Labor Productivity of the Agricultural Sector in Greece: Determinant Factors and Interregional Differences Analysis

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1. Introduction

One fundamental factor that decisively affects the existence and maintenance of inequalities as regards regional levels of development - an issue with an economic, social and political dimension - is the variation in productivity rates in some or all economic sectors on a regional basis. Therefore, any attempt to reduce interregional economic inequalities calls for, in addition to other factors, an inquiry into the determinants of productivity growth in the various sectors of the economy and a calculation of the relation between each determinant factor and productivity.

Productivity expresses the degree of exploitation of the most important factor in the productive process, i.e., labor, and is related to the degree of rational and effective use of the available productive factors. The relevant level and diachronic variation of a business' productivity or of the economy of a region are the most representative indicators of that company's viability and of the developmental potential of the region's economy. In general, productivity is one of the main elements for the economic success of a region and it is linked to the profitability and viability of companies. Moreover, it is a reliable indicator of a country's economic progress and development at a diachronic, regional, sectoral, and also international level (Mergos and Karagiannis, 1997; Polyzos, 2003).

The term "labor productivity" is quantitatively determined by comparing the labor cost with the total labor effi-

Abstract

Labor productivity plays a crucial role in shaping the competitiveness of a specific sector or of the whole economy, and helps create the necessary conditions for economic development. When studied in relation to the broader "regional problem", the existing differences in regional economic productivity prove to be a decisive factor for the emergence of regional inequalities. This paper examines labor productivity differences in the agricultural sector of various Greek prefectures, analyzes the factors that determine the productivity of the sector, and investigate empirically the relation between productivity and its determinant factors.

Résumé

La productivité du travail joue un rôle fondamental dans la définition de la compétitivité d'un secteur spécifique ou de l'économie tout entière et aide à créer les conditions nécessaires pour le développement économique. Si on considère la dimension du "problème régional", on constate que les différences existantes dans la productivité économique régionale constituent un facteur décisif pour l'apparition des inégalités régionales. Dans cet article, on examine les différences en termes de productivité du travail dans le secteur agricole de diverses préfectures grecques, on analyse les facteurs qui déterminent la productivité du secteur et on évalue empiriquement la relation entre la productivité et ses facteurs déterminants.

ciency, which is usually depicted by the amount of produced products. In literature, the term is sometimes used to express the productivity of labor and some other times the total profitability of the production factors. Furthermore, according to another broader definition, productivity refers to production processes and is quantitatively expressed as the quantity of produced goods (output) divided by the units of the production factors used (input) (Polyzos, 2003).

The application of an effective regional policy, amongst other things, also involves increasing the economic productivity of less developed regions -which can be achieved through a variation of as many productivity determinants as it is feasible and economically beneficial- and improving their competitive advantage. Therefore, an identification and analysis of productivity growth determinants for individual sectors or for the regional economy can help locating the weaknesses which do not permit a full exploitation of productive factors, and balancing out economic inequalities.

It is a common theoretical view that the agricultural sector plays a critical role in regional development and in the developmental progress of Greece as a whole. The particular importance attributed to sectors involved in manufacturing of agricultural products and their horizontal connections with other sectors (e.g., tourism, trade) determine the form and rate of economic development to a certain extent. Agricultural development, and more specifically the modernization and restructuring of the agricultural sector, is the result of numerous parameters of a physical, technological, economic, social, political, cultural and educational nature. The technological aspect, in particular, is viewed and widely recognized as fundamental, since it defines the modernization (almost exclusively) and restructuring (in its major-

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ity) of the agricultural sector (Zioganas, 2003).

The structure of the Greek agricultural sector is generally quite poor. This is mainly due to the very high number of small and multi-fragmented farms, the low percentage of irrigated agricultural land and the high rate of economically active people employed by the sector. This structure, combined with the mountainous landscape, inadequate infrastructure, insufficient vocational training, large percentage of aged farmers and ineffectively organized trade of agricultural products is a deterrent for the development of the agricultural sector. As a result, the agricultural income remains relatively low, compared to the income from various other fields of the Greek economy, and the income from the agricultural sector of the other EU Member States. Only those farms that are located in favoured areas, as regards the land and climate, and have the correct composition of productive sectors, guarantee a profitable exploitation of the available family labor and, consequently, a satisfactory level of income (Zioganas, 1999).

An interregional comparison of productivity, regarding the whole group and individual productive sectors, indicates that significant differences exist as regards the productivity level of various geographical regions of Greece (Glytsos, 1988; Skountzos, 1992; Polyzos and Petrakos, 2000), or of other countries (Aberg, 1973; Ke and Bergman, 1995; Lande, 1978; Luger and Evans, 1988; Sasaki, 1985; Polyzos, 2003). Both minor and major differences were observed in relation to the agricultural sector, depending naturally on the scale of the area under review in each case (Fan and Pardey, 1997; Porceddu and Rabbinge, 1997; Fulginiti and Perrin, 1998; Abalu and Hassan, 1998; Ball et al., 2004).

This article deals with an analysis of the determining factors and studies interregional inequalities in relation to labor productivity rates (added value per employed person) for the agricultural sector in the regional economy of Greece. In the next section, there is a description of the factors which are supposed to affect labor productivity in the agricultural sector. In section 3, the determinants parameters are calculated by the use of a production function and of statistical data from the 51 prefectures of Greece; and in section 4, the results obtained from the calculations are evaluated. Finally, in section 5, some general conclusions are presented.

2. Determinants of regional productivity in agriculture

The differences in the productivity of the regional agricultural sector can be attributed to a vast number of factors, which can be classified into two basic categories. The first category encompasses those which are linked to the structure of agricultural enterprises, and can include the used productive (human and fixed) capital, technology, productive dynamism, scale returns, etc. The second category comprises factors related to the land and the natural environment and concerns the geographical and hypsometric position of the land, the climatic conditions, the agricultural infrastructure, etc. Further, we will analyze the main determinants for labor productivity in this sector.

2.1. The amount of used capital per worker

It is obvious that the amount of available capital within the process of agricultural production affects the overall performance of the "capital + worker" system and consequently, the productivity of the sector. As regards the agricultural sector and the present research, capital refers to the two primary productive factors, i.e. the land being cultivated and the machinery being used. Apart from the amount of capital available, labor productivity may also be affected by the age, the technological progress and the degree of capital exploitation (Zioganas, 1999). The technological progress and the degree of capital exploitation are thought to play a role in the differentiation of agricultural productivity amongst the various prefectures in Greece.

2.2. The size of the farms

The size of the farms has a positive impact on their total profitability, since it allows a greater distribution of labor, as well as a better organization and use of the animate and inanimate capital. The size of the farms, which is usually determined by the amount of agricultural land that corresponds to each holding, is relatively small in Greece. Moreover, there has been no evidence to date of crops being consolidated under a cooperative or other umbrella in order to create economies of scale (Zioganas, 1999). We assume and explore further the existence of a positive relation between the size and the average productivity of farms.

2.3. Agglomeration economies

Studies have shown that agglomeration of many sector enterprises within the same region leads to specialized production, the creation of a "labor tank" due to the geographic proximity of many firms involved in related products, and a reduction in risk and uncertainty for the work in question. Moreover, the spread of technology and innovation towards businesses is facilitated and, finally, the production cost per product unit is reduced (Sasaki, 1985; Beeson, 1987). Usually, agglomeration economies refer to other economic sectors with a greater demand for specialized labor and technology in relation to the agricultural sector. However, we believe that up to a certain point, the agglomeration of farms and businesses contributes towards an improved standardization, trade and supply of produced agricultural goods and, finally, to an increase in the sector's revenue.

2.4. The degree of crop intensification and the inflow of circulating capital

Intensive or extensive farming naturally affects the total profitability of farms and by extension, the productivity of the agricultural sector. There are cases where crop intensi-

fication may increase the total produced product and total employment, but not necessarily the product/worker ratio. It seems that the intensification of agriculture is economically profitable with the use of more circulating capital (particularly in the form of pesticides, fertilizers and animal feeds) and labor (Zioganas, 1993; Zioganas, et al., 1994). We estimate that there is a positive relation between the degree of crop intensification and the sector's productivity.

2.5. The social "capital"

This term refers to the general characteristics of the human productive resources that work in the agricultural sector of the economy and particularly those related to the level of education, professional training and specialization (Zioganas and Nikolaidis, 1995). The level of education and professional training of the population in each region determines its efficiency in the workplace, favoring both an improved use of the means of production and the ability to accept new technology and innovation (Porceddu and Rabbinge, 1997).

2.6. Infrastructure

A literature review suggests that in most studies there is a positive relation between the public capital, which essentially involves infrastructure and public works (such as road works, irrigation, land reclamation), and the total produced product and agricultural productivity (Mamatzakis, 2003). More specifically, the infrastructure that provides irrigation to agricultural land has a major impact both on the type and the produced quantity of agricultural goods. Irrigated areas support variation and add flexibility to the composition of the agricultural production, creating the conditions for increased profitability and product quantities.

2.7. Climatic conditions and geographical zones

Climatic changes influence the crop types and the total profitability of agricultural areas. Mild climatic environments combined with irrigation facilities create beneficial conditions for an increased agricultural yield, and a great variety of crops (Zioganas, 1999).

2.8. Research and technology

The most effective exploitation of existing productive factors (land, labor) is attained by farms that incorporate the latest technology in the productive process or even improve their administration methods (Zioganas, 1993; Zioganas, et al., 1994). Technological progress is one of the most important factors for economic enlargement, since a given amount of capital and labor can provide us with a greater quantity of products, therefore increasing the productivity of our economic system. The productivity of any system is closely connected with its capacity to produce or adopt and apply innovative productive systems, while technological progress can affect productivity by increasing the profitability of capital, labor or both (Polyzos and Petrakos,

2000; Polyzos, 2003).

2.9. Distance from urban centers

Urban centers are the recipients of agricultural products and therefore affect the crop type and intensity. In general, agricultural areas located near large cities are more intensively cultivated, since their proximity to the marketplace ensures a demand for the agricultural products produced, which constitutes one of the main points of the von Thunen's theory (Labrianidis, 2002). Furthermore, the impact of "distance" from major urban centers, which are usually centers of production or technology and knowledge management, is significant for productivity growth, since it affects the flow of information and the spatial diffusion of progress, and even the adoption of any innovation by relevant businesses (Polyzos, 2003). Technological developments and overall technological progress do not evolve at the same rate spatially, neither occur haphazardly. Primarily, they emerge in large urban centers with a powerful and "varied" "work" force, which has an "open" education, favors the communication of new information and has an educational level capable of exploiting such knowledge. Such centers also possess a strong advantage linked to the existence of research centers, universities, institutes, etc., which promote research and development (R&D), and agglomeration economies that support the promotion and funding of relevant research projects.

The land fertility could also be added to the above-mentioned determinants, since land is a productive factor, and it is natural that its fertility will affect the total production. However, in many cases it is possible to modify the land fertility through the use of fertilizers; or, fertility can have a varying significance depending on the type of crop being cultivated.

3. Toward an empirical analysis

We will now attempt to quantify the above-described determinants and calculate the effect of each one on the formulation of the final labor productivity rate for the agricultural sector in the 51 prefectures of Greece (NUTS II). We will use the following Cobb-Douglas-type production function for the analysis:

$$AV_i = a(AR)_i^b (ENG)_i^c (EMP)_i^d (ZON)_i^z \exp[(IRR)_i^e (PAR)_i^f (KLIM)_i^h (INV)_i^k (POT)_i^m (EDU)_i^n] \qquad (1)$$

where for each prefecture i:

AV = the added value for the agricultural sector.

AR = the cultivated agricultural areas.

ENG = the number of used instruments (the amount of tractors used).

EMP = the total employment in the agricultural sector.

IRR = the irrigated agricultural areas.

PAR = the degree of divisibility of the cultivated agricultural areas.

ZON = the hypsometric level of the cultivated agricultural areas.

KLIM = the geographic position of the cultivated agricul-

tural areas.

INV = the investments in the agricultural sector.

POT = the population potential.

EDU = the level of training and education of the population.

From the above equation it results that:

$$(AV/EMP)_i = a(AR)_i^b (ENG)^c_i (EMP)^{d-1}_i (ZON)^z_i \exp[(IRR)^e_i$$
$$(PAR)^f_i (KLIM)^h_i (INV)^k_i (POT)^m_i (EDU)^n_i] \qquad (2)$$

The quotient $(AV/EMP)_i$ gives the labor productivity p_i, which is a function of the factors included in the 2nd part of the equation (2). From the equation (2), the following relation arises:

$$(AV/EMP)_i = a(AR/EMP)_i^b (ENG/EMP)^c_i (EMP)_i^{b+c+d-1}$$
$$(ZON)^z_i \exp[(IRR)^e_i (PAR)^f_i (KLIM)^h_i (INV)^k_i (POT)^m_i (EDU)^n_i] \qquad (3)$$

After taking logarithms of the equation (3), we obtain the following relation, and we can now estimate the coefficients by using regression techniques:

$lnp_i = lna + bln(AR/EMP)_i + cln(ENG/EMP)_i + pln (EMP)_i + e(IRR)_i + f(PAR)_i + z(ZON)_i + h(KLIM)_i + k(INV)_i + m(POT)_i + n(EDU)_i$ (4)

where: $p = b+c+d-1$

The ratios AR/EMP and ENG/EMP can be considered approximating variables of the used capital (land, machinery) per worker. The ratio AR/EMP is also related to the size of the agricultural enterprises, since it depicts the used surface of agricultural land that corresponds to each worker, and the degree of crop intensification. Low ratio values indicate intensive farming (a high level of employment on small agricultural areas) and vice versa.

The EMP variable shows the total employment in the agricultural sector per prefecture and consequently, it is possible to accept that it depicts the sector's agglomeration economies. The IPP variable indicates the amount of irrigated land and indirectly reflects the existing infrastructure for irrigation or related works, while the PAR variable shows the degree of fragmentation of the agricultural land and is depicted in the sample with a relevant indicator. The ZON variable concerns the hypsometric zone of the agricultural land, the KLIM variable shows the geographical zone, the INVvariable is related to the total fixed capital investments in the agricultural sector for the period 1995-2000. Moreover, the POT variable indicates the population of each prefecture and the EDU variable provides information about the educational level of the "social" capital. The use of the POT variable ensures an inclusion in the sample of the distance between the cultivated agricultural areas and the urban centers, and indirectly of the level of technology used. As mentioned above, the distance from urban centers - considered the hubs of technology and knowledge- affects the degree of advanced technology use.

We shall now analyze the sources of the statistical data in order to calculate the sample variables. For variables AR, EMP, PAR and IRR, we use the statistical data for land, employment and irrigated areas (NSSG, 1996; NSSG, 2003a; NSSG, 2003b). For the ENG variable, we refer to the total

number of tractors used due to a lack of other statistical data, assuming that this adequately represents the machinery being used by the agricultural sector. For the ZON variable, we use the area of cultivated plains according to the NSSG, and for the INV variable we use the investments made in the agricultural sector (NSSG, 2003a; NSSG, 2003b).

In order to estimate the total population potential POT of a prefecture i, we use interregional distances dij (i, j prefectures), the population size Pj of the prefectures, and the relation (Polyzos, 2001):

$$POT_i = P_i/d_{ii} + \sum_{j}^{n} \frac{P_j}{d_{ij}}$$

For the EDU variable, which presents the educational level of each prefecture population, an educational indicator was applied that was calculated by using the following mathematical formula (Kavvadias, 1992; Polyzos, 2001):

Educational level indicator =

$$\theta \sum_{j} \frac{\partial_j P_{ij} P_n}{P_{nj} P_i} \qquad \text{where:}$$

P_i = the total population of prefecture I

P_n = the total population of the country

P_{ij} = the population of prefecture i with an educational level j

P_{nj} = the population of the country with an educational level j

δ_j = the coefficient of the level of education j

The following values have been obtained:

$\delta_1 = 1$, $\delta_2 = 0.85$, $\delta_3 = 0.7$, $\delta_4 = 0.60$, $\delta_5 = 0.45$, $\delta_6 = 0.25$, $\delta_\pi = 0.1$,

$$\theta = \frac{100}{\sum \partial j}$$

Finally, for the KLIM variable, we used the PD 352/1979 and the distribution map of the country's regions in relation to the environmental temperatures throughout the year.

4. Results

We evaluate the multiple regression equation (4) using the OLS method. Considering the results of the estimations, we can generally say that the overall explanatory power, as expressed by the coefficient of determination (R^2 and R^2-adjusted) is considered to be satisfactory, given the cross-sectional type of the statistical data. The results of the estimations of the equation's parameters and the significance test are presented in detail in table 1. Also, in table 2, we see the correlation coefficients between the model variables and its degree of significance. The values of the calculated estimators confirm our initial expectations, concerning the positive contribution of the determinants to the formulation of the productivity level, only in some cases. The results of the estimation for each variable are analyzed below.

Table 2 demonstrates that the correlation coefficients between the independent variables have satisfactory values

*Table 1. Parameters estimation of the factors' influence on the forma -
tion of productivity in the agricultural sector by OLS*

Dependent variable: lnp_i			
Independent variables	Estimators of parameters	Values of t distribution	Significance of t
(Constant)	-4,688	-5,066	0,000
ln(AR/EMP)	0,699	6,436	0,000
ln(ENG/EMP)	$5,729*10^{-3}$	0,072	0,943
ln(EMP)	$5,248*10^{-2}$	0,753	0,456
lnZON	$-6,164*10^{-2}$	-0,993	0,327
IRR	$2,872*10^{-4}$	2,046	0,045
PAR	$2,223*10^{-2}$	1,526	0,129
KLIM	$8,094*10^{-2}$	1,661	0,097
INV	$-7,422*10^{-4}$	-0,248	0,806
POT	$-1,075*10^{-5}$	-0,958	0,344
EDU	$1,210*10^{-2}$	2,250	0,030

$R^2 = 0,81$, adj$R^2 = 0,77$, Í $= 51$

Table 2. *Correlation coefficients between the variables of the equa -
tion (4)*

	ln(AR/EMP)	ln(ENG/EMP)	ln(EMP)	lnZON	IRR	PAR	KLIM	INV	POT	EDU
ln(AR/EMP) 1,000										
ln(ENG/EMP) 0,498** (0,000)	1,000									
ln(EMP) -0,019 (0,894)	0,216 (0,128)	1,000								
lnZON 0,294* (0,036)	0,585** (0,000)	0,463** (0,000)	1,000							
IRR 0,369** (0,008)	0,409** (0,003)	0,567** (0,000)	0,439** (0,001)	1,000						
PAR 0,352* (0,011)	0,216 (0,127)	0,184 (0,196)	0,282* (0,045)	0,396** (0,002)	1,000					
KLIM 0,536** (0,000)	0,087 (0,546)	-0,069 (0,631)	0,105 (0,463)	0,358** (0,010)	0,129 (0,368)	1,000				
INV 0,290* (0,039)	0,251 (,075)	0,431** (0,002)	0,373** (0,007)	**0,709**** (0,000)	0,130 (0,365)	0,339* (0,015)	1,000			
POT 0,122 (0,394)	0,058 (0,687)	0,412** (0,003)	0,093 (0,517)	0,417** (0,002)	0,009 (0,953)	0,099 (0,488)	0,564** (0,000)	1,000		
EDU 0,220 (0,122)	0,469** (0,001)	0,477** (0,000)	0,462** (0,000)	0,390** (0,005)	0,070 (0,625)	-0,0036 (0,008)	0,444** (0,001)	**0,644**** (0,000)	1,000	

** Correlation is significant at the 0.01 level (2-tailed), *correlation is significant at
the 0.05 level (2-tailed).

and therefore, no multicolinearity is observed in the model. High values in the correlation coefficients are presented by variable INV with variable IRR, and variable EDU with variable POT. This is considered quite reasonable and expected, and leads to the conclusion that most fixed capital investments concern irrigated agricultural areas, and that prefectures with a high population potential (mainly with

their own or near other large population agglomerations) have a better level of education.

The coefficient of the variable ln (AR/EMP) is positive and statistically significant. Both its sign and its significance confirm our initial expectations, i.e. that fewer workers per area unit increase the productivity of the crop.

The coefficient of the variable ln (ENG/EMP) is positive, but statistically insignificant. A possible explanation for this result can be provided by examining the quality of the statistical data used. As mentioned above, due to the lack of other statistical data, the number of tractors in each prefecture was used to reflect the amount of machinery. This information is likely to be insufficient, since the model does not indicate all the available machinery, or even because tractors differ in HP and performance when used.

In addition, the coefficient of the variable ln (EMP) is positive, but statistically insignificant. This result leads us to the conclusion that the amount of employment in the agricultural sector or rather the existence of many farms does not necessarily lead to increased productivity, as is commonly the case in the secondary sector (Sasaki, 1985; Beeson, 1987).

The coefficient of the variable ln (ZON) is negative and statistically insignificant, and this stands in contrast to our initial expectations. This result leads us to the conclusion that non-mountainous areas do not always mean high rates of productivity, and this is probably related to the crop type, since many mountainous areas are used for arboriculture and dispIay higher values of produced added value.

The coefficient of the variable IRR is positive and statistically significant, and this result coincides with our initial hypothesis. Consequently, the irrigation of agricultural areas increases their overall performance and agricultural income. This statement is of particular value for the policies implemented in the agricultural sector and confirms the importance of irrigation works for the development of the sector.

The coefficient of the variable PAR is positive, but the value of its statistical significance is not particularly high. This indicates that the average size of cultivated agricultural plots affects their productivity and that the fragmentation of agricultural areas results in a decreased performance.

The coefficient of the variable KLIM is positive and statistically significant. Therefore, the climatic conditions affect the performance of agricultural crops and we view higher productivity rates in the southernmost prefectures of the country, where the environmental temperatures are higher.

The coefficient of the variable INV is negative and statistically insignificant. The most logical explanation for this result concerns the time of investment and to what extent the investments affected crop profitability. The data used, as mentioned earlier, concerns the fixed capital investments for the period 1995-2000 and it is possible that their impact on added value, which was measured in 1999, was insufficient. Nevertheless, it is likely that the investments took

place in low performance cultivated areas in order to improve the level of agricultural production.

The coefficient of the variable POT is negative and statistically insignificant. Consequently, agricultural crops that belong to regions located near urban centres do not surpass other regions in their incorporation of the latest technology. In contrast, results lead to the conclusion that the existence of large population agglomerations may possibly ensure that those involved in agriculture have access to other alternative sources of income. This is explained, by the involment in other sectors of the economy, which therefore makes their agricultural work take on a complementary or secondary role.

Finally, the coefficient of the variable EDU is positive and statistically significant, which leads us to conclude that the concentration of human capital with a high level of vocational training in each prefecture does contribute to productivity growth. This result is quite reasonable and hardly surprising.

5. Estimation of change in the added value

Following the preceding analysis and estimations, we shall now continue with a calculation of the variation of the produced product in the regions, which arises from a variation of the determinants included in the previous model. Obviously, any productivity growth policy demands a positive variation of all factors that have a positive sign and are statistically significant.

The total change of productivity pi in prefecture i after a change of the determinant F_i by ΔF_i, comes from the differential:

$$\Delta p_i = \frac{\partial p_i}{\partial F_i} \Delta F_i \qquad (6)$$

Furthermore, the relation between added value and productivity for each prefecture is given by the equation:
$(AV)_i = p_i(EMP)_i$, therefore $\delta(AV)_i/\delta p_i = (EMP)_i$ (7)

The overall increase in the added value of each prefecture i after a variation of productivity pi will be given by the partial differential

$$\Delta(AV)_i = \frac{\partial(AV)_i}{\partial p_i} \Delta p_i$$

$$\Delta(AV)_i = (EMP)_i \Delta p_i \qquad (8)$$

From equation (3) and using the symbol Fm for the first 4 factors (and fm for each exponent) and the symbol Fn for the next 6 (and fn for each coefficient), we estimate the first partial derivatives:

From equation (3) and using the symbol Fm for the first 4 factors (and fm for each exponent) and the symbol Fn for the next 6 (and fn for each coefficient), we estimate the first partial derivatives:

$$\frac{\partial p_i}{\partial F_i^m} = f_i^m \frac{p_i}{F_i^m} \text{ for the factors } F^m$$

$$\frac{\partial p_i}{\partial F_i^n} = f_i^n \, p_i \text{ for the factors } F^n \qquad (9)\ (10)$$

The combination of the above-mentioned equations gives the variation of the added value, on condition that there is no variation of total employment, according to the following equations:

$$\Delta(AV)_i = (EMP)_i f_i^m \frac{p_i}{F_i^m} \text{ for the factors } F^m$$

$$\Delta(AV)_i = (EMP)_i f_i^n \, p_i \text{ for the factors } F^n \qquad (11)\ (12)$$

Equations (10) and (11) give us the variation of the added value, after a variation of each productivity determinant. In this way, by relating the cost of varying all those factors that can be modified with the increase in the produced added value, we are in a position to evaluate each relevant policy aiming to support the agricultural sector and increase the agricultural income.

6. Conclusions - Proposals

In this paper, an effort was made to classify and concisely present the factors that shape labor productivity in the agricultural sector in Greece; these were empirically calculated by using cross-section statistical data, statistical significance and the impact of each factor on the formulation of productivity figures.

The aim of the present research was a double one. Firstly, to support the economic policy applied to the primary sector in Greece, by analyzing the factors that define labor productivity in the agricultural sector. Moreover, by empirically calculating the impact of each determinant on the shaping of productivity and added value through the use of statistical data from the last 5 years. Secondly, to support the formulation of an appropriate regional policy by increasing the amount of agricultural goods produced in the less developed prefectures. Knowledge of the factors that pertain to the economic enlargement of the agricultural sector, as of any other economic sector, is of key importance in planning and selecting suitable measures whose aim is to ensure an economic recovery for the sector.

The results have shown that there is a positive relation between certain factors and productivity, while others appeared statistically insignificant, i.e. of limited significance, and others seemed to negatively affect the level of productivity. In addition, using equations (11) and (12), it is possible to calculate the variation (increase) of the goods produced in each prefecture, after improving the quantity of all determinants that can be modified.

After evaluating the results of the empirical investigation, we can conclude that any policy targeting development and a reduction in interregional inequalities in the agricultural sector must be based on three main axes, in order to be effective:

• It must pursue the implementation of irrigation projects, so that the total number of irrigated agricultural areas increases, thus strengthening the possibility of varying the composition of the production at times, in favor of the best-performing crops.
• It must provide technical assistance to farmers, particularly through training and an overall improvement of their level of vocational training.
• It must address the issue of fragmentation of the agricultural land and the structural problem of small-sized farms by implementing reforestation programs and policies that will encourage a consolidation of cultivated areas. This means that an increase in the average farm size must be aimed at, by establishing the relevant legal and economic framework.

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