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An Investigation on the Shuttle Trade Dynamics of a Small-Open-Economy

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Abstract

In this article we have tried to assess the possible relationships between shuttle trade and the expletory variables, export (f.o.b.), import (c.i.f.) and CPI based real effective US dollar exchange rate. We employed monthly data of Turkey covering the years from 1996:01 to 2006:12 and forecasted the parameters by Ordinary Least Square (OLS) estimation method. In order to find out whether there is a linear relationship among these series; we have checked each series whether are integrated at the same order or not. According to the ADF unit root test results, we have found that all the variables are integrated of order one, $I(1)$, but shuttle trade. Besides we detected a case of multicollinearity among some of the expletory variables. Therefore we used first order autoregression model of shuttle trade. We have derived that, previous month's shuttle trade have positive impacts on the current level shuttle trade. We also used the same specification to indicate that the shuttle trade value increases in the months of fall and decreases in months of summer.

Keywords: International Macroeconomics, Shuttle Trade, Ordinary Least Square

JEL classification: F41, E26 and C22

* Corresponding author. All of the views expressed in this paper belong to the authors and do not represent the Republic of Turkey Ministry of Agriculture and Rural Affairs.

1. Introduction

OECD (2001) defines shuttle trade as the activity in which individual entrepreneurs buy goods abroad and import them for resale in street markets or small shops. Often the goods are imported without full declaration in order to avoid customs duty. Besides international definitions, there is a classification debate on shuttle trade among countries, whether or not it will be classified as non-observable, legal or underground economy. Those also make it complicated to measure and determine the shuttle trade volume and define its contribution to the macroeconomy (IMF, 1998:6, Paramonov and Stokov, 2007). Simply, because of its significant role among Eastern Europe and Central Asia; countries try to measure it usually by applying surveys in the customs. Approximately, the origins of shuttle traders are mostly from Russia, China, Ukraine and Bulgaria. These tourists go to their countries with their luggage. The visitors coming from Eastern Europe Countries usually do not encounter by any custom unions restrictions while carrying their goods to their own countries.

The economic meaning of shuttle trade was initially weak until 1990s. Within the appearance of integration and transition economies in Asia, shuttle trade has started to become commonplace among emerging markets. One of the causes of this type of trade flow was the structural transformation in the Eastern Europe. After the collapse of the Soviet Union, its economy has started to be turned to a market economy. In this period, the privatization policy had been administered unsuccessfully, which gave rise to structural unemployment. Some part of this unemployed population started to take jobs as shuttle traders and has started to travel to other countries as Turkey.

The shuttle trade has been in the agenda of Turkish and Russian economies for more than ten years (Eder, Yakovlev and Carkoglu, 2003). The shuttle trade issue concerns thousands of people from both sides of the countries and follows a sensitive policy to crisis and foreign trade policies. Economic indicators determine the volume of shuttle trade with Turkey and Russia. Besides its economic influences, political events are also critical to determine the trade volume between two countries (see Sezeri, 2000 for brief history of Turkish-Russian political history beyond 2000). The shuttle trade has been decreasing since 1998, continued to decrease after the political events in Russia in 2004.

The rest of the article is organized as follows. Section II gives a brief economic outlook for shuttle trade economics. Section III introduces the model specification and presents the results. The last section is the evaluation of the results and the conclusion.

2. Brief Outlook for the Shuttle Trade Economics

In law, shuttle trade has been assessed as export with waiver. This makes trade easier because generally shuttle trade between Russia and Turkey concentrates on textile, leather products, shoe, building supplies, food and plastic products. According to Foreign Economic Relations Board (DEIK), regional total trade volume of shuttle trade is nearly 20 billion dollars and half of this number remains in Turkey. Central Bank of the Republic of Turkey forecasts this number as 9 billion dollars and Turkish Statistical Institute (TURKSTAT) forecasts this number as 4.3 billion dollars. According to LASIAD (2000) from 1996 to 2000, Turkey has lost potentially 21 billion dollars from shuttle trade.

Although shuttle trade has no contribution to the economy related with custom revenues for the governmental budget, another contribution of shuttle trade to economy is related with tourism economy. The visitors coming for this purpose concede thundering currency to the domestic economy. Besides, it has a substantial role in the informal economy which is the biggest negative motive for shuttle trade. Yukseker (2003) redefines informal economy concept within Fernard Braudel's understanding of market economy. Hort (1973) suggests that informal economy grows out of by migration from urban to rural. Urban industry can not observe the unemployed segment, consequently binary labor market come into being. Workless part of the economy searches for alternatives to exist in the world as a human being. Privatizations in 1990s in Russia were a collapse relating with unemployment. Most of the privatized emporiums, hotels and other services sectors passed into the hands of minor groups in 1990s (Serling,1994: 99-100). Consequently, shuttle trade accounts of Russia have started to be controlled by minor groups (Yukseker, 2003:69).

Turkey has earned significant income from the shuttle trade activity in the region since the last ten years of time being. However, as seen in Table 1, there is an important decrease in income after 1996. In 1996, Russian government has decreased the exempting applied to shuttle trade from 2000 dollars to 1000. Also Russia increased the custom duties and quantity restrictions related with the trade. Consequently, shuttle trade among Turkey and Russia has been affected negatively. Laleli Business Association offers free trade zone to Laleli-Istanbul in order to increase the shuttle trade potential between Turkey and Russia. They claim that, after this, the unregistered economic activities will be diminished.

Years	Export (X)	Import (M)	X/M(%)	Equilibrium	BT
1996	1.482	1.846	80	-364	8.842
1997	2.049	2.048	100	1	5.849
1998	1.348	2.155	63	-807	3.689
1999	587	2.372	25	-1,785	2.255
2000	644	3.886	17	-3,242	2.944
2001	924	3.436	27	-2,512	3.040
2002	1.163	3.855	30	-2,692	4.068
2003	1.363	5.420	25	-4,057	3.953
2004	1.860	9.033	21	-7,173	3.880
2005	2.377	12.905	18	-10,528	3.473
2006	3.236	17.529	18	-14,293	6.408

Source: TURKSTAT, CBRT, BT: Shuttle trade income of Turkey

Turkey's most important partner is Russia related with the shuttle trade. General structure and trend in both of the economies affect the shuttle trade volume. We have lack of data denoting the origins of shuttle traders. However, according to Yukseker (2007) the volume of shuttle trade exports from Turkey to the former Soviet Union in the mid-1990s was estimated to 9 billion US dollars, but this number dropped to 2.2 billion US dollars after 1998 economic crisis in Russia. Although some attitudes to increase shuttle trade volume between two countries, in 2001 this number was 3 billion dollars. After 2001, we have no available data to analyze the shuttle trade volume between Russia and Turkey. Shuttle trade imports into Russia were around 86 billion Dollars in 1996 according to Organization for Economic Co-operation and Development.

When we analyze the trade picture between Turkey and Russia, we observe that Russia's export to Turkey increased by the time being. Although the general trade between Russia and Turkey has been increased after 1996, shuttle trade between countries has started to diminish. After 1998, China, United Arab Emirates, Dubai and Poland have started to obtain comparative advantage. Paramonov and Stokov (2007) provides detailed information for the shuttle trade debate among China and Central Asian countries and comparison of volume of Russian and Chinese trade with Central Asian countries. Consequently, the demanders coming to Turkey from Russia have started to turn their way to these countries (see Eder, Yakovlev and Carkoglu, 2003 for the profile of Turkish shopkeepers and Russian traders.). Also more of the informal cross-border trade has been transformed into registered exports since the crisis of 1998. Therefore, it's meaningful to expect a negative correlation between exports and informal shuttle trade.

3. Model Specification and the Results

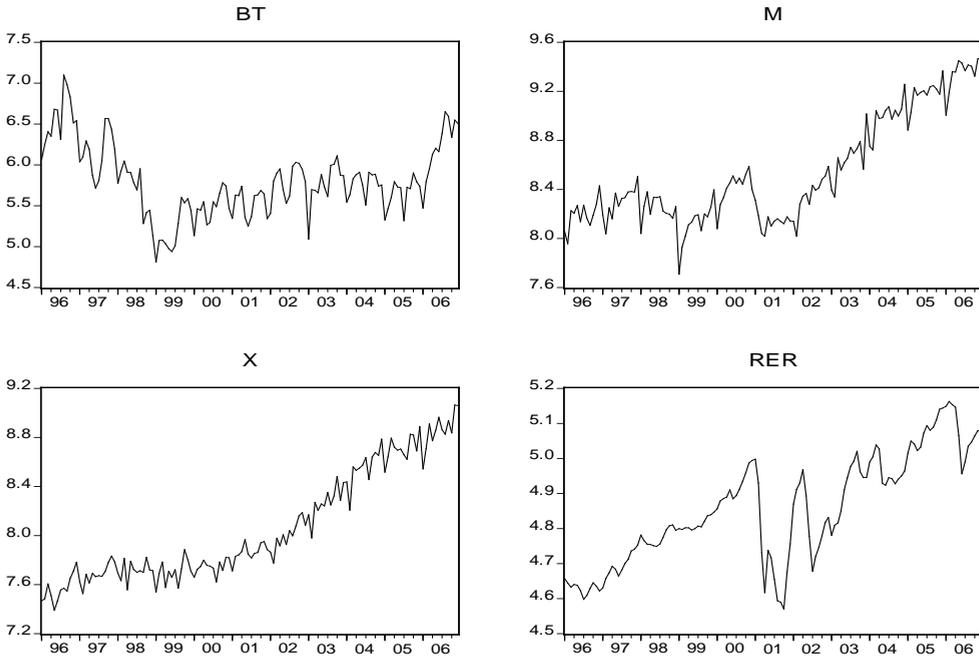
In this section, we have tried to investigate whether there is a possible relationship between shuttle trade of Turkey and export, import values and real effective exchange rate index which are thought to be most related variables with the shuttle trade. There is restricted detailed time series sub-data concerning the shuttle trade dynamics, because the data has been collected by the surveys. Since the detailed information about the shuttle traders, their profiles and origins are unavailable. We have no opportunity to consider the number of tourists in our investigation. We may talk about high level asymmetric information.

The monthly data for the shuttle trade, export, import and real effective exchange rate index are gathered from the Central Bank of Republic of Turkey Electronic Data Delivery System, balance of payments detailed presentation available at www.tcmb.gov.tr for the period January, 1996 to December, 2006. We used shuttle trade as dependent variable (TP.OD.D010:I-A12.Shuttle Trade, monthly, million U.S. dollars) denoted by *BT*. The independent variables used in the model are Export (TP.OD.D009:I-A111.Export, f.o.b., U.S. million dollars, denoted by *X*), Import (TP.OD.D013: I-A121.Imports, c.i.f., million dollars, denoted by *M*), and CPI based Real Effective Exchange Rate Index (TP.DK.REER3, 1995=100, denoted by *RER*). *RER* calculated using the IMF weights for 19 countries including Germany, USA, Italy, France, United Kingdom, Japan, Netherlands, Belgium, Switzerland, Austria, Spain, Canada, Korea, Sweden, Taiwan, Iran, Brazil, China and Greece. An increase in the index denotes an appreciation.

Historically Turkish export is lower than import. Most of the firms export the final goods constructed by the interval goods imported before. Therefore, export value is directly related with the import value. In order to observe it, we used Johansen cointegration test. Trace test indicates two cointegrating equations at the 5% level. The impulse of the export to the import is also positive indicating a significant direct relationship. Therefore, the appreciation of the Turkish Lira may increase the export volume. Besides the correlation coefficient between *X* and *M* is 0.94. The structure of the foreign trade figures increases the collinearity problem of the specification. *RER* directly affects the foreign trade balance of the economy, highly correlated by *X* and *M*, respectively 0.89 and 0.80. Trace test indicated one cointegrating equation at the 0.05 level between *X* and *RER*. Because of observing cointegration relationship among the expletory variables, there is a high possible multicollinearity among the expletory variables (export-import and *RER*). Also, we observe that *BT* is integrated of order zero (e.i. *BT* is stationary) and the others are integrated of order one. Therefore, a possible cointegration relationship to search for *BT* on *M*, *X* and *RER* are not possible.

Most of the economic variables are not pure linear, therefore taking the logarithm of the data gives a great advantage to obtain normality assumption for the variables. The data employed in the specifications are normally distributed. The graphs of the variables are presented in Figure 1.

Figure 1. Logarithmic Graphs of the Variables



In order to search for a linear relationship among these variables, we have to check whether all variables are integrated at the same order or not. Table 2, presents the ADF unit root test statistics results. Based on the data, we observe that *BT* is stationary and the other variables are integrated at the order one.

Table 2. Augmented Dickey-Fuller test Statistics						
Variable	ADF (Level)	ADF (1 st Diff.)	1% Level	5% Level	10% Level	Result
<i>BT</i> *	-2.9982	-4.5955	-3.4808	-2.8836	-2.5786	Stationary
<i>M</i>	-0.0699	-2.5999	-3.4808	-2.8836	-2.5786	Unit Root
<i>X</i>	1.8731	-2.9289	-3.4808	-2.8836	-2.5786	Unit Root
<i>RER</i>	-1.8672	-8.0550	-3.4808	-2.8836	-2.5786	Unit Root

(*) stationary at % 5 significance level.

Equation (1) is the initial specification of the model and call as specification A.

$$\ln BT_t = \ln \beta_0 + \beta_1 BT_{t-1} + \beta_2 \ln M_t + \beta_3 \ln X_t + \beta_4 \ln RER_t + u_t \quad (1)$$

All the variables are considered in logarithmic scale. Because taking logarithms of the data gives an advantage of increasing the probability of normality assumption. In Figure 2a, normal probability plots of the series at the first difference are presented. From the plots, we clearly observe the normality of the data. However, when we take BT as dependent variable, it is not meaningful to search for a linear relationship among other indicators (Engle and Granger, 1987). Because the variables import, export and real effective exchange rate are not stationary. To search for a relationship among the variables, they should be integrated in the same order. Therefore we consider equation (2) and use it as specification B.

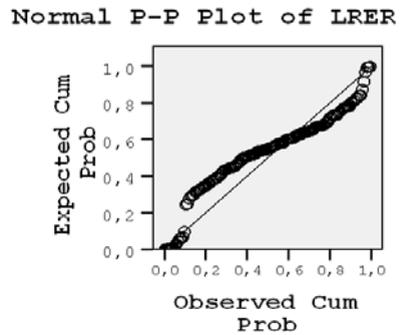
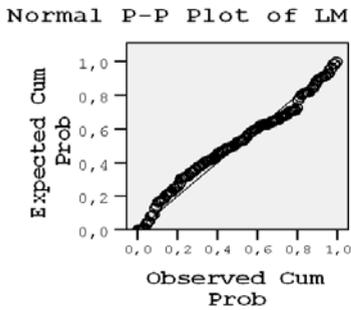
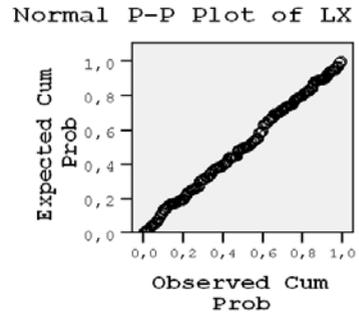
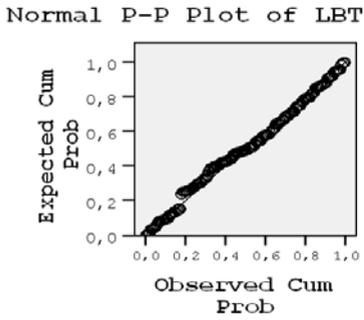
The autocorrelation and partial autocorrelation plots and the analysis indicate that a first order autoregressive time series model (equation 2) for BT is appropriate. The values of AIC and SBC are also support the same model. That is a model for BT is proposed as;

$$(BT_t - \mu) = \alpha_1(BT_{t-1} - \mu) + \sum_{i=2}^{12} \sum_{j=1}^{11} \alpha_i D_j + u_t \quad (2)$$

Eleven monthly seasonal dummy variables are included in equation (2) in order to catch the monthly seasonal effects in the mean equation. We excluded the month December in order to avoid for the dummy trap.

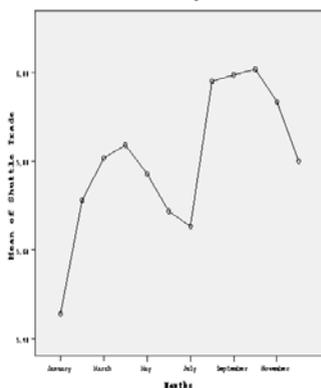
Table (3) presents the parameter estimates of the specification B. The shuttle trade value is persistent and affected by the pervious month. The second pillar of the study is to detect the seasonality in the shuttle trade data. The results of the specification B support our hypothesis that there is a high seasonality in the data. Next by the monthly, yearly and seasonally graphs given in Figure 3, we observed the same structure of seasonality. The trade increases in the fall and decreases in summer. In order to assess the sensitivity of seasonality results to the use of monthly data, we redid our analysis using quarterly data. Similarly, the shuttle trade volume of Turkey increases more in the fall than in the summer.

Figure 2. Distribution Graphs of the Variables (First Difference)

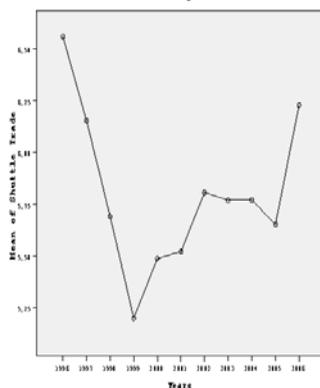


The variables are integrated in different orders; therefore, it is impossible to conduct cointegration analysis between the shuttle trade variable and the others. Therefore, it is not meaningful to search for a long-run relationship for shuttle trade and the other variables.

Figure 3. Shuttle Trade in Mean Monthly



Yearly



Seasonally

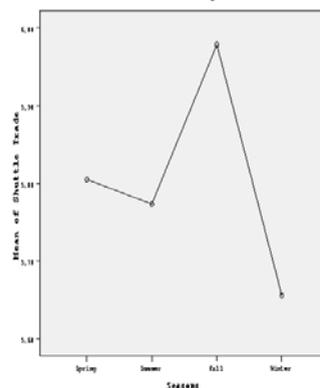


Table 3 Results of the Specification B			
Panel A: Estimates of the Parameters			
Variables	Coefficients		Coefficients
<i>Constant</i>	5.8022*	<i>May</i>	-0.0269
	(0.1883)		(0.0929)
<i>BT(-1)</i>	0.9159*	<i>June</i>	-0.1112
	(0.0377)		(0.0941)
<i>January</i>	-0.3404*	<i>July</i>	-0.1457
	(0.0547)		(0.0927)
<i>February</i>	-0.0853	<i>August</i>	0.1807*
	(0.0716)		(0.0887)
<i>March</i>	0.0094	<i>September</i>	0.1951*
	(0.0823)		(0.0815)
<i>April</i>	0.0381	<i>October</i>	0.2071*
	(0.0891)		(0.0703)
		<i>November</i>	0.1337*
			(0.0523)
Panel B: Robustness of the Results			
R-squared	0.8572	Mean dep.var.	5.8012
Adj.R-squared	0.8427	S.D. dep.var	0.4388
S.E. of reg.	0.1740	AIC	-0.5654
SSR	3.5731	SBC	-0.2801
Log like.	50.0350	F-statistic	59.0417
DW stat	2.3825	Prob (F-statistic)	0.0000
Note: The standard errors are reported in the parenthesis			
* Significant at 5% Level			

4. Discussion

Overall tendency of Turkey's foreign trade with Russia has been increased since the last ten years. But, when we assess the shuttle trade figures, we see that after 1998, the shuttle trade between two countries has been decreased significantly. The firms producing goods with low qualified labour and intermediate goods in Asian countries and obtaining comparative advantage had an important effect on diminishing trend of shuttle trade between Turkey and Russia. Russian shuttle traders have started to turn their ways to countries like China, India or Romania.

Shuttle trade is directly related with the trade regimes of the countries and shows seasonal movements. The shuttle trade value increases in fall and decreases in summer. Shuttle trade volume has been affected from the previous term's inertia. Also we may expect to obtain negative correlation between exports and informal shuttle trade because most of the shuttle trade has been transformed into registered export since the crisis of 1998.

Shuttle trade has an exempt from tax structure because it is luggage traveling with the passenger. Consequently, there is always a possibility of constituting a base for informal economy. Governments should discourage illegal trade by required controls (See Bal, 2004 for relationship between corruption and shuttle trade). There are also positive effects of shuttle trade on social and economic structure of the economies. Reselling of the goods increases the welfare of the region. This type of trade will satisfy economic resources to the home (i.e. tourism economy) and abroad countries (i.e. reselling goods) if they can fetter shuttle trade volume.

Although we have tried to explore the dynamics of shuttle trade with the available data, in the future by the developments of data mining, more qualified and detailed data will help researchers to investigate the hidden points of the shuttle trade. Specifically, because of the keen relationship between the tourism, the mining of data for the issue will increase the quality and depth of the research papers.

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Threshold Conditions' and Regional Convergence in European Agriculture

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Abstract

Convergence across regional economies has spurred one of the most debatable issues in contemporary research in economics. In this paper we seek to address the question of whether, during the period 1995-2004 the NUTS-2 regions of EU-26 exhibited a tendency to converge in terms of agricultural labour productivity. The approach used in this paper is mainly quantitative, with emphasis on empirical results. However, it is hoped that this paper will be able to isolate some interesting views on the issue of regional convergence in Europe. Application of a series of models indicates that the NUTS-3 regions follow a pattern of club-convergence. This pattern is attributed to initial 'threshold conditions' that determine the composition of the convergence-club.

Keywords: Conditional and Club-Convergence, Agriculture, European Union

JEL Classification: Q10, O47, C2

1. Introduction

The publication of the ground breaking work of Baumol (1986) was the spark that ignited an enormous interest to the issue of convergence across national economies. This issue can also be tackled with respect to different areas within a country, that is to say, *regions*. In the context of *regional convergence*, the term ‘region’ refers either to areas determined according to similarities in geographical characteristics or areas corresponding to, somehow arbitrary, administrative divisions.

As perhaps anticipated, recent years have witnessed a growing number of attempts to assess regional convergence using extensive datasets, such as the regions of the European Union (hereafter EU). This focus of interest is not entirely unexpected given the concern about regional convergence or what the European Commission calls ‘regional cohesion’. As Button and Pentecost (1999) point out ‘[...] if the growth rates of regions deviate significantly this, it is feared, can generate instabilities. Those in the poorer regions feel resentment at the prosperity of others’ (p. 2).

Cohesion is one of the primary targets in the context of the EU. Indeed, the question of regional convergence, expressed in terms of economic and social cohesion, is mentioned in the Preamble of the Treaty of Rome and has become one of the major goals of the EU. This is formulated in the Single European Act (title XIV, currently title XVII).

According to article 158 of the Rome Treaty ‘reducing disparities between the levels of development of the various regions’ is one of the primary objectives of EU development policies (as is evident in European Commission, 1996, 1997 and 1999). According to the third report of the European Commission (2004) on social cohesion, regional convergence or ‘regional cohesion’ is seen as vital to the success of several other key policy objectives, such as the single market, monetary union, EU competitiveness and enlargement.

However, in the relevant, literature¹, agriculture is a sector that has rarely received any attention² and still remains a virtually unexploited mine of research for regional economists. Indeed, while the literature on the agriculture sector, and in particular on its general implications for economic growth and on social change, is relatively extensive, it is only comparatively recently that interest has been shown in the

¹ See for example Button and Pentecost (1995), Neven and Gouyette (1995), Sala-i-Martin (1996), Cardoso (1993), Álvarez-García *et al.* (2004), Ezcurra *et al.* (2005) among others. These refer to the regional economy as a whole while fewer studies conducted with explicit reference to specific sectors, usually the manufacturing (Pascual and Westermann, 2002; Gugler and Pfaffermayr, 2004) or the services sector (e.g. Button and Pentecost, 1993).

² Some notable exemptions are the studies by Soares and Ronco (2000), Bivand and Branstad (2003, 2005).

implications of the agriculture sector activity for regional convergence. Thus, this paper aims to shed some further light on that issue. To be more specific, the objective of this paper is to look at the extent to which there has been convergence in terms of regional agricultural labour productivity (hereafter RALP) across the NUTS-2 regions of EU-26.

This effort is organised in the following manner. The context, in which the paper's main question emerges, is discussed in Section 2. Section 3 offers a detailed discussion of the empirical ways to assess regional convergence while Section 4 presents the econometric results. Finally, Section 5 summarises the arguments and considers the lessons for policy making.

2. Regional Convergence: A Conceptual Framework

A useful starting point is provided by the standard neoclassical model³, usually identified with Solow's (1956) model of growth⁴. The reason for the appeal of this model is that this framework not only provides a theoretical background but also a practical and flexible approach to the measurement of convergence in conjunction with an expression for the speed at which convergence takes place⁵. According to this model, economies (countries or regions) converge towards '*steady-state*' equilibrium provided that the growth rate of technology, rate of investment and rate of growth of the labour force are identical across regions. According to the neoclassical model the further a region is 'below' its '*steady-state*', the faster this region should grow. In this framework, it is anticipated that relatively 'poor' regions will exhibit a higher rate of growth than relatively 'rich' regions. This is described as *absolute convergence*; a process leading eventually to eradication of regional disparities⁶.

³ Although this model does not include an explicit spatial dimension, nevertheless its structure is flexible enough and allows its application to several contexts. Explicit regional versions of the neoclassical model were developed by Romans (1965), Borts (1960), Borts and Stein (1964), Williamson (1965), etc and more recently by Barro and Sala-i-Martin (1992), Barro *et al.* (1995), King and Rebelo (1990, 1993) and Knight *et al.* (1993).

⁴ A similar formulation has been developed independently by Swan (1956) while Meade (1961), Cass (1965) and Koopmans (1965), based on Ramsey (1928), extend Solow's model with refinements on optimal growth.

⁵ It should be noted, however, that the early 'seeds' of the convergence question can be found in Kuznets (1955, 1964, 1965), Rostow (1960), Gerschenkron (1962) and Gomulka (1971).

⁶ This is the opposite prediction to that of the pure Harrod – Domar model where if the conditions for steady growth are not satisfied the most likely results is a widening of regional growth rates. For a more detailed discussion see Richardson (1973). Similarly, Myrdal (1957) and Kaldor (1970) argue that market forces tend to generate persistent and cumulative differences in per capita incomes between regions.

The interesting question is, of course, which mechanisms are behind this process. Assuming perfect competition, zero transportation costs, full employment, a single homogenous product and constant returns to scale production functions, which are identical across regions, factors are paid the value of their marginal products. Hence, the wage (equal to marginal product of labour) is a direct function of the capital-labour ratio and the marginal product of capital (return to capital) is an inverse function of the capital-labour ratio. The standard neoclassical model can be summarised in the following set of equations (Richardson, 1978):

$$y_i = \alpha_i k_i + (1 - \alpha_i) l_i + t_i \quad (1)$$

$$k_i = \frac{s_i}{v_i} \pm \sum_j k_{ji} \quad (2)$$

$$l_i = n_i \pm \sum_j m_{ji} \quad (3)$$

$$k_{ji} = f_k(r_i - r_j) \quad (4)$$

$$m_{ji} = f_l(w_i - w_j) \quad (5)$$

where the subscript $i(j)$ refers to a region, y, k, l and t denote the growth rates in output, capital, labour and technological progress, respectively, α denotes the share of capital, s is the savings/income ratio, v is the capital-output ratio, w is the wage, r denotes the rate of return, m_{ji} measures the net migration of workers from region j to region i and k_{ji} the annual net capital flow from region j to region i .

Equations (2) to (5) merely modify the aggregate neoclassical definitional equation (1) to reflect the important contribution of interregional factor flows to growth. Equations (4) and (5) imply the critical hypothesis that capital and labour flow in response to interregional differentials in factor returns and, to increase the probability of convergence, that marginal factor returns are inversely related intra-regionally.

Within this model, movements of factors between regions are induced by differences in the returns to factors of production. This arises from an overriding emphasis on the assumption of diminishing marginal productivity of capital; an assumption that ensures that regions with a high (low) capital-labour ratio will exhibit low (high) marginal product of capital. Similarly, regions with a high (low) capital-labour ratio offer high (low) wages. One straightforward implication of this assumption is that labour will have an incentive to migrate away from low wage regions towards high wage regions while capital will move in the opposite direction, away from the more prosperous regions where its marginal product is low, towards lagging regions where additional capital investment is more profitable.

These factor flows will boost growth in labour productivity in lagging regions. Thus, capital and labour migrate in response to interregional differences in factor returns and these factor movements will continue until factor returns are equalised in each region.

The overall outcome is, therefore, one in which an interlocking and mutually – reinforcing set of processes (i.e. diminishing returns, labour migration, capital mobility and access to the same level of technology), leading to regional convergence.

In spite of long-established objections⁷, the neoclassical model of regional growth continues to be employed by regional economists and to breed dozens of empirical papers⁸. Such results are more likely to occur in a regional context, as it is reasonable to assume that labour and capital can more easily migrate between regions rather than across nations. It might be argued, therefore, that a network of regional economies provides an appropriate 'laboratory' for testing the neoclassical predictions of convergence. Barro and Sala-i-Martin (1995), note that convergence is more likely to occur between regions rather than national economies for precisely this reason.

Moving away from these abstract considerations, so as to get closer to the complications of real situation, account has to be taken of the way by which regional convergence can be measured empirically. According to the neoclassical model convergence is identical to an inverse relation between growth rate and initial level of labour productivity. This will be the starting point for a more elaborated analysis in Section 3.

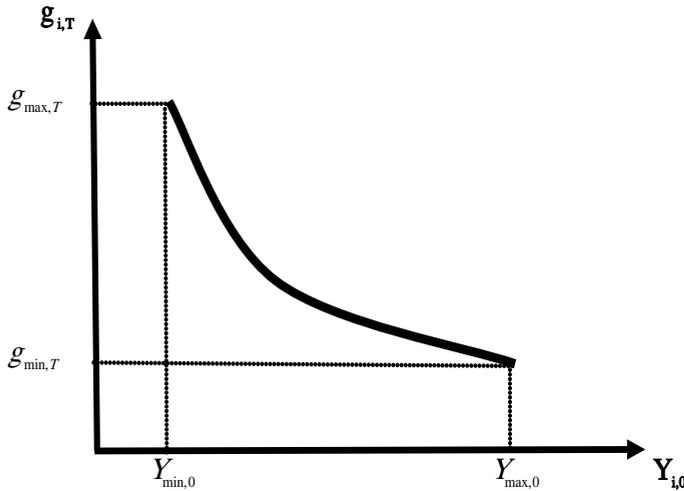
3. Empirical Measures to Regional Convergence

According to the neoclassical model, absolute convergence requires that regions with relatively low initial labour productivity grow faster than those with relatively high labour productivity, indicating that low-productivity regions catching up with high-productivity regions. Consider a distribution of regional labour productivity, i.e. $\mathbf{Y}_{i,0} = \{Y_{\min,0}, \dots, Y_{\max,0}\}$ and the associated rates of growth, i.e. $\mathbf{g}_{i,T} = \{g_{\min,T}, \dots, g_{\max,T}\}$. Absolute convergence occurs when $g_{i,T} \rightarrow g_{\min,T}$ as $Y_{i,0} \rightarrow Y_{\max,0}$; a condition shown in Figure 1:

⁷ A critical assessment of the neoclassical mechanisms of regional growth is provided by McCombie (1988a, b).

⁸ Testing convergence in the context of the neoclassical model is an exercise that a number of authors, including Mankiw *et al.* (1992), Barro and Sala-i-Martin (1992a, 1995), have undertaken.

Figure 1: Absolute Convergence



It is possible to translate this view into a dynamic regression equation, as follows⁹:

$$g_{i,T} = a + by_{i,0} \quad (6)$$

where a is the constant term¹⁰ and $g_{i,T}$ represents the growth rate¹¹ over a given time period $T = 0, \dots, t$.

In general, absolute convergence occurs if

$$f'_{g_{i,T}y_{i,0}} < 0 \quad (7)$$

The parameter b , i.e. the partial correlation between $g_{i,T}$ and $y_{i,0}$, indicates whether convergence or divergence prevails across a set of observational units. In particular, absolute convergence requires that $b \in [-1 \ 0]$ while if $b \in [0 \ 1]$ then this is an indication that $g_{i,T} \rightarrow g_{max,T}$ as $y_{i,0} \rightarrow y_{max,0}$, i.e. high-productivity regions grow faster than low-productivity regions increasing the gap between these two regional

⁹ This equation is based on the premise that growth is a function of the initial level of labour productivity, $Y_{i,0}$, i.e. $g_{i,T} = f(Y_{i,0})$.

¹⁰ This term, essentially, represents the steady-state growth rate. See Barro and Sala-i-Martin (1995) for an elaboration of this argument.

¹¹ Assuming that labour productivity ($Y_{i,T}$) grows as $Y_{i,T} = e^{g_{i,T}} Y_{i,0}$, then taking logarithms and solving for $g_{i,T}$ yields: $g_{i,T} = \ln Y_{i,T} - \ln Y_{i,0}$.

groupings. If $b = 0$, it follows that $g_{i,T} = a$, i.e. regions grow at a given rate which can be considered as an indication of an autonomous growth rate that maintains productivity differences across regions. There is, of course, the case when $b = -1$, which Romer (1996) describes as 'perfect convergence' while $b = 1$ can be conceived as 'perfect divergence'¹².

In this context, it is possible (and necessary given the concerns of this paper) to construct a precise measure of the *speed* at which regions converge. Following Barro and Sala-i-Martin (1995) the convergence coefficient b may be expressed as follows:

$$b = -\left(1 - e^{-\beta T}\right) \quad (8)$$

It is possible to obtain an expression for the speed at which regions approach the steady-state value of labour productivity or the average rate of convergence over the given time period. Thus,

$$\beta = -\ln(b + 1)/T \quad (9)$$

Given that $b \in [-1 \ 0]$ signifies convergence, it is expected that $\beta \in [0 \ 1]$. A value of $\beta = 0$ indicates absence of absolute convergence while if $\beta = 1$, this indicates a rate leading to perfect convergence. Obviously, if $\beta \in [-1 \ 0]$, then this indicates the speed at which regions diverge. It follows, therefore, that a higher β corresponds to more rapid convergence.

Estimating equation (6) using various data sets, Sala-i-Martin (1996a) concludes that for both regional and national economies: '[...] the estimated speeds of convergence are so surprisingly similar across data sets, that we can use a mnemonic rule: *economies converge at a speed of about two percent per year.*' (p. 1326) [Emphasis in the original]

Nevertheless, absolute or β -convergence is not the only notion of convergence. Absolute convergence occurs when *all* regions converge to the same steady-state. If different regions have different structural characteristics, then convergence is conditional on these parameters, giving rise to different steady states. This outcome is known as *conditional* convergence. The most frequently used test for conditional convergence has been put forward by Barro and Sala-i-Martin (1992), which is based upon the argument that different regional characteristics will lead to different steady-states. The hypothesis of conditional convergence can be thought of as:

$$g_{i,T} = f(Y_{i,0}, \mathbf{X}_i) \quad (10)$$

where \mathbf{X}_i represents a vector that includes a set of variables to control for differences in various structural characteristics across regions.

¹² It is worth mentioning that if estimates of b are available for a set of time periods, let $\tau = \tau_1, \tau_2, \dots, \tau_m$, then the condition $b_\tau \rightarrow -1$ as $\tau \rightarrow \tau_m$ signifies a process of moving towards perfect convergence while $b_\tau \rightarrow 1$ as $\tau \rightarrow \tau_m$ indicates a movement towards perfect divergence.

The general function in equation (10) can be written in a linear form as follows:

$$g_{i,T} = a + by_{i,0} + b_x \mathbf{X}_i \quad (11)$$

Absolute (unconditional) convergence is signalled by $b < 0$ and $b_x = 0$ while conditional convergence depends upon $b < 0$ and $b_x \neq 0$. Having selected appropriate variables to represent the institutional, structural, preference and environmental variables that characterise the steady-state value of labour productivity it remains the case that convergence is said to be occurring when higher initial levels of labour productivity are associated with lower rates of growth, over a given time period, i.e. $f'_{g_{i,T}, y_{i,0}} < 0$. Consider two groups of regions, let $i = k, l$, that differ not only in terms of initial labour productivity but also in terms of their structural characteristics, i.e. $\Delta \mathbf{y}_{kl,0} \equiv y_{k,0} - y_{l,0} \neq 0$ and $\Delta \mathbf{X}_{kl} \equiv \mathbf{X}_k - \mathbf{X}_l \neq 0$. Assume further that $\Delta \mathbf{y}_{kl,0} > 0$ and $\Delta \mathbf{X}_{kl} > 0$.

An implication of this assumption is that a superior (inferior) structure of the regional economy, approximated in terms of a high (low) \mathbf{X}_i , is associated with a high (low) level of initial level of labour productivity. Absolute convergence amongst these groups is possible¹³ if $g_{k,T} - g_{l,T} < 0$. However, given that $\Delta \mathbf{X}_{kl} > 0$, it is expected that $\beta_k - \beta_l \neq 0$. Furthermore, given that $\Delta \mathbf{y}_{kl,0} > 0$ and $\Delta \mathbf{X}_{kl} > 0$, then $\beta_k \in [-1 \ 0]$ and $\beta_l \in [0 \ 1]$, which implies that $\beta_k - \beta_l > 0$

$$(12)$$

According to equation (12) convergence is faster among regions with similar structural characteristics. A fast process of convergence is feasible only among regions with similar structural characteristics; a process that is accelerated as regions become more similar in their structural characteristics. This condition can be stated as follows:

$$(\Delta \mathbf{X}_{kl})_t \rightarrow 0 \text{ as } t \rightarrow \infty \quad (13)$$

This leads to an alternative notion of convergence, that of *club-convergence*. Although club convergence was introduced by Baumol in his seminal paper (1986), nevertheless this notion is acknowledged as being a more probable outcome across regional economies¹⁴. Although different authors propose various methods of detecting

¹³ Divergence amongst such regional groupings is, of course, a strong possibility since an inferior structure might lead to a lower growth path, which sustains initial differences in labour productivity. This possibility is explored in Alexiadis and Tomkins (2006).

¹⁴ See for example Canova (2004), Corrado *et al.* (2005), Fischer and Stirböck (2006), among others.

convergence-clubs¹⁵, a test used extensively in empirical applications is provided by Baumol and Wolff (1988). According to Baumol and Wolff (1988), the standard test for absolute convergence is augmented by the introduction of a quadratic term to allow the possibilities of non-linearities in the convergence pattern. Thus,

$$g_{i,T} = a + b_1 y_{i,0} + b_2 y_{i,0}^2 \quad (14)$$

The expression in equation (14) has several important implications. The quadratic function is illustrated in Figure 2 and is drawn on the assumption that $b_1 > 0$ and $b_2 < 0$, which are the conditions required for the existence of a convergence-club.

Growth reaches a maximum (g^*) when

$$f'_{g_{i,T}y_{i,0}} = 0 \quad (15)$$

or more specifically

$$b_1 + 2b_2(y_{i,0}) = 0$$

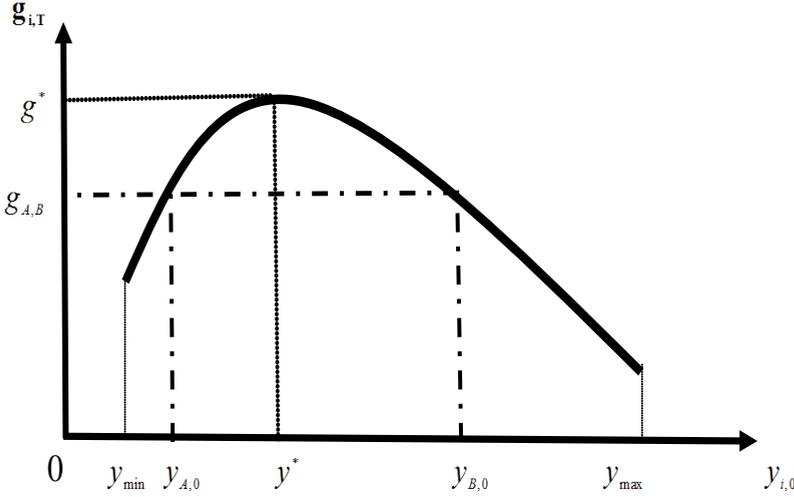
(16)

Solving equation (16) for $y_{i,0}$ yields a level of initial labour productivity which corresponds to maximum growth. Thus,

$$y^* = -b_1/2b_2 \quad (17)$$

¹⁵ See for example Chatterji (1992), Chatterji and Dewhurst (1994), Durlauf and Johnson (1995), Alexiadis and Tomkins (2004) among others.

Figure 2: Club Convergence



It is this turning point which is used to identify members of the convergence-club. For regions with $y^* - y_{i,0} < 0$, growth is inversely related to the initial level of labour productivity:

$$f'_{g_{i,T}y_{i,0}} < 0 \quad \forall i \in [y^*, \dots, y_{max,0}] \quad (18)$$

It may be argued that these regions constitute a 'convergence club' by exhibiting absolute or β -convergence. The opposite holds for regions with $y^* - y_{i,0} > 0$. In this case, provided that $b_1 > 0$ of course, growth is positively related to initial labour productivity:

$$f'_{g_{i,T}y_{i,0}} > 0 \quad \forall i \in [y_{min,0}, \dots, y^*] \quad (19)$$

The following example is illustrative. Consider two regions, A and B, each with an identical growth rate ($g_{A,T} = g_{B,T}$) with $y_{A,0} - y^* < 0$ and $y_{B,0} - y^* > 0$, implying that $y_{A,0} - y_{B,0} < 0$. If these two regions continue to grow at the same rate, i.e. if $(g_{A,T} - g_{B,T})_\tau = 0$, then $(y_A - y_B)_\tau < 0$ as $\tau \rightarrow \infty$, which indicates that region A is unable to close the gap with region B. Convergence between these two regions is feasible only if region A grows faster than region B, i.e. if $(g_{A,T} - g_{B,T})_\tau > 0$, as $\tau \rightarrow \infty$.

In this context it is reasonable to assume that the rates of convergence will differ between the regions included in a convergence-club and the regions excluded from the

club, i.e. $b_c - b_{nc} \neq 0$ and $\beta_c - \beta_{nc} \neq 0$. Given that $f'_{g_{i,T}y_{i,0}} < 0$ implies β -convergence, then it follows that the regions in the club exhibit a rate of convergence faster compare to the regions excluded from the club, i.e. $b_c - b_{nc} < 0$, which implies that

$$\beta_c - \beta_{nc} > 0 \quad (20)$$

A relatively high (low) level of initial labour productivity, defined as $y^* - y_{i,0} < 0$ ($y^* - y_{i,0} > 0$), ensures β -convergence (divergence). Once this knowledge is introduced, it comes as no surprise that the initial conditions, as expressed in terms of labour productivity, determine the composition of the convergence-club. Stated in alternative terms, a convergence-club is unlikely to consist of regions with markedly different levels of labour productivity¹⁶; all must lie within a range that is equal to, or above, the *threshold* value y^* :

$$y_{i,0} - y^* \geq 0 \quad (21)$$

A pattern of club-convergence can be attributed not only to conditions related to the initial level of labour productivity, that is to say initial economic conditions, but also to certain structural characteristics. These characteristics can be conceived as '*threshold conditions*' that determine the composition of a convergence-club.

It is possible to augment the test for club-convergence by introducing a vector that includes a set of variables to control for differences in various structural characteristics across regions, let $\mathbf{X}_{i,0}$. Thus, equation (14) can be written as follows:

$$g_{i,T} = a + b_1 y_{i,0} + b_2 y_{i,0}^2 + b_3 \mathbf{X}_{i,0} \quad (22)$$

Having outlined the main features of the absolute, conditional and club-convergence models, this paper will proceed to evaluate the pattern of regional convergence across the NUTS-2 regions of the EU-26.

4. EU-26 Regions: Testing for Convergence in RALP

The empirical part of this paper is focused upon agricultural regional productivity in European Union. Agricultural productivity can be approximated in various ways. In this paper we exploit data on Gross Value Added (hereafter GVA) per worker¹⁷ since this

¹⁶ This is consistent with Baumol's description of the convergence-club as 'a very exclusive organisation' (p. 1079).

¹⁷ More formally, this is defined as $y_{i,t} = \frac{Y_{i,t}}{L_{i,t}}$, where $Y_{i,t}$ is agricultural GVA and $L_{i,t}$ is average work units in agriculture, hunting, forestry and fishing in each region i during a given time period, t , usually a fiscal year.

measure is a major component of differences in the economic performance of regions and a direct outcome of the various factors that determine regional ‘competitiveness’ (Martin, 2001).

The regional groupings used in this paper are those delineated by EUROSTAT and refer to 258 NUTS-2 regions. The EU uses NUTS-2 regions (Nomenclature Units for Territorial Statistics) as ‘targets’ for convergence and defined as the ‘geographical level at which the persistence or disappearance of unacceptable inequalities should be measured’ (Boldrin and Canova, 2001, p. 212). Despite considerable objections for the use of NUTS-2 regions as the appropriate level at which convergence should be measured, the NUTS-2 regions are sufficient small to capture sub-national variations (Fischer and Stirböck, 2006)¹⁸.

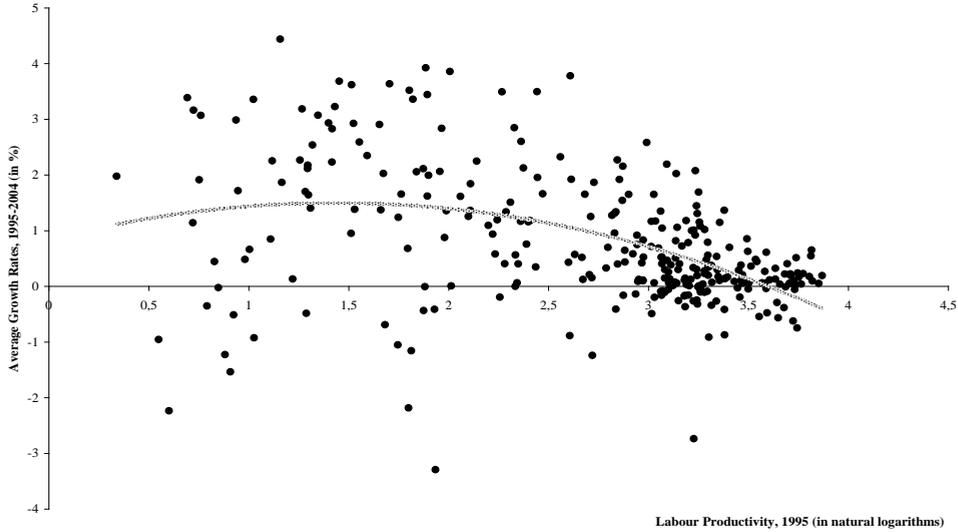
The time period extends from 1995 to 2004, a time period that might be considered as somehow short. However, Islam (1995) and Durlauf and Quah (1999) point out that convergence-regressions, such as equation (4), are valid for shorter time periods as well, since they are based on an approximation around the ‘steady-state’ and supposed to capture the dynamics toward the ‘steady-state’.

In terms of RALP, about 46% of the EU-26 regions are below the European average with the majority of them located in Southern Mediterranean and Eastern Europe. Northern regions, especially in the UK and the Netherlands display a level of labour productivity two times higher than regions located in Southern and Eastern countries, which are generally characterised by relatively high shares of labour force employed in agriculture.

Nevertheless, the potential for absolute convergence is indicated in Figure 3, which shows a scatterplot of the average annual growth rate against the initial level of labour productivity.

¹⁸ Several formal models have been developed to tackle with problems associated with spatial units. See Alexiadis and Tsagdis (2006) for a review of these models.

Figure 3: β -convergence in RALP, EU-26 regions, 1995-2004



Casual inspection of the data in Figure 3 provides some indication of an inverse relationship between the average annual growth rate and initial level of RALP. Nevertheless, this property does not appear to be uniform across all the NUTS-2 regions of the EU-26. As Figure 3 makes visible, this property seems to be constrained in a certain group of regions with a relatively high initial level of RALP. Several regions, on the other hand, appear to diverge, in the sense that relatively low initial levels of labour productivity are associated with relatively low rates of growth and vice versa. The trend curve in Figure 3 is similar to that in Figure 2, implying that club convergence might be a strong possibility across the regions of the Europe.

The presence of absolute convergence (or divergence), however, cannot be confirmed by visual inspection alone. A formal test for absolute convergence can be expressed in terms of the following regression equation:

$$g_{i,T} = a + b_1 y_{i,t_0} + \varepsilon_i \quad (23)$$

where $t_0 = 1995$ and $T = 10$.

In equation (23) ε_i is the random error term, assumed to have zero mean and variance, and to be independent and identically distributed over time ($E[\varepsilon_i \varepsilon_i'] = \sigma_i^2 \mathbf{I}$) and across the observational units and uncorrelated with y_{i,t_0} .

Equation (23) is estimated using Ordinary Least Squares (hereafter OLS), for the NUTS-2 regions of EU-26 while separate regressions are carried out for the regional divisions of EU-12, EU-15 and the new and ascending countries¹⁹.

A similar approach is applied for the empirical assessment of regional conditional convergence. In this case, of particular importance is the choice of appropriate variables that approximate structural differences in the agricultural sector of the European regions. Subsequent analysis deploys two variables. The first variable attempts to approximate the impact of the size of holdings in the growth of RALP while the second attempts to capture the effects of the degree of ‘entrepreneurial’ agriculture. More specifically, the first variable is constructed using the percentage of holdings with over 50 hectares of agricultural land in each region (S_{i,t_0}) and the second the percentage of non-family labour force in agriculture in each region (NF_{i,t_0}).

A way to assess the impact of the *combined* effect of these two conditional variables is to include S_{i,t_0} and NF_{i,t_0} as explanatory variables in equation (23). More formally, the ‘full’ model of conditional convergence in RALP can be expressed as follows:

$$g_{i,T} = a + b_1 y_{i,t_0} + b_2 S_{i,t_0} + b_3 NF_{i,t_0} + \varepsilon_i \quad (24)$$

In equation (24), the conditional variables are expressed in initial values. There are two primary reasons for such an approach. The first is related to the fact that the current conditions of agricultural structure in a region, normally, have future or long-run effects on regional growth. Stated in alternative terms, future growth is affected by current efforts to enhance the structure of agriculture. Therefore, including such variable at the initial time captures these long-run effects on regional growth over a specific time period. A second reason for using initial values is that it tests the hypothesis that initial conditions ‘lock’ regions into a high or low position, for example, high (low) levels of S_{i,t_0} or NF_{i,t_0} might lead to high (low) rates of growth. Before considering the regression results, it is important to note that, from an econometric point of view, inclusion of conditional variables measured at the initial time helps to avoid the problem of endogeneity.

Following the discussion in section 3, the empirical test for club-convergence is specified as follows:

$$g_{i,T} = a + b_1 y_{i,t_0} + b_2 y_{i,t_0}^2 + \varepsilon_i \quad (25)$$

A pattern of club-convergence can be attributed not only to conditions related to the initial level of labour productivity, that is to say initial economic conditions, but also to certain structural characteristics. These structural characteristics are approximated in

¹⁹ These are Czech Republic, Estonia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Slovenia, Slovak Republic and Bulgaria.

terms of the conditional variables S_{i,t_0} and NF_{i,t_0} . Introducing these variables in a test for club-convergence transforms equation (25) as follows:

$$g_{i,T} = a + b_1 y_{i,t_0} + b_2 y_{i,t_0}^2 + b_3 S_{i,t_0} + b_4 NF_{i,t_0} + \varepsilon_i \quad (26)$$

Despite its simplicity, this model aims to highlight the importance of initial conditions regarding spatial technology in the process of regional growth and convergence. While this approach has the virtues of rigour and precision but it easily leads to a neglect of spatial factors. In other words, equations (23), (24), (25) and (26) treat regions as 'closed' economies.

It is possible to overcome this, clearly unrealistic, assumption by introducing in these equations the effects of spatial interaction. Indeed, in the light of recent literature it may be argued that any empirical test for regional convergence is misspecified if the spatial dimension is ignored (Rey and Montouri, 1999; Lall and Yilmaz, 2001), the presumption being that the extent of regional interactions, such as technology spillovers, are significantly dependent upon the location of regions relative to each other.

According to Rey and Montouri (1999) the potential for spatial interaction can be incorporated within convergence analysis by means of the spatial-error model. In this model, the key feature is that spatial interaction occurs through the error term of equation (22), and hence the usual assumption of independent error terms is not sustainable. Following Rey and Montouri (1999), the error term incorporating spatial dependence is shown as follows:

$$\varepsilon_i = \zeta \mathbf{W} \varepsilon_i + u_i = (\mathbf{I} - \zeta \mathbf{W})^{-1} u_i \quad (27)$$

where ζ is the spatial error coefficient and u_i is a $n \times 1$ vector for the new independent error-term with $u \sim N(0, \sigma^2 \mathbf{I})$. Inter-regional spatial dependence is generated by means of the $n \times n$ spatial-weights matrix (\mathbf{W}) the elements of which (w) may be devised in various ways. For example, a common practice is to allow these weights to take the value of 1 if a region is contiguous to another and 0 otherwise (a first order continuity matrix). Alternatively, the spatial weights may be continuous variables (Cliff and Ord, 1981), constructed so as to produce declining weights as distance between regions increases. Thus:

$$w_{ij} = \frac{1/d_{ij}}{\sum_j 1/d_{ij}} \quad (28)$$

where d_{ij} denotes the distance between two regions i and j , as measured by the distance between the major urban centres where the majority of economic activities are located. The denominator is the sum of the (inverse) distances from all regions surrounding region i . This approach is used in the empirical analysis in section IV. Taking into account the effects of spatial interaction, equations (23), (24), (25) and (26) are transformed as follows:

$$g_i = a + b_1 y_{i,t_0} + (\mathbf{I} - \zeta \mathbf{W})^{-1} u_i \quad (29)$$

$$g_i = a + b_1 y_{i,0} + b_2 S_{i,t_0} + b_3 NF_{i,t_0} + (\mathbf{I} - \zeta \mathbf{W})^{-1} u_i \quad (30)$$

$$g_i = a + b_1 y_{i,t_0} + b_2 y_{i,t_0}^2 + (\mathbf{I} - \zeta \mathbf{W})^{-1} u_i \quad (31)$$

$$g_i = a + b_1 y_{i,t_0} + b_2 y_{i,t_0}^2 + b_3 S_{i,t_0} + b_4 NF_{i,t_0} + (\mathbf{I} - \zeta \mathbf{W})^{-1} u_i \quad (32)$$

It should be noted that contemporary empirical literature on regional convergence is based on models that combine conditional variables with spatial terms (that is to say ‘spatial conditional convergence’ models) focused mainly on the EU regions (e.g. Maurseth, 2001; Lopez-Bazo *et al.*, 2004) with fewer studies referring to individual countries (e.g. Funke and Niebuhr, 2005). Equations (30) and (32) are consistent with this literature and can be applied to the regional context of any individual country, provided that the required data are available.

At this stage, however, it is important to comment on the estimation methods for these spatial econometric models. Thus, estimation of the spatial error model is carried out by the maximum likelihood method, as OLS may result in problems of bias. To be more specific, the presence of spatial interaction in the error term leads to the following non-spherical covariance matrix (Rey and Montouri, 1999, p. 149):

$$E[\varepsilon_t \varepsilon_t'] = (\mathbf{I} - \zeta \mathbf{W})^{-1} \sigma^2 \mathbf{I} (\mathbf{I} - \zeta \mathbf{W})^{-1} \quad (33)$$

The presence of non-spherical errors results in unbiased OLS estimators but biased estimations of a parameter’s variance. Bernat (1996) notes that the presence of spatial autocorrelation invalidates the standard tests in OLS regressions in a way similar to heteroscedasticity²⁰. Thus, all inferences based on that model are invalid. Hence, the recommended estimation method is through maximum likelihood (Anselin, 1988; Anselin *et al.*, 1996; Anselin and Florax, 1995a).

The results from estimating equations (23), (24), (29) and (30) are set out in Table 1 and show that the convergence coefficient (b_1) to be negative and statistically significant at the 95% level in the case of the NUTS-2 regions of the EU-26. The presence of absolute convergence in the form of a negative relationship between the rate of growth and initial level of labour productivity is suggested by this evidence, and the NUTS-2 regions of the EU-26 have, on average, shown a tendency to converge over the period 1995-2004, albeit at a relatively slow rate; 0.54% per annum.

Given this slow rate of convergence, it would take a very long time for all the EU-26 regions to reach a common level of labour productivity, as predicted by the

²⁰ Heteroscedasticity occurs when the disturbance variance is not constant and arises due to measurement problems, inadequate specification or omitted variables. See also Stewart and Gill (1998) and Gujarati (1995).

absolute convergence model. As argued in section 3, a low rate of absolute convergence must undoubtedly be sought to differences in structural characteristics across regions.

Earlier in this section, two variables were introduced to approximate structural differences in the agricultural sector of the NUTS-2 regions of Europe. It is quite interesting that in all cases the introduction of conditional variables has a positive impact on regional convergence. That is to say that the estimated rate of convergence is higher compared to that obtained using the absolute convergence model. Thus, the results lend clear support to a perspective that emphasises the importance of structural characteristics in the process of regional convergence across Europe. In all specifications the estimation results yield $b_2 > 0$ indicating that the size of the holdings has a positive impact on the growth of RALP.

Broadly speaking, this it is anticipated, since regions with high initial levels of holdings size are normally associated with high levels of growth and vice versa. However, it is not automatically the case that this condition promotes convergence. In other words, if low productivity regions have a high initial level of holdings size, then this will have positive impacts on convergence, by enhancing their growth rates. On the other hand, if such regions have a low initial size of holdings, then no significant impacts on growth are anticipated and, hence, it may be difficult to converge with high productivity regions. The latter case is the more likely, which might explain the relatively low rate of convergence across the EU-26 regions.

The estimated value of b_2 for the EU-26 regions, suggests that a 1% increase in the percentage of holdings with agricultural area over 50 hectares, or in the size of holdings in general terms, induces an increase in a region's growth in the range between 1.5% and 2.4%, *ceteris paribus*. In all cases the econometric results show that $b_3 < 0$, which indicates that regions with a high initial NF_{i,t_0} , normally high-productivity regions, exhibit relatively low rates of growth; a condition which can be conceived as a source of promoting convergence. Indeed, the rate of convergence increases almost to 1% after introducing the conditioning variables.

This rate increases with the introduction of the spatial-error term. To be more specific, the spatial specification of the absolute convergence model yields a rate of convergence about 8% while the spatial conditional model indicates that the NUTS-2 regions of the EU converge at an average rate equal to 1.2% per annum.

Turning to the alternative hypothesis of club-convergence, the results of estimating the various specifications of club-convergence are presented in Table 2. The obtained results are consistent with the presence of a sub-group of regions demonstrating convergence properties in that the signs of the coefficients are as expected; $b_1 > 0$ and $b_2 < 0$, and both statistically significant.

The *Akaike* and the *Schwartz-Bayesian* (hereafter *AIC* and *SBC*, respectively) information criteria have been used for the model selection. As a rule of

thumb, the best fitting model is the one that yields the minimum values for the *AIC* or the *SBC* criterion, calculated as

$$AIC = -2L + 2K \quad (34)$$

and

$$SBC = -2L + K \ln(T) \quad (35)$$

where L is the value of the log likelihood function, T is the number of observations and K stands for the number of parameters estimated.

The *SBC* test has superior properties and is asymptotically consistent, whereas the *AIC* is biased towards selecting an overparameterized model (Enders, 1995). According to the *AIC* criterion, equation (32) is superior from the other specifications, since the values of this criterion are minimized.

This is also confirmed by the superior *SBC* criterion, which indicates that in all cases equation (32), i.e. a specification that combines initial economic and ‘threshold structural’ conditions, explains the process of convergence in RALP to a more satisfactory degree.

An important conclusion to emerge from the discussion is that the results lend clear support to a club-convergence perspective in agriculture across the NUTS-2 regions of Europe. Equally important is the fact that a pattern of club-convergence due to ‘threshold conditions’ is more obvious in an explicitly spatial model.

Therefore, the next important step forward is to examine the composition of the convergence-club in more detail. The members of the convergence-club can be identified by calculating the threshold point (y^*) at which $f'_{g_i, T y_i, 0} < 0$.

According to the estimated value of y^* (about 9,000 Euros) this club includes 198 regions. It might be argued that these regions have reached a situation of steady-state equilibrium. These regions grow with less than 0.5% per annum while the average growth rate of all regions is 0.6%. On the other hand, the excluded regions exhibit a rate of growth about 1% annually.

The set of non-converging regions exhibits a rate of growth about 1% annually while their average level of initial productivity, in 1995, amounts to 5,300 Euros, less than the average level of productivity in 1995 of all EU regions (17,000 Euros) and that of the convergence-club (23,000 Euros). Hence, it is confirmed that the convergence-club includes relatively ‘rich regions’ (above-the-average) that exhibit relatively low rates of growth (below-the-average) while a reverse situation appears for the regions excluded from the club, i.e. ‘poor’ regions with initial level of productivity below the average and exhibiting a relatively higher growth rate (above-the-average).

The convergence-club includes, almost exclusively, regions from EU-12 countries. Fewer regions are included from EU-15 countries (about 7% of the convergence club) whilst only 3% of the club refers to regions from new and ascending countries-members, such as Slovakia and Czech Republic. The set of the non-

converging regions includes, to a great extent (65% of the set), regions from new member-states (e.g. Poland, Latvia, Lithuania, Bulgaria) and some regions from EU-12 Mediterranean countries (Greece, Spain and Portugal). The diverging regions are all located around the 'edge' of the EU, as shown in Figure 4.

Table 1: Absolute and Conditional Convergence in RALP

Depended Variable: g_{it}	Equation (23)	Equation (29)	Equation (24)	Equation (30)
a	0.3016* (5.018)	0.3652* (6.545)	0.4420* (5.898)	0.5105* (7.384)
b_1	-0.0527* (-2.569)	-0.0752* (-3.944)	-0.0085* (-3.389)	-0.1147* (-4.922)
b_2			0.0154 (1.288)	0.0226* (2.051)
b_3			-0.0444* (-2.298)	-0.0416* (-2.355)
ζ		0.5731* (7.0201)		0.5852* (7.107)
Implied β	0.0054	0.0078	0.0088	0.0121
LIK	0.7553	23.5188	5.6586	29.1155
AIC	2.4893	-41.0377	-3.3173	-48.2311
SBC	9.5952	-30.3789	10.8945	-30.4663

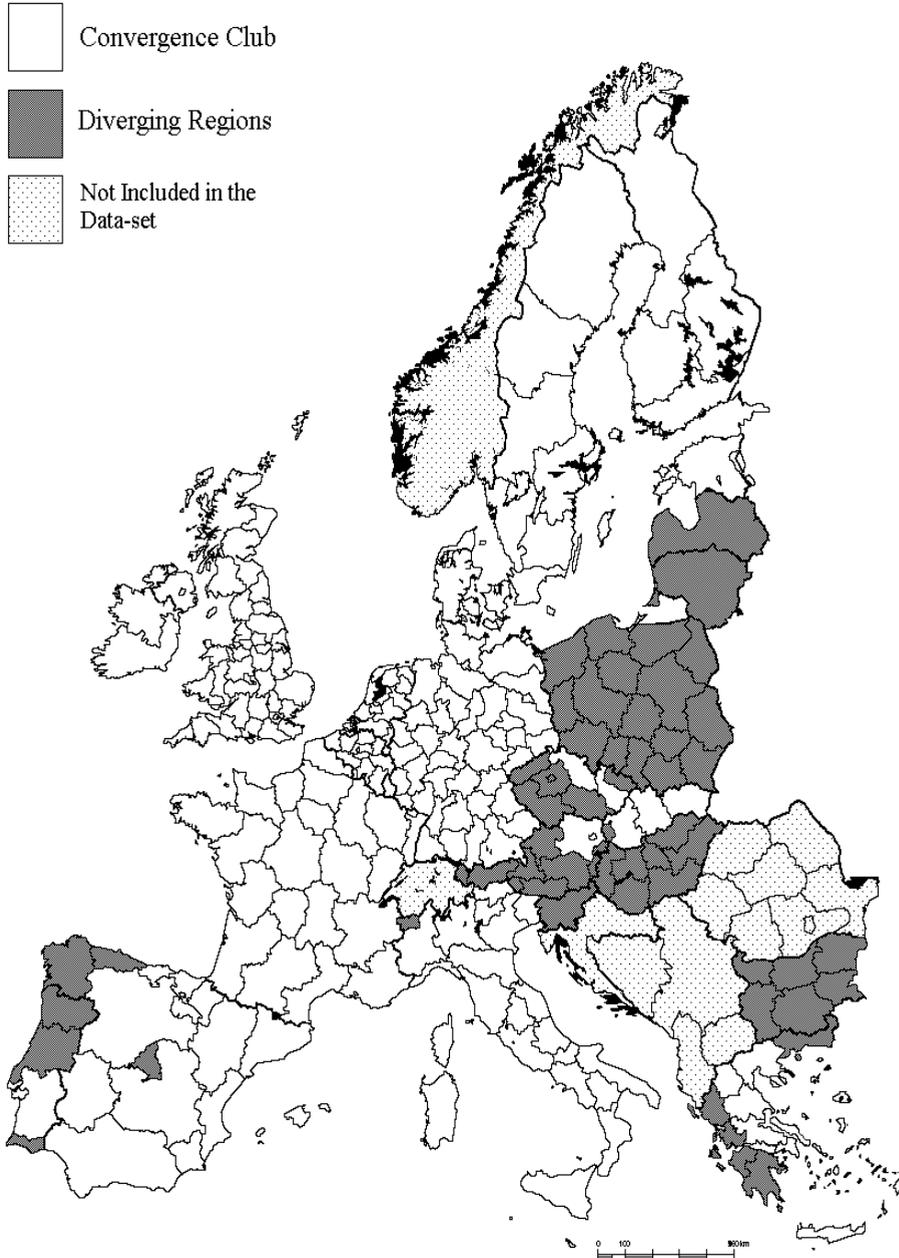
Notes: Figures in brackets are t-ratios. * indicates statistical significance at 95% level of confidence. AIC and SBC denote the *Akaike* and the *Schwartz-Bayesian* information criteria

Table 2: Club Convergence in RALP

Depended Variable: g_{it}	Equation (25)	Equation (31)	Equation (26)	Equation (32)
a	-0.2997* (-2.341)	-0.2556* (-2.135)	-0.1602 (-1.144)	-0.1005 (-0.770)
b_1	0.5115* (4.682)	0.4977* (4.878)	0.4531* (4.113)	0.4301* (4.193)
b_2	-0.1163* (-5.251)	-0.1171* (-5.659)	-0.1109* (-5.005)	-0.1109* (-5.379)
b_3			0.0182 (1.588)	0.0230* (2.147)
b_4			-0.0304 (-1.626)	-0.0320 (1.844)
ζ		0.5281* (6.158)		0.5342* (6.294)
Implied y'	2.1982	2.1249	2.0422	1.9377
LIK	13.9852	31.9193	17.8318	36.6534
AIC	-21.9704	-55.8386	-27.6637	-61.3068
SBC	-11.3115	-41.6267	-13.4519	-39.9890

Notes: Figures in brackets are t-ratios. * indicates statistical significance at 95% level of confidence. AIC and SBC denote the *Akaike* and the *Schwartz-Bayesian* information criteria

Figure 4: Club Convergence in European Agriculture



5. Conclusions and Policy Implications

In the case of the EU, and although an increasing number of empirical studies have paid attention to issues of economic convergence, the empirical assessment of agricultural productivity convergence has not so far received due attention. To remedy this, convergence in agricultural labour productivity is tested empirically using data for 258 NUTS-2 regions of the EU-26 over the period 1995-2004. What is clarified by the econometric results is that the property of convergence is restricted to an exclusive convergence-club.

From a policy perspective, this evidence is useful at two levels. Firstly, given a general focus at national and EU level upon support for lagging regions and the promotion of convergence, the identification of a convergence-club clearly assists in drawing a dividing line between regions which might be deemed eligible for assistance and those which are not. Regional assistance should, to a substantial extent, be diverted towards those regions that do not belong to the convergence-club. Secondly, the greater part of effort and assistance should be directed to improve the underlying conditions of lagging regions and thereby generate an environment that more closely resembles the combination of characteristics found in the convergence-club. Moreover, any tendencies towards regional convergence are affected by certain structural characteristics prevailing in the agricultural sector. The econometric analysis in this paper has identified two structural characteristics that have positive effects on the process of regional convergence. Obviously, more characteristics can be identified by introducing more conditional variables in the model, such as product-mix, adoption of new techniques and innovations in agriculture and so forth. These findings suggest that, until much more detailed investigation of the specific impacts on particular types of regions is undertaken, convergence in RALP will remain a contentious issue.

While the empirical results are serious in their own right, they must be placed in perspective. There is a little pretence that the forgoing analysis provides an exhaustive account of all factors that affect the process of regional convergence in terms of agriculture productivity. For example, additional complications arise from the multidimensional nature of the institutional and political structure of the CAP; a factor that, indubitably, has important spatial implications. Considerably more research, therefore, is required before the issue of regional convergence in agricultural productivity can be discussed with confidence. What then is the purpose of this paper? Perhaps the main purpose of this paper should be to provoke interest in further work on the underlying mechanisms of convergence in regional agricultural labour productivity.

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The Role of Trust in the Resource Allocation Process of an Old University

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Abstract

The issue of effective management accounting systems, and especially the resource allocation procedures, have attracted considerable interest among higher education institutions in recent years.

Relevant previous research indicates that several universities adopt different approaches to the resource allocation problem, employing models and procedures that reflect their organisational arrangements and their internal socio – political dynamics. We argue that while studying accounting processes in their organisational context, the role of trust should also be considered carefully. In particular, it is very important to consider the attitudes of the individuals involved and interacting within organisational processes, and especially the trust between them, which plays an important role to the overall good governance of these processes.

In our study, the role of interpersonal trust in an old Scottish University resource allocation process is examined. The study indicates that trust is a very necessary insight to the facilitation of social structures of accountability that enhance a better governance of the resource allocation process.

Keywords: Organisational Trust, Universities, Resource Allocation, Organisational Context of Accounting

JEL classification: M41, D73, 120

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1. Introduction

In recent decades, public services in Britain have been challenged with a dynamic and a profound reform wave, which articulated the need for better and more accountable organisational governance systems. We argue that although external pressure to public services providers was severe, the choices of response of each institution were driven from the organisation's internal continuous and dynamic socio-political interactions. In the case of British universities a diverse response throughout the sector reflects such internal socio-political interactions. In such a context we studied trust and in particular, the role it plays within senior management decision processes.

At a glance, we consider the institutional reform of the British public services, as the broader context in which The University where the study developed is embedded. The underlined theme of the reform was to reshape the provision of public services ideology from a bureaucratic state to 'a flexile, accountable, and devolved sector; capable of offering choices of uses to the public' (Office of public services reform 2002). This reforming trend aimed on both the institutional and the ideological reconstruction of the sector. On an institutional level, the reform resulted to a devolved administration (i.e. Scotland, England, Wales, Northern Ireland), while attaining a consumer focus service with the introduction of national codes of standards for quality, performance and accountability. Simultaneously, an ideological reform imposed on the 'human' division of the sector introducing principles and values that public servants had to maintain (see committee of standards in public life, www.public-standards.gov.uk).

Subsequently, major changes in the Higher Education market the route of British Universities through the 'modernisation programme'. In 1988, the Education Reform Act allowed institutions to decide on local control in favour of incorporation. Later in 1992, the Further and Higher Education Act challenged the status and internal governance of Higher Education Institutions and, further, reclassified the former polytechniques into universities. The same Act (1992) introduced a devolved Higher Education funding administration through regional Higher Education Funding bodies. These bodies would act as institutional mediators between the British government and universities for the allocation of funding and have responsibility for research and teaching quality assessments. Thereafter, the major funding amounts would be distributed to the universities through the funding bodies in a formulaic manner for both teaching and research (Shattock, 1998). At the same time, a gradual increase of student numbers and elimination of government available resources challenged the sector's educational rather than economic previous orientation (Broadbent et al, 1996; Williams, 1997). The view maintained in the present, is that the impact of the public sector reforms, such as the change of resource allocation procedures within universities, should be studied respecting the sector's unique context (Parker, 1999). Also, it is important to consider the internal organisational social dynamics that produce the sectors' widespread individual organisational arrangements, such as the allocation of financial

resources. We further argue that as far as trust is developed within such a process, then better governance is attained while maintaining and producing structures of accountability. The evidence supporting our argument gathers with an in depth study of resource allocation process case of an Old (pre – 1992) university.

2. Higher Education Reform

The changes of the Higher Education institutional environment imposed a multisided pressure to the universities, which were asked to respond by reinventing the spectrum of their organisational arrangements. In particular, the pre 1992 traditional university structures, reporting mechanisms and control processes were facing difficulties in coping with the increased workloads and reduced levels of resources (Shattock, 1998; Ackroyd and Ackroyd, 1999; Knight, 2002). While previous research indicates that internal governance structures and management arrangements of British universities are not uniform and it is difficult to give a commonly accepted picture of the entire sector (Bourn, 1994; Tomkins and Mawditt, 1994; Jarzabkowski, 2002). Social attributes such as the non profit character of the universities goals (Gross, 1968), the strong attachment to traditional academic values (Paterson, 2003; Lapsley and Miller, 2004) and the unique nature of contemporary academic work as not just a public service but as a creative knowledge work (Deem, 2004), are few of the many reasons of universities distinguished diverse responses.

Attempts to impose models of performance measurement of the two key functions of universities, teaching and research, instigated the formation of ‘political games’ (Sharp et al, 1997; Salter and Tapper, 2002), and widely regarded as being arbitrary and subjective (Kanter and Summers, 1987; Humphey et al, 1995), that resulted to unintended consequences of competitive, adversarial and punitive spirit between academic units (Elton, 2000; Lewis and Pendlebury, 2002). Similarly, resource allocation processes and models found to be historically and culturally situated within the context of each university, and the models in use were more a matter of internal fit than of best practise (Goddard and Ooi, 1998; Jarzabkowski, 2002). Further empirical research indicates that while the existence of models in universities provided a sense of objectivity, strong collegial culture proved unwilling to accept the strongly centralised organisation of the resource allocation processes (Jones, 1994; Scapens et al, 1994). And although computerised planning tends to be considered as having more transparent planning resource allocation models, knowledge of how universities allocate resources appears to be largely restricted to those involved in the process (Angluin and Scapens, 2000). Formula based systems of resource allocation found to be influenced by patterns of micropolitical activity and sub-unit power exercise between individuals and groups (Goddard and Ooi, 1998; Thomas, 2000). Clearly, political and social factors influence the selection of resource allocation system more than economic considerations. Further, socio-political tensions also emerged as an explanation of the overall observed resistance to the new managerialism ideology imposed on the organisation and audit of

academic conduct (Prichard and Willmott, 1997; Parker, 2000; Strathern, 2000; Saravanamuthu and Filling, 2004).

Clearly the ideological reform of public services, including Higher Education, appears to be a continuous and dynamic process where Universities responded actively. The diversity of responses reflects the underlined socio-political plurality of the internal environment of the universities. Following we introduce the concept of trust as an interesting dimension to the challenging issue of governance of internal processes.

3. Studying Trust within Organisational Processes

Although trust is a difficult to define concept, there is an agreement that is important for organisations in a number of ways (Keyton and Smith, 2008). It enables cooperative behaviour (Hardy et al, 1998; Gambetta, 1988; Whitener et al, 1998), promotes adaptive organisational forms (Brenkett, 1998; Whitener et al, 1998), eases the management of conflicts (Das and Teng, 1998), decreases transaction costs (Williamson, 1975), supports organisational change (Sydow, 1998), and curtails opportunistic behaviour (Nooteboom, 1992). Furthermore, trust is required to reduce uncertainty, promote a more participative management style (Hosmer, 1995), and lower the formalisation in organisations (Whitener et al, 1998) emphasising the delegation of authority to the members of the committee to decide about the vital issue of funds distribution.

However, a 'great deal of conceptual confusion' (Blomqvist, 1997; Schoorman et al, 2007) implies to the various sources, forms and functions of trust and makes it a 'complex and slippery' concept (Nooteboom, 2002). Basically, in the literature the notion of trust is based on different foundations (Mayer et al, 1995). At one side is the approach that assumes an undersocialised (Granovetter, 1985; Bradach and Eccles, 1989) human behaviour which most influenced by the rational decision model and economic theory (Molm et al, 2000; Rotter, 1967; Williamshon, 1993). In that approach trust's extrinsic value is defined as an element of a transaction between two parties and refers to the confident expectation based on the predictability of another party's behaviour, that one's interest will not be harmed or put at risk by the other (Luhmann, 1979; Nooteboom, 2002). On the other hand, an oversocialised (Granovetter, 1985; Bradach and Eccles, 1989) view of behaviour formulates the importance and conceptualisation of trust. In this approach, trust is referred as the concern of confident expectation based upon the other party's goodwill that one's interests would be protected. This approach is often analysed as a facilitator of long term interdependent and stable relationships (Fukuyama, 1995; Broadbent et al, 1996; Offe, 1999).

An interesting contribution to organisational processes is trust's role in governing arrangements. Understanding governance as the outcome of interaction and interdependencies of a range of political actors (Rose, 1999), trust is required to support the actual operation of the exchanges through which governance occurs. Trust as an element of governance is related to effective control (Bradach and Eccles, 1989), cooperation (Powell, 1996), deliberation (Warren, 1999), participation and / or

delegation of authority (Hardin, 1999; Mills and Ungson, 2003), communication, procedural justice and organisational support (Albrecht and Travaglione, 2003).

In public services organisations in particular, trust found to be associated with important aspects of governance. Albrecht and Travaglione (2003) suggest that given the fundamental change that public sector environments continue to go through, trust in senior management is a critical factor in determining employee attitudes to change. It has been further suggested that trust in public sector organisations increases with participation in decision making and feedback from employees (Nyhan, 2000), procedural justice, organisational support and satisfaction with job security (Albrecht and Travaglione, 2003). In organisations with increased trust there is more organisational commitment and productivity (Nyhan, 2000). Also, trust in senior management influences the extent to which employees are cynical towards change and the extent and conditions under which employees intend to remain in the employ of the organisation (Albrecht and Travaglione, 2003). However, it should be acknowledged that different levels of trust have been observed in different levels of management (Perry and Mankin, 2004).

Once considering governance as a process an outcome of interactions and interdependencies (Rose, 1999) the organisational context of such processes should be considered when studying trust. The role of trust in such a perspective is an important insight of managing a range of organisational challenges. At the following we will report the research undertaken to investigate the role of trust in the resource allocation process on an old University.

4. Methodological Considerations

The role of trust in the process of resource allocation at an old 'traditional' university was the case under investigation. The attention of the study was placed on the interaction between the senior personnel of the institution in the committee deciding on the allocation of financial resources in The University. Other contacts for the particular issue were also considered (such as the Resource Strategy Committee, task force groups, and individual contacts), which had a minor role in the resource allocation decision process, although adding value to the perception of trust in the whole context of the process.

The resource allocation process meetings were mainly financial discussion within a committee, which took place during the planning process of The University and determine the Cash Limited Allocations on the top – slice model employed by the University. These committee meetings took place between the Heads of the Resource Units (also Deans of Academic Faculties) and the University's Principal and Director of Finance. Ten Deans and five senior managers voluntarily took part in our study (including the Principal, Director of Finance, two Vice Principals and the administrator who designed the resource allocation model). At the time of the study the meetings were

conducted on individual basis between Dean and Senior Managers and were three during the planning period.

The research was conducted in an 18 month period gathering material and reflections during the resource allocation discussions. The methods used in the study were an organisational trust inventory that was administered to each of the participants at the beginning of the planning cycle, and individual semi-structured interviews that took place at the end of that period. The interviews provided with rich and meaningful insights to the understanding of the conditions of interaction between the participants and their perceived role of trust in the process. Analysing the material gathered, in order to 'make sense' of the case, was an important part of the study. Identifying patterns in three levels of analysis supported the study's evidence. Therefore the analysis first identified individual patterns for each of the participants, which then synthesised as themes within each major group (the participants of the Senior Managers and the Deans of Faculties) and finally compare two major groups of participants. The pattern matching analysis technique strengthens the internal validity of the case study while it seeks emerging themes to see if there is 'a master pattern that expresses them all' (Miles and Huberman, 1994; Yin, 2003). Eisenhardt (1989) explains that searching for cross case pattern eliminates the tendencies to derive to false conclusions as a result of information processing biases, forcing the investigation to go beyond initial impressions through the use of structured and diverse lenses on the data.

5. The Case of an Old University and the Role of Trust its Resource Allocation Process

The University was founded in 15th century. The civic character of its operation and the historical role in the social reality of Higher Education determine its particular organisational characteristics. Mainstream to The University life is the strategic orientation of a public institution 'leading to national and international position in teaching, in research and in links with industry and commerce' (quoted from the Strategic Planning Statement 1997 - 2001). The emphasis is on the civic status of The University that determines its role within the local and international community and it is related to the social expectations concerning its educational leadership and achievement. The history and tradition of large civic universities 'have at times led to a complacency, exacerbated in many cases by failure to develop more up - to- date management structure and strategies' (quoted from the University's Strategic Planning Statement). The Higher Education reform demands, impact on The University. In response to the government guidelines of governance and operation The University critically reviewed its practices. Our study focused on the interaction between senior personnel of the University during the resource allocation process. In this context trust found a diverse notion.

The participants from both groups (Senior Managers and Faculty Deans) when explaining their understanding of the notion of trust in general, all gave different but

personal views on what they think trust is, and these views considered individually. However, both groups referred to similar context in where trust can exist and develop. In that respect participants from both groups expressed the view that trust exists between specific individuals and is a 'human thing'. As one member of Senior Managers (5) team explains:

'it's rather a matter of me as an individual of having a particular predisposition with you as an individual, and vice versa'

From the interviews we gathered that to trust takes a judgement of the other's personal integrity and it is maintained when one feels that s/he has been listened to. It can be based on an instant intuitive impression about the personal values of others. A trustworthy other is a reasonable person who does not take advantage, gives fair representation of events, is honest, keeps and value agreements and is fair with others. The particular context of the university's resource allocation process is a function of personalities and trust is associated with good lines of communication, with previous experience and knowing who the others are by working together, with the ability to feel part of the group and willingness to compromise. One of the Faculty Deans (3) explains:

'trust has been for me very important when someone is asking for resources'

Conditions that would develop trust are time, openness, stage of the process, and good reason. Trust could be harmed with a misunderstanding, tendency to keep information, unfounded presumption for the outcome and the situation, suspicion, surprise and mistakes along with inaccurate information. However, regarding their perceived level of trust in their current interaction, there are differences in views, which will be analysed later, but here tend to demonstrate that the participants of the Management Group think that there is more trust in their relationship with the Deans, and the Deans seem to think that there is an issue of trust in the relationship.

'if you look at it overall, I don't think that any of the deans they say they fully trust the management group. But I think most of the deans trust most of the management group, most of the time. If you like one may be a little sceptical about some of the university's truth that most of us trust most of the deans most of the time' Senior Manager (3)

Considering this difference in views with more attention, it was observed that the two groups had differences in their opinion about the intentional efforts to 'let the others know' as form of 'trust them to know' about issues of importance in the resource allocation process. As a Senior Manager (3) explains:

'so there is a critical question in terms of retain people's trust, is how to find the right time to tell them'

By first sight, both groups argue that they are willing and they make efforts to some extent (more or less), to maintain accountability of issues that concern both groups. A senior manager (4) says:

'I mean trust is when you have a relationship with the someone and when you are willing to give information, to short of give them information or you are willing to discuss things which have over sensitive nature I would think! In this short of context yes, and where you feel that they are

going to operate in a way that which is entirely short of reasonable and not using it to their advantage'

Firstly, the participants from the Management Group argue that there is enough 'openness' and 'dialogue' in the process, and if there is some inefficiency that is due to technical (for instance the model's complexity) rather than intentional intricacy. However, with closer consideration to this claim, it is possible to gather a level of inconsistency and reservation in the group that might be either an effect of the centralised authority pattern (they do not let the Deans know because they never considered them part of the Management Group, they are the next lower level of authority- never given decision making power), or insufficient communication modes (listening but not doing it), or simply a presumed stance of moral rights and obligations (because Deans are not considered part of the Management Group, therefore they do not have the right to express disagreement but they have the obligation to be loyal to the decisions of the Management Group) that they reciprocally expect in the particular context.

On the other hand, the Head's of the Resource Units opinions vary to the extent that they trust the Management Group to know about the way they use their budgets, or the amount of savings they manage to generate. These differences can be explained considering the possible effect of the centralised authority pattern of The University (which does not involve the Deans in the Management Group), the different 'messages' that the Deans acquire from the distant relationship with the Management Group in respect to the resource allocation, and the perceived reciprocity to their legitimate anticipations. One of the Faculty Deans (11) explains:

'I think trust mix with caution. I think blind trust is doesn't respect the fact that the system makes mistakes. I mean my perception is I don't think anybody around the table has got a malicious intend. Ehm, and I mean in that sense I can trust them to operate in the interest of the university, as best as it fit. I don't necessary trust to do well on every occasion.'

In respect of the resource allocation procedure employed in The University, the participants choose to raise a variety of issues perceived to be influential to the trust between them. It is argued that it is possible for trust to evolve as the process evolves in different stages. In general, the main resource allocation meetings are perceived in very different ways by the participants. The participants of the Management Group tend to argue that they are the only possible way the negotiations can take place and the style and frequency of the meetings is appropriately flexible and feasible. Although they agree that the committee meetings can be very different experiences for each faculty, they argue that this is due to the individual attention paid to particular needs and settings. However, they tend to argue that focus is to retain trust and also to find the most reasonable solution to the financial situation of The University as a whole. On the other hand, the views held by the Heads of the Resource Units vary and reflect their expressed trust. Although all of them expressed uncertainty about the purpose, conduct and atmosphere of the meetings it was possible to identify different patterns of views. Explicitly, the Deans who tended to express more trust they also tended to give more

optimistic views on the way aspects of the meetings as documentation, strategic or operational nature and atmosphere were organised and perceived. In contrast to those Deans who gave indications of less trust and tended to express more pessimistic views. For instance, as Dean (3) explains:

‘the most positive relationship will be one of mutually respecting each others point of view. Meaning that if the person recognised that I have limited resources, and that person saying ‘well I understand that if I ask for those resources, I better show the dean that I am the kind of person it can be trusted with his resources. Yes, I see it very much as a two way short of thing.’

A dimension that found to be also related with the participant’s varying views was the authority patterns influencing the process. The highly centralised hierarchical pattern of the decision authority, the limited participation of the Heads of the Resource Units to the Management Group (no academic Heads of Resource Units are members except the case of the Executive Dean of Medicine), result to the questioning of trust. This attitude is expressed as a cautious belief in what the senior management believes is the ‘big picture’ or the award of ‘notional deficits’ as an attempt of the central management to control the Units.

The other dimension that should be considered, is the role of trust as a value that ensures reciprocity, acceptance and cultivation of moral anticipations in the resource allocation process. Both sides argue that they should be trusted to deliver, maintain, and care for the units they are responsible for. In that respect, the Management Group participants are viewed responsible for The University as a whole and the Heads of the Resource Units responsible for the Resource Units in the context of the whole University. In particular the participants of the management group tend to view their position as bearing a moral responsibility to maintain and grow the University. In their view they anticipate trust as an appreciation, support and understanding of their efforts. Also tend to intentionally promote a reasonable, sensible and open profile. In a similar expression, the Heads of the Resource Units found to expect moral support and reciprocity to their anticipation on the basis of trust. In their view support by the Management Group is reflected by allowing the faculties to exercise the right to ‘roll the budgets’, spent a reasonable share of the income they generated, to be rewarded for their efforts and to be trained to managerial skills. Further they insist in the view that they should know all the relevant aspects of the resource allocation process. Overall trust is important as Dean 4 explains:

‘ my view is that we are trying to get to a same point. So in that sense I trust them in a sense that we are trying to achieve the same objectives’.

6. Discussion

The present study argues that trust between the resource allocation process members, has an important role since it facilitates better management of the process and supports structures of accountability between the participants. It is also argued that trust contributes to the democratic governance of the organisation. The enhancement of

accountability along with the participative – inclusive pattern of the procedures, can be enhanced when the participants trust each other. The main assumption of this supposition is that trust and accounting depend on a specific context of interaction. Important elements of this line of argument, such as the operation of internal organisational process of accounting (management accounting), governance (as a management of a range of organisational possibilities), and social interaction have been developed in the existing academic literature.

More precisely, it has been demonstrated that management accounting, and in particular budgets, should be carefully examined in their role of the broader governance of the organisation. The literature suggests that the organisation's internal accounting practices should be considered under the combination of strategic, operational, financial and behavioural issues (Anthony, 1965; Otley, 1994); with a considerable attention on the socio-political effect of accounting which requires an understanding of the norms, values, role expectations and power inequalities within the organisation (Schiff and Lewin, 1970; Merchant, 1981); combining qualitative and quantitative information for performance evaluation and control (Lowe, 1970; Emmanuel *et al*, 1990); considering the boarder organisational context in order to eliminate the effects of the 'only financial' information such as 'inflexibility', 'short-termism', 'abstraction' (Hopwood 1983; Merchant, 1985). The present study argues that, along with the mentioned considerations, particular attention to the role of interpersonal trust between the actors who are involved in internal accounting practices (such as the resource allocation process), should enhance the perceived role of accounting as an element of the overall governance of the organisation.

In alignment with the above mentioned thoughts trust is also considered to be a very important value in organisational governance. It has been argued that trust's extrinsic and intrinsic value facilitates participative forms of governance (Speitzer and Mishra, 1999); smoothes the power inequalities in the organisational interactions (Meyerson *et al*, 1996); enhances information sharing and the development of 'common' interests and understanding (Hardy *et al* 1996; Butler, 1999); by creating a sense of fairness and collaboration during financial crisis (Mishra, 1996), reflecting to the anticipation of support by others (Minkes, 1997; Albrecht and Travaglione, 2003), and enhancing self-direct and flexible teams (Creed and Miles, 1996). Therefore, it could be expected that interpersonal trust should provide for more democratic and flexible systems of decision making in the organisation. Therefore, it is argued that a deliberative accountability pattern should be enhanced with trust.

In respect to the literature review the British higher education reform should be considered as a dynamic and diverse process, especially concerning the particularity of the British universities' responses. The two major classifications of the British universities as 'old' (pre 1992) and 'new' (post 1992) can be founded on deep and very complex characteristics ranging from the governing structure of the institutions up to the belief of what constitutes 'higher education' learning – with distinctive approaches on research and teaching (Ackroyd and Ackroyd, 1999). Although the present study was

not seeking to justify the rightness of the differentiation between the old and new universities, the references gathered by previous reports found to be useful.

Old, research lead, civic University is associated with difficult internal change (Salter and Tapper, 2002); highly centralised administration (Hackman, 1985); collegial structure (Ackroyd and Ackroyd, 1999); enhanced role of Vice Chancellor as an academic leader and chief executive together with limited participation of staff and students (Knight, 2002); and attachment to civic role (Patterson, 2003). These characteristics are combined with the general issues facing the Higher Education academic culture, such as difficulty to measure research and teaching performance (Kanter and Summers, 1987); resistance to the management academic construction (Parker, 2000); critical approach to the appropriateness of the Research and Teaching assessment schemes (Humphrey *et al*, 1995); and response to the pressure of 'new managerialism' (Deem, 2004). In addition, university's resource allocation models need more careful consideration of the internal behaviour patterns that might affect the implementation of such processes (Thomas, 2000). When the resource allocation is based on a computerised model, it tends to be perceived more transparent and fair (Angluin and Scapens, 2000). In any case it has been argued that the models are historically and culturally situated in the context of each particular institution (Jarzabkowski, 2002).

Further, Tomkins (2001) argues that trust is necessary at the early stages of the development of accounting systems. We should therefore suggest that considering the introduction and newness of the 'accounting systems' to Higher Education, trust is important. Similarly, adopting the Jones and Dugdale (2001) language, managing with the use of accounting procedures is not yet an established regime in Higher Education and learning is considered necessary. This learning should be facilitated with trust, which should support the way to democratic and fair accounting processes.

7. Conclusion

The main observation evident from the study is twofold. First, the participants who indicated more trust towards others were found to be willing to be more accountable, even when elements of the process were not favourable. Their attitude of trust also facilitated a much more tolerant perspective, while adopting a cooperative stance in order to overcome the difficulties faced in the procedure of the resource allocation. Second, the participants who expressed less trust tended to be willing to make less effort to be accountable and they also tended to perceive the complexities and difficulties of the system or the resistance to cooperate during the process as deliberate efforts of the 'other side' to manipulate the process. Therefore trust is an important aspect for governing arrangements, especially where accountability is necessary. Therefore, it is important to broaden the scope of trust within organisational process for more advanced understanding of social systems of governance within organisations.

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Efficiency Measurement in Greek Dairy Farms: Stochastic Frontier vs. Data Envelopment Analysis

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Abstract

Parametric Stochastic Frontier Analysis (SFA) and non-parametric Data Envelopment Analysis (DEA) have become very popular in the analysis of productive efficiency. This paper undertakes a comparison of the SFA and the constant returns to scale (CRS) and variable returns to scale (VRS) output-oriented DEA models, based on a sample of 165 dairy farms in Greece. However, the aim of this paper is not only to compare estimates of technical efficiency obtained from two approaches, but also to produce efficiency data about the farms studied, which have implications for agricultural policy to improve dairy production. The results indicate that there is a potential for increasing production in the dairy farms through improved efficiency.

Keywords: Data Envelopment Analysis, Stochastic Frontier Analysis, Dairy Farms

JEL classification: Q18, D24, Q12

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1. Introduction

Efficiency measurement has been the concern of researchers with an aim to investigate the efficiency levels of farmers engaged in agricultural activities. Based on Farrell's (1957) pioneering article, several approaches to efficiency measurement have been developed. Among these, Stochastic Frontier analysis (SFA) models and Data Envelopment Analysis (DEA) models have proved an extremely useful tool in measurement of the technical efficiency of production units. The stochastic frontier approach was initiated by Aigner *et al.* (1977) and Meeusen and van der Broek (1977), while DEA approach was proposed by Charnes *et al.* (1978). Many authors in economic literature have dealt with the two approaches. Comprehensive reviews can be found in Kumbhakar and Lovell (2000), Seiford and Thrall (1990), Fried *et al.* (1993), Coelli, Rao and Battese (1998), Bravo-Ureta and Pinheiro (1993), Coelli, (1995), Cooper *et al.* (2000).

The main advantage of non-parametric DEA is that it does not require specification of the functional form of the production function. Furthermore, DEA simultaneously utilizes multiple outputs and multiple inputs with each being stated in different units of measurement. DEA focuses on revealed best practice frontiers rather than on central-tendency properties or frontiers and it generates a set of "peer" units with which a unit is compared. However, several properties that represent strengths in one capacity may act as limitations in another. DEA is deterministic and attributes all the deviations from the frontier to inefficiencies, i.e. at first sight, the method does not have any statistical foundation; it is not possible to make inference about estimated DEA parameters, sensitivity, asymptotic properties, etc. Recently, bootstrap techniques have been applied in order to obtain measures of statistical precision in the DEA estimates (Simar and Wilson, 2000a, 2000b, Löthgren and Tambour, 1999).

In contrast, the parametric stochastic frontier approach treats deviations from best-practice as comprising both random error (white "noise") and inefficiency. SFA also assumes a structure for the best-practice frontier and then fits a curve. An advantage of the econometric approach is that it allows for formal statistical testing of hypotheses and the construction of confidence intervals (Hjalmarsson *et al.*, 1996). The main drawback of the approach is that it requires a pre-specification of the functional form and an explicit distributional assumption for the technical inefficiency term.

The main purpose of this study is to compare technical efficiency measures from SFA and DEA models and to test if there are significant differences in the estimates of efficiency. A few studies (Hjalmarsson *et al.*, 1996; Kalitzandonakes and Dunn, 1995; Bjurek *et al.*, 1990; Wadud and White, 2000; and Sharma *et al.*, 1997) have compared empirical performance of the two techniques. As it concerns the dairy sector, there exist many studies which apply one of the two methods (Kumbhakar and Hjalmarsson, 1993; Tauer and Mishra, 2003; Cuesta, 2000; Bravo-Ureta and Rieger, 1991; Kumbhakar and Hesmati, 1995; Weersink *et al.*, 1990; Manos and Psychoudakis,

1997; Hallam and Machado, 1996 and Luitj and Hillebrand, 1991), but there is only one (Reinhard, 1999), at least to our knowledge, comparative study of SFA and DEA approach concerning the dairy sector. Furthermore, this study contributes to the existing literature with the use of data from Greek dairy farms.

For the purpose of this paper, the analysis is limited to technical efficiency. A Cobb-Douglas stochastic frontier production function and constant returns to scale (CRS) and variable returns to scale (VRS) output-oriented DEA models are estimated. The analysis is based on farm accounting data from Greek dairy farms, which have not been studied before.

The paper is organized as follows: Section 2 describes the Stochastic Frontier Analysis and Data Envelopment Analysis models. Section 3 describes the dairy data. Section 4 contains the empirical results and their implications. Section 5 concludes the paper.

2. Theoretical Models

2.1 Stochastic Frontier Model

The stochastic frontier production function can be expressed as:

$$y_i = f(x_i; \beta) \cdot \exp\{v_i - u_i\} \quad i = 1, 2, 3, \dots, n \quad (1)$$

where y_i is scalar output, x_i is a vector of inputs, and β is a vector of parameters to be estimated. The first error component, v_i , is assumed to be independently and identically distributed (iid) and symmetric, distributed independently of the u_i and captures the effects of statistical noise. The second error component, $u_i \geq 0$, is intended to capture the effects of technical efficiency component and it is assumed to be independently and identically distributed truncations (at zero) with mean, μ , and variance, σ_u^2 . The technical efficiency of the i th farm, denoted by TE_i , can be estimated as:

$$TE_i = \exp(-u_i) \quad (2)$$

The prediction of technical efficiencies is based on the conditional expectation of e^{-u_i} given the values of $v_i - u_i$ (see Jondrow *et al.* (1982) and Battese and Coelli (1988)). This method allows a direct comparison between the results from the stochastic frontier approach and DEA.

Coelli (1995) suggests that the stochastic frontier method is recommended for use in agricultural applications, because measurement error, missing variables and weather, are likely to play a significant role in agriculture. More details and further approaches can be obtained from books edited by Fried, Lovell and Schmidt (1993), Coelli, Rao and Battese (1998) and Kumbhakar and Lovell (2000).

2.2 Data Envelopment Analysis

The non-parametric approach to efficiency measurement obtains technical efficiency

estimators as optimal solutions to mathematical programming problems. Charnes *et al.* (1978, 1979, 1981) formulated the Data Envelopment Analysis (DEA) methodology, which defines a non-parametric frontier and measures the efficiency of each unit relative to that frontier. Assuming that there are n decision making units (DMUs), each producing single output by using m different inputs and the i th DMU produces y_i units of output using x_{ki} units of the k th inputs, the variable returns to scale (VRS) output-oriented DEA model for the i th DMU is expressed as follows:

$$\text{Max}_{\theta_i, \lambda_j} \theta_i \quad (3)$$

subject to:

$$\sum_{j=1}^n \lambda_j y_j - \theta_i y_i - s = 0$$

$$\sum_{j=1}^n \lambda_j x_{kj} + e_k = x_{ki} \quad (4)$$

$$\sum_{j=1}^n \lambda_j = 1$$

$$\lambda_j \geq 0; s \geq 0, e_k \geq 0;$$

$k = 1, \dots, m$ inputs; $j = 1, \dots, n$ DMUs;

where θ_i is the proportional increase in output possible for the i th DMU; s is the output slack; e_k is the k th input slack; and λ_j is the weight of the j th DMU.

When the restriction $\sum_{j=1}^n \lambda_j = 1$ is removed the constant returns to scale (CRS) is obtained.

The output-oriented DEA model maximizes the proportional increase in output while remaining within the production possibility set. The proportional increase in output is obtained when output slack is zero. The i th farm is efficient, which means that the unit lies on the frontier when $\theta_i = 1, \lambda_i = 1$, and $\lambda_j = 0$ for $j \neq i$. The frontier level of production for the i th farm, denoted by y_i^* , is given by

$$y_i^* = \sum_{j=1}^n \lambda_j y_j = \theta_i y_i. \quad (5)$$

The output-oriented measure of technical efficiency of the i th farm unit, denoted by TE_i , can be estimated by

$$TE_i = \frac{y_i}{y_i^*} = \frac{1}{\theta}. \quad (6)$$

This measure can be compared directly with the measure of technical efficiency obtained under the stochastic production frontier. Both techniques consider the observed production relative to the corresponding potential production, given the quantities of the inputs used. Hence, the technical efficiency scores from the output-oriented DEA model are comparable with those obtained from the stochastic frontier model.

The scale efficiency measure for the i th farm, denoted by SE_i , can be calculated from the relationship of the estimate of technical efficiency of the i th farm in the VRS DEA (TE_i^{VRS}) and that in the CRS DEA (TE_i^{CRS}) as:

$$SE_i = \frac{TE_i^{CRS}}{TE_i^{VRS}} \quad (7)$$

where $SE_i = 1$ indicates constant returns to scale and $SE_i < 1$ indicates scale inefficiency. The nature of scale inefficiency can be of two types. First, a farm is too small and belongs to the section of the frontier where increasing returns to scale prevail; second a farm is too large and belongs to the section of the frontier where decreasing returns to scale prevail. In order to determine the type of scale inefficiency the sum of the weights is inspected. According to Banker and Thrall (1992) if the sum of the weights is greater than 1.0 we have decreasing returns to scale and if the sum of the weights is less than 1.0 we have increasing returns to scale. Constant returns to scale occur when the sum of weights equals one. (See also Banker *et al.*, 1984; Löthgren and Tambour, 1996; Ali and Seiford, 1993; and Favero and Papi, 1995).

Table 1. Summary statistics for variables

Variable	Sample mean	Standard Deviation	Minimum	Maximum
Gross Output (€)	129030.98	142462.81	3363.90	743681.10
Labor (hours)	5315.72	3267.90	386.50	20650.00
Fixed Cost (€)	220705.60	206048.47	6001.00	989030.50
Variable Cost (€)	65294.55	71255.48	2803.00	359243.70

3. Data

The farm accounting data for this empirical application was collected from 12 prefectures in the regions of Macedonia and Thessaly through a farm management survey carried out during the period of 2003-2004. A sample of 165 dairy farms, which are located mainly in Macedonia, Greece, was surveyed for the application of this analysis.

All farms have the required characteristics for the empirical application of both DEA and SFA. The summary statistics of the variables gathered from the farms are

reported in Table 1. In the specification chosen in this study, the conventional inputs have been aggregated into three categories (labor, fixed capital and variable capital). The labor input consists of total labor, measured in hours. Fixed capital is composed of buildings, machinery and livestock for breeding and utilisation, measured in Euros. The variable capital contains fertilisers, fuel, hired labour, purchased feed, rent of land and other variable inputs, all expressed in Euros. The rent of the land is included in the variable capital since the crop production has been used as feedstuff in the farms. Gross output, measured in Euros, is selected as the dependent variable in this study. The standard deviation of the average Gross output indicates the large variability of output among the farms.

4. Empirical Results

4.1 Stochastic Frontier Results

The maximum likelihood estimates of the Cobb-Douglas stochastic frontier are reported in Table 2. Specifically, in this table the coefficients of the estimated variables, their t-ratios and the variance of the parameters are presented. Maximum likelihood estimates of the parameters of the stochastic frontier model are obtained using the program FRONTIER 4.1 (Coelli, 1996). All coefficients are significant at the 1 percent level. As expected, the signs of the slope coefficients of the stochastic frontier are positive. The estimated value for the variance parameter, γ , in the stochastic production is significant, suggesting that inefficiency was present in production and that the traditional “average” production function is not an adequate representation of the data. Hence, technical inefficiency effects have significant impact on output (Wadud and White, 2000; Sharma *et al.* 1997; Hjalmarsson *et al.* 1996). The estimate of γ indicates that the portion of the one-sided error component in the total variance is as high as 61.6 percent. Thus, 61.6 percent of variation in the data between farms can be attributed to inefficiency and the remaining 38.4 percent is pure “noise”. The estimated parameter σ_ε^2 is also found to be statistically significant at the 1 percent level. This result, which is consistent with Wadud and White (2000), Sharma *et al.* (1997) and Hjalmarsson *et al.* (1996), suggests that a conventional production function is not an adequate representation of the data. The mean technical efficiency estimated for the SFA approach is 0.812.

A more flexible translog production function was also applied. A Generalized Likelihood Ratio test (LR) was performed to test whether or not Cobb-Douglas production function could be used as an appropriate form of the production function estimated in this study. The result of the LR test suggested that translog stochastic production function is an inadequate representation of the data and it is rejected confidently in favor of the Cobb-Douglas. The test statistic was equal to 8.3, which is less than 12.6, the 95 percent critical value for the Chi-squared distribution with six degrees of freedom. The results presented here refer solely to the Cobb-Douglas

production function. Another LR test was conducted to test the distribution of the inefficiency effects. The null hypothesis, which states that the half-normal distribution is an adequate representation for the distribution of the inefficiency effects could not be rejected.

Table 2. Maximum-likelihood estimates of the Cobb-Douglas stochastic production frontier model

Name of Variables	Parameters	Coefficients	t-ratios
Stochastic frontier			
Constant	β_0	0.0417 (0.2885)	0.1447
Labor	β_1	0.1928 (0.0603)	3.1964***
Fixed Cost	β_2	0.1281 (0.0459)	2.7913***
Variable Cost	β_3	0.7830 (0.0429)	18.2360***
Variance Parameters			
Sigma-squared	$\sigma_\varepsilon^2 = \sigma_u^2 + \sigma_v^2$	0.1257 (0.0317)	3.9626***
Gamma	$\gamma = (\sigma_u^2 / \sigma_\varepsilon^2)$	0.6159 (0.1985)	3.1034***
Sigma-squared of u	σ_u^2	0.0774	
Sigma-squared of v	σ_v^2	0.0482	
Log-likelihood		-21.2643	

Note: *** indicate the variables are significant at the 1% level of significance, respectively. Figures in parentheses indicate standard errors.

The value of the elasticity of scale, which is found to be statistically significantly different from unity, is 1.1, implying that dairy farms operate under mildly increasing returns to scale, a finding, which is similar to that of Reinhard (1999).

4.2 DEA Frontier Results

The constant returns to scale (CRS) and variable returns to scale (VRS) output-oriented DEA models are estimated. The method has been applied to the same sample (same number of farms) and the same output and input variables as for the stochastic frontier model. As it has been already mentioned in the previous section, the output orientation

has been selected because the technical efficiency scores obtained from the DEA method are comparable with those of the stochastic frontier production function.

Table 3. Frequency distribution of technical efficiency estimates from both the stochastic frontier and technical and scale efficiency from the DEA models

Efficiency Score	Stochastic frontier		Data Envelopment Analysis					
			CRS		VRS		SE	
	No. of farms	% of farms	No. of farms	% of farms	No. of farms	% of farms	No. of farms	% of farms
< 0.3	0	0.00	7	4.24	3	1.82	1	0.61
0.3-0.4	0	0.00	8	4.84	6	3.64	0	0.00
0.4-0.5	0	0.00	32	19.39	17	10.30	0	0.00
0.5-0.6	5	3.00	33	20.00	41	24.84	2	1.21
0.6-0.7	10	6.10	26	15.75	29	17.58	2	1.21
0.7-0.8	41	24.84	24	14.54	19	11.52	9	5.45
0.8-0.9	93	56.36	16	9.69	20	12.12	23	13.94
0.9-1.0	16	9.69	10	6.10	13	7.88	97	58.79
1.0	0	0.00	9	5.45	17	10.30	31	18.79
Total	165	100.00	165	100.00	165	100.00	165	100.00

The mean technical efficiencies estimated for the CRS and VRS DEA approaches are 0.634 and 0.685; a result which is consistent with the theory that the VRS frontier is more flexible and envelops the data in a tighter way than the CRS frontier. The mean technical efficiencies of the DEA models indicate that there is substantial inefficiency for the dairy farms in the sample, which confirms the expectations. Seventeen farms are fully technically efficient in terms of the VRS model and 9 farms are fully technically efficient under the CRS model. The technical efficiency scores estimated under the CRS DEA frontier are equal to, or less than those calculated under the VRS DEA model. This relationship, as stated above, is used to obtain the measure of scale efficiency SE. The scale efficiency index for the sample ranges from 0.298 to 1.000 with a sample mean and standard deviation of 0.927 and 0.098 respectively. Of the 165 farms, 27 show CRS, 61 show IRS and 77 show DRS.

The frequency distribution of the efficiency estimates obtained from the stochastic frontier and DEA model are presented in Table 3, while their summary statistics in Table 4.

Table 4. Summary statistics of efficiency estimates from both the stochastic frontier and DEA model

Efficiency score	SF	CRS	VRS	SE
Mean	0.8121	0.6340	0.6849	0.9270
Minimum	0.5195	0.2271	0.2540	0.2984
Maximum	0.9409	1.0000	1.0000	1.0000
Standard Deviation	0.0781	0.1902	0.1919	0.0985
Skewness	-1.2031	0.2137	0.1498	-2.9204
Kurtosis	1.7979	-0.6782	-0.8781	12.0185

4.3 Comparison of the Efficiency Results

Two different approaches have been applied to measure the technical efficiency of dairy farms. The mean efficiency for each of the methods is reported in table 4. Efficiency measure obtained from the stochastic frontier model is greater than that obtained from the VRS and CRS DEA model. DEA efficiency scores was expected to be less than those obtained under the specifications of stochastic frontier because the DEA approach attributes any deviation of the data from the frontier to inefficiency, while stochastic frontier analysis acknowledges the fact that random shocks beyond the control of the farmers can affect output. Both the CRS and VRS DEA measures exhibit greater variability than the stochastic frontier efficiency measure.

Spearman rank correlation coefficients between the technical efficiency rankings obtained from the stochastic frontier and the DEA are reported in Table 5. The general impression here is that all correlation coefficients are positive and highly significant at the 1 percent level. The strongest correlation is obtained between the efficiency rankings estimated from the VRS and CRS DEA model. The weakest correlation is achieved between the rankings from the stochastic production frontier and the VRS DEA model.

There are very few studies which have compared the technical efficiency estimates derived from the stochastic parametric frontier and deterministic nonparametric frontier. Sharma *et al.* (1997) reported similar results with ours, while Wadud and White (2000) reported a greater mean technical efficiency (0.858) obtained from the VRS DEA model than those of both CRS DEA and stochastic frontier model (0.789 and 0.791 respectively). However, Wadud and White (2000) did not find a greater variability of technical efficiencies from the DEA models than from the stochastic frontier efficiency measures. Hjalmarsson *et al.* (1996) reported both similar and dissimilar results obtained from the stochastic frontier analysis and, the DEA frontier analysis, depending upon the inclusion of the control variables in the stochastic frontier and the sequential or intertemporal specification in the DEA frontier. Kalaitzandonakes and Dunn (1995) found a significantly higher level of mean technical efficiency under CRS DEA (0.93) than under the stochastic production frontier model

(0.74), which is opposite from what we have found in this study. Finally, the results from Reinhard (1999), who applied the two frontier methods to a dairy sample using panel data, are very similar to ours. Reinhard (1999) found that SFA technical efficiency score (0.889) are higher (by about 10 percent) than CRS DEA efficiency score (0.783) and exhibits less variability.

Table 5. Spearman rank correlation matrix of technical efficiency rankings of sample dairy farmers obtained from different methods.

	TE _{SF}	TE _{VRS}	TE _{CRS}
TE _{SF}	1.000		
TE _{VRS}	0.7991	1.000	
TE _{CRS}	0.8384	0.9034	1.000

4.4 Implications

The dairy sector is one of the most heavily supported and is protected by the Common Agricultural Policy (CAP) mechanisms. The milk quota regime (introduced in 1984) has put a limit on the amount of milk that dairy farmers produce each year, in order to reduce the imbalance between supply and demand on milk and milk products market and the resulting structural surpluses, thereby achieving better market equilibrium. However, in Greece where the Mediterranean climatic conditions prevail, the country experiences a permanent deficit in its dairy production. Greece is a net importer of milk and milk products. The national reference quantity for Greece is 820,513 tones (Greece has “succeeded” an increase in its national quota by almost 100,000 tones, see EU Council Regulation No 1788/2003), whereas its milk production is only 721,261 tones. It is of particular interest to examine the potential of milk production in Greece, if dairy farms could operate efficiently.

Table 6 presents, according to farm size, the average levels of the actual outputs and frontier outputs relative to the stochastic and DEA frontiers. The farms were divided in this manner in order to get a close approximation as possible to the structure of Greek dairy sector and to include a satisfactory number of farms in each category. Based on the stochastic results, farms in the last category (>125 cows) could, on average, increase their output by 17.8 percent, farms in the third category (75-125 cows) by 16.3 percent, farms in the second category (25-75 cows) by 14.2 percent, and small farms (<25 cows) by 18.6 percent by producing their frontier outputs. The corresponding values for the VRS DEA frontier are 9.7 percent, 18.2 percent, 28.0 percent and 36.9 percent and those for the CRS DEA frontier are 20.5 percent, 21.8 percent, 30.9 percent and 40.4 percent, respectively. These results indicate that dairy production could have been increased substantially. This increased output could restore the equilibrium between supply and demand in the internal dairy products market in Greece. Furthermore, it would increase

the profitability and the competitiveness of Greek dairy sector, since increased revenues would compensate for the high production costs.

Table 6. Average actual and frontier output for Greek dairy producers by farm size (in euros).

Note: Figures in parentheses are standard deviations.

Farm size	Number of Farms	Actual output	SF output	DEA frontier output	
				VRS	CRS
< 25 cows	60	28345 (16425)	33618 (19137)	38802 (22528)	39804 (22283)
25-75 cows	61	121350 (55207)	141472 (61602)	155376 (65686)	158895 (65661)
75-125 cows	27	302581 (117805)	351966 (123691)	357681 (106642)	368627 (116182)
> 125 cows	17	533417 (125838)	628319 (136221)	585183 (102370)	642564 (130874)
Total farms	165	129031 (142463)	150814 (164120)	157259 (156199)	163211 (166777)

5. Conclusion

In this paper two alternative approaches are applied for the estimation of technical efficiency, SFA and DEA. The econometric frontier model is estimated under the specification of the Cobb-Douglas stochastic frontier production model. A more flexible translog stochastic frontier is also applied but it is rejected in favor of the Cobb-Douglas model. In the DEA analysis, the output-oriented frontiers are estimated under the specifications of constant and variable returns to scale. Both approaches are used in order to estimate the technical efficiency of 165 Greek dairy farms. The objective of the paper is to compare the measures of technical efficiency obtained from the two approaches and to contribute to the existing relevant literature with the use of data from Greek dairy farms.

The estimated mean technical efficiency in the stochastic frontier model is larger than those obtained from the DEA analysis. According to the spearman rank coefficients the correlation between the two approaches is positive and highly significant. The highest correlation is observed between the stochastic frontier and the VRS DEA. The dairy farms appear to be characterized by mildly increasing returns to scale under the econometric specification, but by increasing and dominantly decreasing returns to scale under the DEA approach.

Results from both econometric and programming frontier indicate that there are substantial production inefficiencies among the sample dairy farmers. The sample dairy farmers, given the existing technology, could, on average, enhance their production by 17-26 percent and improve their competitive position if they could operate efficiently.

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The Cooperation of Fyrom's Local Authority Agencies with Local Authorities in the European Union and the Balkans

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Abstract

This article examines the modern role of local authorities in the new Balkan and European environment as well as the institutions, means and experiences of cooperation among local authorities agencies of the FYR of Macedonia and those of Balkan and European countries. Based on the results of a primary research survey undertaken in the FYR of Macedonia, this paper examines top priority sectors of such inter-regional cooperation. Countries for cooperation were selected on the basis of factors of importance, such as geography, scale of economic cooperation, intra-Balkan conflicts and the degree of participation of Balkan countries in the European integration process; sectors of cooperation are ranked on the basis of specific local authorities needs in each country. More specifically, in the case of Balkan countries, cooperation between local societies, apart from contributing to local development and strengthening the role of local authorities, it could also contribute towards reinforcing security, stability, peace and friendship among the populations of the region.

Keywords: LAAs, cooperation, Balkans, EU

JEL Classification: H77

1. Introduction

This article examines the cooperation of the Local Authority Agencies (LAA) of the Former Yugoslav Republic of Macedonia (FYROM) with Local Authorities (LA) in the European Union (EU) and the Balkans. The investigation concerns in particular: The modern role of LAAs in the new Balkan, European and international environment; whether this facilitates or not cooperation among LAAs, as well as institutions and experiences of LAAs in Europe and the Balkans. With which EU and Balkan countries have LAAs of the FYR of Macedonia developed cooperation? In which sectors? What are the factors influencing the selection of countries and sectors for inter-regional cooperation for the FYR of Macedonia LAAs? How far is inter-regional co-operation with EU and Balkan countries and LAAs of the FYR of Macedonia prioritized? What are the objects and the extent of satisfaction from such cooperation?

Methodologically, the above mentioned questions are examined on the basis of the results of the primary research as well as the relevant literature concerned the cooperation experiences in Europe and the Balkans.

Data reported are drawn from the findings of a primary research survey undertaken in 2000 on a random sample of executives/officials of LAAs in the FYR of Macedonia, i.e. 70 Municipalities comprising 56.9% of the total number of 123 Municipalities. The survey used a structured questionnaire that was filled in at a personal interview taken from 193 executives, 74.6% of which were men and 25.4% of which were women. At every Municipality, the questionnaire was filled in by 1-3 persons: at 81.4% of the municipalities by three persons, at 12.9% by two and at 5.7% by one person. These were selected on the basis of their capacity, i.e. Mayors (33.2%) or other elected officers (23.3%), senior and middle-level managerial executives (28.5%) and employees - executive members of the union/association (14.5%). This survey was undertaken within the context of Community Initiative INTERREG II, the main partners of which are the Federation of Public Employees' Organizations – regional branch of Thessaloniki, the Trade Union of Administration Employees of -FYR of Macedonia, the Independent Trade Union of Health Employees of Albania and the Confederation of Independent Trade Unions in Bulgaria.

2. The cooperation among LA agencies in the EU and the Balkans: theoretical references, institutions, experiences.

The experiences and know-how of developed countries, concerning the role of local authorities in regard to development, as far as local authorities are concerned [regional development offices in the United Kingdom (Shutt & Henderson, 2005, pp. 221-223); the role of metropolitan development offices (Italy, USA, Canada, Mexico) as economic and administrative tools of intervention and encouragement of regional strategies and programs for generating wealth, provision of public goods, investment and the transition

to the economy of knowledge (Greg Clark, 2005, pp. 408 - 411); the contribution of networks to local and regional development (Palazuelos, 2005, p. 138)], on the one hand, as well as the weaknesses of local and regional authority agencies in SE Europe, in general, and the promotion of entrepreneurship, in particular (Pinto Ricardo, 2005, p. 112), on the other, highlight the significance of inter-regional co-operation of LAAs in Balkan states for local, regional and overall development of the region and for the establishment of a climate of stability and security.

The new European geography, cities and major urban centers have undertaken a decisive role in the sectors of development and cooperation. The trend for internationalization of economic activities co-exists with the promotion of districts, regions and countries that have competitive advantages and facilitate the development of the economic activities in question. This is the background against which clusters are being developed; they concern geographical clusters of enterprises, agencies, and institutions, as well as bodies associated with them (Kalogirou, 2000, p. 141).

Additionally, as indicated by international practice to attract investment, local and regional agencies are highlighted as actors undertaking initiatives to attract investment (England, Scotland, Ireland, etc) (Hassid, 2000, p. 156).

Throughout the available literature, major CEE agglomerations and urban areas are consistently as leaders in the transformation process. As established of economic development, major cities benefit from a high level of investment, a skilled labour force, more developed infrastructure, business services, access to key decision-makers, a higher standard of accommodation and retail facilities. "The types of regional problems in CEE reflect both the unique process of transition, as well as structural changes already undertaken in Western countries but delayed in CEE by geopolitical factors. Overall groupings include: a) Capital cities/major urban agglomerations which demonstrate the most favourable economic indicators, benefiting from e.g. high investment, skilled labor force and training facilities, more developed infrastructure, business services and access to decision-makers. b) Western border regions which benefited from proximity to the EU, encouraging investment, trade, tourism and cross-border retail and education/technological initiatives. c) Peripheral eastern and rural regions which are among the most economically disadvantaged in CEE. Geographical location, poor infrastructure, low investment, declining agriculture and rural out-migration are all contributory factors. d) Old industrial regions, the drivers of economic activity under socialism, which have been particularly negatively by privatization, enterprise restructuring/closures, subsidy loss and market re-orientation (DIW and EPRC, European Commission Tender No. PO/00-1/RegioA4, 2001, p. 55, 56, 130).

"EU cohesion policy has to face in an enlarged Europe two big challenges. On the one hand, due to the legacy of the socialist era, there is a general economic and social backwardness in Central and Eastern Europe with respect to the old EU member states. Hence, EU cohesion policy will have to contribute to the catching-up of the new member states' economies if the Treaty objectives of economic and social cohesion are to be respected. On the other hand, the transition from centrally planned economies to

market economies and the ongoing integration with EU have to led to a preoccupying rise of regional inequalities within CEECs... Some regional policies can have unfortunate consequences, including a reduction in the rate of growth, or the same effect coupled with an increase in income inequalities, or the relocation of firms to the richer regions” (Jorg Lackenbauer, 2004, pp. 156-157).

“Municipal growth orientations are strongly patterned by the community’s existing character, by the every day conditions experienced by its residents, and by the city’s experiences with past growth” (Paul G. Lewis, 2002, p. 156). “The main reason for economic growth and development of municipalities in Slovenia in the period 1996-2002, was an inefficient use of human capital in the production process” (Matjaz Novak, Stefan Bojnec, p. 174) .

In this context, LAAs, as the institutions closest to citizens, face modern challenges in the current international environment, with the internationalization of economies and the search for new governance mechanisms, the EU enlargement and developments in Eastern European countries. Such developments affect and redefine the modern role of local governance in the economic, social, cultural and environmental development of local societies. LA agencies aspire to upgrade their role and mission in modern governance and demand the necessary resources that will allow them to respond to related challenges.

The basic issue, faced by the economies of Balkan countries as a whole and each one individually, is whether their future will lead to regional unification within the context of European integration or to isolation and marginalization.

If “in a civilised society, attention must be focused on the people as a whole”, in the Balkan states, above everything else, it is necessary to shape the awareness of shared Balkan interest for the progress and prosperity of the region (Galbraith, 1997, p. 197).

A strategic choice for all Balkan countries in transition is to participate in the process of European integration. In an official statement by the European Parliament, in November 1997, it is stated that regional co-operation among Balkan countries should be reinforced, since it is a positive step towards their European accession. In the conclusions of the Greek Presidency concerning the “future of structural policies and cohesion in the enlarged EU”, (Halkidiki, May 16, 2003), it is noted, among other things, that “it is also necessary to reinforce trans-national and cross-border co-operation with countries outside the Union. Therefore, in the new planning period, better co-ordination is necessary for all relevant mechanisms the EU activates to this effect (Structural funds, PHARE, TACIS, CARDS, MEDA)”.

An announcement by the European Commission (EU Bulletin, Dec 11, 2002, COM 2002, 709) – “a framework for target-based tripartite contracts and agreements between the Community, the States and regional and local authorities” – underlines “the increasingly significant role of local authorities, both in planning and, mainly, in implementing community policies”. Furthermore, the White Paper on European Governance (EU Bulletin, Aug 7, 2001), highlights the idea of “establishing contractual tools among member states, regional and local authorities and the European

Community". These contractual tools are foreseen to include targeted tripartite agreements involving the Commission, one member state and local or regional authorities; furthermore, agreement features are also defined. The proposal by the European Commission (14/7/2004, COM 2004, 492) concerning the reform of regional policy, includes the establishment, as of Jan 1, 2007, of the European Groupings of Cross-Border Co-operation (EGCC), the objective of which is "to facilitate and promote cross-border cooperation between Member States, regional and local authorities".

The basic principles ruling the work of the Committee of the Regions (subsidiarity, proximity) also include partnership schemes, according to which, sound European governance presupposes co-operation of European, national, regional and local levels of governance. In the 2000–2006 period, the EU Committee of the Regions has determined that enlargement and European governance are two of its top priorities. In this framework, the Committee of the Regions supports local and regional authorities of candidate countries so that they may adapt to the European environment; it makes efforts to strengthen administrative competence of regional and local institutions, it provides assistance to them so that they may develop their relations within the EU, to make good use of community programs and to adopt community legislation (Political priorities of the Committee of the Regions for the 2000–2006 period, Office for Official Publications of the European Communities, 2002, p.16).

European integration is associated, among other things, with modernization, effectiveness and the quality of services provided to citizens by LAs. With the EU enlargement, the map of LAs is changing; the degree of decentralization varies from country to country and local authority models are organised differently. However, there are common features among LAs and this is particularly true in enlargement countries; these features are related to the need for transference of local competences and upgrading human potential and to the limited resources available. Furthermore, common goals for the reinforcement of the role of LAs, local development, provision of satisfactory services to citizens, promotion of local democracy and employment are also common features of LAs.

In the European Spatial Developmental Perspective (ESDP), "Towards a balanced and sustained development of the Union Territory (Potsdam May 1999)", it is noted that intervening in regard to spatial development issues should take into account "constant progress in economic integration, a growing role for local and regional authorities, the forthcoming enlargement of the Union to central and eastern Europe and the development of links between the 15 and their neighbours". Among other things it is recommended that member states and local and regional authorities should continue to implement plans in the context of cross-border and inter-regional cooperation.

The programme for cross-border cooperation (Official Gazette L 240, Sept 7, 2002), in the framework of PHARE, aims at promoting co-operation among border regions in Central and Eastern Europe and adjacent regions and developing co-operation networks among border regions as well as the establishment of links among such networks and broader community networks.

In the EU context operates the Council of European Municipalities and Regions (CCRE), which, among other things, aspires at expanding and strengthening institutional competences of LAs and the development of their cooperation with each other. At a conference organised by CCRE on twinning between cities in Europe (Antwerp May 22-24, 2002), delegates asked for the support of the European Commission so that twinning actions between cities should include Balkan countries as well (Albania, Bosnia-Herzegovina, Croatia, FYR of Macedonia, Serbia-Montenegro), (Twinning in Europe: Beyond exchange, p. 2).

More than 170 European Municipalities have signed the Aalborg+10 Commitment on Sustainable Development adopted at the 4th European Conference on Sustainable Cities (June 9-11, 2004) (Aalborg+10 Conference).

Similar co-operation initiatives are being developed in the context of Euro-Mediterranean Cooperation of Local and Regional Authorities (COOPEM), with the participation of 86 members from the 15 EU member states and 12 Mediterranean countries.

In May 2004 the founding conference of the new world organization of United Cities and Local Governments was held in Paris. Its aims included, according to the official declaration, cooperation with the United Nations and the world community, peace among peoples, strong Local Authorities, inter-municipal international co-operation, sustainable development, decentralization, diplomacy of the cities, preservation of the cultural versatility of modern cities and the adoption of a World Charter by Local Authorities.

At the EU – Western Balkan Summit (Thessaloniki, June 21, 2003), the EU repeated its definite decision to support the European prospects of Western Balkan countries and its commitment to a common political and economic future for the countries of SE Europe. It is stated that “the process of stabilization and association” of the EU in the region leads to the conclusion of contractual agreements, which comprise an important step for EU accession and co-financed Community aid.

Most EU programmes for Balkan countries are implemented through the European Agency for Reconstruction. Sectors supported include central and local government along the following basic axes: preparation of law-drafts, development of training courses and provision of information technology equipment, support to local and regional administration and strengthening of the public sector.

The basic problems of Community aid to Balkan countries still concern limited resources, the level of which is significantly lower than that provided to countries of Central/Eastern Europe, and reduced efficacy of interventions. Furthermore, the Stability Pact, which, when established, was considered the most significant initiative to support the Balkans, has not so far yielded the results expected, exactly because there was no commitment to the disposal of necessary resources and due to a lack of clearly defined goals. The problem of inadequate resources will get worse, if we take into account that the budget of the EU of the 25 is lower (1.045% of the Community GDP) than that of the Europe of the 15 (around 1.22% of the Community GDP).

An important role in the development of inter-regional co-operation in the Balkans may be played by social, trade union, spiritual, and entrepreneurial agencies as well as LAAs, many of which have accumulated significant experience from inter-Balkan co-operation initiatives.

Chambers in Balkan countries are also developing co-operation initiatives; a Balkan Bar Association has been established, along with a Balkan Press Centre; co-operation schemes have been created among news agencies, publishers, Farmers' Co-operative Associations, Universities and Local Authority agencies of Balkan countries.

More specifically, at the first meeting of LAAs held in Thessaloniki in December 2000, the Mayors of thirty major Balkan cities decided to found the Network of Balkan Cities for friendship, cooperation and development. The founding agreement states the goals of the Network, which include cooperation and issues related to the instruments and operation of the Network. Article 1 of the Agreement, which develops the content of Inter-Balkan, Inter-Municipal Co-operation states: "The cooperation and joint action of cities, beyond the exchange of information and know how and the development of friendly, cultural and entrepreneurial contacts, could also aim at the mobilization of cities vis-à-vis major issues, such as reconstruction programmes, developmental projects, co-operation projects and, of course, utilisation of the possibilities provided by the European Union so as to develop joint co-operation initiatives and programs. Implementation of such programs by Local Authorities as well as the participation of LAAs in project planning, in a creditable and effective manner, makes inter-Balkan, inter-municipal co-operation imperative".

As for the sectors of co-operation, these include, among others: the organization and administration of LAs, the environment, the management of water resources and refuse/waste, town planning and urban infrastructure, education, culture, social welfare, employment, traffic issues, economic development, telecommunications and Information Technology (Founding Declaration of Balkan Cities Network, Thessaloniki 2000).

At the second meeting of the Mayors of the Balkan Cities Network in December 2001, the axes of co-operation were further specified.

Initiatives for the co-operation of local and regional authorities are encouraged and undertaken in the framework of the South-East European Cooperation Process (SEEC) in the sectors of economy, trade, the environment, security, cross-border co-operation, etc.

Local, democratic Non-Governmental Organizations in Croatia, Bosnia-Herzegovina, Serbia and the FYR of Macedonia participate in the Association of Local Democracy Agencies (ALDA), which promotes initiatives supporting democracy, human rights, culture and cross-border cooperation.

In the framework of the Council of Europe, operates the Network of National Associations of Local Authorities of South-Eastern Europe (NALAS-SEE) with the participation of Central Associations of Municipalities from Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Serbia-Montenegro, Kosovo, Greece, Moldova,

Romania, Slovenia, FYR of Macedonia and Turkey. The aims of the network include exchanging good practices and experiences, reinforcement of the position and role of LAAs in each country, organisation of working groups for education and joint programs and the promotion of twinning and technical co-operation among members of the network and other networks and organisations. A similar initiative is the European Network of Training Organizations for Local and Regional Authorities (ENTO), which operates in the context of the 45 member states of the Council of Europe.

3. Inter-regional co-operation among LAAs in the FYR of Macedonia

The ACT 52/1995 enacts the creation of the local government units are the municipalities and the city of Skopje. In the city of Skopje there are seven municipalities, which arrange the issues concerning the residential district of the city of Skopje through a collective body. In the FYROM there are no other levels of local government apart from the primary level. The area where the local government unit is established should shape a natural, geographical and economic unbreakable entity, where inhabited areas communicate each other and are directed to the common centre. The FYROM consists of small-sized municipalities in terms of population. In particular, from 123 municipalities of the country, 47, that is 39%, have up to 5.000 inhabitants, while the population of an equally high percentage of municipalities (26 municipalities or 21% of the total) is up to 10.000 inhabitants. The population of only 10 municipalities is from 50.000 to 100.000 inhabitants and the population of only 1 municipality (Skopje) is more than 100.000 citizens (Statistical Service of FYROM, 2001). The local government units co-operate with local government units of other countries, as well as with international organizations and are entitled to become members of international organizations with a local power.

Considering the interviews conducted and as far as the inter-municipal cooperation is concerned, it doesn't seem to be a widely adopted cooperation practice among the local authorities. No economic or other incentives have been laid down by the government to strengthen this co-operation, as a result, even in common geographical areas, with comparatively common advantages, no joint services and operations are found.

In this context, and within the framework of the "diplomacy of citizens and social agencies", priorities and sectors of interregional cooperation among LAAs from the FYR of Macedonia with equivalent agencies of the EU and Balkan states are to be considered. But first, certain findings related to current LAAs have to be mentioned.

3.1 Assessment of the current state of LAAs in the FYR of Macedonia

When asked to assess LAAs before and after 1989, the persons who filled in the survey questionnaires characterized their Municipality current state after 1989 as good (average ranking 44 in the 1-100 scale), the situation before 1989 as bad (38) and the future

prospects as very good (69). It seems that the persons asked were not happy with the situation that existed before 1989, they are not fully satisfied with the transitional situation as this has been shaped after 1989, and that they are expecting a future improvement in the state of LAAs (Table 1).

According to the responses of the persons asked, LAAS in the FYR of Macedonia greatly lack funding (average of 29 in the 1-100 scale) and, therefore, problems in building infrastructure (40), inadequacy of equipment (40) and low level of computerization. They consider the staff sufficient (63), staff qualifications adequate (70) and management efficient (57) (Table 2).

In regard to the current institutional framework of LA, the highest percentage of those asked consider it very good; in regard to equal opportunities between men and women, and relatively good in regard to the recruitment of staff; modernization prospects and personnel evaluation criteria. On the contrary, the institutional framework is considered elementary in regard to meritocracy, when it comes to promoting managers, adaptability to European standards and efficiency. Furthermore, the framework is considered very bad in regard to decentralization (Table 3). This assessment shows that, in general, those asked consider the institutional framework of LA inefficient and not up to par with modern requirements. This is why – according to their responses to another question – they consider the institutional framework as the biggest obstacle in the process of modernization of the system of LA, the second one being the lack of funding.

These findings that concern the current state of affairs and the institutional framework of LAAs in the FYR of Macedonia, seem to have an impact on the priorities of co-operation with corresponding agencies in the EU and the Balkans, which are presented below.

3.2 Cooperation of LAAs of the FYR of Macedonia with EU countries

3.2.1 Countries and sectors of co-operation

Table 4 indicates that LAAs of the FYR of Macedonia are co-operating mainly with agencies from Germany; they share experiences in working methods, they organise personnel exchange visits and community programs. Co-operation with Greece follows, in the sectors of community programs, sharing of experiences in working methods and personnel exchange visits. There is quite pronounced co-operation with agencies of the following countries, presented in descending order: Austria, the Netherlands, Italy, Denmark, France, Belgium and the United Kingdom, while there are a few cooperation schemes with agencies from Spain and Luxembourg. There is no cooperation with agencies from Finland, Ireland, Portugal and Sweden.

It seems that when FYR of Macedonia LAAs select countries for cooperation, what plays an important role is geography, since co-operation appears to be more enhanced with countries that are relatively near; on the contrary, cooperation seems to be weaker, if it exists at all, with more remote countries. In addition, the cooperation is

being influenced by the scale of the economic co-operation of the FYR of Macedonia with EU member states (FDI and external trade).

Furthermore, the selection of countries for co-operation seem to be influenced by the level of development and the significance (power) of these countries in the EU (priority is given to bigger countries) as well as their role in EU evolution, since all six of the founding EEC members are included in the group of countries the FYR of Macedonia is cooperating with.

In regards to the sectors of co-operation to date with corresponding agencies within the EU, sharing of experiences in working methods ranks first, followed by community programs, research surveys, personnel exchange visits, information, personnel training and citizen services.

These priorities, in regards to sectors of co-operation, are directly related to current conditions, problems and needs of LAAs in the FYR of Macedonia, which, according to the findings of the same research survey are related to upgrading human potential, modernizing equipment and technical infrastructure and lack of necessary funding resources.

3.2.2 Countries and agencies of co-operation

The main majority (81.5%) of FYR of Macedonia LA representatives asked stated that they are co-operating with corresponding Municipalities in EU member states; these were followed by trade unions within LAAs (4.3%), Prefectures (0.6%) and Regions (0.6%). This choice, i.e. to mainly co-operate with municipalities, has to do with the fact that the latter are more similar to the features and needs of FYR of Macedonia LAAs, while having the necessary and useful experience and know how, these LAAs aim at utilizing. It is mentioned that in the FYROM there is only the primary level of local government.

Inter-regional co-operation of FYR of Macedonia LAAs is being developed with agencies from the following countries, in descending order: Germany (19.7%), Greece (16.1%), Austria (8.3%), the Netherlands (8.3%), Italy (6.7%), Denmark (6.2%), France (5.7%), Belgium (5.2%), the United Kingdom (5.2%), and Spain (2.1%), while no co-operation initiatives have been developed with agencies from Portugal, Sweden, Finland and Ireland (Table 5).

3.2.3 Evaluation of the experience of co-operation with EU countries

From the assessment of the experience gained by officials of FYR of Macedonia LAAs from their co-operation with corresponding agencies from EU countries, it may be concluded that, on a scale from 0 to 100 (negative > positive), average rating is 72. Assessed as very positive is co-operation with agencies from the Netherlands (84) and France (80), as positive with agencies from the United Kingdom (78), Italy (77), Austria

(73), Germany (71), Belgium (68), Spain (67), Greece (65) and Denmark (63), while cooperation with agencies from Luxembourg is assessed as mediocre (50).

It may be seen that representatives from FYR of Macedonia LAAs assess as positive and very positive their co-operation with corresponding agencies in EU countries. It is obvious that this reflects the higher level of development of LAAs in EU countries, as compared to their equivalent agencies in the FYR of Macedonia, and the wealth of their experience, which may be disseminated and utilised.

3.2.4 Participation in Community Programmes

57.5% of LAA representatives stated that their agency had participated in the PHARE Programme, 5.2% in Community Initiative INTERREG, 17.1% in some other program/project and 25.9% in no such program. The majority of LAAs have utilized community programs/projects, which comprise the main mechanism of inter-regional cooperation, and this gives them the possibility to deal with problems of adaptation to the new environment, to draw funding, to co-operate with EU agencies and to enhance their prospects of integration in EU conditions.

3.3 Cooperation of FYR of Macedonia LAAs with Balkan countries

3.3.1 Countries and sectors of co-operation

The representatives of FYR of Macedonia LAAs have reported that, in regards to inter-regional co-operation with Balkan states, they have so far developed co-operation schemes with the following countries, in descending order: Bulgaria, Turkey, Albania, former Yugoslavia, Romania and their own country.

As for sectors of inter-Balkan co-operation, the following were reported in descending order: sharing experiences in working methods, community programs, information, research-surveys, services users, new technologies, personnel training and technical infrastructure (Table 6).

In regard to sectors of co-operation per country, they are as follows: exchange of working method experiences, community programs and information with Bulgaria, exchange of working method experiences and information with Turkey. LAAs of the FYR of Macedonia also co-operate with former Yugoslavia and Albania, while the scale of co-operation with Romania is lower.

3.3.2 Countries and agencies of co-operation

Co-operation of FYR of Macedonia LAAs is mainly developed with Municipalities in Balkan states (82.3%), the first choice being Bulgaria, followed by Turkey, Albania, former Yugoslavia and Romania. These LAAs also co-operate with LAA trade unions (7.7%), Regions (2.7%) and Prefectures (1.7%), (Table 7).

3.3.3 Evaluation of experience from co-operation with Balkan countries

FYR of Macedonia LAA's rating of the cooperation experience with corresponding agencies from Balkan countries was 59, on average, on a scale from 0 to 100; this is considered satisfactory and it is lower than the average rating for co-operation with EU member states. Cooperation with agencies from Turkey (66) is considered satisfactory, while that with former Yugoslavia (59), Bulgaria (58), Albania (52), Romania (50) and FYR of Macedonia agencies (50) is considered mediocre.

3.4 Correlation of LAAs of FYR of Macedonia with corresponding LAAs from EU and Balkan countries

When correlating the cooperation between LAAs from the FYR of Macedonia with corresponding LAAs in EU and Balkan countries, it is apparent that the highest percentage of persons asked (93.8%) stated that they cooperate with corresponding agencies from Balkan countries, while the lowest percentage referred to cooperation with those from EU countries (83.9%). When it comes to cooperation sectors, Balkan countries agencies rank first in comparison to the EU ones in the sectors of information, exchange of experiences in working methods and community programs; they are lagging behind in the sectors of personnel training, research-surveys and services users.

The priority given to Greece by FYR of Macedonia LAAs, (2nd among EU countries) as well as the choice of co-operation sector (community programs, exchange of experiences, new technologies) are attributed to the fact that Greece is the only EU member-state in the region - in the period when the present survey was implemented - it has a higher level of overall development and LAA development, there is a good scale of economic co-operation between the two countries in the trade and investment sectors and the two countries are close to each other, which facilitates co-operation between their respective agencies.

4. Conclusions

After 1989 and the beginning of transition procedures from centrally planned economies to market economies, Balkan countries, including the FYR of Macedonia, have had to face the challenge of a radical transformation at the political, administrative, economic and social levels.

This transformation concerns the structure, content and operation of Local Authority Agencies and the need for their adaptation to modern European conditions as well as the need for the promotion of regions and local communities to a major stakeholder in the European edifice.

Following the end of bipolarity and incompatibility of their respective systems after 1989, Local Authority agencies in the Balkans also undertook initiatives of inter-

regional co-operation with each other and corresponding EU agencies, utilizing related EU programs and initiatives that encourage and facilitate such co-operation as well as international experience of cooperation and networks of cities and their role as a basic tool for the promotion of local development. This type of initiative is reinforced by the new European geography, according to which cities and major urban centers become decisive actors in the development and co-operation sectors; there is an international tendency to create cities-pylons, "internationally open urban systems", which are becoming new forms of urban development.

As for the factors influencing the choice of EU member states for co-operation by the FYR of Macedonia LAAs, geography plays an important role, since co-operation seems to be stronger between countries that are nearer and weaker to non-existent with more remote ones. Furthermore, selection of countries for cooperation seems to be influenced by the scale of the economic co-operation of the FYR of Macedonia with EU member states (FDI and external trade), their development level and their "weight" in the EU (priority is given to bigger countries), as well as their role in the EU evolution, since all six founding EEC member states are included in the countries the FYR of Macedonia has selected to cooperate with.

In regards to the sectors of co-operation to date with corresponding agencies from EU countries, top priority is given to the exchange of experience in working methods, followed by community programs, research surveys, personnel exchange visits, personnel training and service provision to citizens.

The selection of inter-Balkan co-operation countries on behalf of FYR of Macedonia LAAs is affected by geographic proximity, in the sense that cooperation schemes are developed with countries that are closer; other factors include inter-Balkan conflict (cooperation is impossible with Albanian agencies and stronger with countries characterized by weaker bilateral disputes), as well as the level of integration of the Balkan country in question within the EU, which explains the high priority given to cooperation with Greece, since it is the only EU member state in the region. Generally speaking, proximity, the scale of overall economic cooperation and national priorities seem to be influencing both the choice of countries and the intensity of cooperation.

In correlating the cooperation of FYR of Macedonia LAAs with the corresponding agencies in EU and Balkan countries, it is clear that an overwhelming majority of those asked (93.8%) stated that they cooperate with corresponding agencies in Balkan countries and a smaller majority (83.9%) stated that they cooperate with LAAs from EU countries. In regard to the sectors of such cooperation Balkan LAAs rank first over those of the EU in the sectors of information, exchange of experiences in working methods, and community programs, while they lag behind in sectors of personnel training, research-surveys and services users. On the contrary, the level of satisfaction of FYR of Macedonia LAA representatives vis-à-vis their co-operation so far with agencies from EU member states seems to be higher than that of their satisfaction with cooperation with Balkan countries. The agencies that FYR of Macedonia LAAs mainly cooperates with are municipalities and less so trade unions of

LAA employees, Prefectures and Regions; this choice is related to the fact that the former are more similar in features and needs, while they have necessary and useful experience and know-how, which they aspire to use. Priorities in the sectors of cooperation are directly related to the current state of affairs as well as problems and needs of LAAs in the FYR of Macedonia; they have to do with upgrading human potential, modernizing equipment and technological infrastructure and the lack of necessary funding. Community programs seem to be the basic mechanism of inter-European and inter-Balkan cooperation; through these programs issues of adapting to the new environment are expected to be resolved and funds to be drawn so that prospects of the country's European integration may be enhanced.

Cooperation of local societies and the "diplomacy of cities" so as to strengthen regions not only contributes to local development and the enhancement of the role of LAAs, but – specifically in the Balkans – it may also contribute towards cultivating an atmosphere of security, stability, peace and friendship among the peoples of the region and mitigating conflicts and disputes between countries. This is even more important in view of the fact that, despite the opportunities mentioned above and the experiences of inter-regional cooperation of Balkan countries with each other and with EU countries, there are still obstacles and difficulties limiting the dynamics and prospects for such co-operation. Obstacles include the limited, as yet, or even different competences of local and regional authorities at the European and Balkan level, the use, in certain instances, of such co-operation for promoting "national" and "political" aspirations, in combination with the existing "national suspicions", and the tension and insecurity these often lead to.

Upgrading and strengthening the role of LAs in the Balkans and Europe as well as the brave action of decentralization and safeguarding necessary resources at the national and European levels are the main prerequisite conditions for supporting inter-regional cooperation among LAAs and networking of initiatives in the context of regional Balkan integration, which will contribute towards the development of the region and will facilitate their accession to single Europe.

APPENDIX

Table 1. Assessment of the current situation in the Municipality (after 1989), The previous state (before 1989) and the future one, as you personally project it to be: Scale 1-5 (1=very bad / 5=excellent)

s/n		N.A.	Very bad >>> excellent					Total	Average score scale 0 - 100
			1	2	3	4	5		
1	Current situation	8 <i>4,1</i>	26 <i>13,5</i>	44 <i>22,8</i>	68 <i>35,2</i>	43 <i>22,3</i>	4 <i>2,1</i>	193 <i>100,0</i>	<i>44</i>
2	previous situation	28 <i>14,5</i>	46 <i>23,8</i>	38 <i>19,7</i>	43 <i>22,3</i>	26 <i>13,5</i>	12 <i>6,2</i>	193 <i>100,0</i>	<i>38</i>
3	future situation	4 <i>2,1</i>	8 <i>4,1</i>	7 <i>3,6</i>	52 <i>26,9</i>	77 <i>39,9</i>	45 <i>23,3</i>	193 <i>100,0</i>	<i>69</i>

Table 2. You are kindly requested to assess your Municipality as follows: Scale 1-5
(1=not considerable / 5=very considerable)

s/n	SECTOR	N.A.	not considerable >>> very considerable					TOTAL	Average score Scale 0 - 100
			1	2	3	4	5		
1	Sufficiency of funding	1 0,5	62 32,1	67 34,7	44 22,8	6 3,1	13 6,7	193 100,0	29
2	Building infrastructure	3 1,6	35 18,1	57 29,5	60 31,1	26 13,5	12 6,2	193 100,0	40
3	Adequacy of equipment	3 1,6	23 11,9	60 31,1	82 42,5	21 10,9	4 2,1	193 100,0	40
4	Equipment	3 1,6	27 14,0	38 19,7	82 42,5	35 18,1	8 4,1	193 100,0	45
5	Level of computerized services	6 3,1	29 15,0	43 22,3	65 33,7	41 21,2	9 4,7	193 100,0	44
6	Staff Sufficiency	3 1,6	2 1,0	30 15,5	53 27,5	81 42,0	24 12,4	193 100,0	63
7	Staff Qualifications	3 1,6	2 1,0	18 9,3	44 22,8	79 40,9	47 24,4	193 100,0	70
8	Management Efficiency	15 7,8	17 8,8	27 14,0	51 26,4	55 28,5	28 14,5	193 100,0	57

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Table 3. How would you assess the current institutional framework of Local Authorities in your country, according to the parameters below: scale 1 - 5 (1=very bad / 5=excellent)

s/n	SECTOR	N.A.	Very bad >>> excellent					TOTAL	Average score Scale 0 - 100
			1	2	3	4	5		
1	Decentralization	3 <i>1,6</i>	110 <i>57,0</i>	41 <i>21,2</i>	28 <i>14,5</i>		11 <i>5,7</i>	193 <i>100,0</i>	<i>19</i>
2	Efficiency	4 <i>2,1</i>	32 <i>16,6</i>	79 <i>40,9</i>	57 <i>29,5</i>	15 <i>7,8</i>	6 <i>3,1</i>	193 <i>100,0</i>	<i>35</i>
3	Equal opportunities between Men and women	3 <i>1,6</i>	6 <i>3,1</i>	20 <i>10,4</i>	58 <i>30,1</i>	58 <i>30,1</i>	48 <i>24,9</i>	193 <i>100,0</i>	<i>66</i>
4	Staff recruitment criteria	3 <i>1,6</i>	24 <i>12,4</i>	20 <i>10,4</i>	79 <i>40,9</i>	44 <i>22,8</i>	23 <i>11,9</i>	193 <i>100,0</i>	<i>53</i>
5	Staff evaluation criteria	6 <i>3,1</i>	32 <i>16,6</i>	43 <i>22,3</i>	68 <i>35,2</i>	34 <i>17,6</i>	10 <i>5,2</i>	193 <i>100,0</i>	<i>43</i>
6	Meritocracy in Manager Promotion	7 <i>3,6</i>	35 <i>18,1</i>	53 <i>27,5</i>	64 <i>33,2</i>	28 <i>14,5</i>	6 <i>3,1</i>	193 <i>100,0</i>	<i>39</i>
7	Prospects of modernization and positive changes	5 <i>2,6</i>	10 <i>5,2</i>	64 <i>33,2</i>	71 <i>36,8</i>	35 <i>18,1</i>	8 <i>4,1</i>	193 <i>100,0</i>	<i>46</i>
8	Adaptability to European standards	1 <i>0,5</i>	33 <i>17,1</i>	71 <i>36,8</i>	55 <i>28,5</i>	21 <i>10,9</i>	12 <i>6,2</i>	193 <i>100,0</i>	<i>38</i>

Table 4: Which of the following EU countries have you developed inter-regional co-operation with so far and in which sectors?

s/n	SECTOR OF CO-OPERATION	N.A.	Information	Personnel training	Personnel exchange visits	Research - Surveys	Citizens' services	Sharing experiences- in working methods	Community programs	Other	TOTAL
	COUNTRY	0	1	2	3	4	5	6	7	8	
1	BELGIUM	2 2.0	0.0	0.0	0.0	2 20.0	2 20.0	0.0	0.0	5 50.0	10 5.2
2	DENMARK	0.0	0.0	0.0	0.0	2 16.7	2 16.7	3 25.0	4 33.3	7 58.3	12 6.2
3	GERMANY	0.0	8 21.1	8 21.1	12 31.6	8 21.1	2 5.3	14 36.8	9 23.7	5 13.2	38 19.7
4	GREECE	0.0	7 22.6	1 3.2	10 32.3	3 9.7	0.0	16 51.6	19 61.3	0.0	31 16.1
5	SPAIN	0.0	0.0	0.0	0.0	0.0	0.0	1 25.0	3 75.0	0.0	4 2.1
6	FRANCE	0.0	0.0	0.0	2 18.2	1 9.1	1 9.1	4 36.4	3 27.3	2 18.2	11 5.7
7	ITALY	1 7.7	2 15.4	3 23.1	3 23.1	4 30.8	1 7.7	7 53.8	3 23.1	3 23.1	13 6.7
8	LUXEMBOURG	0.0	1 100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1 0.5
9	THE NETHERLANDS	0.0	3 18.8	1 6.3	3 18.8	4 25.0	1 6.3	5 31.3	2 12.5	4 25.0	16 8.3
10	AUSTRIA	1 6.3	0.0	0.0	0.0	8 50.0	0.0	0.0	2 12.5	5 31.3	16 8.3
11	UNITED KINGDOM	0.0	2 20.0	0.0	0.0	0.0	1 10.0	1 10.0	3 30.0	3 30.0	10 5.2
	TOTAL	4 2.5	23 14.2	13 8.0	30 18.5	32 19.8	10 6.2	51 31.5	48 29.6	34 21.0	162

Finland, Ireland, Portugal, Sweden: No data

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Table 5: Which of the following EU countries and which agencies below have you developed inter-regional co-operation with to date?

s/n	AUTHORITY CO-OPERATION	N.A.	Municipality	Prefecture	Region	Trade Union of local authority	Other	TOTAL
	COUNTRY	0	1	2	3	4	5	
1	BELGIUM	1 10.0	6 60.0	0.0	0.0	2 20.0	1 10.0	10 5.2
2	DENMARK	1 8.3	9 75.0	0.0	0.0	0.0	2 16.7	12 6.2
3	GERMANY	0.0	31 81.6	0.0	0.0	1 2.6	6 15.8	38 19.7
4	GREECE	0.0	25 80.6	1 3.2	1 3.2	4 12.9	0.0	31 16.1
5	SPAIN	0.0	4 100.0	0.0	0.0	0.0	0.0	4 2.1
6	FRANCE	1 9.1	9 81.8	0.0	0.0	0.0	1 9.1	11 5.7
7	ITALY	1 7.7	10 76.9	0.0	0.0	0.0	2 15.4	13 6.7
8	LUXEMBOURG	0.0	1 100.0	0.0	0.0	0.0	0.0	1 0.5
9	THE NETHERLANDS	1 6.3	14 87.5	0.0	0.0	0.0	1 6.3	16 8.3
10	AUSTRIA	0.0	14 87.5	0.0	0.0	0.0	2 12.5	16 8.3
11	UNITED KINGDOM	0.0	9 90.0	0.0	0.0	0.0	1 10.0	10 5.2
	TOTAL	5 3.1	132 81.5	1 0.6	1 0.6	7 4.3	16 9.9	162

Finland, Ireland, Portugal, Sweden: No data

Table 6: Which of the following Balkan countries have you developed inter-regional co-operation with to date and in which sectors?

s/n	FIELD OF CO-OPERATION	N.A.	Information	Personnel training	Research surveys	services Users	Exchange of experience in work methods	Community programs	New technologies	Technical infrastructure	Other	TOTAL
	COUNTRY	0	1	2	3	4	5	6	7	8	9	
1	ALBANIA	1 4.0	10 40.0	3 12.0	5 20.0	3 12.0	12 48.0	17 68.0	1 4.0	1 4.0	0.0	25 13.0
2	BULGARIA	1 2.0	11 22.4	2 4.1	3 6.1	1 2.0	23 46.9	14 28.6	0.0	2 4.1	7 14.3	49 25.4
3	GREECE	0.0	5 16.1	1 3.2	10 32.3	1 3.2	9 29.0	21 67.7	8 25.8	0.0	0.0	31 16.1
4	FORMER YUGOSLAVIA	1 4.2	6 25.0	0.0	0.0	2 8.3	7 29.2	3 12.5	4 16.7	0.0	6 25.0	24 12.4
5	FYR of MACEDONIA	0.0	6 75.0	1 12.5	0.0	0.0	1 12.5	0.0	0.0	0.0	1 12.5	8 4.1
6	ROMANIA	0.0	3 27.3	0.0	0.0	1 9.1	5 45.5	5 45.5	1 9.1	0.0	2 18.2	11 5.7
7	TURKEY	0.0	11 33.3	2 6.1	4 12.1	2 6.1	21 63.6	1 3.0	2 6.1	3 9.1	5 15.2	33 17.1
	TOTAL	3 1.7	52 28.7	9 5.0	22 12.2	10 5.5	78 43.1	61 33.7	16 8.8	6 3.3	21 11.6	181

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Table 7: Which of the following Balkan states and agencies have you developed inter-regional co-operation with to date?

	AUTHORITY CO-OPERATION	N.A.	Municipality	Prefecture	Region	Trade Union of local authority	Other	TOTAL
	COUNTRY	0	1	2	3	4	5	
1	ALBANIA	1 4.0	22 88.0	0.0	1 4.0	1 4.0	0.0	25 13.0
2	BULGARIA	2 4.1	36 73.5	1 2.0	1 2.0	6 12.2	5 10.2	49 25.4
3	GREECE	1 3.2	27 87.1	2 6.5	0.0	2 6.5	0.0	31 16.1
4	FORMER YUGOSLAVIA	2 8.3	19 79.2	0.0	0.0	2 8.3	2 8.3	24 12.4
5	FYR of MACEDONIA	0.0	6 75.0	0.0	1 12.5	1 12.5	0.0	8 4.1
6	ROMANIA	0.0	10 90.9	0.0	1 9.1	0.0	0.0	11 5.7
7	TURKEY	2 6.1	29 87.9	0.0	0.0	2 6.1	0.0	33 17.1
	TOTAL	8 4.4	149 82.3	3 1.7	4 2.2	14 7.7	7 3.9	181

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