from a sector's extension owing to its relative size at the present time, rather than on the potential impacts that could be incurred as a future result of its growth. Consequently, elasticities signify the sectors where developmental planning must focus, when the desirable aim is to attain an output, income or employment enlargement on the whole economy, during a relatively short period of time.

In contrast to elasticities, multipliers signify the sectors where the developmental planning must be turned, when the predominant aim is to improve the structure of the economy for the long-term. Multipliers essentially direct policy-makers towards those sectors that have the dynamic to get a more important role in the future, due to the specific structure, intersectoral flows and specialization of the economy. It is not necessary for these sectors to have a significant magnitude at present. Furthermore, it is uncertain whether these sectors could generate all the multiplicative effects drawn by their multipliers magnitudes. Such sectors are likely to be kept away from the top of the sectoral classifications that are derived from the elasticity's indicators.

Observing table 3 it appears that the sectors regarded as the most important for the economy of the selected region by the elasticity's indicators are the following: textiles-clothes and fur products, constructions, energy, energy's materials mining, hotels and restaurants, national safety and insurance, education, trade, foodstuff-beverages and tobacco products and real-estate management.

The differences between multipliers and elasticities, regarding the derived sectoral rankings, underline the ability of elasticities to take into account the relative size of the sectors (compare rankings in tables 2 and 3 and see the information for the sectoral participation on the formation of the regional gross output and employment in table 1).

The information of both the elasticities and the multipliers should coexist when making developmental policy. Thus, the decision making process could compose a more logical development planning as for the distribution of the available funds (for subsidies) among the various sectors. A pattern like this, could refine on the economic prosperity level in a relatively short time, and on the other hand could re-form the structure of the economy in the future so as to take advantage of the specializations and to ameliorate its efficiency.

The sector of textiles-clothes and fur products has the ability to bring about significant impacts on the total gross output, income and employment of the region within a relatively short period of time, mostly due to its size (table 1 and 3 – the ranking with the elasticity's indicators). However, by the sectors' ranking and using the multipliers criterion there is a belief that there are other more dynamic sectors allowing for further development. Among them, the most important is that of foodstuff-beverages and tobacco products. This sector has the potential to spill over higher multiplicative effects on gross output, income and employment magnitudes on the regional economy simultaneously (see type I multipliers on table 2). Nevertheless, this ability is confined into the relatively small size of the sector (table 1 and the elasticity's rankings in table 3). The reinforcement of private investors' interest for this sector within a suitable developmental planning and the enlargement of the sector could make it the most important sector for the region in the future, due to its multiplicative ability. Hotels and restaurants constitute a promising economic activity in West Macedonia. This sector has the capacity to improve more its multiplicative ability to spread growing impacts on the economy as a whole within its enlargement in the future (tables 1,2&3).

Table 2. Output, Income and Employment Multipliers

Sectors	OM by SLQ	OM by CILQ	OM by FLQ	EM by SLQ	EM by CILQ	EM by FLQ	IM by SLQ	IM by CILQ	IM by FLQ
Agriculture, Livestock, Hunting and Forestry	1.33273 (08)	1.34398 (14)	1.14425 (17)	1.24490 (14)	1.24819 (21)	1.10738 (22)	1.28557 (15)	1.29319 (17)	1.12432 (19)
Fishing	1.16161 (21)	1.26988 (22)	1.22500 (08)	1.18468 (20)	1.28578 (17)	1.23042 (12)	1.10579 (26)	1.17208 (26)	1.13943 (16)
Mining / Energy's Materials	1.27049 (14)	1.28778 (21)	1.12610 (21)	1.23948 (15)	1.25781 (20)	1.11113 (21)	1.26220 (16)	1.27857 (18)	1.12292 (20)
Mining / Non-Energy's Materials	1.04310 (28)	1.04727 (29)	1.01950 (29)	1.13640 (25)	1.15204 (26)	1.07801 (26)	1.19035 (22)	1.20688 (23)	1.11030 (23)
Foodstuff - Beverages and Tobacco Products	1.71414 (01)	1.90534 (02)	1.53938 (02)	4.67035 (01)	5.13032 (01)	3.80222 (01)	2.93126 (01)	3.31953 (01)	2.46562 (01)
Textiles, Clothes and Fur Products	1.45624 (03)	1.47872 (08)	1.19451 (11)	1.75288 (03)	1.77700 (06)	1.31506 (09)	1.71004 (02)	1.74222 (07)	1.30081 (10)
Leather Products	1.28986 (10)	1.30640 (18)	1.12837 (20)	1.35641 (09)	1.37573 (13)	1.15512 (16)	1.38724 (09)	1.41326 (13)	1.16953 (14)
Wood Products	1.28680 (11)	1.42363 (09)	1.18754 (12)	1.31386 (11)	1.42806 (12)	1.20242 (14)	1.43213 (07)	1.61704 (11)	1.27750 (11)
Paper Products and Printings	1.17079 (19)	1.54638 (06)	1.36515 (05)	1.20143 (05)	1.57571 (11)	1.39363 (11)	1.32265 (12)	1.83401 (06)	1.59713 (05)
Oil Products	1.62353 (02)	1.67944 (04)	1.55588 (01)	2.46937 (02)	2.77946 (02)	2.07372 (02)	1.58358 (05)	1.71322 (09)	1.42645 (07)
Chemical Products	1.11387 (24)	1.30989 (17)	1.20105 (10)	1.38546 (07)	1.81285 (04)	1.59420 (03)	1.43979 (06)	1.92274 (04)	1.70223 (03)
Rubber and Plastic Products	1.16915 (20)	1.53612 (07)	1.46673 (04)	1.23662 (16)	1.57952 (09)	1.50405 (04)	1.37383 (10)	1.87981 (05)	1.77397 (02)
Non-Metal Products	1.33288 (07)	1.58715 (05)	1.34961(06)	1.36216 (08)	1.65765 (07)	1.38916 (07)	1.39182 (08)	1.66902 (10)	1.41051 (08)
Metal Products	1.34308 (06)	1.68447 (03)	1.30784 (07)	1.39516 (06)	1.78987 (05)	1.35593 (08)	1.60827 (04)	2.15028 (03)	1.54245 (06)
Machinery	1.07464 (26)	1.08375 (27)	1.03591 (27)	1.18118 (21)	1.20627 (25)	1.08702 (25)	1.29201 (14)	1.33765 (16)	1.13925 (17)
Electrical Machinery and Office Equipment	1.10485 (25)	1.23875 (23)	1.10867 (23)	1.27630 (12)	1.61038 (08)	1.28510 (10)	1.32879 (11)	1.71878 (08)	1.33648 (09)
Transportation Means	1.03928 (29)	1.08856 (26)	1.04800 (26)	1.10078 (27)	1.21260 (24)	1.12258 (19)	1.10812 (25)	1.22379 (22)	1.12935 (18)
Others Manufactured Industries	1.19210 (18)	1.35481 (13)	1.20898 (09)	1.19402 (18)	1.33704 (15)	1.21049 (13)	1.21068 (20)	1.37973 (14)	1.22821 (12)
Energy	1.35699 (05)	1.36863 (12)	1.16332 (15)	1.32446 (10)	1.34125 (14)	1.14170 (17)	1.19822 (21)	1.20669 (24)	1.08808 (25)
Constuction	1.28186 (12)	1.32993 (15)	1.13414 (18)	1.25840 (13)	1.30097 (16)	1.12252 (20)	1.21185 (19)	1.25022 (21)	1.10004 (24)
Trade	1.24027 (15)	1.39333 (11)	1.17468 (14)	1.13331 (26)	1.21300 (23)	1.09641 (23)	1.22096 (17)	1.35468 (15)	1.16146 (15)
Hotels and Restaurants	1.30635 (09)	1.42234 (10)	1.18693 (13)	1.42350 (05)	1.56097 (11)	1.25028 (11)	1.31201 (13)	1.42307 (12)	1.18962 (13)
Transportations and Communications	1.20313 (17)	1.32521 (16)	1.14765 (16)	1.17272 (23)	1.27457 (18)	1.12500 (18)	1.15926 (24)	1.25185 (20)	1.11616 (22)
Banking / Finance	1.44442 (04)	2.41132 (01)	1.48154 (03)	1.46280 (04)	2.44133 (03)	1.50033 (05)	1.62186 (03)	2.88459 (02)	1.67121 (04)
Real Estate Management	1.11426 (23)	1.16098 (25)	1.09874 (24)	1.19320 (19)	1.26178 (19)	1.16777 (15)	1.07460 (27)	1.10664 (27)	1.06573 (27)
National Safety and Insurance	1.27174 (13)	1.28862 (20)	1.12602 (22)	1.13949 (24)	1.14883 (27)	1.06350 (27)	1.16763 (23)	1.17825 (25)	1.07765 (26)
Education	1.05380 (27)	1.05740 (28)	1.02509 (28)	1.01862 (29)	1.01988 (29)	1.00869 (29)	1.03886 (29)	1.04082 (29)	1.01841 (29)
Health Services	1.12172 (22)	1.16553 (24)	1.07703 (25)	1.07640 (28)	1.10231 (28)	1.04720 (28)	1.07395 (28)	1.09930 (28)	1.04677 (28)
Other Public Services	1.23828 (16)	1.29427 (19)	1.12904 (19)	1.17520 (22)	1.21566 (22)	1.09553 (24)	1.21953 (18)	1.26998 (19)	1.12000 (21)

Notes: 1. Obtained by calculations using Equations 8, 9 and 10, respectively.
2. Numbers in parentheses represent sectoral rankings.

Table 3. Output, Income and Employment Elasticities

Sectors	OE by SLQ	OE by CILQ	OE by FLQ	EE by SLQ	EE by CILQ	EE by FLQ	IE by SLQ	IE by CILQ	IE by FLQ
Agricultural, Livestock, Hunting and Forestry	0.04280 (09)	0.04316 (09)	0.02234 (13)	0.03909 (11)	0.04143 (09)	0.02229 (13)	0.03868 (11)	0.04129 (09)	0.02230 (13)
Fishing	0.00062 (26)	0.00058 (25)	0.00056 (24)	0.00065 (26)	0.00059 (25)	0.00052 (24)	0.00064 (26)	0.00059 (25)	0.00052 (24)
Mining / Energy's Materials	0.08471 (04)	0.08586 (04)	0.07420 (04)	0.08115 (04)	0.08600 (04)	0.07523 (04)	0.08030 (04)	0.08571 (04)	0.07528 (04)
Mining / Non-Energy's Materials	0.00000 (29)	0.00000 (29)	0.00000 (29)	0.00000 (29)	0.00000 (29)	0.00000 (27)	0.00000 (29)	0.00000 (29)	0.00000 (27)
Foods - Beverages and Tobacco Products	0.05669 (08)	0.05636 (08)	0.04529 (08)	0.04026 (10)	0.03816 (10)	0.03359 (09)	0.03984 (10)	0.03803 (10)	0.03361 (09)
Textiles, Clothes and Fur Products	0.14360 (01)	0.14581 (01)	0.11680 (01)	0.12002 (02)	0.12720 (02)	0.11164 (02)	0.11877 (02)	0.12677 (02)	0.11171 (02)
Leather Products	0.00642 (19)	0.00650 (17)	0.00558 (18)	0.00606 (19)	0.00642 (18)	0.00564 (18)	0.00599 (19)	0.00640 (18)	0.00565 (18)
Wood Products	0.00012 (27)	0.00025 (27)	0.00000 (27)	0.00012 (27)	0.00023 (27)	0.00000 (28)	0.00012 (27)	0.00023 (27)	0.00000 (28)
Paper Products and Printings	0.00079 (25)	0.00057 (26)	0.00050 (26)	0.00082 (25)	0.00048 (26)	0.00042 (25)	0.00081 (25)	0.00047 (26)	0.00042 (25)
Oil Products	0.00263 (23)	0.00080 (24)	0.00052 (25)	0.00197 (23)	0.00062 (24)	0.00038 (26)	0.00195 (23)	0.00062 (24)	0.00038 (26)
Chemical Products	0.00285 (22)	0.00217 (22)	0.00194 (22)	0.00311 (22)	0.00214 (22)	0.00184 (22)	0.00308 (22)	0.00213 (22)	0.00184 (22)
Rubber and Plastic Products	0.00001 (28)	0.00000 (28)	0.00000 (28)	0.00001 (28)	0.00000 (28)	0.00000 (29)	0.00001 (28)	0.00000 (28)	0.00000 (29)
Non-Metal Products	0.00142 (24)	0.00115 (23)	0.00097 (23)	0.00130 (24)	0.00094 (23)	0.00082 (23)	0.00129 (24)	0.00093 (23)	0.00082 (23)
Metal Products	0.00543 (20)	0.00308 (21)	0.00215 (21)	0.00492 (20)	0.00236 (21)	0.00187 (21)	0.00487 (20)	0.00235 (21)	0.00188 (21)
Machinery	0.01880 (14)	0.01896 (14)	0.01777 (14)	0.02129 (24)	0.02257 (14)	0.01958 (14)	0.02107 (14)	0.02249 (14)	0.01960 (14)
Electrical Machinery and Office Equipment	0.00643 (18)	0.00636 (18)	0.00565 (17)	0.00708 (18)	0.00663 (17)	0.00582 (17)	0.00701 (18)	0.00660 (17)	0.00582 (17)
Tranportation Means	0.00838 (17)	0.00811 (16)	0.00776 (16)	0.00982 (17)	0.00961 (16)	0.00845 (16)	0.00972 (17)	0.00957 (16)	0.00846 (16)
Others Manufactured Industries	0.00474 (21)	0.00479 (20)	0.00424 (19)	0.00484 (21)	0.00456 (19)	0.00401 (19)	0.00479 (21)	0.00454 (19)	0.00401 (19)
Energy	0.11531 (03)	0.11630 (03)	0.09577 (03)	0.10343 (03)	0.10962 (03)	0.09399 (03)	0.10235 (03)	0.10924 (03)	0.09405 (03)
Constuction	0.13064 (02)	0.13554 (02)	0.11184 (02)	0.12405 (01)	0.13147 (01)	0.11259 (01)	0.12275 (01)	0.13101 (01)	0.11266 (01)
Trade	0.06179 (07)	0.06396 (07)	0.05220 (07)	0.06064 (07)	0.05921 (07)	0.05074 (07)	0.06000 (07)	0.05901 (07)	0.05077 (07)
Hotels and Restaurants	0.06888 (06)	0.07467 (05)	0.06185 (06)	0.06418 (06)	0.06772 (06)	0.05949 (06)	0.06351 (06)	0.06748 (06)	0.05953 (06)
Trasportations and Communications	0.03632 (11)	0.03455 (11)	0.02928 (11)	0.03674 (12)	0.03363 (12)	0.02913 (12)	0.03636 (12)	0.03352 (12)	0.02915 (12)
Banking / Finance	0.01183 (16)	0.00516 (19)	0.00301 (20)	0.00997 (16)	0.00276 (20)	0.00232 (20)	0.00987 (16)	0.00275 (20)	0.00232 (20)
Real Estate Management	0.03758 (10)	0.03281 (12)	0.03038 (10)	0.04105 (09)	0.03645 (11)	0.03157 (10)	0.04062 (09)	0.03632 (11)	0.03159 (10)
National Safety and Insurance	0.07023 (05)	0.07116 (06)	0.06190 (05)	0.06721 (05)	0.07124 (05)	0.06276 (05)	0.06651 (05)	0.07099 (05)	0.06280 (05)
Education	0.03560 (12)	0.03572 (10)	0.03436 (09)	0.04112 (08)	0.04358 (08)	0.03827 (08)	0.04069 (08)	0.04343 (08)	0.03829 (08)
Health Services	0.02915 (13)	0.03024 (13)	0.02779 (12)	0.03163 (13)	0.03347 (13)	0.02946 (11)	0.03130 (13)	0.03336 (13)	0.02948 (11)
Other Public Services	0.01597 (15)	0.01561 (15)	0.01244 (15)	0.01570 (15)	0.01556 (15)	0.01258 (15)	0.01554 (15)	0.01551 (15)	0.01259 (15)

Notes: 1. Obtained by calculations using Equations 11, 12 and 13, respectively.
2. Numbers in parentheses represent sectoral rankings.

If the desirable aim is to attain an amelioration of the economic prosperity level into a relatively short period of time, some other sectors that could help to achieve this purpose are constructions, energy and trade (see table 3) due to their size (compare table 2).

If the policy-makers look for a more efficient composition of the economic structure in a long-term period, then it would be preferable for them to re-orientate funds towards those sectors that reveal the higher type I multipliers. Apart from foodstuff-beverages and tobacco products sector, banking and metal products are sectors which have a considerable potential ability to bring about multiplicative effects on regional output, income and employment magnitudes (table 2). However, this ability is constrained from their relative small size. Specifically, the banking sector contributes with 1.2% on the formation of total regional employment and 1.7% on the formation of regional gross output (see table 1 and 3). As for the metal products sector, its participation is 0.9% and 1.3%, respectively (see table 1 and 3).

Table 4. Correlation Coefficients of the Sectoral Rankings from Type I Multipliers and Elasticities

Multipliers	Type I OM			Type I EM			Type I IM		
	OM by SLQ	**OM by CILQ**	**OM by FLQ**	**EM by SLQ**	**EM by CILQ**	**EM by FLQ**	**IM by SLQ**	**IM by CILQ**	**IM by FLQ**
OM by SLQ	1.000								
OM by CILQ	0.809	1.000							
OM by FLQ	0.638	0.908	1.000						
EM by SLQ	0.762	0.737	0.682	1.000					
EM by CILQ	0.600	0.796	0.826	0.908	1.000				
EM by FLQ	0.440	0.736	0.850	0.790	0.955	1.000			
IM by SLQ	0.627	0.755	0.673	0.857	0.849	0.744	1.000		
IM by CILQ	0.468	0.766	0.731	0.753	0.861	0.817	0.938	1.000	
IM by FLQ	0.363	0.726	0.798	0.688	0.857	0.884	0.862	0.953	1.000
Elasticities	**OE**			**EE**			**IE**		
	OE by SLQ	**OE by CILQ**	**OE by FLQ**	**EE by SLQ**	**EE by CILQ**	**EE by FLQ**	**IE by SLQ**	**IE by CILQ**	**IE by FLQ**
OE by SLQ	1.000								
OE by CILQ	0.993	1.000							
OE by FLQ	0.985	0.993	1.000						
EE by SLQ	0.993	0.989	0.988	1.000					
EE by CILQ	0.987	0.996	0.993	0.991	1.000				
EE by FLQ	0.979	0.988	0.997	0.987	0.992	1.000			
IE by SLQ	0.993	0.989	0.988	1.000	0.991	0.987	1.000		
IE by CILQ	0.987	0.996	0.993	0.991	1.000	0.992	0.991	1.000	
IE by FLQ	0.979	0.988	0.997	0.987	0.992	1.000	0.987	0.992	1.000

Notes: Obtained by calculations using the data of tables 2 and 3.

In table 4 the correlation coefficients for the sectoral classifications that are revealed from

type I multipliers and elasticities are presented. The used non-survey techniques affect in a considerable extend the sectoral rankings of type I output multipliers (0.809, 0.638, 0.908). In the case of type I employment (0.908, 0.790, 0.955) and income (0.938, 0.862, 0.953) multipliers respectively, the influence of the used non-survey techniques is smaller.

CILQ and FLQ techniques improve the similarity among the generated rankings (0.908, 0.955 and 0.953 respectively) from all type I multipliers (output, employment and income). In contrast, SLQ and FLQ techniques generate the more dissimilar rankings (0.638, 0.790 and 0.862, respectively).

Comparing in pairs the sectoral classifications between type I output and employment multipliers, the correlation coefficients show a moderate proximity. However, this correlation is improved when data for computation of both the above multipliers have resulted from the FLQ technique (0.850). From the classifications between the type I output and income multipliers (0.798), the deductions are similarly. The combining result from the classifications regarding the type I employment and income multipliers is that there are enough significant similarities regardless from the used non-survey technique. Particularly when the computations of the multipliers are based on data derived from the FLQ technique, the proximity is improved (0.884).

In pairs, the sectoral rankings from the elasticities agree to each other in a large extend, regardless of the used non-survey techniques. The correlation coefficients are almost one, even if the rankings of the various elasticity indicators have come from the data of other non-survey techniques. Specifically, between employment and income elasticities, the sectoral classifications reveal an absolute coincidence (the correlation coefficients are equal to one) when the data for their computation have originated from the same non-survey technique. Of course, this is just a coincidence and not a rule. The elasticities are likely to have a propensity to generate similar rankings when the number of the large sectors of the economy is small. The above identification concerns only the sectoral rankings and not the absolute magnitudes of these indicators.

Finally, the FLQ technique tends to generate smaller magnitudes for the elasticities, than the other techniques.

4. Conclusions

In this paper, peculiarities and usefulness of type I multipliers, elasticities and location quotients for the regional development planning was analyzed and a distinction between short-term and long-term planning was adopted. The economic structure of West Macedonia region was used as an example for this purpose.

The empirical results show that multipliers and elasticities are not suitable at the same extend for short-term and long-term developmental planning. Multipliers essentially direct policy-makers to those sectors that have a potential ability to play more important role in the future, based on the specialties of the economic structure of the region. It is uncertain in the present whether these sectors could generate the whole multiplicative effects which reveal from their multipliers magnitudes. A developmental planning based exclusively on the type I multipliers is not a definite improvement of the economic prosperity in an area, in the present. Thus, a political cost exists for any government, when its developmental policy is based exclusively on the type I multipliers.

On the contrast, elasticity's indicators mostly emphasize on the virtual impacts that could be induced from a sector's extension, owing to its relative size in the present time, rather than on the potential impacts that could be incurred as a future result of its enlargement. Consequently, the elasticities illustrate the sectors where the developmental planning must be turned to, when the aim is to attain output, income or employment growth on the economy within a relatively short period of time. When the developmental policy is based on the elasticities, the government on the one hand avoids political cost, but on the other hand does not adopt a strategy for the alteration of the economic structure of a region towards a more efficient one in the future. In this case, there is a transition of economic prosperity from the future to the present time, which causes serious problems to the physical recourses, the environment and the ability of the next generation to cover their needs and finally the political cost is just transferred enlarged to the future.

The coexistence of multipliers and elasticities for the developmental planning improves the economic prosperity both in short and long term and creates the necessary circumstances for a smooth transition of the economic structure of a region towards a more efficient one. The political cost between the present and the future is cumulatively minimized, the development

process has mildness impacts on the environment and next generations can have enhanced standard of living in a more effective economic environment. The main disadvantage of type I multipliers is the ignorance of the relevant size of the sectors in the region. Elasticity's indicators have the advantage to take into account this agent. However, elasticities are influenced by the participation of the sectoral output in the final demand, due to their definition.

Regarding sectoral classifications, type I output multipliers are more influenced by the used non-survey techniques, than type I employment and income multipliers. CILQ and FLQ techniques improve the similarity among the generated rankings from all type I multipliers (output, employment and income). In contrast, SLQ and FLQ technique generates more dissimilar rankings. In pairs, the FLQ technique improves the similarity of the sectoral rankings among type I output, income and employment multipliers.

The sectoral rankings from the elasticity's indicators do not seem to have been influenced from the used non-survey techniques. The elasticities are likely to have a propensity to generate similar rankings when the number of the large sectors of the economy is small. In pairs, sectoral classifications from the elasticity's indicators almost present a complete agreement, regardless of the used non-survey techniques.

CILQ technique has provided higher magnitude for the type I multipliers, whereas FLQ technique has generated smaller type I multipliers and elasticities.

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