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The Growth and Crisis of the Greek Economy in a Kaldorian Framework.

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Abstract

The present paper surveys the role of two economic sectors, namely tourism and agriculture in the economic growth of Greece, a country that goes through a severe economic crisis during the last decade. The findings, confirm that tourism has a major contribution to the GDP growth. Therefore, the Kaldorian theory on an "engine of growth" appears to apply in Greece for tourism (rather than manufacturing in Kaldor's original findings). In fact, a bidirectional causality linear intertemporal relationship is found between GDP and tourist GDP (in the long as well as in the short term) whiles the relationship between GDP and agricultural GDP seems to apply only for the long term period. Furthermore, non-linearities in the GDP – agricultural GDP relationship, led the authors to the implementation of threshold co-integration. The findings underline the shift of the economy from the primary (agriculture) to the tertiary sector.

Keywords: Economic Growth, Kaldorian Theory, Greek Economy, Tourism, Agriculture, Threshold Co-integration

1. INTRODUCTION

When you submit your paper print it in one-column format, including figures and tables. In addition, designate one author as the "corresponding author". This is the author to whom proofs of the paper will be sent. Proofs are sent to the corresponding author only. Tourism and agriculture are the most dynamic sectors of the Greek economy in recent decades. Tourism is one of the most flourishing sectors (World Tourism Organization, the 2016 Annual Report), in spite of the economic recession over the last decade in most developing countries of Southern Europe. Since the 1970s, Greece managed to transform from a purely agricultural to an economy with a remarkable service sector (Galani, 1993).

Throughout the last decades, the main source of income for Greece has been agriculture with a decreasing trend and tourism with an increasing one. More specifically, the primary sector continues to be very significant for the economy with a basic role in terms of social and environmental perspectives. The contribution of the primary sector to the total Gross Value Added (GVA) of the country decreased from 13% in 1981 to 7% in 2002 and 5.2% in 2005 against an EU average of 2% for 2005 (World Bank Developing Indicators, 2016).

Additionally, the primary sector's share in total employment has been shrinking since the early 1980s (30% in 1981) due to the rapid growth of the service sector (Delivani, 1991). However agriculture is still a substantial (and certainly higher than the EU average) employer in Greece (more than 10%). This is positive, given that unemployment in Greece remains at the forefront of economic problems (in the area of 25% in 2016).In addition, according to World Bank figures (Employment in Agriculture, 2016), the agricultural sector, consisting of agriculture, hunting, forestry and fishing, contributes steadily to more than 10% of the total employment active labor force. Trends indicate that these rates are likely to fall further over the next few years, but are steady at a two-digit number.

The agricultural sector enabled Greece to maintain a low unemployment rate in the early 1980s. However, according to the official report from the Greek National Statistical Service (NSAG, 2017) the contribution of agricultural employment in maintaining low unemployment rate in recent years seems to decline sharply compared with the 1980s and 1990s. Nevertheless, the national rate of 12.6% compared to 3.8% in the EU-15 for the same year (2016), shows that the agricultural sector in Greece continues to offer employment to a large number of people in a country where unemployment remains at the forefront of the issues

The EU-financed investment projects, improved equipment, knowledge and services such as agricultural irrigation, but their positive influence in total was not very substantial. One of the most important structural changes in the primary sector since the 1990s was the multi-employment (employment of a person in more than one jobs or even sectors) for the diversification of income.

The tertiary sector and especially tourism, provides solutions for the potential economic development of economies in recession. According to the World Tourism Organization (2015), tourism is a powerful contributor of economic growth in global terms. As a major force in the global economy it accounts for over 10% of global GDP with tendencies for even greater percentage. Although Europe has maintained a dominant position in the tourism industry, other parts of the world have also experienced an extremely rapid growth in recent years.

However, the trend seems to be changing after the outbreak of the economic crisis in Europe from 2009 onwards. Greece has set as a priority to place greater emphasis on the tourism sector and the potential benefits that may arise from the further development of tourism industry. According to the World Travel and Tourism Council (WTTC, 2015) and Economic Impact (2015) Travel and Tourism generated US$7.6 trillion (10% of global GDP) and 277 million jobs (1 in 11 jobs) for the global economy in 2014. The contribution of Travel and Tourism to GDP grew by 3.6% in Europe e.g 17.5 billion, that is 7.9% of the GDP. At this point, we must mention that the world average of Travel and Tourism's Total contribution to the formation of GDP for year 2014 was 58.3 US Billion Dollars (bn) against a 45.4 US bn.one for the European countries (WTTC, 2015).

In terms of the contribution to employment, Travel and Tourism generated 340,500 jobs directly in 2014 (9.4% of total employment) and was expected to further grow by 3.8% in 2015 reaching 353,000 (9.5% of total employment). Indeed, this economic advantage is grounded on the employment by hotels, travel agents, airlines and other passenger transportation services (excluding commuting services). It also includes other activities such as restaurants and leisure industries directly supported by tourists. Consequently, Travel and Tourism will account for about 446,000 jobs directly, reaching an increase of 2.4% over the next eight years (WTTC, 2015) until 2025.

In this framework, the Greek tourism industry has grown rapidly. The direct participation of the tertiary sector and specifically tourism was EUR11.8bn (7.0% of total GDP) in 2014. Furthermore it is expected to increase by 3.6% from 2015 to 2025, to EUR17.5bn (7.9% of total GDP) (WTTC, 2015).

In 2014, Travel and Tourism directly created and simultaneously retained 340,500 jobs (9.4% of total employment). The estimation for 2015 was accurate where the employment growth was up 3.8% compared with the previous year's one. According to recent studies (Yearbook of Tourism Statistics, 2015; WTTC, 2015), the money spent by foreign visitors in a country (or visitor exports), is a key component of the direct contribution of Travel and Tourism.

It is worth noting that in 2014, Greece produced EUR 12.2 bn in visitor exports. Leisure travel spending (inbound and domestic) produced 94.1% of direct Travel and Tourism GDP in 2014 (EUR 20.7bn) compared το 5.9% for business expenditure (EUR 1.3bn). The same studies argue that the percentage of the leisure travel spending is expected to grow by 3.8% in 2025 and business spending by 6.7% in 2025.

In spite of the ongoing economic crisis, Greece continued to expand its tourist sector. At the same time the crisis and the escalating unemployment led many people (including young ones) back to farming. Without underestimating the contribution of other industries and sectors, we will concentrate on the study of the contribution of these two sectors to the economic growth of Greece for the period 1970-2015.

The Kaldorian theory: Manufacturing or services?

The Kaldorian theory was formulated in order to explain the growth of countries in the process of industrialization, or transition from agricultural economies to industrialized ones. This superiority of manufacturing over the two other sectors of the economy was largely attributed to its ability to expand by absorbing resources (mainly labor) by the less productive primary and tertiary sectors (Kaldor, 1966). This dynamism, combined with the introduction of new production methods, technology and innovation, high specialization, expanding markets and strong forward and backward linkages, all considered as industry's exclusive privileges, made the growth of manufacturing look like a never ending process. Especially if manufacturing could adapt to the changing economic environment, it could maintain the economy to the path of economic development forever.

In many cases, the rapidly developing manufacturing sector has indeed proved to be the economy's major engine of growth, up to the point when it eventually reaches "economic maturity", which signals the beginning of the process of de-industrialization and the expansion of the tertiary sector (see Rowthorn and Wells, 1987). This is exactly what happened to many European industrial countries during the 1970s leading to a re-opening of the discussion on whether sectors other than manufacturing could prove to be alternative engines of growth.

The application of the Kaldorian theory on Greece has attracted the scientific interest within the last few decades. Drakopoulos and Theodosiou (1991) and more comprehensively Katrakilidis et al. (2013) explored the validity of the Kaldorian insights into the economic growth and manufacturing. In the second paper, the three Kaldorian Laws were examined and tested for relevance to the Greek economy for the period 1970-2006 using the ARDL methodology. Their research was based on the basic assumptions of the Kaldorian theory and their findings verified the positive relation between manufacturing production and GDP growth for Greece. The extent of their data and the process followed were generally acceptable.

The conclusions of the two papers stressing the role of manufacturing on the economic growth of Greece were challenged by Delivani (1991; 1992) and Delivani and Nikas (2011; 2013) who argued that the "engine of growth" for Greece was not the manufacturing but the tourism sector. Their findings provided a motive for a further research in order to point out the importance of the tourism sector and the primary sector during deep economic recession in Greece.

In this study, we will investigate the contribution of the tertiary sector and especially tourism and agriculture to

economic growth using ARDL Bound testing econometric approach. We proceeded with a different approach in order to study the relation between tourism receipts, agriculture and the GDP of Greece.

The present paper aims a different approach of the Kaldorian theory for the case of Greece. Tourism and primary production will be tested as alternative Kaldorian "engines of growth". This country has experienced high GDP growth (since the early 1970s and up to 2008 with a short interval in the late 1970s) and unprecedented negative growth rates (up to -16%) after 2008.

In the next section, a literature review on the efficiency and growth potential of the tourism and the primary sector is provided. In the third section, the methodology of this study and the data employed are analyzed. In the fourth section, the results of this study are presented and discussed. The final section refers to conclusions and policy recommendations.

2. LITERATURE REVIEW.

Kyrkilis et al. (2012) argued that while the research on the primacy between the economic sectors is in place, at the same time, the relationship between the economic sectors should be also investigated. The impact of tourism on the economy undoubtedly attracted little scientific interest until the last decades of the 20th century. There are, however, some early studies that have focused on tourism contribution to the economy as for instance those of Gray (1966) and Witt (1987, 309-314) who provided per capita income elasticities of the demand for tourist services in the whole World and for Canada respectively.

Many researchers claim that revenues in foreign currency coming from tourism can be used for the import of capital goods and the production of goods and services, which in turn leads to economic growth (McKinnon, 1964). It is also considered that tourism can have more benefits for the economy including tax revenue, employment creation and the provision of additional sources of income (Archer 1995, 918-923; Belisle and Hoy 1980, 83-88; Davis et al. 1988, 2 and 6; Durbarry 2002; Khan et al. 1990, 17-17)

Within the last two-three decades the expanding role of tourism and agriculture on the formation of GDP, allured scientific interest. Many of the researchers perceived that tourism expenditure is an alternative form of export that can contribute to refine a country's balance of payments and generate additional tax revenues (Archer 1995, 918-923; Belisle and Hoy 1980, 83-88; Davis et al. 1988, 2 and 6). The agricultural sector, besides its basic function as a food provider is a key factor for the economy. Creating jobs and preventing the abandonment of the periphery are among the key benefits of the exploitation of the agricultural sector according to the OECD (2001). Since the abandonment of agricultural land is not avoided, the loss of physical capital is inevitable (Cramer et al., 2008). In Greece the abandonment of rural land became particularly noticeable in the 1960s and 1970s. This trend continued at lower rates after the country's accession to the European Economic Community in 1981.

Tourism receipts can support a nation's financial development through their positive impact on the whole state or country economy through the diffusion and other individual factors of the economy (Martin, 1992). The hypothesis that sectors like tourism and agriculture separately or combined could generate economic growth is not recent.

A number of studies surveyed the relationship between tourism and economic growth along with the causality of this relationship. Ghali (1976, 527-528) empirically investigated the relationship between tourism and growth using time series analysis. In other studies conducted by Kadir and Jusoff (2010, 138-140), Lionetti and Gonzalez (2012, 19-20) using co-integration between tourism and trade confirmed earlier findings and also provided an analysis of the direction of causality. In most of the aforementioned papers a soleco-integration relationship between tourism and economic growth was verified while employing the causality test (Granger, 1988) they showed that the relationship was both stable and univocal.

Dritsakis (2004, 308-308) examined the tourist-driven growth hypothesis regarding the case of Greece between 1960 and 2000. He applied an econometric methodology of the co-integration test suggested by Johansen (1995) and the causality test proposed by Granger (1988), using an error-correction model. He found evidence of a bidirectional causal relationship between international tourism and economic growth. However, while both tourism receipts and the real exchange rate had a strong causal relationship with economic growth, economic growth and the real exchange rate affected tourism receipts only through a linear causal relationship.

A different model was used by Durbarry (2004, 392-393). He analyzed the relationship between economic growth and tourism regarding Mauritania between 1952 and 1999. Unlike Dritsakis, Durbarry used a model built on five variables that included tourism receipts, capital stock, human capital, real sugar exports and manufacturing exports. Based on this econometric approach, it was proved that tourism fostered economic growth in Mauritania during the period examined.

Gunduz (2005) also tried to investigate whether tourism has really contributed to economic growth in Turkey. The relation between tourism and economic growth was investigated using of leveraged bootstrap causality tests. This method was robust to the existence of non-normality and ARCH effects. Special attention was given to the choice of the optimal lag order of the empirical model. It was found that the tourism-led growth hypothesis is empirically supported in the case of Turkey.

However, Oh (2005, 40-41) rejected the tourism-led growth theory. Using a bi-variate model and excluding exchange rates, he concluded that there was no long-term relationship between the two variables analyzed. Furthermore, using Granger's causality test he found a unidirectional causal relationship from economic growth to tourism. Thus, the hypothesis was not verified and, consequently, tourism promotion policies could not be considered as principal to economic growth.

An interesting research was performed by Kim et al. (2006, 925-927). This study examined the causal relationship between tourism expansion and economic development in Taiwan for the period 1971 to 2003. A Granger causality test was performed following the co-integration approach to reveal the direction of causality between economic growth and tourism expansion. Test results indicated a long-run equilibrium relationship and further a bi-directional causality between the two factors. In other words, in Taiwan, tourism and economic development reinforce each other.

Tourism is a strategic sector that needs to be fostered in the long term period. Kaplan and Çelik (2008, 13-17) found that a stable unidirectional relationship between tourism and the GDP applies, using the general methodology already applied in previous studies.

Louca (2006, 606-607) examined the existence and the nature of long-run relationships between the incomes derived from the tourism industry in Cyprus and tourist arrivals on the one hand and three categories of supply-side expenditure, on the other. Katircioglu (2007, 2741-2744), also conducted an analysis for Cyprus on the relationship between tourism, international trade (imports, exports, jointly and separately) and economic growth for the period 1960-2005. Using an autoregressive distributed lag Bound Co-integration methodology (ARDL Test), he validated a long-term relationship between the variables studied. On the one hand the causal direction showed that economic growth stimulated the growth of international trade and the number of international tourist arrivals on the island. On the other hand, the growth of international trade stimulated an increase in the number of international tourist arrivals is an obvious result. The interpretation of these relationships was based on the fact that greater economic growth generates an increase in R&D allowing the resources devoted to advertising and promoting tourist facilities to increase as well, thereby attracting more tourists.

Capó, et a.l (2007, 720-723) found that tourism activities have been the driving force for income growth. They attempted to measure the contribution of different production factors and of productivity to economic development in the Spanish Balearic and Canary Islands.

The relationship between tourism and economic growth was also studied. Those studies were focused on the causality relationship between international tourism revenue and economic growth in the Turkish economy during the period 1963-2013. Annual data were obtained from the World Data Indicators and the Turkish Statistical Institute. Three different methodologies were employed to test the causality: pair-wise Granger causality, unrestricted VAR and Toda-Yamamoto VAR analysis.

In the mid-90s and onwards, lots of empirical studies supported that the agricultural sector leads to long-term economic development. Schultz (1968), examined the role of the primary sector in the economic development process. Specifically he supported that there are mechanisms through which the increasing of the agricultural productivity could contribute to structural changes in the economy. The implementation of empirical researches on whether the agricultural sector contributes to the economic growth has been strong in recent years. Gollin et al., (2007) stressed that poverty reduction and long-term development is directly related to the development of agriculture sector.

The nature of agriculture's role is, of course, highly relevant to determining the appropriate "balance" between agriculture and other sectors with respect to (1) direct government investment or aids the investment, (2) budget allocations for publicly supported research and education-extension programs, and (3) the burden of taxation levied on different sectors.

The broader question of whether agriculture plays a larger role in economic development than other economic sectors has been answered by Dercon (2014). The causal relationship between the agricultural sector and in particular the role of agricultural productivity has been a challenge for researchers

Without underestimating the role of other sectors of the economy the exploration of the relationship between economic growth with the agricultural sector and the service sector is essential. As far as Greece is concerned, the contribution of the tourism and agriculture sector to economic growth is a key priority for the country. Agricultural and tourism sectors showed particular strength in the seven years of prolonged economic recession in Greece (NSAG, 2017).

At the same time, the exploitation of agricultural land in Greece has been maintained, compared with the relative decrease in the number of farms in Europe in recent years. It is generally accepted that the lack of employment in other sectors of the economy, such as in the secondary sector, has led to the retention of farms over the last decade and the strengthening of the tourism industry in relation to the past in the countries of the European South and particularly in Greece and Spain. (European Commission, 2013a; 2013b; 2013c).

Agricultural production was affected by globalization. Europe and particularly countries like Slovakia and Greece have shown more exposure to new challenges (Alexiades et al. 2013). The industrialization of the Greek economy failed in the postwar period. This failure led to the creation of a sustainable manufacturing sector and boosted the

economy, but with low intensity (Delivani, 1991; Kyrkilis and Semasis, 2015). The manufacturing intensity was interrupted by the first oil crisis, beginning a long period of de-industrialization in favor of the service sector. In the last eight years of intense economic recession in Greece, a number of factors prevented the Greek agriculture from establishing links with other sectors of the economy. In fact, factors such as higher production costs due to rising energy costs and taxation, lack of technological and organizational improvements led to lower yields in agricultural production.

Taking into account this literature we decided to investigate tourism sector and the agricultural sector in terms of their contribution to the economic development of Greece.

3. DATA METHODOLOGY

Our empirical investigation was based on the use of linear cointegration and threshold investigation cointegration when needed. The data employed for the particular study was derived from the World Bank and World Tourism Organization extending from 1970 to 2013 including both periods of economic growth and economic recession. The variables employed are the following as a proxy for tourism GDP is used the tourism receipts derived from the Greek National Bank. As for agriculture, the GDP from agriculture is used and GDP of Greece for the same time period is used. All the variables are in logarithmic forms while the implementation of appropriate tests validated the existence of linear relationship between GDP and GDP generated from tourism while on the other hand non-linearity was validated for the GDP – GDPagr. For the aforementioned reasons, Johansen cointegration was used for the first pair of variables and threshold cointegration for the second.

Johansen's approach provides the maximum estimated likelihood and the two likelihood ratio test statistics are aiming to determine the rank of the cointegration space. For the first pair of variables (GDP and agricultural GDP) this approach could not provide results; therefore we employed the threshold cointegration methodology. The particular relationships (either linear or nonlinear) may well provide the necessary tools to promote economic growth in a country facing a severe crisis for more than eight years. In the next few paragraphs there is a subtle description of Johansen cointegration technique, VECM mechanism and the theoretical background for the impulse response analysis introduced by Pesaran et al. (2002).

The trace and the maximum eigenvalue statistics are used to determine the rank of Π and to reach a conclusion on the number of cointegrating equations, r, in our VAR system. Given that the time series studied are I(1), based on the results of all the unit root tests employed, we can use Johansen technique to examine whether there is a combination (linear relation) of the variables that is stationary. In this case the variables studied are cointegrated hence, there is a long-run relationship between them. The cointegration technique can be applied since the time series are I(1), that is non-stationary in levels and stationary in first differences. The Johansen co-integration technique (1988; 1991), involves testing the null hypothesis that there is no cointegration against the alternative that there is cointegration. The implementation of Johansen technique perquisites the calculation of the number of lags of the endogenous variables of the model since an autoregressive coefficient is used in modeling of each variable. The number of lags is determined using the Akaike criterion.

Thus, in the second stage we estimated the Vector Error Correction Model in order to examine the direction of the causality between the four variables employed. The direction of the causality is determined by the statistical significance of the cointegrating equation coefficient. Additionally, the error correction model captures not only the long-term but also the short-term dynamics of the model.

Finally, in our study we conducted an impulse – response analysis for the variables studied. The Generalized impulse responses (Pesaran and Shin, 1998) provides a tool for describing the dynamics in a time series model by mapping out the reaction in, the Gdp of Greece for instance to a one standard deviation shock to the residual in the GDP of tourism and vice versa.

The VAR process is provided by the following formula;

$$x_t = \Phi D_t + \sum_{i=1}^{k} \Pi_i x_{t-i} + \varepsilon_t \qquad t = 1,2,...,T \tag{1}$$

The process xt representing the vector of prices is covariance stationary, integrated of order d (and possibly cointegrated), while εt is p dimensional and assumed to be i.i.d. (identically, independently, distributed) with zero mean and positive definite covariance matrix Ω.

The h-ahead forecast error for the xt process is given by the following equation;

$$x_{t+h} - E[x_{t+h} / I] = \sum_{j=0}^{h-1} C_j \varepsilon_{t+h-j} \tag{2}$$

Where I is information set which includes the history of xs up to and including period t as well as the entire time path for D_t. The p × p matrices C_j are given by C_0= Ip and

$$C_j = \sum_{i=1}^{\min k,\, j} \Pi_i C_{j-i} \qquad j \geq 1 \tag{3}$$

So that all C_j matrices can be determined recursively from the Π_i matrices.

Koop, Pesaran and Potter (1996), defined the generalized impulse response function with the following formula;

$$GI_x(h, \delta, I_{t-1}) = E[x_{t+h} / \varepsilon_t = \delta, I_{t-1}] - E[x_{t+h} / I_{t-1}] \tag{4}$$

where δ is a known vector. For the VAR process this means that:

$$GI_x(h, \delta, I_{t-1}) = G_h \delta \tag{5}$$

The choice of δ is therefore central to determining the time profile for any generalized impulse response function. As an alternative to shocking all elements of εt one may consider just shocking one element such that $\varepsilon_{jt} = \delta_j$. We may now define the generalized impulse responses as:

$$GI_x(h, \delta_j, I_{t-1}) = E[x_{t+h} / \varepsilon_{jt} = \delta_j, I_{t-1}] - E[x_{t+h} / I_{t-1}] \tag{6}$$

Letting $\delta j = (\omega jj)^{1/2}$, the standard deviation of ε_{jt}, and assuming that ε_t is Gaussian, it follows that:

$$E[\varepsilon_t / \varepsilon_{jt} = \sqrt{\omega_{jj}}] = \Omega e_j \omega_{jj}^{-1/2} \tag{7}$$

where ej is the j:th column of Ip. For the VAR model we then find that;

$$GI_x(h, \sqrt{\omega_{jj}}, I_{t-1}) = C_h \Omega e_j \omega_{jj}^{-(1/2)} \tag{8}$$

This measures the response in xth from a one standard deviation shock to εjt, where the correlation between εjt and εit is taken into account. Defining the diagonal p × p matrix Σ as:

$$\Sigma = \begin{bmatrix} (e_1' \Omega e_1)^{-1/2} \\ (e_2' \Omega e_2)^{-1/2} \\ (e_3' \Omega e_3)^{-1/2} \\ .... \\ (e_p' \Omega e_p) - 1/2 \end{bmatrix} \tag{9}$$

we may express the generalized impulse responses in matrix form as:

$$GI_x(h, \sqrt{\omega_{11}}, ..., \sqrt{\omega_{pp}}, I_{t-1}) = C_h \Omega \Sigma = C_h B = A_h \tag{10}$$

Where column j is given by $GI_x(h, \sqrt{\omega_{jj}}, I_t)$, I_{t-1}. When Ω is diagonal, then B* $\Omega^{1/2}$* Σ^{-1}, is a diagonal matrix with standard deviations along the diagonal.

The next few paragraphs present the theoretical background for the threshold cointegration employed for the other pair of variables gdp – GDP from agriculture. Therefore in that part of methodology we employ the model introduced by Hansen and Seo (2002), to be more specific, the threshold Error Correction Model (TVECM). The particular model examines the nonlinear relationship between the gdp and GDP generated by agriculture. Implicitly, we employ a three regime vector error correction model with one cointegrating vector, and a threshold effect in the error correction term. The three regime threshold model, where γ_1, γ_2 are the threshold parameters, is formed as follows:

$$\Delta y_t = c_j + \Pi_j y_{t-1} + \Gamma_{1j} y_{t-1} + \cdots . + \Gamma_{p-1,j} y_{t-p+1} + u_{tj}$$

If $\gamma_{j-1} \leq \gamma_{t-d-1} \leq \gamma_j$

Where;

$p \geq 0, \qquad k > 1$

j = 1,...,k and γ_i are real numbers such that $-\infty = \gamma_0 < \gamma_1 < \cdots < \gamma_k = \infty$, and

- u_{tj} is a K-dimensional white noise process for each j = 1,...,k,

- p denotes the order of the autoregressive term AR,
- d denotes the threshold delay, that is the time delay of the threshold variable y_{t-d-1} compared with y_{t-1}, the integer j denotes the regime number, while the numbers $\gamma_1,...,\gamma_{k-1}$ denote the k−1 thresholds which divide the threshold space into k regimes.

It should be mentioned that in each of the k regimes, the time series y_t is a linear VECM. The results of the aforementioned methodologies are provided in the next section.

4. THE FINDINGS

The Johansen co-integration technique employed in order to test the existence of linear relationship but unit root test have to be initially employed. The DF – GLS test was employed in both sole time series including the GDP and GDP generated by agriculture and tourism (Table 1).

Table 1. DF – GLS test

Variables	DF - GLS test
GDP	-0.7462
ΔGDP	-3.6097***
GDPagr	-0.746
ΔGDPagr	-3.126***
GDPtour	-0.7325
ΔGDPtour	-3.257348***
***,**,* reject of null hypothesis for 1,5,10% level of significance critical values for 1, 5, 10% are respectively -2.62 -1.95 -1.62	

According to these findings, all the time series employed are I(1), non-stationary in levels, stationary in first differences, allowing us to employ either Johansen co-integration technique or threshold co-integration in the present survey.

The next step in our analysis involves the employment of the threshold co-integration as validated by preliminary tests. The most important test is the grid test indicating the existence of one threshold.

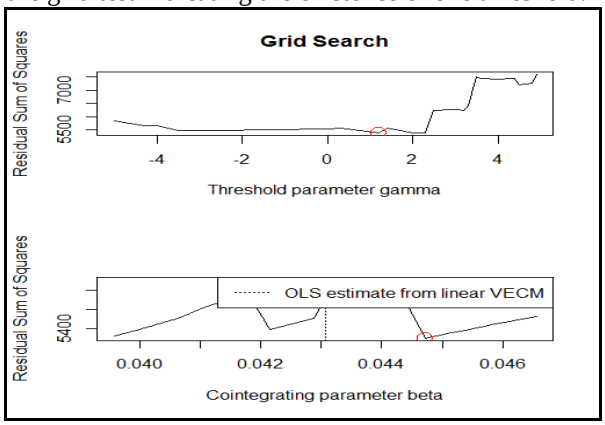

Figure 1. Threshold co-integration Test with Grid Search

Within the next step in our methodology we estimated the threshold vector error correction model. The coefficients of the estimated TVECM from the simulated data with β = - 0.04471815, lag=1 and threshold value γ1= 1.2 on Table 2.

Table 2. Coefficients of the estimated TVECM, Low Regime

Regime	Term	GDP	GDPagr
Low Regime	ECT	6.5487(0.0001)***	0.1426(0.1703)
	Const	17.8378(0.0024)**	0.3085(0.3998)
	Gdp(-1)	-14.3658(0.0074)**	-0.3359(0.3226)
	Gdpagr(-1)	0.6545(8.4e-05)***	0.0088(0.3726)
The standard errors of the coefficients are in the parenthesis.			

The first regime corresponds to 28.6% while the upper regime corresponds to 71.4% .The coefficients of the estimated TVECM from the simulated data with β = - 0.04471815, lag=1 and threshold value $\gamma 1$= 1.2 on Table 3.

Table 3. Coefficients of the estimated TVECM, Upper Regime

Regime	Term	GDP	GDPagr
Upper Regime	ECT	0.1856(0.9415)	-0.1756(0.3002)
	Const	3.9038(0.6330)	0.7216(0.1888)
	Gdp(-1)	4.3396(0.3412)	0.2232(0.4599)
	Gdpagr(-1)	-0.2070(0.6667)	0.0013(0.9665)
The standard errors of the coefficients are in the parenthesis.			

The second regime for which the following results should be mentioned; No statistical significance for neither the long term nor for short term period dynamics validates an indication for stable area.

The next pair of variables for which linear co-integration is confirmed involves the GDP in Greece and the GDP generated by tourism another extremely significant motion of growth surveyed with Johansen co-integration technique while the Vector Error Correction Model was additionally estimated in order to determine the causality among the pair of the variables studied. The results are provided in the next few paragraphs;

Results of Johansen co-integration technique;

Table 4. Results of Johansen co-integration technique

test 10pct 5pct 1pct
r <= 1 | 1.16 6.50 8.18 11.65
r = 0 | 16.41 12.91 14.90 19.19

The existence of one co-integrating vector is thus validated. The sole cointegrating vector is the r1 (1, 0.01352), while the estimated vector error correction is the following;

The coefficients of the estimated VECM;

Table 5. The coefficients of the estimated VECM

Term	GDP	GDPtour
ECT	0.0051(0.0029).	0.0145(0.0060)*
Const	0.2576(0.1281).	0.6718(0.2634)*
Gdp(-1)	0.4054(0.1577)*	0.1655(0.3244)
Gdptour(-1)	0.0517(0.0798)	0.0970(0.1641)
The standard errors of the coefficients are in the parenthesis.		

According to our findings the Gdp in the short term as well as in the long term is affected by the Gdp of tourism while the opposite relationship is valid only in the long term. The next step in our analysis involved the impulse

response analysis and the variance decomposition analysis. The results of decomposition analysis are illustrated in the next figure 2.

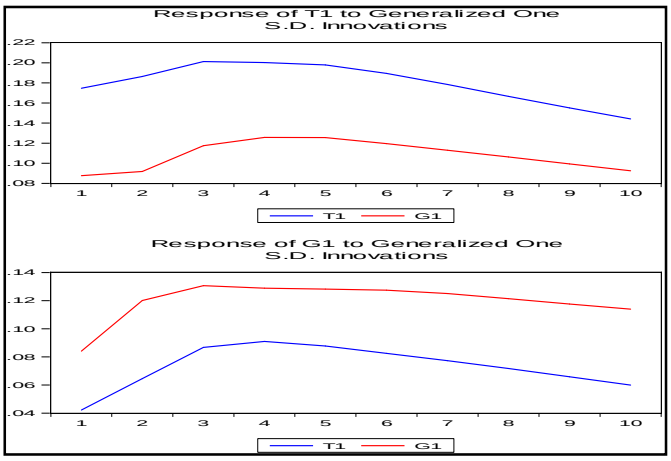

Figure 2. Impulse response analysis and the variance decomposition analysis

According to the figure, it is evident that factors leading to a change of one standard deviation for the Gdp leads the Gdp from tourism to a similar volatility pattern within a ten-month time period and vice versa. The particular results are indicative of the role that tourism could play in the economic growth of a country under a severe crisis.

5. CONCLUSIONS – POLICY RECOMMENDATIONS

Tourism is one of the most rapidly developing sectors on a global scale. However, the primary sector is also a major contributor to GDP formation for many countries. They can both prove very important for a country, especially during a period of economic crisis as the tourism industry and the primary sector could contribute to a fall in unemployment and an acceleration of growth. Therefore, this research investigates the factors affecting positively main economic indicators of the Greek economy during a period including the years of the ongoing economic crisis. We used data regarding tourism receipts and GDP generated by agriculture from the World Tourism Organization and the World Bank.

Significant conclusions came from the results of this study since it confirmed our intuition regarding the importance of the tourism sector in GDP growth of Greece. Measuring the contribution of Tourism and Primary sector to GDP, based on the theory and the relevant literature, the study attempted to investigate the existence of linear relationship between them. According to our findings the GDP affected by tourism Gdp (in long and short term) while the opposite relationship is valid only in the long term. As far as our second variable, namely the agricultural GDP, no statistical significance for neither the long-term nor for the short-term dynamics validates an indication for stable area.

In the context of a prolonged economic crisis, the results of such research can confirm the important potential role for tourism in the economic recovery of Greece and, to a lesser extent, by agriculture in order to implement policies focused on these particular sectors. The findings indicate that the fall in the GDP in Greece would have been even worse without the country's dynamic tourist sector. In conclusion, tourism and agriculture may well be a solution to the problem of Greece and therefore innovation, knowledge spread to the farmers on new farming practices and cultivations and a hard effort with well planned investments on tourism should become a priority in the agenda of all the Greek governments.

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