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Content

From the Editor

It is a great pleasure to introduce the new issue of the South East European Journal of Economics and Business (Volume 8, Issue 1). This special issue covers papers presented at the 6th International Conference of the School of Economics and Business in Sarajevo – ICES2012 - Beyond the Economic Crisis: Lessons Learned and Challenges Ahead. After a rigorous selection and reviewing process, this special issue carries five papers. A common feature of these studies is that they focus on one or more countries of the South-Eastern or Central Europe; all of them are empirical papers, three of them focus on the effects of the last global economic downturn in this part of Europe, and they are mainly based on new data. As such, this issue provides a nice compilation of five different economic and business research areas, which we present in turn.

The first paper is by Mikulić, D., Lovrinčević, Z. and Galić-Nagyszombaty, A., entitled "Regional Convergence in the European Union, New Member States and Croatia". The paper investigates the issue of regional convergence in the European Union with special reference to Croatia. The novelty of this empirical work is that the authors provide more insights into the differences in regional growth patterns of new member states, as well as Croatia, in addition to the factors influencing regional disparities within each country. This paper provides a nicely elaborated empirical analysis of regional convergence for the period 2001-2008 at the NUTS II and NUTS III levels. The main hypothesis that the authors test in their empirical work is whether the process of regional convergence in new member states (NMS) and Croatia is strong enough to dominate over other factors influencing regional potential growth (mainly industry structure and the quality of human capital). The authors report that absolute β-convergence can be found at the national level for EU countries. Convergence also can be found in NMS regions, but the pace of convergence at the regional level is lower in comparison to the national level, and the estimated β-convergence parameter is less significant.

The second paper by Čaršimamović-Vukotić, N., Jankulov-Suljagić, I. and Smirnov, I. is entitled "Post-crisis Potential Output in the Western Balkans". The study covers a contemporary issue – the effect of the last global economic downturn in the Western Balkans on the output (GDP) gap of these countries. In the empirical part of their research, the authors calculate and compare pre- and post-crisis potential GDPs and GDP gaps for the Western Balkan countries. They use a symmetric filter method developed by Hodrick and Prescott to de-trend GDP time series data by decomposing it into growth and cyclical components. The authors report that there was a strong decrease in potential output growth compared to the pre-crisis potential output growth of the Western Balkans. One of the implications of this empirical investigation is that structural economic reforms are needed in order to support sustainable long-term production and employment growth. Moreover, the authors argue that recovery in the region will strongly depend on global international trade recovery as well.

The third paper written by Zaimović, A. under the title "Testing the CAPM in Bosnia and Herzegovina with Continuously Compounded Returns" is also an empirical work focused on the capital market of Bosnia and Herzegovina (BiH). Zaimovic argues that capital markets of the Western Balkan countries in general are characterized by higher returns, but also with higher volatility of stock returns as compared to those of developed markets. The recent economic and financial crises devastated capital markets worldwide, an effect the author identifies in the BiH capital market as well. To further investigate the BiH capital market's performance, the author explores whether there is a standard relation between stock returns and market portfolio returns as proposed by the Sharpe-Lintner Capital Asset Pricing Model. This is an empirical work based on a traditional two-stage regression OLS methodology. The obtained results imply that despite the crisis' effects on the BiH capital market, the systematic risk measured by the beta coefficient is priced and that the beta premium is positive.

The fourth paper written by Pop, L.N., Rovinaru, F. and Rovinaru, M. is entitled "Commodity Price Volatility During and After the Economic Crisis – Implications For Romania". The authors argue that under the impact of a wide range of determinants, the prices of globally traded commodities often experience sudden and significant fluctuations (especially over the last global economic downturn), putting under uncertainty and risk the economic status of producers, consumers and traders from the private to the national level. In the authors view, Romania, due to the processes it has undergone in recent decades, experienced the international turmoil in a severe manner as well. This motivated authors to investigate the food price volatility experienced at the international level and on the Romanian market during the years of the crisis and immediately after its appeasement. The authors report that Romania's current volatility context is a mixture of imported volatility and internal instability and the lack of maturity of its market structures. The paper ends with some interesting policy implications.

Finally, the fifth paper by Dlačić, J. and Kadić-Maglajlić, S. is entitled "The Role of Gender and Situational Factors in Wine Consumption of Generation Y". The paper discusses theoretical, empirical and practical implications of wine consumption and offers ideas for further research. The main research motive of this investigation was to analyze the factors influencing the wine consumption of Generation Y consumers in the context of two countries from South-Eastern Europe (Bosnia and Herzegovina and Croatia). The paper's empirical analysis implies that self-expression, sociability, tradition and food are factors that have been recognized as significant predictors of wine consumption in these two countries. Multivariate regressions have been applied in order to explain the influences of the abovementioned factors on wine consumption. In particular, the research findings show that specific gender and situational differences exist in wine consumption behaviour between males and females in Generation Y.

In the end, we do hope that you will find reading this issue interesting and that you will be motivated to conduct and submit your research to the Journal as well. We would like to thank the journal's referees, who helped us improve the papers and who supported the continuity of publishing high-quality research. Without their support it would hardly have been possible to publish this issue.

On behalf of the Editorial Board
Adnan Efendic

University of Sarajevo
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REGIONAL CONVERGENCE IN THE EUROPEAN UNION, NEW MEMBER STATES AND CROATIA

Davor Mikulić, Željko Lovrinčević, Andrea Galić Nagyszombaty *

Abstract

Over the past two decades, the issue of regional convergence in the European Union has been the subject of a wide range of empirical research. This paper aims to provide more information on the differences in regional growth patterns of new member states (NMS), as well as Croatia, in addition to the factors influencing regional disparities within each country. This research provides an analysis of regional convergence in the period 2001-2008 at the NUTS II and NUTS III level.

The most widely used model for testing convergence hypotheses is beta-convergence analysis. Other factors commonly included in the econometric modelling of convergence are demographic variables, labour market conditions, industrial structure, institutional factors and overall government policy. The main hypothesis is that the process of regional convergence in NMS and Croatia is not strong enough to dominate over other factors, influencing regional potential growth (mainly industry structure and quality of human capital). Absolute β-convergence can be found at the national level for EU countries. Convergence also can be found for NMS regions, but the pace of convergence on the regional level is lower in comparison to the national level and the estimated β-convergence parameter is less significant.

Keywords: regional convergence, regional policy, economic growth, Croatia

JEL classification: R11

1. INTRODUCTION

Regional disparities in economic development are more evident in the European Union in comparison to other developed economies such as USA or Japan, particularly after the recent waves of EU enlargement. The most developed EU regions are approximately eight times richer than the least developed regions. Due to significant differences in regional development, the EU introduced a set of policy measures to promote the integration and convergence of less developed areas among the Member States.

While data on regional disparities in the EU shows recent improvements, all new member states show increasing 'dispersion within country'[1] over the analyzed period. In the period 2000-2008, Croatia, besides Latvia and Portugal, recorded the lowest change in regional dispersion (1.5) in comparison to NMS.

Theoretical and empirical research on regional income convergence has become especially popular over the last two decades. The first studies on convergence were presented in Baumol (1986) and Barro and Sala-i-Martin (1991). The

[1] The dispersion of regional per capita GDP (at NUTS 3 level) is measured by the sum of the absolute differences between regional and national GDP per capita, weighted with the share of population and expressed in percent of the national GDP per capita. The indicator is calculated from Eurostat regional GDP figures based on the European System of Accounts (ESA95). The dispersion of regional GDP is zero when the GDP per capita in all regions of a country is identical, and it rises if there is an increase in the distance between a region's GDP per capita and the country mean.

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Table 1. Dispersion of regional GDP per inhabitant in EU member states and Croatia

	2001	2002	2003	2004	2005	2006	2007	2008	Difference 2008-2001
EU (27 countries)	35.3	34.6	34.1	33.4	33.1	33.0	32.6	32.2	-3.1
OLD MS									
Belgium	28.4	28.4	27.8	28.1	28.3	27.8	27.9	27.2	-1.2
Czech Republic	24.3	24.9	25.0	24.2	25.0	25.4	26.6	26.8	2.5
Germany	29.4	29.1	29.3	29.1	28.8	28.7	28.4	27.8	-1.6
Austria	26.3	26.1	25.7	24.8	24.6	24.3	23.6	23.3	-3.0
Finland	32.7	31.7	29.8	29.5	29.9	30.4	30.3	30.0	-2.7
Ireland	23.7	26.9	27.5	26.4	27.9	28.6	29.3	30.0	6.3
Spain	21.1	20.5	19.8	19.4	19.1	19.1	18.8	18.8	-2.3
France	23.8	23.5	23.6	22.6	23.2	23.1	23.7	23.9	0.1
Italy	26.0	25.6	25.4	25.5	25.0	24.4	24.2	24.2	-1.8
Sweden	14.9	15.2	14.9	15.7	16.2	15.2	15.5	15.9	1.0
United Kingdom	27.2	27.9	27.9	27.4	27.4	28.0	28.9	30.7	3.5
NMS									
Bulgaria	28.8	30.1	30.2	30.9	32.9	38.0	42.7	44.3	15.5
Estonia	37.2	38.6	41.3	42.3	39.6	43.4	41.4	41.0	3.8
Poland	31.1	32.7	32.4	32.2	33.3	34.3	34.5	33.3	2.2
Portugal	27.5	27.8	28.3	28.8	29.3	28.6	28.9	28.9	1.4
Romania	27.9	30.1	29.3	29.2	33.7	34.4	35.2	37.7	9.8
Slovenia	20.1	20.5	22.3	21.9	21.8	22.3	22.4	21.8	1.7
Slovakia	27.3	28.1	28.7	29.2	33.7	34.4	35.0	32.7	5.4
Latvia	45.2	51.9	49.0	52.9	51.3	46.9	45.6	45.3	0.1
Lithuania	21.8	24.7	24.2	23.7	25.1	27.6	29.0	28.0	6.2
Hungary	37.6	39.6	37.7	37.9	40.2	42.5	42.4	42.8	5.2
Croatia	29.6	28.5	31.0	31.9	32.9	33.8	32.8	31.1	1.5

Source: Eurostat database (downloaded in 2012).

broad literature on convergence is mainly concerned with three well-known competitive convergence hypotheses:

- the absolute (unconditional) convergence hypothesis
- the conditional convergence hypothesis
- the club convergence hypothesis

According to the absolute convergence hypothesis, the per capita incomes of countries or regions converge with one another in the long-term regardless of other initial conditions. The traditional and widely used tool for testing convergence hypotheses is beta-convergence analysis. Beta-convergence (β- convergence) is defined as a negative relationship between initial income level and growth rate, and implies that all economies converge at the same unique and stable steady state equilibrium. The theoretical background for this hypothesis is found in traditional neoclassical growth theory, stating that economic growth depends on the three main production factors: population, capital accumulation and technology. As more capital is engaged in more developed regions, lower marginal returns to capital and slower economic growth are to be expected. Globalization and international trade, as well as migration and liberalization of international capital flows, are factors in favor of reducing the productivity gap and living standards between countries and regions.

While some empirical research confirms the unconditional convergence hypothesis, the majority of this research employs a homogeneous sample of countries or regions. The absolute β-convergence hypothesis is usually tested by the following cross-sectional econometric equation (Baumont et al 2002):

$$gt=\alpha S + \beta y0 + \varepsilon,$$

where gt is the (n*1) vector of per capita GDP average growth rate (where n is the number of regions) in the period (0, t); y0 is the vector of per capita GDP initial levels (at time 0); S is the unit vector and ε is the vector of error terms. The absolute convergence hypothesis is confirmed if the estimate of coefficient beta is statistically significant and negative.

The conditional convergence hypothesis assumes that in the long run per capita incomes of economies converge with one another if the main features of those economies are similar. The technological levels of economies, their socio-demographic features (such as educational levels and population growth) and overall institutional environment are the main factors which are assumed to be similar as a prerequisite for convergence. If those factors differ among economies, each particular economy will tend to reach its own unique equilibrium. The evidence should suggest the existence of conditional convergence if the negative relationship between initial per capita incomes and their growth rates holds only after the possibility of the above-mentioned structural characteristics has been controlled for (Mankiw et al 1995). The cross-sectional equation for testing conditional β– convergence is as follows, in matrix form (Baumont et al 2002):

$$g = \alpha S + \beta y + X\varphi + \varepsilon$$

where X is the matrix of explanatory variables constant in the steady state equilibrium and all other terms are as previously defined. There exists conditional β–convergence if the estimated value for β is significantly negative even after controlling for other initial factors.

In addition to the conditional and unconditional convergence hypothesis, Fischer and Stirböck (2004) define club convergence as the process by which each region belonging to a certain club moves from a disequilibrium position to its club-specific steady-state position. At the steady-state the growth rate is the same across the regional economies of a club. Cappelen (2001) notes that the concept of club convergence is not relevant in the context of standard neoclassical models because the agents are assumed to be homogeneous. This assumption would mean that there are no different initial conditions and therefore no club convergence. However, if the agents are allowed to be heterogeneous the dynamic system of the neoclassical growth model could lead to multiple steady-state equilibrium in spite of diminishing returns to capital. Durlauf (2001) points out that a key limitation of the majority of empirical analyses of cross-sectional regional growth has been that the assumption of a single steady-state has to hold for all the regional economies in the sample, which is the case for absolute and conditional convergence hypotheses. The club convergence hypothesis, on the other hand, allows multiple and local stable steady-state equilibriums only. The sigma-convergence approach has become popular following the work by Quah (1993) showing that the traditional negative relationship between economic growth and initial development level does not provide a unique answer in terms of convergence. According to the author, the relationship tends to be negative even if income differences have not decreased. Sigma-convergence (σ – convergence) pertains to the decline in the cross-sectional dispersion of per capita incomes over time.

Paas and Schlitte (2007) highlighted the theoretical background for the convergence/divergence process. According to neoclassical growth theory, the decrease of disparities in income levels is expected because of decreasing returns to capital. On the other hand, endogenous growth theory predicts stable or even increasing inequality due to increasing returns to scale. According to the endogenous growth theory, policy measures can have a long-term impact on the growth rate of an economy, while in the neoclassical model long-term growth can be established only by a change in the savings rate. In addition to mainstream theories, North (1990) shows that institutions are the stimulating systems of a society which can both promote and slow economic growth. Less developed regions can therefore grow and catch up with developed regions only if efficient institutions are developed.

2. *RECENT EMPRIRICAL STUDIES ON REGIONAL CONVERGENCE IN THE EUROPEAN UNION*

In addition to the theoretical research, convergence hypothesis has been broadly empirically tested in recent literature. Barro and Sala-i-Martin (1991), analyzing 73 European regions (since 1950) and 48 USA states (since 1880) found the existence of convergence in both samples. In the USA, over a long time period, less developed states tend to growth faster in per-capita terms in comparison to richer states even if other relevant variables are not considered constant. On the other hand, for the group of European countries, conditional convergence was found after controlling for factors of initial productivity and the rate of technological progress. In further research, Sala-i-Martin (1996) included Japanese prefectures and Canadian provinces and concluded that regions tend to converge at a speed of approximately two percent per year, which resulted in diminishing interregional dispersion of income over time. The convergence process in the USA has been subject of interest in Rey (1998) and Tsionas (2000). While Rey (1998) found strong patterns of global and local spatial autocorrelation, Tsionas (2000) concluded that regional income in USA has not converged over the sample period (1977-1996).

The remainder of the paper is mainly concerned with convergence studies in the EU. In the majority of studies there is agreement that regional income convergence has been recorded in Europe from the 1950s to the 1970s. After that period the convergence process is less obvious, although some studies found evidence of further convergence.

Neven and Gouyette (1994) analyzed the growth of European economies in the period 1975-1990 and pointed to the differences in convergence trends across sub-periods and across the subsets of regions. In the first half of the 1980s, they found a divergence pattern in Northern Europe, while after that period clear and strong convergence can be found. Regions in Southern Europe converged at the beginning of the period and stagnated thereafter.

Lopez-Bazo et al. (1997) found fast and continuous convergence in productivity for 129 EU regions in the period 1983-1992. On the other hand, they found no clear evidence of convergence in living standards measured by GDP per capita. According to the authors, the factors behind those results are trade liberalization and the need for firms to achieve common competitiveness standards. Firms which have not succeeded in that process have been forced to reduce costs by reducing the number of employees and eventually exit the market. Consequently, less developed regions have suffered from higher unemployment rates. The authors concluded that EU regional policy has a direct impact on labour productivity, but its effects on per capita GDP are less evident.

Boumont et al. (2002) using a sample of 138 European regions over the period 1980-1995 conclude that spatial dependence and spatial heterogeneity really matter in the estimation of beta convergence processes. They found that the convergence process varies across areas. The convergence process could not be identified for northern regions, while there is some evidence of convergence for southern regions. They also estimated a spatial spillover effect in the European regions and found this effect to be strongly significant, meaning that the growth rate in a certain region is positively affected by the average growth rate of neighboring regions.

Arbia, Basile and Piras (2005) found spatial autocorrelation through a regional interaction effect using a sample of 92 Italian provinces between 1951 and 2000, although the speed of convergence estimated by the spatial lag model is lower in comparison to the speed resulting from classical fixed-effect specification. Arbia and Piras (2005) conducted similar research on 125 regions of 10 European countries for the period 1980-1995 and concluded that taking into account the spatial dependence among the units resulted in slower convergence, but the beta coefficient is still significant and negative. Using micro-data for the Czech Republic, Hungary, Poland and Russia, Foster, Jesuit and Smeeding (2005) found that regional income inequality is increasing. Capital cities and major urban areas which are generally the most developed areas recorded higher growth of income, while poorer areas lagged behind.

Paas and Shclitte (2007), based on *beta*-convergence analysis during the period 1995-2002, concluded that the speed of regional income convergence processes in EU was relatively slow. According to their analyses the average speed of absolute convergence was higher for the EU15 than for the NMS. Using models with country dummies they found evidence for conditional convergence (models with country dummies) neither between the EU15 regions nor the NMS regions. At the same time, for the new member states conditional divergence can be found and regional disparities increased. These findings imply that despite an overall convergence in the EU (among countries), there was no convergence within individual countries.

Checherita, Nickel and Rother (2009) analyzed the convergence process and the role of fiscal transfers in EU for the period 1995-2005. They concluded that there has been a process of convergence across the European regions in terms of both per-capita output and income. Like Paas et al. (2007), they also concluded that convergence within each individual country is noticeably more limited, although it can be found in Italy. Disposable income across European regions converges during the analyzed period at a higher speed than primary income. At the same time, output per capita converged slower than primary income. As the main difference between GDP per capita and household primary income per capita is explained by the commuting flows of workers, the authors concluded that labour mobility appears to be particularly important for the process of income adjustment.

Melchior (2009) presented the results on within-country regional inequality in per capita income for 36 mainly European countries during 1995-2005. He found that there was a significant increase in regional inequality in 23 out of the 36 analyzed countries, while a reduction in inequality was present in only three countries. Similar to the above-mentioned research, inequality increased in all Central and Eastern Europe countries. On the other hand, no evident change was recorded for the group of old EU member states.

The process of regional economic developments in Croatia has been limited, with few pieces of research primarily focusing on related issues, such as unemployment, the formulation of regional policy or the role of public investments. Botrić (2003) tried to answer the question of whether regional differences in unemployment rates are region specific or under the influence of nation-wide shocks. The results imply that some of the regions are influenced by region-specific shocks. Those regions have developed their own trends, which might lead to persistent and even increasing unemployment rates, which, in turn, could be a significant problem for regions with already high unemployment.

Maleković, Puljiz and Tišma (2011) find that the NMS integration process inevitably brings new opportunities and challenges, both on local and regional levels. Besides opportunities for the funding of development projects, the authors outline other advantages in the context of increasing the speed of convergence. These benefits include the process of institution building, a more active approach in formulating national policy frameworks, and the creation of new cooperation.

Drezgić (2011) studied variations in regional growth rates in Croatia, attempting to identify the proportion of difference in growth which could be attributed to regional level capital accumulation. The results showed that the regional disparities in Croatia intensified in the period of increased government investment activity.

3. *ECONOMIC DISPARITIES IN THE EUROPEAN UNION, NEW MEMBER STATES AND CROATIA*

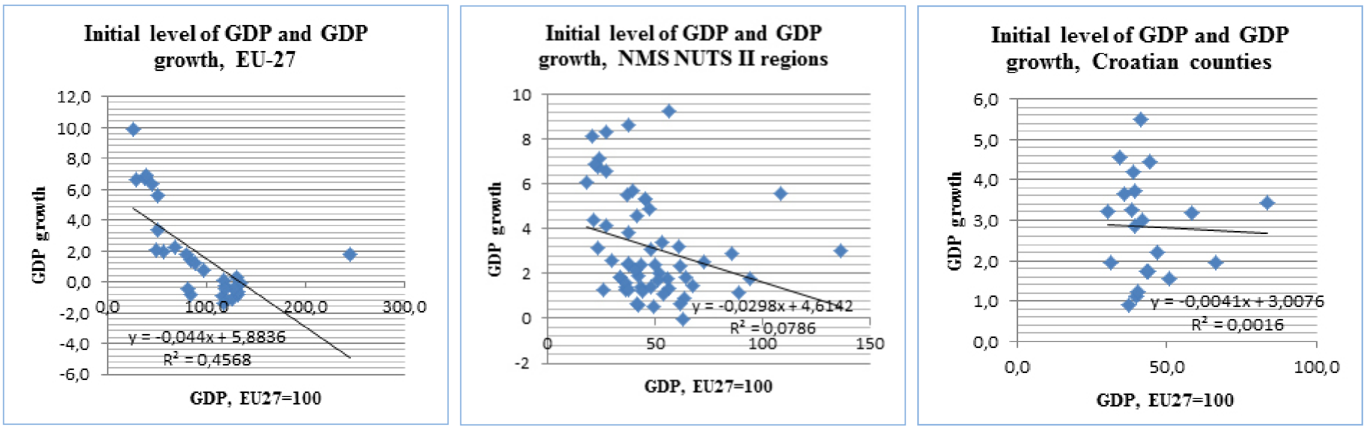
This chapter presents an overview of basic economic indicators for EU, the NMS NUTS II regions and Croatian counties. As can be seen, in base year (2000) GDP per capita[2] was highest in Luxembourg (244.9), followed by Netherlands (134.1), Denmark (131.5) and Austria (131.2). With a 49.6 GDP per capita, Croatia is in the group of less developed countries. It is obvious that Romania (26.0) and Bulgaria (28.4) have the lowest GDP per capita in the EU 27. The highest average annual growth of GDP per capita is registered in new member states - Romania (9.9), Lithuania (6.9), Latvia (6.7) and Bulgaria (6.6). On the other hand, in the period 2000-2008 the lowest average annual growth of GDP per capita (-1.4) was recorded in Italy. The average annual growth of GDP per capita in Croatia was 3.3%.

Figure 1 presents differences in the convergence process for EU countries, the NUTS II regions of new member states and Croatian counties. The data show a clear negative relation between initial development level and growth in the EU 27. While a weak relationship can be found for NMS regions, there is no relationship in the Croatian case.

Apart from initial GDP level, economic literature on convergence identifies other relevant variables in order to account for differences in development, such as economic structure, education and fixed capital. Those additional variables are presented in Tables 2-4.

[2] Expressed in PPS, EU 27=100.

Figure 1. Initial development level and growth, EU, new member states and Croatia



Source: Eurostat database and authors' calculations.

Table 2. Initial level of GDP, average annual growth rate and structural features of economic development

	GDP, p.c. EU27=100, 2000.	Average annual growth of GDP, p.c., 2000-2008	Services, as % of GVA	Agriculture, as % of GVA	Industry, as % of GVA	Investment, as % of GDP	Pupils and Students in all levels of education (ISCED* 0-6) - as % of total population at regional level
Belgium	126.0	-1.1	74.2	1.0	24.8	20.6	26.7
Bulgaria	28.4	6.6	61.4	10.0	28.6	23.0	17.7
Czech Republic	68.4	2.2	59.2	3.1	37.7	27.0	20.7
Denmark	131.5	-0.8	72.5	1.9	25.7	20.2	25.6
Germany	118.4	-0.3	69.4	1.0	29.6	18.6	20.0
Estonia	45.1	6.3	67.5	3.8	28.7	30.8	22.9
Ireland	130.4	0.3	60.8	2.0	37.1	23.9	24.0
Greece	84.0	1.4	75.6	4.9	19.4	22.4	19.2
Spain	97.3	0.8	67.3	3.5	29.2	28.1	20.5
France	115.2	-0.9	76.3	2.4	21.2	19.4	23.2
Italy	116.7	-1.4	70.1	2.4	27.5	20.9	18.7
Cyprus	88.7	1.2	77.9	3.0	19.1	19.4	21.4
Latvia	36.7	6.7	73.3	4.0	22.6	28.2	22.0
Lithuania	39.3	6.9	63.5	4.9	31.6	22.8	24.5
Luxembourg	244.9	1.8	82.4	0.5	17.1	21.2	19.6
Hungary	55.8	1.9	65.3	4.5	30.1	22.7	19.6
Malta	83.5	-0.9	73.8	2.6	23.6	20.1	20.1
Netherlands	134.1	-0.1	73.3	2.2	24.5	20.0	23.0
Austria	131.2	-0.7	68.3	1.8	29.9	22.3	20.4
Poland	48.2	2.1	65.6	4.5	29.9	20.1	23.7
Portugal	81.0	-0.5	71.0	3.0	26.0	24.1	22.4
Romania	26.0	9.9	53.3	11.0	35.8	23.9	21.2
Slovenia	79.7	1.8	62.5	2.8	34.7	25.8	21.5
Slovakia	50.1	5.6	59.2	4.3	36.6	26.0	22.3
Finland	117.0	0.1	63.7	3.0	33.3	20.0	26.4
Sweden	127.5	-0.4	70.2	1.8	28.0	18.1	26.1
United Kingdom	118.9	-0.4	74.9	0.8	24.2	16.9	22.5
Croatia	**49.6**	**3.3**	**65.0**	**6.9**	**28.1**	**23.8**	**18.4**

Source: Eurostat database (downloaded in 2012).
*ISCED - International Standard Classification of Education (ISCED) of the UNESCO.

Table 3. Initial level of GDP, average annual growth rate and structural features of economic development, Croatian counties*

County of Croatia	GDP, p.c. EU27=100, 2000.	Average annual growth of GDP, p.c., 2000-2008	Services, as % of GVA	Agriculture, as % of GVA	Industry, as % of GVA	Investment, as % of GDP	Pupils and Students in all levels of education (ISCED** 0-6) - as % of total population at regional level
County of Zagreb	36.0	3.7	66.9	6.3	26.8	16.6	20.3
Krapina-Zagorje	40.0	1.1	51.3	8.3	40.4	22.3	20.3
Sisak-Moslavina	43.7	1.7	46.6	9.6	43.8	17.8	16.5
Karlovac	43.6	1.7	57.8	7.5	34.7	20.9	20.3
Varaždin	46.8	2.2	52.8	11.2	36.0	20.1	20.3
Koprivnica-Križevci	50.9	1.6	41.7	20.4	37.9	16.1	20.3
Bjelovar-Bilogora	39.3	2.8	51.0	25.5	23.5	12.6	16.5
Primorje-Gorski kotar	58.4	3.2	67.0	1.5	31.5	25.9	17.8
Lika-Senj	41.6	5.5	56.3	11.0	32.7	76.7	17.8
Virovitica-Podravina	40.2	1.2	46.3	27.1	26.6	11.2	16.5
Požega-Slavonia	37.3	0.9	53.3	20.2	26.5	16.7	16.5
Slavonski Brod-Posavina	31.4	1.9	54.6	15.7	29.7	16.7	16.5
Zadar	38.8	4.2	71.4	6.4	22.2	28.5	17.8
Osijek-Baranja	39.2	3.7	55.8	15.6	28.6	20.9	16.5
Šibenik-Knin	34.1	4.5	71.9	4.3	23.8	23.5	17.8
Vukovar-Sirmium	30.5	3.2	53.9	21.7	24.4	24.9	16.5
Split-Dalmatia	38.6	3.3	69.4	2.7	27.9	26.5	17.8
Istria	66.7	2.0	64.0	3.2	32.8	23.7	17.8
Dubrovnik-Neretva	44.4	4.5	72.7	5.1	22.2	21.3	17.8
Međimurje	41.9	3.0	45.1	13.0	41.9	16.2	20.3
City of Zagreb	83.5	3.4	76.6	0.2	23.2	26.9	20.3

Source: Eurostat database (downloaded in 2012).
*Data on pupils and students are available only for NUTS II region.
**ISCED - International Standard Classification of Education (ISCED) of the UNESCO.

Table 3 presents the main economic indicators and structural features of the economic development of Croatian counties. The GDP per capita in base year (2000) of all Croatian counties is below the EU 27 average and significant dispersion of development can be noticed.

Table 4 shows indicators of regional differences in new member states and Croatia. For each of the selected countries the indicators for the most and the least developed county (minimum, maximum) are given, where EU27=100. The highest ratio between the minimum and maximum (ratio max/min) developed region in 2008 is registered in Romania (3.9). On the other hand, Slovenia (1.4) and Croatia (1.7) had the lowest max/min ratio. The highest difference of the max/min ratio for the period 2000 – 2008 was recorded in Bulgaria and Romania (0.8), indicating a significant growth in economic inequalities.

The data on standard deviation show that regional differences between counties were increasing in all countries for the period 2000–2008. The difference between standard deviation in 2008 and the base year were the highest in Slovakia (20.6), Romania (14.5) and Bulgaria (11.1). By contrast, Poland (2.5) recorded relatively slow growth of inequalities during this period.

Apart from Poland and Slovenia, Croatia recorded the smallest change in max/min ratio and standard deviation for the period 2000-2008, indicating a very slow process of within-country convergence despite different general public perceptions. A list of all regions at the NUTSII level can be found in the Appendix, Table A.

Table 4. Indicators of regional differences in economic development, NMS and Croatia

	2000	2001	2002	2003	2004	2005	2006	2007	2008	Difference 2008 -2000
Bulgaria										
Minimum	21.5	22.8	23.5	25.6	26.6	27.5	26.2	26.7	28.2	6.6
Maximum	37.5	41.2	45.5	48.6	50.9	54.3	59.8	66.4	72.4	34.9
Ratio max/min	1.7	1.8	1.9	1.9	1.9	2.0	2.3	2.5	2.6	0.8
Standard deviation	5.7	6.5	7.8	8.6	9.4	10.3	12.6	15.1	16.8	11.1
Czech R.										
Minimum	53.4	54.6	54.0	56.7	59.4	59.2	59.7	61.4	62.2	8.9
Maximum	136.5	145.0	147.4	153.7	154.2	158.4	161.6	171.1	172.6	36.1
Ratio max/min	2.6	2.7	2.7	2.7	2.6	2.7	2.7	2.8	2.8	0.2
Standard deviation	27.5	30.2	31.1	32.4	31.9	33.2	34.2	36.9	37.2	9.7
Hungary										
Minimum	36.0	37.9	39.2	40.6	41.4	40.0	39.7	38.9	39.7	3.7
Maximum	85.6	93.5	100.7	100.1	101.4	103.2	105.1	103.6	107.0	21.4
Ratio max/min	2.4	2.5	2.6	2.5	2.4	2.6	2.6	2.7	2.7	0.3
Standard deviation	18.1	19.8	21.9	21.5	21.8	22.6	23.7	23.3	24.1	5.9
Poland										
Minimum	33.6	33.4	33.8	34.5	35.0	35.0	35.0	36.8	38.8	5.2
Maximum	72.8	74.3	74.5	75.9	77.0	81.3	82.8	87.2	88.7	15.9
Ratio max/min	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.4	2.3	0.1
Standard deviation	9.6	10.0	9.9	10.1	10.3	11.2	11.6	12.2	12.1	2.5
Romania										
Minimum	18.1	20.4	21.3	22.5	23.5	23.3	24.7	26.6	28.8	10.7
Maximum	56.4	57.3	59.1	62.6	68.1	76.8	83.7	91.9	113.1	56.7
Ratio max/min	3.1	2.8	2.8	2.8	2.9	3.3	3.4	3.5	3.9	0.8
Standard deviation	12.1	11.7	12.1	12.8	13.9	16.9	18.5	20.6	26.6	14.5
Slovenia										
Minimum	67.2	66.5	68.7	68.7	71.5	72.6	72.3	73.0	75.6	8.3
Maximum	94.4	95.0	98.1	100.6	103.6	104.9	105.4	106.6	108.9	14.4
Ratio max/min	1.4	1.4	1.4	1.5	1.4	1.4	1.5	1.5	1.4	0.0
Standard deviation	19.2	20.1	20.8	22.5	22.7	22.9	23.5	23.8	23.5	4.3
Slovakia										
Minimum	37.7	40.1	41.0	41.3	42.0	43.0	43.8	46.4	50.8	13.2
Maximum	108.7	115.4	122.2	124.6	128.8	146.5	147.7	160.9	166.9	58.1
Ratio max/min	2.9	2.9	3.0	3.0	3.1	3.4	3.4	3.5	3.3	0.4
Standard deviation	33.5	35.8	38.6	39.4	40.9	49.2	48.6	53.3	54.1	20.6
Croatia										
Minimum	37.8	38.6	39.9	39.7	40.1	40.0	40.8	42.1	45.8	7.9
Maximum	60.9	62.5	65.2	68.0	69.2	71.7	73.0	76.1	78.2	17.3
Ratio max/min	1.6	1.6	1.6	1.7	1.7	1.8	1.8	1.8	1.7	0.1
Standard deviation	11.5	12.0	12.8	14.1	14.5	15.9	16.1	17.0	16.2	4.7

Source: Eurostat database (downloaded in 2012).

4. MODEL FOR TESTING CONVERGENCE HYPOTHESIS IN THE EUROPEAN UNION, NEW MEMBER STATES AND CROATIA

In this chapter various models for testing hypotheses on convergence are presented. A concept of convergence is derived from the neoclassical model according to which the rate of growth of an economy is inversely correlated with its initial level of development (absolute β-convergence). As a tool for testing a hypothesis on absolute β-convergence we used the following model:

$$ln\frac{Yi2008}{Yi2000} = \alpha + \beta \ln Yi2000 + \ \varepsilon i$$

where:

Yi2008 – GDP *per capita* in EURO PPS in region i in 2008,

Yi2000 – GDP *per capita* in EURO PPS in region i in 2000 (initial period),

α - constant to be estimated in model,

β - parameter to be estimated in model,

i - denotes regions covered in the model (in the model covering the EU, i goes from 1 to 28, in the NMS model i goes from 1 to 59, while in the case of Croatia i goes from 1 to 21)

ε - error term.

The main aim of this research is to test for signs of regional convergence in Croatia and to compare the results of the same model applied to EU member states and the EU NUTS II regions. However, the choice of the applied method primarily related to the availability of data. In the Croatian case, some socioeconomic variables are not available on an annual basis and harmonization according to Eurostat concepts has been completed only for certain years. Therefore, a simple cross-section OLS model is applied instead of a panel data model which could provide a better description of the convergence pattern. Selection of the initial year is also based on a data availability issue, as regional GDP data for Croatia was published in the year 2000 for the first time. A data set for longer periods, covering the pre-transition years and the first years of the transition process would have been more convenient for detailed research on regional growth patterns and identification of the role of the most significant socioeconomic variables, but unfortunately the data is not yet available in Croatia.

Recent literature suggests that spatial econometric techniques which are able to capture the influence of neighbouring regions on growth are more appropriate to determine the speed and intensity of the convergence process, in comparison to the traditional β-convergence approach. In this research, instead of a spatial econometric model a more traditional approach is applied primarily because of the lack of comparable data.

Croatian counties are extremely different regarding their size, and due to geographical shape there is significant diversity in a number of neighbouring counties. In addition, the majority of Croatian counties have an international border with Bosnia and Herzegovina or Serbia which have no comparable NUTS II regions. The study of spatial dependence and common exogenous factors are therefore left for further research.

In order to determine whether there is evidence of absolute β-convergence, three equations are estimated, each comprising a different unit sample. In the first equation, the model is tested on the national level for a group of EU countries including Croatia which joined the EU in 2013. The second equation comprises the NUTS 2 regions of new member states (NMS) and Croatia, while the third equation is comprised of Croatian counties (NUTS III level). As can be seen from Table 5, strong evidence for absolute *β*-convergence can be found on the national level for EU countries. The estimated parameter for β-convergence is significant and has an expected sign. Some additional diagnostic tests are also presented in the tables. However, one should bear in mind that some of the estimated models have a small size, which could influence their reliability.

Two additional indicators for convergence speed are presented in the table. Both are derived from the estimate of parameter β and could be found in various papers on convergence. The speed of convergence measures how fast economies converge towards the steady state and can be calculated from the following formula:

$$s = -\ln(1+ \beta\ ) / T$$

in which T stands for the number of periods for which we have data for per capita GDP growth rates (as a period from 2000 to 2008 is analysed, T=8).

The half-life period is defined as the time necessary for the economies to cover half of the initial lag from their steady states and can be calculated from the following formula:

$$\tau = -\ln(2) / \ln(1+ \beta /T).$$

As can be seen from Table 5, the convergence process on the national economy level is relatively strong in the EU, and despite significant initial differences in development we can expect a strong convergence process as in the period under analysis half of the initial lag will be covered in less than 20 years. Of course, the recent economic recession would probably change the conclusions to an extent based on data for 2000-2008 since the issues of vulnerability of certain regions in period of crises have not been accounted for.

The econometric properties of the convergence equation comprising new member states of the NUTS 2 regions are not as good in comparison to the equation relating to national economies, although the parameter for β-convergence is still highly significant. The speed of convergence at the regional level is approximately half that at the national level. On the other hand, no evidence on regional convergence (on the county level) can be found in Croatia. The estimated parameters are absolutely insignificant and the estimated equation has a very low ability to explain regional development differences in Croatia.

Table 5. Results for testing absolute β-convergence hypothesis

	EU+Croatia	NMS NUTS 2 regions	Croatia
	$ln\frac{Yi2008}{Yi2000} = \alpha + \beta \ln Yi2000 + \ YjXji + \varepsilon i$		
Constant (α)	3.3377*** *(9.2430)*	0.873*** *(-4.462)*	0.271 *(-0.843)*
Initial level of GDP (β)	-0.3058*** *(-6.410556)*	-0.166** *(-3.2233)*	-0.016 *(-0.189)*
R2	0.756	0.154	0.002
Prob (F-stat)	0.0000	0.0021	0.8520
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	2.416	0.035	0.77
Obs*R-squared	2.381	0.036	0.82
Number of units	28	59	21
Speed of the convergence	0.0456	0.0227	0.0020
Half-life period	17.8	33.0	346.2

t-statistics are in parentheses under the estimated coefficients.
Significance levels: ***p<0.001. **p<0.01 and * p<0.1.
Source: authors' calculations (eviews software is used) based on data from Eurostat (downloaded in 2012).

Tables 6 and 7 present results for testing the conditional β-convergence hypothesis. According to that hypothesis if other factors which determine economic growth differ among economies, then each particular economy will approach its own but unique equilibrium. The evidence should suggest the existence of conditional convergence if the negative relationship between initial per capita incomes and their growth rates holds only after the possibility of the above-mentioned structural characteristics has been controlled for. According to available data, as control variables in the paper we used data on regional structure of gross value added (GVA) share of fixed capital formation (investment) in GDP and share of pupils and students in overall population (education).

$$ln\frac{Yi2008}{Yi2000} = \alpha + \beta \ln Yi2000 + \ YjXji + \varepsilon i$$

In addition to the symbols defined above, Xj stands for additional development factors (education, investment, share of agriculture in GVA, share of industry in GVA and share of services in GVA) and are parameters to be estimated for each of the relevant factors.

The results for the beta-convergence parameter after investment and education are included as control variables and presented in Table 6. As can be seen from the equation comprising EU countries, education as a control variable is not a significant factor in explaining differences in economic development, while share of investment has a limited impact on speed of the convergence. Although fixed capital and human capital are important factors in all growth models, other benefits of EU accession (free movement of goods and capital, availability of structural funds) dominated over traditional factors in the period under analysis.

Table 6. Results for testing conditional β-convergence hypothesis (control variables for investment and education)

	EU28			NMS NUTS 2 regions + Croatia			Croatia		
	$ln\frac{Yi2008}{Yi2000} = \alpha + \beta \ln Yi2000 + \ YjXji + \varepsilon i$								
Constant (*α*)	2.65*** *(5.059)*	3.349*** *(8.756)*	2.664*** *(5.386)*	0.548** *(2.901)*	0.721*** *(3.684)*	0.696*** *(3.630)*	0.256 *(0.790)*	0.286 *(0.817)*	0.296 *(0.844)*
Initial level of GDP (β)	-0.266*** *(-6.230)*	-0.305*** *(-7.778)*	-0.266*** *(-6.411)*	-0.267*** *(-5.133)*	-0.228*** *(2.598)*	-0.207*** *(-4.149)*	-0.0273 *(-0.309)*	-0.011 *(-0.120)*	-0.029 *(-0.367)*
Education	0.001 *(0.098)*	-0.001 *(-0.106)*		0.018** *(2.749)*	0.018* *(2.598)*		-0.0006 *(-0.049)*	-0.0017 (-0.1262)	
Investment	0.013* *(1.857)*		0.013* *(1.896)*	0.0146** *(3.195)*		0.015** *(3.068)*	-0.0030* *(2.016)*		0.0029* *(2.078)*
R2	0.755	0.755	0.720	0.363	0.245	0.276	0.195	0.002	0.195
Prob (F-stat)	0.000	0.000	0.000	0.000	0.000	0.000	0.285	0.975	0.142
Heteroskedasticity Test: Breusch-Pagan-Godfrey									
F-statistics	1.566	2.24	1.336	1.26	3.32	0.44	0.298	0.48	0.44
Obs*R	4.58	4.26	5.089	3.80	5.82	0.95	1.05	1.06	0.98
Number of units	28	28	28	59	59	59	21	21	21
Speed of the convergence	0.0387	0.0455	0.0386	0.0388	0.0232	0.0290	0.0035	0.0014	0.0037
Half-life period	20.5	17.8	20.5	20.4	32.3	26.4	202.6.6	484.3	190.6

t-statistics are in parentheses under the estimated coefficients.
Significance levels: ***p<0.001. **p<0.01 and * p<0.1.
Source: authors' calculations (eviews software is used) based on data from Eurostat (downloaded in 2012).

On the other hand, education and investment activity have significance in explaining development differences in the NUTS 2 regions of new member states. Speed of convergence after controlling for those variables is approximately the same as in the analyses on the national economy level, meaning that NMS regions with a higher proportion of educated population and higher attractiveness for investors benefited more from EU accession. The model for Croatia has low explanatory power for development differences even after accounting for education and investment as additional variables, although the investment parameter is significant and is expectedly positive. On average, Croatian counties with stronger investment activity recorded higher economic growth.

The results for testing the impact of structural features on the convergence process are presented in Table 7. In the model for EU countries, economic structure has low impact on growth and the inclusion of control variables do not significantly change conclusions on the convergence process. The same holds for the NUTS 2 regions of new member states. On the other hand, the economic structure of Croatian regions is significant in explaining growth differences. Croatian counties specialized in the service sector recorded higher growth rates, while regions with a higher share of agriculture recorded slower growth. Counties with a higher share of industry also recorded lower growth rates, which is probably a consequence of the slow process of industry sector restructuring in Croatia.

Table 7. Results for testing conditional β-convergence hypothesis (economic structure used as control variables)

	EU+Croatia			NMS NUTS 2 regions+Croatia			Croatia		
	$ln\frac{Yi2008}{Yi2000} = \alpha + \beta \ln Yi2000 + \Upsilon jXji + \varepsilon i$								
Constant (*α*)	2.840*** *(3.826)*	3.330*** *(7.426)*	3.335*** *(9.059)*	1.333*** *(3.546)*	0.939*** *(4.074)*	0.818*** *(4.037)*	0.706** *(2.106)*	0.380 *(1.331)*	0.176 *(0.748)*
Initial level of GDP (β)	-0.259** *(-3.529)*	-0.305*** *(-7.465)*	-0.300*** *(-6.218)*	-0.268** *(-3.057)*	-0.170** *(-3.246)*	-0.200** *(-3.299)*	-0.113 *(-1.325)*	0.011 *(0.147)*	-0.089 *(-1.372)*
Agriculture	0.012 *(0.770)*			-0.011 *(-1.428)*			-0.006** *(-2.472)*		
Industry		0.000 *(0.028)*			-0.002 *(-0.550)*			-0.007* *(-2.579)*	
Services			-0.001 *(-0.213)*			0.003 *(1.055)*			0.006*** *(4.220)*
R2	0.726	0.720	0.720	0.184	0.159	0.276	0.255	0.271	0.498
Prob (F-stat)	0.000	0.000	0.000	0.003	0.008	0.000	0.071	0.058	0.002
Heteroskedasticity Test: Breusch-Pagan-Godfrey									
F-statistics	3.078	3.01	2.096	0.73	0.82	1.31	0.27	0.59	1.35
Obs*R	5.53	5.44	4.02	1.51	1.68	2.63	0.67	1.28	2.73
Number of units	28	28	28	59	59	59	21	21	21
Speed of the convergence	0.037	0.046	0.045	0.039	0.023	0.028	0.015	-0.001	0.012
Half-life period	21.1	17.8	18.1	20.4	32.3	27.4	48.7	-499.2	62.3

t-statistics are in parentheses under the estimated coefficients.
Significance levels: ***p<0.001. **p<0.01 and * p<0.1.
Source: authors' calculations (eviews software is used) based on data from Eurostat (downloaded in 2012).

5. CONCLUSION

Based on evidence of significant disparities in regional development, the EU introduced a set of policy measures to promote the integration and convergence of less developed areas of the Member States. Consequently, according to GDP per capita data at the national level, overall disparities in the EU have recently diminished. On the other hand, an increasing dispersion in economic development can be found among the regions of individual new member states.

According to the absolute convergence hypothesis, the per capita incomes of countries or regions converge with one another in the long-term regardless of other initial conditions. In conditional convergence models, there is a negative relation between initial development and growth, but the impact of other factors could produce a different steady-state for different regions. Most recent empirical researches confirm the convergence hypothesis at the overall EU level, but in most cases regional convergence within individual countries could not be found. Capital cities and major urban areas, which are generally the most developed areas, recorded higher growth of income, while less developed areas are lagging behind.

According to our model, absolute β-convergence can be found on the national level for EU countries, which is in line with previous studies. Convergence also can be found for NMS regions, but convergence speed on the regional level is lower in comparison to the national level and the estimated β-convergence parameter is less significant. No evidence on regional convergence (on the county level) can be found in Croatia, and disparities have been highly persistent throughout the period of 2000-2008. More precisely, aside from Latvia and Portugal, Croatia recorded the smallest change in regional dispersion between 2000-2008 (1.5) when compared to NMS.

At the national level, education as an additional variable is not significant in explaining differences in economic development, as well as variables reflecting economic structure, while share of investment has limited impact on the speed of convergence. Obviously, in the first years of EU membership the benefits from free movement of goods, significant capital inflow and the availability of structural funds dominated over traditional factors like availability of human and fixed capital.

Contrary to previous conclusions on the national level, education and share of investment in GDP are significant in explaining differences in development for the NUTS 2 regions of new member states. This means that NMS regions with a more highly educated population and higher attractiveness for investors benefited more from EU accession in comparison to the regions with less educated populations and lower investment levels. In order to reduce the development gap, national governments should introduce various programs for improving education and the promotion of investment in less developed regions. Models for testing the conditional convergence for Croatia have low explicatory power for development differences and we can conclude that in the case of Croatia, a regional convergence process is absent. The most developed counties in Croatia at the same time have a higher proportion of GVA in industries with high growth potential. As such, the availability of structural funds should be primarily used for improvement in overall regional investment attractiveness, which could promote the economic restructuring of less developed regions.

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APPENDIX

Table A: Initial level of GDP, average annual growth rate and structural features of economic development, NUTS II regions of new member states and Croatia

NUTS II region	GDP, p.c. EU27=100, 2000.	Average annual growth of GDP, p.c., 2000-2008	Services, as % of GVA	Agriculture, as % of GVA	Industry, as % of GVA	Investment, as % of GDP	Pupils and Students in all levels of education (ISCED 0-6) - as % of total population at regional level
Severozapaden	25.6	1.3	52.9	17.6	29.5	0.0	14.4
Severen tsentralen	23.5	3.1	55.5	16.1	28.4	0.0	18.2
Severoiztochen	27.2	4.1	61.5	12.5	26.0	0.0	19.4
Yugoiztochen	29.6	2.6	51.2	11.5	37.3	0.0	16.2
Yugozapaden	37.5	8.6	70.4	3.6	26.1	0.0	19.4
Yuzhen tsentralen	21.5	4.4	55.7	14.6	29.6	0.0	16.9
Praha	136.5	3.0	81.6	0.2	18.2	29.7	28.7
Stredni Cechy	64.4	1.8	51.6	3.8	44.5	26.7	14.7
Jihozápad	63.5	0.9	52.7	5.4	41.9	27.0	19.6
Severozápad	56.1	1.3	50.7	2.2	47.1	25.7	18.5
Severovýchod	61.5	0.6	51.3	4.2	44.6	22.9	19.3
Jihovýchod	61.3	2.3	55.2	5.3	39.4	25.7	22.6
Stredni Morava	55.9	1.8	51.5	4.5	44.1	24.9	20.1
Moravskoslezsko	53.4	3.4	50.5	2.2	47.3	24.1	21.5
Eesti	45.1	5.3	67.5	3.8	28.7	30.6	22.9
Cyprus	88.7	1.2	77.9	3.0	19.1	10.3	21.4
Estonia	45.1	5.3	67.5	3.8	28.7	30.6	22.9
Latvia	36.7	5.5	73.3	4.0	22.6	27.7	22.0
Lithuania	39.3	5.7	63.5	4.9	31.6	22.4	24.5
Közép-Magyarország	85.6	2.9	76.2	0.9	22.9	17.6	22.7
Közép-Dunántúl	53.5	1.1	48.7	4.9	46.4	24.5	20.0
Nyugat-Dunántúl	63.2	0.0	51.2	5.3	43.6	21.7	19.8
Dél-Dunántúl	42.2	0.6	63.0	9.4	27.6	22.2	22.0
Észak-Magyarország	36.0	1.3	56.3	5.3	38.5	23.1	22.0
Észak-Alföld	36.1	1.4	60.4	9.2	30.4	23.1	23.3
Dél-Alföld	41.1	0.6	60.4	11.8	27.8	20.3	21.4
Lódzkie	43.4	2.4	62.6	6.1	31.4	18.9	23.0
Mazowieckie	72.8	2.5	74.0	3.9	22.1	23.6	26.0
Malopolskie	41.9	1.9	67.1	2.9	29.9	20.8	25.8
Slaskie	51.9	2.0	59.9	1.3	38.8	16.9	21.5
Lubelskie	33.7	1.9	67.6	7.8	24.5	16.5	23.9
Podkarpackie	33.6	1.8	63.7	3.4	32.9	18.9	23.1
Swietokrzyskie	37.4	2.4	62.3	6.6	31.1	17.4	22.9
Podlaskie	36.3	1.6	65.3	10.5	24.3	19.0	23.6
Wielkopolskie	51.3	1.7	59.9	7.4	32.7	20.8	25.3
Zachodniopomorskie	49.1	0.5	70.5	4.7	24.9	18.1	22.8
Lubuskie	43.4	1.4	63.8	4.5	31.6	19.5	21.5
Dolnoslaskie	50.1	2.4	62.4	2.8	34.8	21.2	23.1
Opolskie	40.7	2.1	59.8	5.6	34.6	17.2	21.1
Kujawsko-Pomorskie	44.1	1.2	63.1	6.6	30.2	16.7	23.1
Warminsko-Mazurskie	37.7	1.3	64.0	8.7	27.3	18.7	23.6
Pomorskie	47.9	1.4	67.1	3.0	29.9	20.0	23.7
Nord-Vest	24.0	7.1	52.3	13.2	34.6	18.9	21.4
Centru	26.9	6.6	47.8	11.6	40.6	20.5	20.8
Nord-Est	18.1	6.1	50.7	16.5	32.8	15.8	20.6
Sud-Est	23.2	6.8	49.3	14.2	36.4	22.4	18.3
Sud - Muntenia	20.9	8.2	44.4	14.6	41.1	19.4	17.1
Bucuresti - Ilfov	56.4	9.3	69.7	0.7	29.6	35.6	33.3
Sud-Vest Oltenia	21.6	6.9	45.1	14.1	40.8	18.1	19.5
Vest	26.8	8.3	51.1	12.4	36.4	20.2	21.2
Vzhodna Slovenija	67.2	1.5	53.4	4.3	42.3	25.3	18.3
Zahodna Slovenija	94.4	1.8	69.8	1.5	28.6	25.3	25.2
Bratislavský kraj	108.7	5.6	75.0	1.0	24.0	24.5	29.2
Západné Slovensko	47.4	4.9	47.7	5.7	46.6	25.9	20.0
Stredné Slovensko	41.3	4.6	57.4	5.4	37.2	27.6	21.9
Východné Slovensko	37.7	3.9	59.5	4.9	35.6	27.3	22.6
Sjeverozapadna Hrvatska	60.9	3.2	66.4	4.3	29.3	23.8	20.3
Sredisnja i Istocna (Panonska) Hrvatska	37.8	2.4	56.5	16.4	27.1	23.4	16.5
Jadranska Hrvatska	47.8	3.1	68.7	4.1	27.2	28.7	17.8

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POST-CRISIS POTENTIAL OUTPUT IN THE WESTERN BALKANS

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Abstract

Spurred by the recent global economic crisis, there has been a resurgence of research on output gaps. As the crisis caused a decline in potential GDP due to a strong contraction in demand, it is expected that the recovery of potential output will be especially difficult in demand-driven small open economies, such as the Western Balkan countries, where recovery will strongly depend on global international trade recovery. The purpose of this research is to calculate and compare pre and post-crisis potential GDPs and GDP gaps for the Western Balkan countries. The symmetric filter method developed by Hodrick and Prescott is used to de-trend GDP time series data by decomposing it into growth and cyclical components. The results point to a strong decrease in potential output growth compared to the pre-crisis potential output growth of the Western Balkans.

Keywords: *Potential output, Output gap, Crisis, Western Balkans, HP filter*

JEL classification: E32

1. INTRODUCTION

Output gap measures the difference between potential and actual output. Potential output of a country is a macroeconomic indicator measuring the equilibrium level of output related to long term aggregate supply and the ultimate level of gross domestic product (GDP) under the assumption of no transitory shocks and no price and wage rigidities. Consequently, the importance of proper approximation of the potential output cannot be overestimated, since it gauges the level of the maximum sustainable economic growth of a country and is used to cyclically adjust monetary and fiscal indicators to examine levels that would occur in the absence of inflationary expansion and recession.

Most structural macroeconomic models used for forecasting and policy analyses require an estimate of potential output. In these models, the gap between actual and potential output is a key variable determining the evolution of prices and wages. A level of real GDP above potential will often be seen as a source of inflationary pressures and a signal that the monetary authorities should tighten their policy, and vice versa. The output gap then corresponds to the transitory component of output.

Potential output can also be a useful indicator for policymakers in adopting appropriate measures in response to a crisis. Knowledge of the cyclical position - based on estimates of potential output and the position of GDP in relation to its potential - is a key element in monetary and fiscal frameworks. First, the level of GDP relative to its potential has implications for inflationary pressures in the economy. Second, the size and sign of the output gap provides a good indicator of an economy's cyclical position, which is

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an important element in the estimation of the structural fiscal balance. Potential output estimates may also point to the necessary overall direction for general macroeconomic policy, with large gaps implying that existing production factors are not utilized well and exhausted gaps implying that the economy may need more fundamental structural change (IMF 2009).

Having in mind the current recession-riddled global economic environment, examination of potential output levels and their changes in comparison to the pre-crisis levels is particularly timely and insightful. Empirical research shows that recessions associated with financial turmoil significantly reduce potential output, and in addition, it is expected that developing (non-advanced) countries in Europe will see a particularly strong reduction in potential output due to capital inflow reduction, the additional volatility in risk premium negatively affecting investment, as well as due to labor market mismatches and over-heated pre-crisis growth arising, for example, from real estate and construction booms (IMF 2009a).

According to IMF (2011b) research on the impact of the global crisis on South-Eastern Europe, "the crisis exerted a significant and, in some key respects, lasting impact on these countries". The study finds that the SEE region experienced macroeconomic adjustments that could be grouped in three main categories: (i) current account correction, (ii) more difficult financing and credit conditions, and (iii) deterioration in public finances. On top of these macroeconomic turbulences, the crisis stripped down domestic weakness and exposed problems with the countries' growth model. Growth potential has been held down by delays in advancing structural reforms needed to address sizable external imbalances (EBRD 2009, pg.56).

In terms of possible policy implications, it is clear that the crisis hit the Western Balkans at a time when the countries' growth model - which relied on strong capital inflows, rapid credit expansion, and consumption-based domestic demand – had already been put into question. In the pre-crisis period, the region benefited from this model having higher real and potential output growth rates, which have now been halved. With rising external imbalances, domestic weaknesses have been revealed and restoring pre-crisis growth rates now depends on new growth engines (Daviddi, Carsimamovic Vukotic, and Smirnov 2012), which in turn rely on on implementing "good" policies promptly. This requires adoption of appropriate macroeconomic and structural policies. Sound macroeconomic policies can contribute to the stability of the economy and provide a framework for a recovery to take place. Although structural reforms are country-specific, measures aimed at improving the business environment, educating, restructuring and enhancing labor supply, reforming product markets, and stimulating research and development all need to be considered. In other words, human capital and total factor productivity gains will play a major role in the growth potentials of the WB countries.

The purpose of this research is to calculate and compare pre-crisis and post-crisis potential GDPs and GDP gaps for the Western Balkan (WB) countries of Albania, Bosnia and Herzegovina (BiH), Croatia, Kosovo, Macedonia, Montenegro, and Serbia. The paper uses a symmetric filter method developed by Hodrick and Prescott (HP), which de-trends GDP time series data by decomposing it into growth and cyclical components. The paper is organized as follows: Section 2 defines potential output, gives a literature review in the field of measuring potential output, and provides an overview of approaches to estimating potential output. Section 3 provides a rationale for the application of the approach used in the paper and a description of its methodology – a statistical de-trending tool. Section 4 describes the data used in the research, as well as the results and explanations of the empirical research. Finally, Section 5 offers conclusions stemming from the research.

2. THEORETICAL FRAMEWORK AND LITERATURE REVIEW

2.1. What is Potential Output?

Despite the fact that the potential output concept is widely used by economists, there are different opinions as to how exactly potential output should be defined. In statistical terms, potential output is a trend output (Ladiray, Mazzi, and Sartori 2003). The theoretical view is that potential output is based on the supply side of the economy and, as such, is defined as the production level at the normal utilization of factors of production at the current state of technology (Castle 2003). Subsequently, the output gap – thought of as a consequence of demand shocks - would equal the transitory component of output (Campbell and Mankiw 1987). As the shock is absorbed by the economy, the economy should return towards its steady state. In other words, potential output can also be considered to be the steady state level of output associated with the long-run aggregate supply curve. Often, potential output is referred to as the *production capacity* of the economy (Jahan and Mahmud 2013).

In literal terms, the potential output would mean the maximum possible output of an economy if all of its resources were fully employed. One such extreme definition of potential output (Gibbs 1995) would be the output that is associated with a situation in which everyone of working age worked 24 hours per day, every day of the year. This concept broadly corresponds to what is also referred to in the literature as 'efficient output' (Fueki, Fukunaga, Ichiue and Shirota 2010), defined as the level of output in an environment without nominal rigidities in goods and labor markets and without shocks to price and wage markups (Mishkin 2007). Under this concept, the potential output moves closely with the actual output and is more volatile than conventional measures of potential output.

Alternatively, the term 'potential output' can be defined as some normal level of production given an 'average' factor utilization rate (Mazi 1997). In line with this approach, the potential output of an economy is defined as the maximum level of output obtainable without generating an increase in inflation. In this case, calculations of potential output are based either explicitly or implicitly on estimates of the natural rate of unemployment, i.e. 'the rate of unemployment which prevails when expectations of inflation are realized, and toward which the economy will tend to converge following a disturbance' (Friedman 1968).

Regardless of the theoretical differences in terms of the definition of potential output, both potential output and the corresponding output gap – defined as the difference between potential and actual output expressed as a share of potential output - are latent variables that cannot be observed directly (Kutner 1994, Parigi and Siviero 2001).

2.2. Review of the Research on Potential Output in the Western Balkans

In contrast to studies covering developed countries, there are relatively few empirical studies of the potential output in developing countries, due to issues with the availability and/or quality of data (De Masi 1997). Most of the available studies for developing countries deal with East-Asian countries, and are not conclusive in terms of the overall size of output gaps, regardless of the methodology used (HP filter and production function approaches are commonly used). Cerra and Saxena (2008) show that crises produce a significant and permanent loss in the level of output compared with the pre-crisis trend and that it is thus generally likely that developing countries' potential output has fallen in the current crisis.

The region of the Western Balkans includes transition countries for which studies are scarce, since calculation of potential output is further complicated due to the fact that the time series data is short spanned. Thus, for these countries, research is limited to first constructing medium- to long-term growth projections and then applying one of the calculation approaches (De Masi 1997).

Studies and papers calculating output gaps for the Western Balkan countries are mostly limited to calculations by international financial institutions, such as the International Monetary Fund and World Bank, performed as one of the indicators of the overall macroeconomic frameworks of these countries. The World Bank (2010) estimates that around 5.5% percentage points of potential output growth rates was lost in the Western Balkan countries in 2009 and 2010. There are no scholarly journal articles that look specifically at all of the Western Balkan countries and calculate and compare their potential outputs.

Given the fact that potential output cannot be observed directly, the question emerges of whether several years of strong growth should be interpreted as a new long run steady trend, or whether in fact it represented unsustainable growth. According to Darvas (2011), the 2008-2009 crisis has also altered the future growth prospects of the countries of Central and Eastern Europe, the Caucasus and Central Asia even in the optimistic case of a return to pre-crisis capital inflows and credit booms. This issue was in particular associated with emerging European economies, as catching up with the output levels of advanced economies has rarely been a steady process but often involved much variation (IMF 2009). With the EU's potential output expected to decline more than 1 percentage point from the pre-crisis period and euro zone potential growth halving from 1.3% to 0.7% (European Commission 2009b), risk for the potential growth of emerging economies that rely on Europe's capital inflows is more than apparent. Simulations performed by the IMF (2009a) suggested that the crisis could reduce medium-term growth between 0.6 to 2.5 percent and 0.4 to 2.2 percent for New Member States and other emerging economies, respectively. The IMF concluded that "while some of the developments affecting potential output are bound to correct themselves, others tie into long-standing European issues, such as high levels of employment protection and unrealized growth opportunities in the market for services, particularly in advanced economies (IMF 2009a)".

In 2013, within the European Economic Forecast for spring 2013, the European Commission included an explanation of whether the impact of the crisis on potential output estimated in 2009 (European Commission 2009b, referred above) is still valid (European Commission 2013). The forecast notes that the previous estimates were too optimistic in terms of the pace of the economic recovery. The new estimates show that the euro zone's potential output is expected to decline 1.3 percentage points (from 1.8% in 2003-2007 to 0.6% in 2009-2013) from the pre-crisis period (in comparison to the 2009 estimate of decline from 1.3% to 0.7%).

While there are several studies examining growth models and potential outputs and output gaps for a large group of countries, few include the Western Balkan countries (Darvas 2011, Becker et al 2010). Among the rare articles that include some of the Western Balkan countries is a 2011 paper by Turrini, Roeger, and Szekely. These authors analyze the growth potential of 56 advanced and emerging economies for the period of 1970-2008 (thus only backward looking data), including Albania, Croatia, Macedonia, and Serbia and Montenegro. They report the average GDP growth and the growth rate of potential output during periods with and without banking crises, and show that both in emerging and advanced economies, GDP growth during banking crises is almost half that during periods without financial distress and that potential output growth is also significantly lower (about 1% in emerging countries).

The most recent review of potential output for the group of countries which includes the Western Balkans is the IMF's 2013 calculation of potential output for Central, Eastern, and South-Eastern Europe (IMF 2013b). They find that potential output growth fell from 5.2% in 2003-2008 to 1.7 in 2008-2012 and 2.3 in 2013-2017 in these countries, which represents a fall larger than in other emerging markets (other emerging markets had lower pre-crisis potential growth than Central, Eastern, and South-Eastern Europe, with a fall from around 4.5% to 4%). It should be noted that these estimates by the IMF, due to data constraints, use varying methods for different countries (production function approach, structural VARs and statistical filtering techniques including the HP filter). Furthermore, out of the seven Western Balkan countries, potential output in this IMF report is estimated only for Croatia (showing a decrease in potential growth from 4.1% in 2003-2007 to

1.1% in 2013-2017) and Bosnia and Herzegovina (showing a decrease in potential growth from 3.9% in 2003-2007 to 2.2% in 2013-2017). While the periods covered in the analyses used by the IMF and in this paper (shown in Table 1 and in the discussion in the following sections of this paper) differ, the overall estimate of decline of potential growth is broadly comparable.

Given the scarcity of comparative studies of the potential output of the Western Balkan countries, this paper adds to the body of research by performing a calculation of the potential output and growth rates of the seven countries of the Western Balkans, thus enabling cross-country comparison and analyses of the average trends in the Western Balkans. Future research should be directed towards applying more sophisticated multivariate, growth accounting or DSGE methodologies for calculating potential outputs of the Western Balkan countries, given that the main limitation of this paper is the simplicity of the HP filter methodology being used.

2.3. How is Potential Output Estimated?

Since potential output (and thus the output gap as well) is an unobservable variable, and at the same time is also a variable used for numerous macroeconomic and fiscal analyses, several methodologies for the calculation of the potential output were developed. Measurement of the output gap, defined as the difference between the actual and potential output expressed as a share of potential output, is widely controversial in economic theory, reflecting the controversy and disagreement in the nature of economic cycles, since the potential output separates the trend from the cyclical component of the output (Cerra and Saxena 2000).

Several ways have been developed so far in order to calculate potential output indirectly. The methods of estimation vary in robustness and data requirement; hence, not all of them are equally suitable for all the countries. In general, there are three different types of approaches to estimation of potential output (Mishkin 2007). These are: i) aggregate approaches; ii) production function, or growth-accounting, approaches; and iii) dynamic stochastic general equilibrium (DSGE) approaches.

Aggregate approaches to estimating potential output are also referred to as top down approaches. These approaches normally use aggregate variables to derive measures of potential output (Mishkin 2007). The main assumption used in these calculations is if a change of an aggregate variable, such as employment or output, is sustainable, then it is also likely to be permanent. Subgroups of aggregate approaches include univariate and multivariate methods.

Univariate statistical methods are used to identify a permanent component of changes in output as a measure of potential output. For example, Beveridge and Nelson (1981), in an attempt to measure and date business cycles in the post-war US economy, identify a permanent component as a random walk drift, and the cyclical component as a stationary process with zero mean. As the decomposition methodology depends on past data (historical data or projections), it is computable in real time. Statistical de-trending can be performed either by filtering or smoothing data series. Filtering equates to one-sided estimation and relies on backward information, and while it is often used for policy-making (Castle J. 2003), it is less accurate than smoothing (two-sided estimation) which uses both backward and forward information. For policy-making, smoothing requires forecast estimates.

Univariate methods include the Hodrick-Prescott filter, Baxter-King filter, Beveridge Nelson decomposition, and the Kalman filter (a description of different univariate and multivariate filters and production function approaches is given in Cotis, Elmeskov, and Mourougane 2005). The most frequently used univariate method is the HP filter. The HP filter is a pure mechanical smoothing procedure, whose statistical foundations are simple and transparent. According to the findings of an ad-hoc working group (European Commission 2001), established by the Economic Policy Committee to review estimation methods used by the European Commission and other national and international institutions, the HP filter 'does not require any judgmental assumptions nor reliance on any particular economic theory, and estimates from the HP filter can be easily and quickly replicated. These are the main reasons why the EC has relied on the HP filter for estimating trend output and the output gap in order to assess structural fiscal balances. There is little scope for countries to disagree with the details of the calculations. Overall, the advantages of using his method can be summed up as: allowing for stochastic shocks to the trend component; being simple, transparent and easily reproducible; and providing a uniform framework for many countries even in the presence of data availability issues (McMorrow and Roger 2001). In terms of shortcomings, besides the fact that HP filter de-trending can lead to spurious cyclicality and an excessive smoothing of structural breaks, the output gap estimates are also known to be affected by end-sample biases as the estimates of trend output tend to rely excessively on the latest developments in actual output (Cerra and Saxena 2000). This end-sample bias stems from the symmetric property of the HP filter, which requires that output gaps sum to zero over the estimation period. However, this problem can be partially overcome by using medium-term growth projections (as this paper does, including the IMF projections up to 2018). In this case the extent of the bias will depend on the accuracy of the projections.

Generally, the main advantage of univariate methods is their simplicity and relatively modest data requirements. They provide a feel as to what potential output may be using a limited number of variables. The general disadvantage of these approaches, however, is that they require a variety of statistical assumptions and estimates related to these assumptions may vary significantly (McMorrow and Roger 2001). Another disadvantage is that the association of the movements of the permanent component of output with the stable inflation rate cannot be deduced, which is an obstacle for monetary economics' use of potential output (Mishkin 2007).

Having in mind the shortcomings of univariate aggregate approaches, multivariate aggregate approaches get more sophisticated and, rather than being purely statistical de-trending approaches (which statistically separate permanent from cyclical components of the time series data), they include information on structural relationships, using economic theory to separate structural and cyclical effects on level of economic activity (de Brouwer 1998). Multivariate approaches include the assumption developed by seminal works of Phelps (1967) and Friedman (1968), which state that economies in the long run steer towards the natural unemployment rate (the non-accelerating inflation rate of unemployment) associated with the long-run expected inflation level. Under multivariate approaches of calculating potential output, potential output corresponds to the non-accelerating inflation rate of unemployment, while the output gap indicates whether inflation is expected to increase or decrease. Multivariate methods include the Hodrick-Prescott multivariate filter (HPMV filter), Beveridge Nelson multivariate decomposition, and Kalman multivariate filter (Cotis, Elmeskov, and Mourougane 2005). The main disadvantage of multivariate approaches is that they are based on certain assumptions of relationships between the variables used (as in Phillips Curve and Okun's Law). For example, the relationship between the unemployment gap and inflation must be correctly specified and all-encompassing, as well as the relationship between output and the unemployment gap, which is complicated by complex productivity and labor supply relations, while the natural rate of unemployment cannot be estimated without relative statistical uncertainty (Mishkin 2007). Thus, given the complex dynamics among variables, quantitative estimates of these relationships are prone to mistakes and misspecifications.

Production function approaches (also named growth accounting approaches) employ more sophisticated relationships from economic theory to derive potential output. These approaches examine different factors that influence potential growth, as opposed to looking at historical trends only (as is the case with the previous approaches), generating an estimate of potential output based on the assumption that all factors of production are utilized using more data than previous approaches (Mishkin 2007). Production function approaches include a full structural model, a production function with exogenous trends, and structural VAR. While the main advantage of these approaches is their narrower focus on different factors that drive potential output, their main shortcoming is the data gap in terms of labor, capital, and total factor productivity indicators for most countries. As an illustration of the data requirement in its simplest form, the growth-accounting framework requires data on labor productivity, even further decomposed into contributions of capital deepening, changes in labor quality, and the growth rate of multifactor productivity. Hence, in transition countries the application of this approach is virtually impossible due to data limitations. Furthermore, even for developed countries with robust data, the shortcoming of this approach is the difficulty of estimating the individual components of the growth accounting framework, since there is a large degree of uncertainty surrounding the estimates of growth accounting components (Cotis, Elmeskov, and Mourougane 2005). The growth rate of capital services is just one of the examples of variables that are difficult to measure.

Finally, by contrast to the conventional top-down approaches and production function-based approaches, the set of approaches based on dynamic stochastic general equilibrium (DSGE) gives a somewhat different perspective on the definition of potential output. The DSGE approaches are the most complex and most realistic approaches, since they allow for market imperfections (such as preference change, fiscal policy shocks, or terms of trade changes) to influence the level of potential output. In this context, the potential output is output level which would be achieved if the prices and wages were fully flexible so that the inflation is constant (Woodford 2003). Hence, if this approach is used, the potential output will fluctuate more, and output gaps will be smaller than in the case of traditional approach (Mishkin 2007), which has its disadvantages. The main shortcoming is that these approaches require estimation of model parameters of structural shocks, while from a policy-making stand point the DSGE approaches are problematic in the sense that they imply that most of the fluctuations are efficient and do not require policy measures (Cotis, Elmeskov, and Mourougane 2005). Compared to the first two sets of approaches, the third set of approaches requires even more data, most of which is not readily available and is often estimated by the researchers.

Severe data constraints (either the lack of data or lack of time-series records of data) limit the possibilities for calculation of the potential output for the Western Balkan countries, in particular in terms of structural relationship methodologies. Therefore, the plausible methodology to be applied to calculate the potential output of the Western Balkan countries is statistical de-trending – an aggregate univariate approach. This paper uses the HP filter - one of the most prominent univariate methods of potential output estimation, given its relative simplicity and low demands in terms of data availability.

3. METHODOLOGY

As discussed in the previous Section, due to data constraints in terms of structural relationship methodologies, this paper is limited to using the simple statistical de-trending methodology of the Hodrick-Prescott filter. It is the most known and commonly used of univariate methods of potential output estimation in both academic research and by international organizations such as the IMF, OECD, European Commission and European Central Bank (Ladiray, Mazzi, and Sartori 2003), given its relative simplicity and low demands in terms of data availability. This methodology uses a long-run symmetric, moving average to de-trend GDP data. In essence, the main intuition is that the HP filter extracts a trend component by introducing a tradeoff between a good fit to the actual series and the degree of smoothness of the trend series (Cotis, Elmeskov, and Mourougane 2005). For the purpose of this paper, in line with the traditional approach, the potential output is understood to be a trend output.

While there are downsides of mechanical de-trending in Hodrick and Prescott's approach that could result in spurious cycle reporting and over-smoothing (a description of the properties and shortcomings of the HP filter are given in Harvey and Jaeger, 1993) the HP filter is the most popular method for the derivation of potential output due to its flexibility in identifying fluctuations in trend output (Cerra and Saxena 2000). Moreover, if used with discretion, it 'yields extremely fast results and can prove very useful for the initial, exploratory analysis of time series' (Pedregal and Young 2001).

In terms of actual calculation, the HP filter assumes that the actual output, Y_t is composed of a trend component Y^* and a cyclical component C_t.

$$Y_t = Y^* + C_t \tag{1}$$

The HP filter is used to isolate the C_t by minimizing the sum of the term determining goodness of the fit and the term determining smoothness on the assumption that the average value of the cycle component is zero over longer intervals of time, thus deriving at trend output Y* by minimizing a combination of the gap between the actual output and trend output and the rate of change in trend output for the entire observation sample T (Cerra and Saxena 2000). In other words, the filter, which is a two-sided symmetric moving average filter, minimizes the following objective function:

$$\sum_{t=1}^{T}(Y_t - Y_t^*)^2 + \lambda \sum_{t=2}^{T-1}\left[\left(Y_{t+1}^* - Y_t^*\right) - \left(Y_t^* - Y_{t-1}^*\right)\right]^2 \tag{2}$$

Here, the first term estimates the time series' fitness and the second term estimates the smoothness. The obtained trends balance the first to the original series against the degree of smoothness. The term λ – Lagrange multiplier – is a positive number which penalizes variability in the growth component series (Hodrick and Prescott 1981). Parameter λ controls the smoothness of the trend (the trend component approaches a linear trend as λ approaches infinity, while at λ=0 the trend component equals to the actual series). In other words, the filter de-trends the data by solving a least square problem, i.e. minimizing the sum of squares of the transitory component subject to a penalty parameter λ for the variations in the second differences, with the minimization resulting in a TxT matrix of linear equations for the series for the series Y_t as a function of the trend component Y^* (Ladiray, Mazzi, and Sartori 2003).

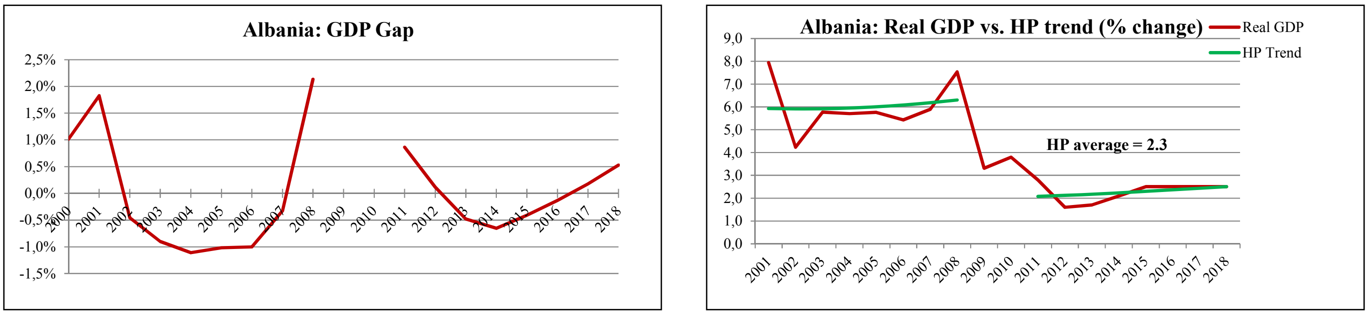
The choice of the value of parameter λ is determined by the frequency of time series. Commonly used values of λ are 100 for annual data (which is used in this paper), 1,600 for quarterly data, and 14,400 for monthly data. The parameter λ is chosen somewhat arbitrarily and the above values have been popularized by the academic literature on real business cycles.

4. DATA AND RESULTS

This paper uses secondary data and projections on real GDP levels and growth rates for the period 2000-2018 for the seven Western Balkan countries from the International Monetary Fund's World Economic Outlook (WEO) Database from October 2013 (IMF 2013a). The seven Western Balkan countries (Albania, Bosnia and Herzegovina, Croatia, Kosovo, Macedonia, Montenegro, and Serbia) are chosen given that the region is inter-connected not only through historical and geographical bounds, but also through current connections through trade among the countries, as well as similar economic growth models in most cases. These countries are also frequently grouped in one category by international organizations – for example the World Bank groups them as south-eastern Europe, with the recent exclusion of Croatia, due to its 2013 EU membership.

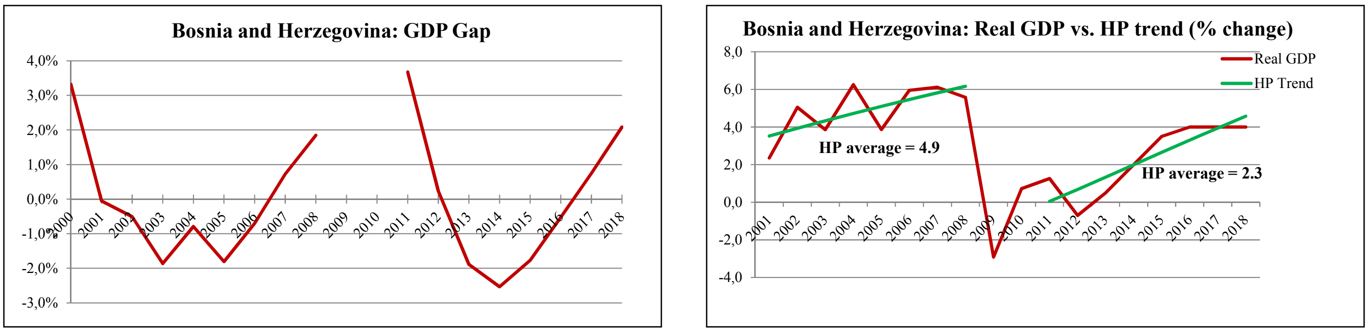
Figures 1 to 7 (given at the end of the article) show GDP gap (the percentage difference between the absolute values of real GDP and the HP trend of absolute values of real GDP calculated using equation 2) and real GDP growth rates in comparison to average HP trend for GDP growth (calculated as the HP trend of real GDO growth rates using equation 2) for each of the seven Western Balkan countries during the 2001 to 2018 period. While the HP filter methodology used in this paper has its limitations (as mentioned in the previous section of the paper), the estimates of potential growth loss in this paper (shown in Figures 1-7 and Table 1) are broadly in line with the IMF's recent calculation of the potential output loss for Central, Eastern and South-Eastern Europe which include some of the Western Balkan countries (IMF 2013b, explained above in the section on review of the research). Moreover, the estimated results are intuitively plausible.

Figure 1: GDP Gap and Real GDP Growth for Albania



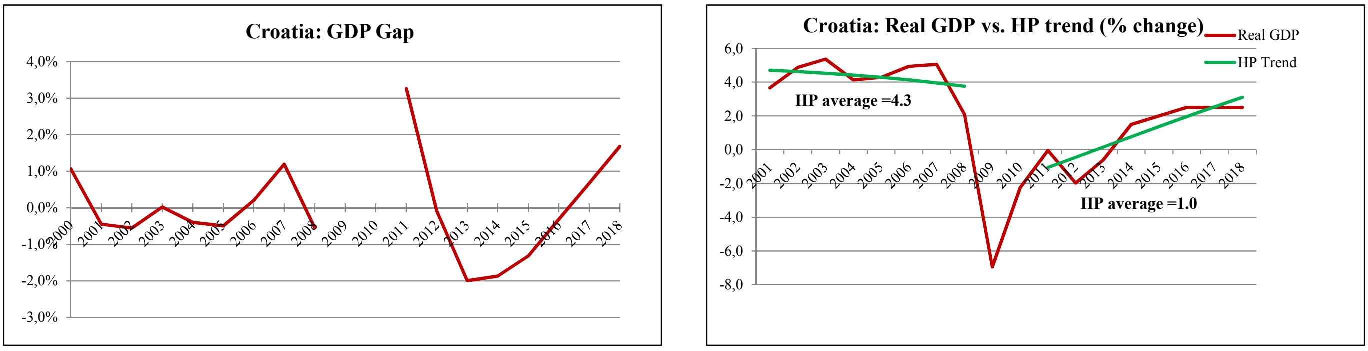
Source: Own calculations based on data from the International Monetary Fund's World Economic Outlook from October 2013

Figure 2: GDP Gap and Real GDP Growth for Bosnia and Herzegovina (BiH)



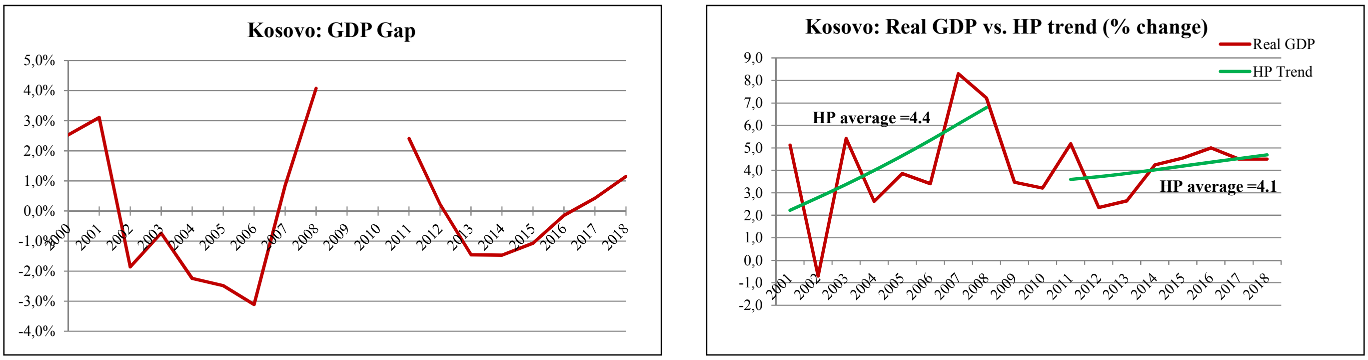
Source: Own calculations based on data from the International Monetary Fund's World Economic Outlook from October 2013

Figure 3: GDP Gap and Real GDP Growth for Croatia



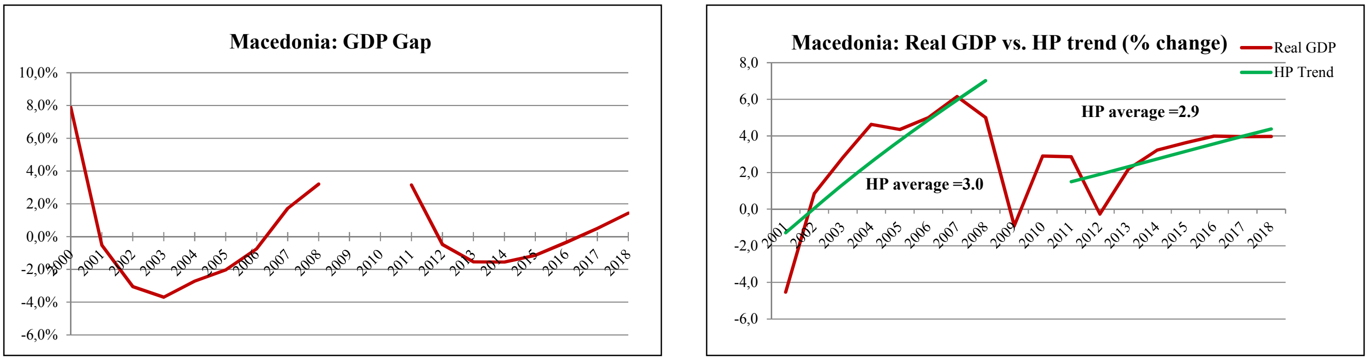
Source: Own calculations based on data from the International Monetary Fund's World Economic Outlook from October 2013

Figure 4: GDP Gap and Real GDP Growth for Kosovo



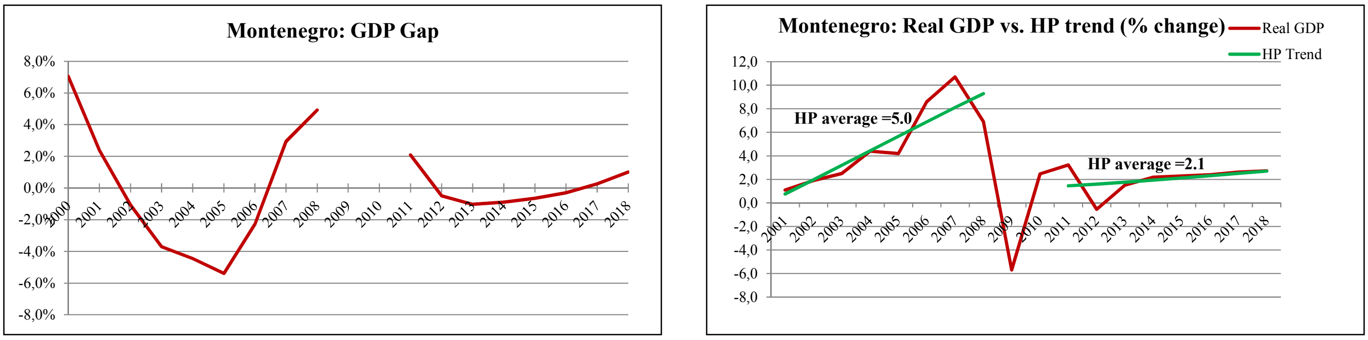
Source: Own calculations based on data from the International Monetary Fund's World Economic Outlook from October 2013

Figure 5: GDP Gap and Real GDP Growth for Macedonia



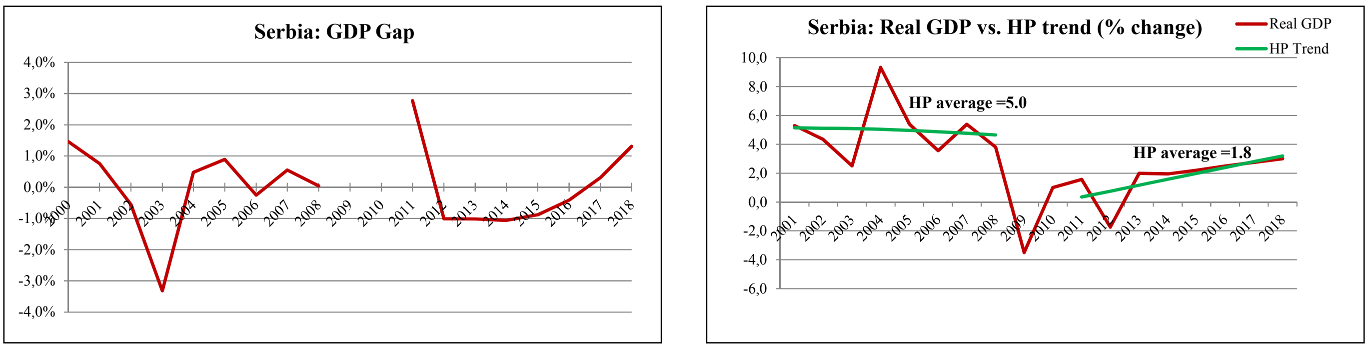
Source: Own calculations based on data from the International Monetary Fund's World Economic Outlook from October 2013

Figure 6: GDP Gap and Real GDP Growth for Montenegro



Source: Own calculations based on data from the International Monetary Fund's World Economic Outlook from October 2013

Figure 7: GDP Gap and Real GDP Growth for Serbia



Source: Own calculations based on data from the International Monetary Fund's World Economic Outlook from October

Estimating potential output of a country is useful in defining sustainable growth levels and in determining whether the macroeconomic policy of that country should be more geared towards demand stimulation (in the case of a large gap between potential and real GDP, implying that the production factors in the economy are not utilized well) or structural reforms (in cases where the gap between potential and real GDP is exhausted and the economy needs underlying change to the growth model). Table 1 (given at the end of the article) shows potential real GDP growth rates derived from the average HP trend for each of the countries for the two periods. The 2001-2008 and 2011-2018 HP trend figures shown in Table 1 represent average HP trends for average potential real GDP growth rates for these periods, which are shown in Figures 1-7 next to the annual HP trends in text boxes (in other words, the text boxes in Figures 1-7 show the average of the annual HP trends for these two periods, which are also summarized in Table 1).

For the purpose of this paper, 2001-2008 is looked at as the pre-crisis period and 2011-2018 as the post-crisis period. The years of 2009 and 2010 were selected to serve as a "crisis period" for the purpose of this paper; the two four-year cycles prior to this primary crisis period served to examine potential output trends before the crisis, and the two four-year cycles after this primary crisis period served to examine potential output trends after the crisis. This is a frequently used approach in which a specific period is taken out of analysis to compare the estimates prior to that period to those following that period – for example, the European Commission in its latest potential output calculations uses 2003-2007 and 2009-2013 for comparison, leaving out 2008, which was the year of the most severe downturn in the euro area (European Commission 2013). It needs to be noted that for most of the countries year 2012 was also a year in which GDP reduction was recorded as the result of the sovereign debt crisis in the euro zone, but given its relatively shorter length, 2012 remains included in the post-crisis period for the purpose of this paper.

As expected, the results point to the strong decrease in the post-crisis potential output relative to pre-crisis levels due to crisis-related contraction of both domestic demand and export demand for the WB countries. In fact, on average for the seven WB countries, potential real GDP growth has halved, showing a decrease of 49% from a 4.7% average potential pre-crisis real GDP rate to a 2.4% average potential post-crisis real GDP rate.

More specifically, Table 1 shows estimates that average annual HP trend, calculated as explained in the previous section (equation 2) based on real GDP growth rates in 2001-2008 (column 2 of Table 1) and 2011-2018 (column 3 of Table 1) and noting that 2013-2018 data consists of projections, is between 77% and 3% lower in the post-crisis period.

Looking at individual countries:

- for Albania average potential growth in 2001-08 was 6% and is 2.3% for 2011-18,
- for BiH average potential growth in 2001-08 was 4.9% and is 2.3% for 2011-18,
- for Croatia average potential growth in 2001-08 was 4.3% and is 1% for 2011-18,
- for Kosovo average potential growth in 2001-08 was 4.4% and is 4.1% for 2011-18,
- for Macedonia average potential growth in 2001-08 was 3% and is 2.9% for 2011-18,
- for Montenegro average potential growth in 2001-08 was 5% and is 2.1% for 2011-18, and
- for Serbia average potential growth in 2001-08 was 5% and is 1.8% for 2011-18.

Thus, for the majority of the Western Balkan countries - Albania, BiH, Croatia, Montenegro, and Serbia, which together comprise around 90% of the total Western Balkan countries (IMF WEO data, October 2013) – post-crisis potential output growth is between 53% and 77% lower than in the pre-crisis period (column 4 in Table 1). Although they are also estimated to have lost potential output growth in the post-crisis period, Macedonia and Kosovo are somewhat different in that they show relatively small estimated potential output loss (3% for Macedonia and 7% for Kosovo). This may be explained by the following facts: Macedonia and Kosovo experienced relatively low GDP growth in 2001-2008

Table 1: Potential Real GDP Growth Rates for Western Balkan Countries

	HP trend 2001-2008	HP trend 2011-2018	% Change
1	*2*	*3*	*4=(3-2)/2*
Albania	6.0%	2.3%	-62%
Bosnia and Herzegovina	4.9%	2.3%	-53%
Croatia	4.3%	1.0%	-77%
Kosovo	4.4%	4.1%	-7%
Macedonia	3.0%	2.9%	-3%
Montenegro	5.0%	2.1%	-58%
Serbia	5.0%	1.8%	-64%
AVERAGE	4.7%	2.4%	-49%

Source: Own calculations based on data from the International Monetary Fund's World Economic Outlook from October 2013 compared to the rest of the Western Balkans, partially due to less open economies in terms of foreign capital inflow and international trade; they did not experience average growth reduction in 2009-2010; and they have the highest growth/growth projections for 2011-2018. Real GDP trends for all countries are shown in Figures 1-7. The order of magnitude of the potential output loss for all seven countries is also broadly (for the most part) in line with the order of their development in terms of GDP per capita in purchasing power parity, thus implying that some countries are farther from the process of catching up with developed countries than others, so it is plausible that for those countries a smaller potential output loss is estimated (for example, the difference between the most developed country, Croatia, versus the least developed, Kosovo).

Based on calculated pre-crisis and post-crisis potential GDPs and GDP gaps for the Western Balkan countries, significant potential output losses took place. This implies that since they are faced with slowed potential output growth, the Western Balkan countries need to implement structural economic reforms in order to support long-term production and employment growth (as is also the case in the euro area, as discussed by the European Central Bank (2011)). This fall in the post-crisis potential growth rate of the WB economies, which results in domestic output remaining permanently below pre-crisis trends, is in line with the findings in other literature (e.g. IMF 2013b).

In other words, the results which show a decrease in potential growth rates (Table 1 and Figures 1-7), imply that since the crisis has exacerbated and put additional spot light on the internal weaknesses of the economies in the Western Balkans, it is not likely that the governments of the Western Balkan countries will be able to achieve strong growth rates comparable to the pre-crisis period solely by improving the utilization of existing production factors at their current technology level, but that structural reforms will need to be implemented to change the underlying growth model.

In terms of a possible policy focus for the structural reforms, countries may want to consider areas of economic weaknesses (common for most of the WB countries) such as: over-reliance on private consumption and foreign capital inflows; weak investments and sub-optimal business environments; growing public debt and the sub-optimal efficiency and effectiveness of the public sector; the high indebtedness of the private sector; and significant structural weaknesses in labor markets.

5. CONCLUSIONS

This paper aims to contribute to the discussion on whether recent crises led to the impairment of the Western Balkan economies' potential output over the medium term. Due to data constraints, the simple aggregate univariate HP filter approach is followed to investigate whether potential output levels tend to be different in the aftermath of the crises compared to the pre-crisis period. The results point to the strong decrease (with potential real GDP growth rate being roughly halved on average for the WB countries) in post-crisis potential output relative to pre-crisis potential output - on average for the seven WB countries, potential real GDP growth has halved, showing a decrease of 49% from 4.6% average potential pre-crisis real GDP rate to a 2.4% average potential post-crisis real GDP rate.

Since estimating the potential output of a country may indicate whether the demand stimulation (in the case of a large gap between potential and real GDP, implying that the production factors in the economy are not utilized well) or structural reforms (in a case where the gap between potential and real GDP is exhausted and the economy needs underlying changes to its growth model) are more appropriate, the estimates of the shrinking potential output of the Western Balkans laid out in this paper may imply that structural economic reforms are needed in order to support sustainable long-term production and employment growth.

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TESTING THE CAPM IN BOSNIA AND HERZEGOVINA WITH CONTINUOUSLY COMPOUNDED RETURNS

Azra Zaimović *

Abstract

The capital markets of neighboring transitional Western Balkan countries have attracted a lot of interest from domestic and international investors in the last decade, who view them as an attractive alternative to investing in more developed markets. These markets are characterized by higher returns, and higher volatility of stock returns as compared to those of developed markets. The recent economic and financial crises devastated capital markets worldwide. The new Bosnian capital market faced its hardest times following the withdrawal of international investors.

The aim of this paper is to explore whether there is a standard relation between stock returns and market portfolio returns, as proposed by the Sharpe-Lintner Capital Asset Pricing Model (CAPM), in the stock market of Bosnia and Herzegovina. We tested the model hypotheses with a traditional two-stage regression procedure using the OLS method, using continuously compounded (logarithmic) returns on stocks. Our study indicates that despite the crisis the systematic risk measured by the beta coefficient is priced and that the beta premium is positive. Nevertheless, the Security Market Line (SML) intercepts the ordinate lower than the risk free rate of return. Other factors might also influence stock returns in this market.

Keywords: *CAPM, beta, OLS, Bosnia and Herzegovina*

JEL classification: G12, C32

1. INTRODUCTION

There is no consensus in the literature as to which model should be used to explain the volatility of stock returns and the cost of capital in new capital markets (Morgese Borys, 2007; Morgese Borys, Zemčik, 2008, 2009). The CAPM model is the most often used in developed markets, despite its poor empirical record. Brounen, De Jong and Koedijk (2004) found that 64.2% of US and 57% of European companies use CAPM when assessing the financial feasibility of an investment opportunity. Various factor models have been proposed to overcome CAPM shortcomings (Ross, 1976; Fama, French, 1992, 1993, 1996a, 1996b etc). Since the Bosnian capital market is new and underdeveloped, our analysis focuses on whether one of the most widely used factor models for financial asset pricing, the CAPM, can be used to determine the rates of return in the Bosnian capital market.

Under strong assumptions, the CAPM (Sharpe, 1964; Lintner, 1965a, b) implies a linear equation for pricing risky securities (individually) and/or portfolios of securities. CAPM assumes that the return of every individual security is linked to a single factor (index). According to this model, the relative risk measure of individual financial assets held as a part of a well-diversified portfolio, and of portfolios, is the financial asset beta.

In this research we tested if the regression coefficient, CAPM beta, is a statistically significant risk measure in the new and underdeveloped capital market of BiH. We used a representative sample of 50 actively traded stocks in the five-year period, 2005 to 2010. In this period the average

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share of sample stock transactions in all transactions was 87%, the average turnover share was 54%, and the average share of market capitalization was 65%. We tested the following standard CAPM hypotheses: (1) there is a positive premium on systematic risk; and (2) there are no other factors but the systematic risk that influences stock returns.We used the traditional two-stage regression procedure. First, we estimated the beta coefficients with the OLS method using a time series of countinously compounded (log) returns. Second, we estimated cross-section models with the OLS method using the estimated beta from the first step as the independent variable.

This paper is divided into five sections. Section 2 discusses the theoretical background, literature review and methodology used in our study. Section 3 explains the sample and provides some preliminary estimation. Section 4 presents the study's results, followed by its conclusions.

2. *THEORETICAL BACKGROUND AND METHODOLOGY*

The Sharpe-Lintner CAPM is the basis of Capital Market Theory, representing an extension of the single-period mean-variance model developed by Markowitz (1952) and Tobin (1958) using the Expected Utility Theory formulated by Von Neumann and Morgenstern (1944). The CAPM finds that the relevant risk measure of individual financial assets held as a portion of a well-diversified portfolio is not a variance (or a standard deviation) of financial assets, as proposed by the Modern Portfolio Theory, but a contribution of the financial assets to the portfolio variance, measured by the financial asset beta. The beta coefficient is the measure of the systematic risk of the risky assets. In this model, the number of estimated variables (variances, covariances etc.) is much lower than in Markowitz's model, which is its crucial advantage.

Considering that rational investors are risk-averse, it is intuitive that a stock with a higher risk (higher beta) should yield a higher return than a stock with a lower beta. The CAPM model suggests that an asset with a zero beta, in equilibrium, will yield an expected return equal to that of a risk-free rate, and that the expected return of all risky assets must be higher than the risk-free rate for a risk premium that is in direct proportion with the beta. In the rational and competitive market, the investors diversify the entire unsystematic risk, thus pricing assets according to the systematic risk.

The theory itself caught a lot of attention from theoreticians and practitioners from around the world. Numerous empirical tests of the CAPM model are available, relating to various markets and testing periods, with no conclusive confirmation or rejection of the model. There is wide international evidence of CAPM application possibilities (e. g. Lintner, 1965a, b; Black et al., 1972; Fama and MacBeth, 1973; Strambaugh, 1982; Ulschmid, 1994; Mateev, 2004; Michailidis et al., 2006; Omran, 2007; Guersoy and Rejepova, 2007 etc.). The most prominent early tests of CAPM were proposed by Lintner (1965a, b), Black et al. (1972) and Fama and MacBeth (1973). In all of these studies a combination of time-series regressions and cross-section regression was used.

Taking into account the characteristics of BiH's capital market, we reviewed what some of the newer tests in the region and in some new capital markets are revealing. Experiences from the Croatian capital market suggest that unsystematic risk explains better stock returns than systematic risk (Fruk and Huljak, 2004). A test of the three-factor Fama-French model on 6 portfolios shows that this three-factor model is successful in the explanation of stock return variations in the Croatian market (Kleut, 2008). Atanasovska (2008) analyzed the Macedonian stock market in the period 2002 – 2006, using the methodology of Fama-MacBeth (1973) and Pettengill et al. (1995). The research rejects the hypothesis of a linear risk-return relationship for individual stocks, but its results are in line with the findings of Pettengill et al. (1995), suggesting a conditional risk-return relation.

Mateev (2004) finds that CAPM beta coefficient, size, book and market leverage are priced in the Bulgarian market. Michailidis et al. (2006) show that the risk return relationship is linear and residual risk does not influence portfolio returns in the Greek capital market. On the other hand, this test does not support the intercept hypothesis; in addition, the coefficient of the betas in cross-section regressions is negative, implying an inverse relationship between beta and return. A negative linear relationship between beta and stock returns was also found in the Egyptian capital market (Omran, 2007).

In the Turkish market, Guersoy and Rejepova (2007) used the direct test (Black et al., 1972) and found systematic risk measured by beta to be statistically significant (although negative) as well as the intercept to be significantly different from zero (except in one sub-period). The systematic risk was priced in this market. In addition, they use the methodology of Pettengill et al. (1995) for CAPM tests and got the expected results; the beta was positive in up-markets and negative in down-markets. The intercept test was rejected in both markets (except in two cases) bringing the authors to the conclusion that beta was not the only variable that explains realized returns.

Experiences from the Visegrad Group countries (Czech Republic, Hungary, Poland and Slovakia) are also controversial. The standard CAPM has been confirmed in Hungary and Slovakia, while the four-factor model (besides market portfolio, the factors are industrial production, inflation and term structure) has had some significance in Poland and Hungary (Morgese Borys, 2007).

There is limited evidence from BiH's capital market about the factor pricing models. Earlier studies (Zaimović, 2011, 2012a, 2012b) have shown a positive beta premium, linear risk and return relationship, while the intercept hypothesis has been rejected. These studies detected the violation of the normality assumption of discrete returns employed in regression analysis due to trends at that time in the capital market in the observed period (a bull market in 2006 and the first half of 2007, followed by a bear market). In this paper we aim to test whether continuously compounded returns better satisfy the normality assumption. Finally, we investigate how this shift in inputs affects CAPM test results.

In order to test the CAPM hypotheses with stock returns from BiH's capital market we adopted the most widely used two-stage regression methodology. In empirical tests *ex-ante* variables are substituted with *ex-post* variables; expected returns are replaced with historical returns, and the beta coefficient is estimated from the regression analysis. The basic CAPM equation (Sharpe, 1970) with expected returns, where $E(R_i)$ represents the expected return on security *i*, $E(R_M)$ the expected return on market portfolio, r_f the risk free rate and β_i the security's beta

$$E(R_i) = r_f + \left(E(R_M) - r_f\right)\beta_i \tag{1}$$

is being transformed into the *ex-post* equation (Ulschmid, 1994)

$$r_{i,t} = r_{f,t} + \beta_i\left(r_{M,t} - r_{f,t}\right) + \varepsilon_{i,t} \quad i = 1 \ldots n\,;\, t = 1 \ldots T \tag{2}$$

where $r_{i,t}$ is return on security *i* for the period from t-1 to t, $r_{f,t}$ is risk free rate in the period from t-1 to t, $r_{M,t}$ is return on market portfolio analogues $r_{i,t}$, estimated beta coefficient represents the expected change in $r_{i,t}$ conditioned with the change in $r_{M,t}$, $\varepsilon_{i,t}$ is the regression residual and *T* are the periods in days, weeks, months or years. In order to test the CAPM model we employ the most common time series regression analysis using the OLS method. We estimated the following model:

$$r_{i,t} = \hat{\alpha}_i + \hat{\beta}_i r_{M,t} + \varepsilon_{i,t} \quad i = 1 \ldots n\,;\, t = 1 \ldots T \tag{3}$$

where variables with hat are estimated from regression; estimated beta is a measure for systematic risk, and estimated alpha is a regression constant. The second stage regression enables us to test the CAPM hypothesis. We used both the direct (Black et al., 1972) and the indirect test (Lintner 1965 a, b). The first one is specified as:

$$\bar{r}_i = \hat{\gamma}_0 + \hat{\gamma}_1\beta_i + u_i \qquad i = 1,\ldots,n \tag{4}$$

and the second one is specified as:

$$\bar{r}_i = \hat{\gamma}_0 + \hat{\gamma}_1\beta_i + \hat{\gamma}_2 s_i + u_i \qquad i = 1,\ldots,n \tag{5}$$

where $\bar{r}_i$ is average return on security *i* (*i = 1,...,n*), $\hat{\gamma}_j$ are models parameters (*j = 0,1,2*), β_i are estimated betas from the first stage regression for the security *i*, s_i is the additional measure of risk for the security *i*, the residual variance and u_i is residual.

In contrast to the methodology of Black et al. (1972) where in equations (3) and (4) excess returns were used, we estimate regressions with full returns. This adoption affects the hypotheses testing, as we suggest. The intercept in the cross-section regressions does not represent the CAPM alpha coefficient, therefore the intercept is not expected to be equal to zero, but to equal the risk-free rate. If we compare equations (4) and (5) with the *ex-ante* CAPM equation (1) we conclude that for the CAPM validity three conditions must hold

$$\gamma_0 = r_f \ (6), \qquad \gamma_1 > 0 \ (7), \qquad \gamma_2 = 0 \ (8).$$

If we cannot reject the null hypothesis of an expected value for $\hat{\gamma}_1$, than the systematic risk is positively priced. Other risk factors that might influence stock returns are accounted for in the indirect test by the expected value of $\hat{\gamma}_2$. The intercept hypothesis says that assets not correlated with the market portfolio should earn a risk-free rate.

3. DATA AND PRELIMINARY ESTIMATES

The capital market of Bosnia and Herzegovina was established in 2002, when two stock exchanges, the Sarajevo Stock Exchange (SASE) and the Banja Luka Stock Exchange (BLSE), started working. This market is new and underdeveloped, with a relatively small number of traded securities. As in most new and less liquid markets, the Bosnian capital market faces the problem of nonsynchronous trading, where prices are followed in regular periods (daily, weekly, monthly) while trading has happened in irregular periods (Campbell, Lo and MacKinlay, 1997; Latković, 2001; Mateev, 2004), which was a dominant determining factor influencing the size of the sample and the return interval used in our econometric analysis.

We included all stocks with sufficient liquidity, based on trading volume and number of transactions, from BiH's capital market in the sample. Namely, only 50 stocks from both stock exchanges, 27 from the Sarajevo Stock Exchange (SASE) and 23 from the Banja Luka Stock Exchange (BLSE), were traded on a regular basis in the five-year period, 2005-2010. Data on individual stocks were obtained from the local stock exchanges' official websites. The sample is made of companies' stocks from 9 industries (54%) and of closed-end investment fund stocks (46%).[1] The average share of transactions of sample stocks in the transactions of all registered stocks in both stock exchanges in the observed period is 87%, the average turnover share is 54%, and the average share of market capitalization is 65%. We calculated the monthly log returns on stocks for the five year period from January 2005 to January 2010 for all 50 stocks, which were used as a dependent variable in the estimated model (4).[2] Dividend yields are not taken into account due to missing data. If there were no transactions with particular stocks during a month, a null return was notified. Returns are adjusted for stock splits and reverse stock splits.

In order to test the normality assumption of log returns the Skewness - Kurtosis (SK) test was used. The results of the SK test for log returns of sample stocks (P values) are presented in Table 1. Based on these results we suggest that the null hypothesis regarding the normal distribution of returns cannot be rejected in 21 cases at the 5% significance level.

Stock	P value	Stock	P value	Stock	P value	Stock	P value	Stock	P value
1	0.4495	11	0.0029	21	0.0108	31	0.7778	41	0.0323
2	0.0000	12	0.0004	22	0.0201	32	0.0406	42	0.6015
3	0.0000	13	0.2057	23	0.0344	33	0.0024	43	0.4226
4	0.0222	14	0.0014	24	0.0112	34	0.0139	44	0.7495
5	0.0474	15	0.0836	25	0.0153	35	0.1076	45	0.0356
6	0.5050	16	0.2148	26	0.0005	36	0.0136	46	0.0286
7	0.0635	17	0.2136	27	0.4473	37	0.3602	47	0.0180
8	0.0633	18	0.0029	28	0.9369	38	0.0000	48	0.0049
9	0.8928	19	0.0443	29	0.0054	39	0.0000	49	0.2921
10	0.0603	20	0.0136	30	0.0000	40	0.4203	50	0.3924

Source: Author's calculations
Table 1: Results of SK test for returns' normal distribution

We find, in general, the normality assumption more satisfactory for log than for discrete returns, compared to the results of earlier studies when only 6 stock returns were normally distributed (Zaimović 2011, 2012a). In the observed period there were ongoing extreme trends in Bosnian capital market; a bull market from the beginning of the period was followed by a bear market that was deepened by the global financial and economic crisis. Most returns' distributions are positively skewed, which is understandable due to the global trends in the observed period.

The unit root test, ADF test (Dickey and Fuller, 1979) is used to test whether a time series of log returns is stationary. Considering that the time series of stock prices is not stationary, we tested the first difference of prices, log returns, for stationarity. The results of the ADF test for monthly returns for all sample stocks show that the time series of log returns is stationary. By using graphical analysis, we excluded time trend and drift. The null hypothesis regarding the time series of discrete returns with the unit root is rejected in all cases at the 1% significance level. As expected, our results indicate that stock prices series are integrated to the order 1, I (1).

Some studies have shown that there is a low to moderate positive correlation between pairs of indices returns for the most important stock indices in BiH's market (Zaimović and Delalić, 2010). Furthermore, BIFX and FIRS indices are not mean-variance efficient (Arnaut-Berilo and Zaimović, 2012a). These indices are not suitable proxies for a market portfolio because the calculated betas would significantly differ if instead of one index returns another index returns were used. Indices that are a substitute for each other and a good proxy for a market portfolio at the same time cannot result in different beta estimates. We can conclude that none of these indices represents the entire Bosnian stock market.[3] Instead of using the existing stock market indices, we created an equally weighted portfolio of all sample stocks that serves as proxy for a market portfolio for this market.

This is a well-diversified portfolio composed of stocks from 9 sectors, and the stocks of investment funds from the entire Bosnian market. This methodology has been widely used since the first CAPM tests (e. g. Fama and MacBeth, 1973; Winkelmann, 1981; Pasquariello 1999).

Since there is no official statistical data on monitoring and calculating the risk-free rate of return in Bosnia and Herzegovina, we had to estimate this missing economic indicator for the purpose of this research. Damodaran (2008) suggests that the real rate of return is equal worldwide and that it can be extracted from the return on government securities of some mature markets, such as the American. Applying this methodology, we used the monthly inflation rates in BiH and the US, and the monthly data for US government securities yields, with one month constant maturity.[4] Data was obtained from Agency for Statistics of BiH Releases, the Historical Consumer Price Index website and Federal Reserve Statistical Releases.[5] The average BiH monthly inflation rate in the observed period was 0.297%, while average monthly inflation in the US was 0.211%. We estimated the average risk-free rate in BiH in the period of January 2005 to January 2010 at 0.337% monthly, or 4.12% annualized.[6,7]

4. *RESULTS*

We used monthly returns on sample stocks as the dependent variable, and monthly returns on the proxy of the market portfolio as the independent variable in order to estimate the first stage regression, model (3), during the period January 2005 to January 2010. We performed the estimation with full returns, not excess returns, as explained earlier. The Ramsey Regression Equation Specification Error Test (RESET) test (Ramsey, 1969) was used to test the classical linear models for correct specification. Estimated time-series regressions are summarized in Table 2.

Model	**1**	**2**	**3**	**4**	**5**
Constant $\hat{\alpha}_i$	-0.003	-0.024	0.002	0.012	0.010
Market portfolio return $\hat{\beta}_i$	0.584***	0.864***	0.582***	0.759***	1.304***
R^2	0.16	0.15	0.32	0.31	0.38
Ramsey RESET test (P value)	0.164	0.984	0.902	0.144	0.219
Model	**6**	**7**	**8**	**9**	**10**
Constant $\hat{\alpha}_i$	-0.015	-0.007	-0.021	-0.014	0.001
Market portfolio return $\hat{\beta}_i$	1.150***	1.174***	1.287***	0.800***	1.162***
R^2	0.24	0.46	0.24	0.24	0.52
Ramsey RESET test (P value)	0.988	0.08	0.370	0.497	0.084
Model	**11**	**12**	**13**	**14**	**15**
Constant $\hat{\alpha}_i$	0.004	0.009	-0.001	-0.009	0.004
Market portfolio return $\hat{\beta}_i$	1.104	1.463	1.210	0.895	1.174
R^2	0.37	0.59	0.63	0.39	0.69
Ramsey RESET test (P value)	0.824	0.052	0.765	0.147	0.137
Model	**16**	**17**	**18**	**19**	**20**
Constant $\hat{\alpha}_i$	0.002	0.008	0.007	0.002	0.001
Market portfolio return $\hat{\beta}_i$	1.330***	1.009***	1.397***	1.499***	0.559***
R^2	0.69	0.42	0.58	0.52	0.28
Ramsey RESET test (P value)	0.718	0.779	0.656	0.608	0.342
Model	**21**	**22**	**23**	**24**	**25**
Constant $\hat{\alpha}_i$	0.002	-0.004	0.000	0.002	0.005
Market portfolio return $\hat{\beta}_i$	0.898***	0.756***	1.370***	0.786***	1.015***
R^2	0.49	0.34	0.69	0.45	0.61
Ramsey RESET test (P value)	0.127	0.665	0.336	0.147	0.673
Model	**26**	**27**	**28**	**29**	**30**
Constant $\hat{\alpha}_i$	-0.007	0.009	-0.015	0.010	0.002
Market portfolio return $\hat{\beta}_i$	1.101***	1.097***	0.647***	0.897***	1.247***
R^2	0.588	0.351	0.338	0.399	0.522
Ramsey RESET test (P value)	0.017	0.616	0.647	0.355	0.450
Model	**31**	**32**	**33**	**34**	**35**
Constant $\hat{\alpha}_i$	0.011	0.015	0.002	0.033	0.012
Market portfolio return $\hat{\beta}_i$	0.658***	1.359***	1.265***	1.201***	0.722***
R^2	0.27	0.63	0.57	0.30	0.33
Ramsey RESET test (P value)	0.449	0.379	0.321	0.046	0.978
Model	**36**	**37**	**38**	**39**	**40**
Constant $\hat{\alpha}_i$	0.008	-0.002	0.021	0.012	-0.007
Market portfolio return $\hat{\beta}_i$	0.994***	1.038***	0.155***	1.397***	1.011***
R^2	0.35	0.53	0.37	0.33	0.65
Ramsey RESET test (P value)	0.646	0.246	0.001	0.180	0.967
Model	**41**	**42**	**43**	**44**	**45**
Constant $\hat{\alpha}_i$	-0.012	-0.010	-0.002	-0.019	-0.004
Market portfolio return $\hat{\beta}_i$	0.656***	0.795***	1.167***	0.499***	0.743***
R^2	0.37	0.39	0.44	0.23	0.48
Ramsey RESET test (P value)	0.657	0.694	0.428	0.532	0.525

Model	46	47	48	49	50
Constant $\hat{\alpha}_i$	-0.001	-0.011	-0.012	0.001	-0.013
Market portfolio return $\hat{\beta}_i$	1.054***	0.613***	0.677***	1.185***	0.709***
R^2	0.60	0.28	0.27	0.59	0.41
Ramsey RESET test (P value)	0.744	0.175	0.550	0.592	0.685

Source: Author's calculations
Notes: *** denotes statistical significance at the 1% level; ** denotes statistical significance at the 5% level; * denotes statistical significance at the 10% level; number of observations varies from 48 to 60.

Table 2: Results of estimated OLS regressions

According to the CAPM, beta coefficients should statistically differ from zero, should be positive and should vary across stocks. All beta coefficients in our analysis (Table 2) were statistically significant at 1% and positive, with variability of estimated betas present. The constant was insignificant in all models; we cannot reject the null hypothesis that the constant is equal to zero. The variability of betas ranged from 0.499 to 1.499. There are no negative betas, typical in other markets as well. The average coefficient of determination in all 50 regressions was 42.6%. In our case, this measure has its economic interpretation, showing the relative significance of systematic risk for each stock.

The variance of the sample stocks was on average 42.6% due to systematic risks and 57.4% due to unsystematic risks. Based on Ramsey's RESET test in three cases (models 26, 34 and 38) we have indications that the relationship between variables can be better explained by non-linear models. These are highly speculative stocks indicating a large portion of unsystematic risk in their variance.

The models have been tested for structural stability because of the financial and economic crises in the analyzed period. The structural breaks were to be looked for in October/November 2008, when the global crises appeared in this market. The Chow test was not an adequate method, because of the quite short length of one sub-period (only 16 observations). Therefore, we used regression with dummy variables as an alternative to the Chow test (Gujarati, 2006) and CUSUM - CUSUMSQ techniques and found betas to be unstable in 2 cases systematically, while in other (45) cases stable.[8]

In order to test the CAPM hypotheses, expressions (6), (7) and (8), we estimated with the second stage regressions (4) and (5). Estimated betas from the first stage regressions (Table 2) were used as the independent variable, while average log returns on sample stocks were used as the dependent variable. Betas from misspecified models are excluded from the sample in the cross-section regressions. The models were checked with diagnostic tests.

Coefficients with betas were significant at 1% and were positive. This means that systematic risk measured by beta is priced in this market and beta premium is positive; we cannot reject the hypothesis (7) in either of the models. The basic CAPM statement that stocks with higher risks bring higher returns applies in this market. The indirect test shows that the unsystematic risk measured by residual variance is also priced in the Bosnian market, thus hypothesis (8), above, must be rejected. The Ramsey-RESET test indicates that the estimated cross-section models were well-specified, which allows us to conclude that the relationship between risk and return is linear in this market. In estimated

	Direct test	Indirect test
Constant $\hat{\gamma}_0$	-0.018*** (0.005)	-0.017*** (0.005)
Betas $\hat{\gamma}_1$	0.030*** (0.005)	0.026*** (0.005)
Residual variance $\hat{\gamma}_2$		0.167*** (0.065)
R^2 (No. of observations)	0.46 (47)	0.52 (47)
Ramsey RESET test (P value)	0.445	0.201
Heteroscedasticity test based on the regression of squared residuals on squared fitted values (P value)	0.757	0.948

Source: Author's calculations
Notes: Standard errors are given in brackets; *** denotes statistical significance at 1% level; ** denotes statistical significance at 5% level; * denotes statistical significance at 10% level.

Table 3: Results of estimated cross-section regression

cross-section models, the constant is significant and negative, i.e. lower than 0.337%, the estimated risk-free rate of return. According to our results, assets not correlated to the market portfolio had a return that is lower than the risk-free rate of return. We reject the hypothesis about the expected value of the SML intercept, expression (6). These results indicate that other factors influence the returns' dynamics in the capital market of Bosnia and Herzegovina as well, and investors were risk-loving rather than risk-averse in the analyzed period.

5. *CONCLUSIONS*

We tested the Sharpe-Linter version of the CAPM with log monthly stock returns from the capital market in Bosnia and Herzegovina. The usage of continuously compounded returns in CAPM estimations has improved satisfaction of the normality assumption as compared to the usage of discrete returns. However, due to the extreme returns, outliers, and return distribution, it would be necessary to model outliers in such an analysis, which could be done in further research.

All beta coefficients were positive and significant at the 1% level. There are no negative betas, typical in other markets as well. In the long run, and especially in bull and bear markets, stock prices tend to move together, not necessarily as a result of issuers' better or worst performances, but due to the herding effect, the irrational and emotion-driven behavior of investors. This causes betas to be positive in the market most of the time, as it is in our study. We also found three of the fifty models were misspecified. One possible explanation is that these securities stock prices were driven by some speculative attacks.

Based on direct and indirect tests using cross-section regressions, we found that systematic risk measured by the regression coefficient beta is priced and beta premium is positive in this market. The empirical regression line has a lower intercept in both cross-section models, as one would expect under the CAPM, implying that other factors, like size, book to market value etc., influence the stock returns in this market as well. In addition, the indirect test suggested that the unsystematic risk measured by residual variance is also priced in this market, in contrast to the earlier CAPM test with discrete returns (Zaimović, 2011). Other indirect tests could help explain additional factors that are priced in this market, which could be addressed in further research. Multi-factor models like the Fama –French three factor model are a natural extension of our work, as well as other methods for beta estimation such as ARCH and GARCH.

Although beta, as a CAPM measure of systematic risk, is found to be statistically significant and positively priced in BiH's capital market, we must conclude that as in other, much more developed capital markets in the world, most CAPM assumptions do not hold in this market. Namely, investors were not able to lend and borrow at a risk-free rate in this market because prior to 2011 there were no treasuries in this market at all. Since 2011, there are quasi-government treasuries, issued by the two entity-level governments.

Not all investors have homogeneous expectations, and not all information is available at the same time to all investors. The fact that the SML line intercepts the y axis lower than the risk-free rate indicates that the market was not in equilibrium in the analyzed period, i.e. forces other than the market itself, like speculative attacks, have driven the realized returns. Investors in that time had substantially different expectations about the return and risk of stocks in this market, which in turn explains the extreme trends in the BiH's capital market in the analyzed period.

(Notes)

1 List of companies included in the sample available with the author.

2 Some stocks were introduced to the market a few months later. Therefore the number of observation varies from 48 to 60.

3 In contrast to our research, Winkelmann (1981) finds the contrary when he analyzes four German stock market indices. Based on the high correlation coefficients he concludes that the analyzed indices are a good substitute for each other.

4 A similar methodology for risk-free rate estimation was used by Guersoy and Rejepova (2007) for the Turkish market.

5 www.bhas.ba, www.federalreserve.gov and www.inflationdata.com

6 For detailed methodology and data see Zaimović (2010) and Zaimović and Mrkonja (2010).

7 Average risk-free rates are used in other studies also, e. g. Omran (2007) and Učkar and Nikolić (2008).

8 Models with non-linear risk-return relation were not tested for stability.

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COMMODITY PRICE VOLATILITY DURING AND AFTER THE ECONOMIC CRISIS – IMPLICATIONS FOR ROMANIA*

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Abstract

Under the impact of a wide range of forces, the prices of globally traded commodities often experience sudden and significant fluctuations, putting under uncertainty and risk the economic status of producers, consumers and traders from the private to the national level. Although commodity markets are notorious for their price volatility, the events the world economy experienced in recent years, particularly the global economic crisis, offered new connotations to this phenomenon. These price movements reverberated across internal markets all over the world, affecting their statuses. As Central Eastern European countries, due to the processes they have undergone in recent decades, manifest an increased responsiveness to external shocks, Romania experienced the international turmoil in a severe manner. This paper calculates and presents, by comparison, the food price volatility experienced at the international level and on the Romanian market during the years of the crisis and immediately after its appeasement.

Keywords: *commodity price volatility, economic crisis, Romanian market, GARCH.*

JEL classification: E30, E37, Q02

1. INTRODUCTION

The prices of globally traded commodities often experience sudden and significant fluctuations as a consequence of a wide range of forces and factors. Undoubtedly, the determinants of price volatility differ from one commodity to another, but in general, sudden price movements are the consequence of low elasticities of demand and supply in the short term (UNCTAD 2008, p. 39). Moreover, price changes tend to have sources that go beyond market fundamentals, adding to supply and demand shocks a large variety of factors, such as: the impacts of changing weather patterns, cycles in key markets, currency fluctuations, agreements or conflicts, trade policies, investments, and so on, an almost inexhaustible list if all of the linkages were to be considered.

The volatility of prices has increased over time, particularly since the 1970s; there were as many major price fluctuations between 1972 and 1999 as there were between 1899 and 1971 (Cashin and McDermott 2002, p. 15). However, even though commodity markets were already notorious for their price volatility, the events that the world economy experienced during the 2000s deepened and offered new connotations to this phenomenon. In the first decade of this millennium, commodity markets experienced profound turbulence and high volatility, with prices reaching

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historical peaks only to crash dramatically some months later and soon restart their rise. Following a steady increase since 2002, induced by the relatively strong performance of the world economy, fast growth and structural changes in several emerging countries, and growing attention to the challenges of global warming and shrinking oil reserves (UNCTAD 2008, p. 19), the international markets for primary commodities reached their peaks in 2008. During this boom, volatility was amplified by the increasing linkages between commodity markets and financial ones. Price volatility, however, has been particularly severe since the emergence of the economic crisis at the global level. In September 2008, the global outlook had already dramatically deteriorated. Accordingly, the boom experienced in the previous years came to an end, followed by a sudden and intensive collapse, which very soon gave way to other consequent rises and falls in prices. Although the reasons for this instability were numerous, the global economic crisis, through a series of mechanisms, has been identified as having made a major impact on commodity price volatility during 2007-2011, as it brought both factors determining sudden pushes downward for prices (through financial restraints) and others determining sudden impulses upwards (through stimulus packages) (Pop 2011).

The price developments on international markets reverberated across internal markets all over the world, affecting their statuses. Because of the particular processes they had undergone in recent decades, Central and Eastern European (CEE) countries manifested an increased responsiveness to external shocks, while Romania experienced the international commodity markets turmoil in a particularly severe manner (Rovinaru, Rovinaru and Pop 2012). In order to illustrate this aspect, this paper presents by comparison the volatility experienced at the international level and on the Romanian market, concentrating the analysis exactly on the years of the crisis and offering a glimpse at the state registered immediately after its appeasement.

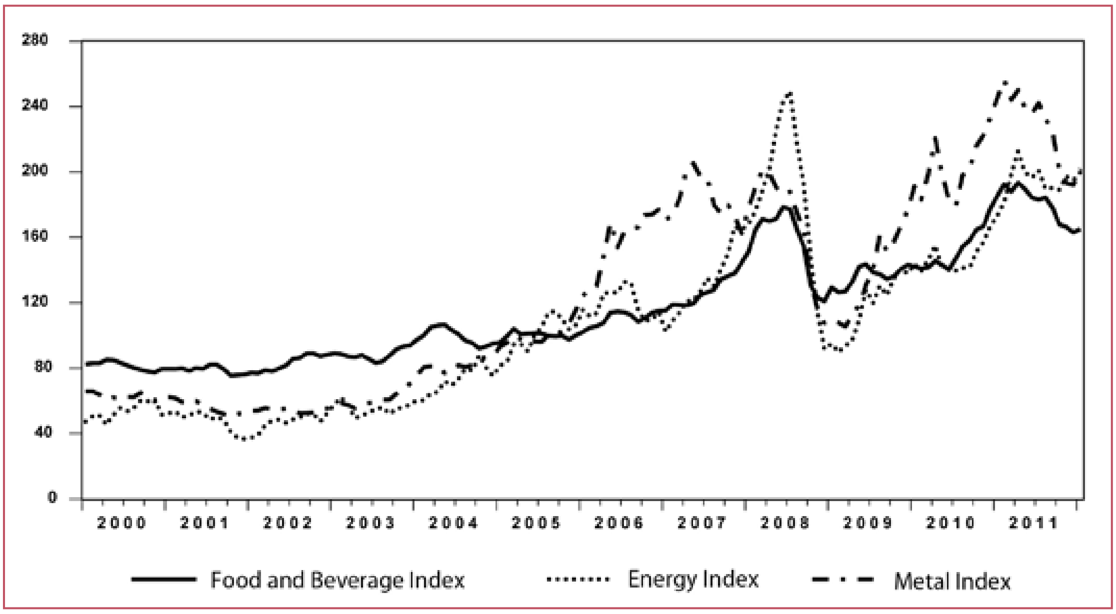
The remainder of the paper is structured as follows. The second section highlights the new perspectives offered by the global crisis regarding commodity price volatility, presenting a literature review supported by some empirical evidence meant to emphasize the mechanisms through which the crisis affected prices and intensified the commodity market's turmoil. The third section illustrates and compares the volatility experienced at the international level and the situation registered on the Romanian market, applying GARCH econometrical models to express the conditional variance on the two markets. Accordingly, this section offers a methodology description focused on the GARCH models and then an empirical illustration in which the econometric models are applied for analyzing the price series of food both on the Romanian market and on the international one. Further, in keeping with the results achieved, a comparison is offered between the conditional volatility on the Romanian and international markets as estimated from the models. Several conclusions finalize the paper in the fourth section.

2. *NEW PERSPECTIVES OFFERED BY THE GLOBAL CRISIS REGARDING COMMODITY PRICE VOLATILITY*

2.1. Literature Review and Empirical Evidences

Since the beginning of the 2000s, commodity markets at the global level have experienced profound turbulence and significant volatility. Starting from 2002, the international prices of all major commodity groups rose gradually in a boom that reached its peak at the middle of 2008, as the financial crisis that had just started to spread caused sharp commodity price declines (Rovinaru, Rovinaru and Pop

Figure 1. Commodity Price Indices (US Dollar Terms) Monthly Data: January 2000 – January 2012 (2005=100)



Source: Authors' illustration in Eviews 7.1 based on data released by IMF 2012.

2012). The graphs in Figure 1 illustrate these developments, as they present the trend of prices for some major commodity groups, emphasizing all the stages of the turmoil, including the blooming period experienced during the price boom, the collapse at the emergence of the crisis, and also the turning point and the restarting of the increase despite the ongoing global recession.

As calculations made using data released by the IMF (2012) show, fuel prices experienced drops of about 70%, metals prices by 50%, and even food and beverage prices, which are generally known to oscillate less under global cyclical conditions, also fell by about 30% (Rovinaru, Rovinaru and Pop, 2012). Even though the world economy was still in the realm of the crisis, the prices ceased falling by the beginning of 2009 and restarted their rise, continuing their rebound during 2010 as the global economy started to overcome the crisis. Increased demand from China, significant production cuts for metals and oil, and some weather-related factors in agricultural markets also contributed to higher prices. In spite of the recovery, even in 2011 prices continued to oscillate drastically, as the world economies continued to struggle with other turbulences, such as the sovereign debt crises.

As emphasized by the graphs in Figure 1, since the moment the economic crisis started to spread worldwide, the fluctuations on the commodity markets became more acute. An investigation of the recent literature regarding the commodity price shock of 2002-onward and the global economic crisis that troubled the world since 2008 led to the conclusion that there is a relationship of cross-determination between the two, each being regarded as both cause and effect for the other. Consequently, the subject "*commodity price shock – global economic crisis"* can be approached in both directions: the commodity price turmoil as a cause and aggravating factor of the crisis, and the global crisis, through its mechanisms, as a major determinant for the commodity price instability of recent years (Pop 2011). Regarding the first direction of approach, Gnan (2009), for example, offers support through explanations based on terms of trade deterioration in commodity-importing countries (which affected production and diminished private purchasing power and demand) and tightened monetary policies designed to avoid inflationary spreading, which contributed to the bursting of various asset price bubbles that had been accumulating since the beginning of 2000s, a fact that determined the global recession. Further, the price collapse of the second half of 2008 deteriorated the exporting countries' terms of trade, adding another adverse shock to the already decreased demand caused by the world recession, while, in the context of the negative global background, the gain in terms of trade for the importing countries did not provide much stimulus for investment and consumption, primarily contributing to an increase in private savings. As a result, high commodity price volatility may not only have caused the global crisis but may also have intensified its subsequent development (Gnan 2009, p. 22-23).

At the same time, the global crisis represented a major determinant for commodity price volatility in recent years. The mechanisms through which the crisis induced price instability are as follows:

- *shortages in credit availability and trade financing* that influenced market fundamentals;
- the deterioration of the global economic outlook and the lack of quick recovery perspectives that determined the *decrease of consumption and investments* and the increase of household savings rates, which further influenced the demand;
- the *invested capital on exchange markets*, which directly influenced volatility;
- the *depreciation of US currency*, in which most of the commodity prices are denominated;
- the *stimulus packages* introduced by some OECD countries and by some emerging economies, as a response to the crisis, which created supplementary pressure on the market fundamental.

The first three mechanisms listed above (*shortages in credit availability and trade financing, consumption* and *investment decreases*) can be regarded as typical reactions to an economic and financial recession. However, we consider the other two mechanisms (*U.S. dollar depreciation* and *stimulus packages*) to be those that offered new perspectives of analysis for price instability in the context of the crisis. Several theoretical and empirical analyses support this conclusion. For example, Lipsky (2008, p. 7) has shown that the depreciation of the U.S. dollar contributed approximately 20% to the increase of food prices. Moreover, if the U.S. dollar had maintained in recent years its level in 2002, oil prices would have been lower by 25 dollars per barrel and the price increase in other categories of goods would have been lower by 12%. Also, Pop (2011, p. 106-108) brings arguments to the fact that the 4000 billion Yuan (the equivalent of 586 billion USD) economic stimulus plan launched by China in November 2008 has been the major determinant for the end of the commodity price collapse and its consequent increase, despite the fact that the world was still in the midst of the global recession.

3. *PRICE VOLATILITY DURING AND AFTER THE CRISIS: THE INTERNATIONAL AND ROMANIAN MARKETS*

The significant turbulence of the international markets reverberated across internal markets all over the world, affecting their statuses. The CEE countries, due to the processes they had undergone in recent decades – post-communist transformations, market externalizations, globalization and European Union integration – manifest an increased responsiveness to external shocks. With the outburst of the global crisis, the vulnerability of these markets came once again to the front, as almost all of these states had accumulated major economic imbalances and had been experiencing sharp depressions (Rovinaru, Rovinaru and Pop 2012). Consequently, Romania experienced the global crisis and international market turmoil in a severe manner. In order to illustrate how the price instability on the world market reverberated across that of Romanian, we chose to model the volatility of food prices on the two markets from January 2006 onwards in order to emphasize the moment of the crisis and its consequent effects.

3.1. Methodology

When estimating price volatility, a wide range of methods can be encountered in the economic literature, and which vary from rather simple ones, such as unconditional standard deviation or the coefficient of variation, to more complex ones, such as the ARCH model and its extensions. A series of limitations may be identified in the abovementioned simple approaches, causing an exaggeration of uncertainty and related price risk while computing volatility. These aspects are due to the fact that the unconditional standard deviation and the coefficient of variation do not distinguish between the predictable and unpredictable components of price series, intrinsically assuming that market participants behave in a naive way, not having the ability to detect regular features of the price process. Certain approaches are not founded on realistic considerations, as it is unrealistic to suppose that market participants do not have the experience of predicting seasonal behaviors, long-term tendencies or cyclical components in the prices of the commodities they deal with (Figiel and Hamulczuk 2010).

A common approach is represented by the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) model (Bollerslev 1986), which has the merit of accounting for both the predictable and unpredictable components in the price process, while considering time varying conditional variances, and consequently, only the stochastic or unpredictable components when modeling volatility (Jordaan et al. 2007). According to Engle (2001), applications of the GARCH approaches are widespread in situations where the volatility of prices is a central issue, as relatively high volatility implies two problems: the autocorrelation of the residuals and heteroscedasticity. The latter refers to a situation in which the variances (σ_t^2) do not have a constant evolution in time, being conditioned, on the one hand, by its own lagged values (σ_{t-i}^2) and revealed by the GARCH-terms and, on the other hand by the lagged values of standardized errors with the aid of ARCH-term $\left(\frac{\varepsilon_{t-i}}{\sigma_{t-i}}\right)$ (Pop and Ban 2011, p. 515).

Studies using the ARCH model and its extensions are commonly encountered in modeling stock market prices. With regard to commodity prices, notable models include those of Aradhyula and Holt (1988) which applied the GARCH method to modeling meat production, and Jordaan et al. (2007), which measured conditional volatilities for the prices of various crops traded on the SAFEX using the ARCH or GARCH approach. More recently, Figiel and Hamulczuk (2010) tested for conditional volatility by analyzing monthly wheat procurement prices in Poland. Regarding the Romanian market, this kind of approach in commodity price modeling has been applied by Pop and Ban (2011), who used EGARCH for modeling the price of wheat in order to estimate volatility and price risk, both on the Romanian and international markets. As part of a larger investigation of price volatility on the Romanian market, an investigation which also includes the present paper, Rovinaru, Rovinaru and Pop (2012) estimated and compared the price volatility on the Romanian and international combustible markets, while Pop, Rovinaru and Rovinaru (2013) analyzed price volatility at a deeper level, investigating the cereal and sugar markets.

The general form of a GARCH (p,q) model includes two equations, one for the conditional mean and another for the conditional variance. The coefficients of ARCH-terms (α_i) reveal the volatility of previous periods of time and this volatility is measured with the aid of squared residuals from the equation of mean. The coefficients of GARCH-terms (β_j) show the persistence of past shocks on volatility. In our empirical analysis, we started from the basic GARCH (p,q) model, but during our research concluded that, for the analyzed price series, the asymmetrical GARCH models perform better compared to the symmetrical ones. This conclusion is also consistent with the findings of Pop and Ban (2011) and of Rovinaru, Rovinaru and Pop (2012). The symmetrical models assume that both the positive and negative innovations have a similar impact on volatility, while in reality it was demonstrated that for certain financial series, their volatility is significantly higher after negative shocks $(\varepsilon_t>0)$ compared to its level after positive ones $(\varepsilon_t<0)$. This effect is included in the extended model called EGARCH with the aid of an asymmetric coefficient, γ_i (Rovinaru, Rovinaru and Pop 2012). Similar to the methodology applied by Rovinaru, Rovinaru and Pop (2012) for studying combustible price volatility, in our paper we used the AR(k)-EGARCH(p,q) model, elaborated by Nelson (1991) with the following structure:

$$X_t = \pi_0 + \sum_{i=1}^{k} \pi_i \cdot X_{t-i} + \varepsilon_t \qquad (1)$$

$$\log\left(\sigma_t^2\right) = \omega + \sum_{i=1}^{p} \alpha_i \cdot \left| \frac{\varepsilon_{t-i}}{\sigma_{t-i}} - E\left(\frac{\varepsilon_{t-i}}{\sigma_{t-i}}\right) \right| + \sum_{l=1}^{r} \gamma_l \cdot \frac{\varepsilon_{t-i}}{\sigma_{t-i}} + \sum_{j=1}^{q} \beta_j \cdot \log\left(\sigma_{t-j}^2\right) \qquad (2)$$

where the residuals from (1), ε_t, follow a GED or a normal distribution and the $\log\left(\sigma_t^2\right)$ is the logarithm of conditional variances.

3.2. Empirical Results

The empirical investigation of the present paper is concentrated on the analysis of the price indices evolution for the Romanian food market, offered by the Romanian National Institute of Statistics (RNIS) and corresponding ones at the international level from the International Monetary Fund (IMF) Primary Commodity Prices database. We used monthly data between January 2006 and November 2011 in order to emphasize and analyze exactly the moment of the global crisis and its consequent effects immediately after its appeasement. We performed the analysis using *Eviews 7.1*.

Initially, a series of steps required by the statistical analysis of the time series were implemented. We eliminated the seasonal component of the two series using the multiplicative moving average method. From that point forward, we operated with the logarithmic price ratios of the two series ($\ln(P_t/P_{t-1})$), due to their better statistical properties (Sironi and Marsella 1997, p. 159). The descriptive analysis of the food price return series, both on the Romanian and international markets, revealed that its volatility is not constant in time, indicating the presence of heteroscedasticity, making our data appropriate for GARCH modeling. In order to detect the serial autocorrelation, we analyzed the autocorrelation (ACF) and partial autocorrelation function (PACF) estimated for a number of lags varying from 12, 24 to 36, and the calculated Q-statistics indicated the presence of this phenomenon. Table 1 presents other descriptive statistics, showing mainly that the log returns of food prices do not follow a Gaussian distribution, since the skewness is different from zero and the kurtosis has a value larger than 3, as they should be for a Gaussian distribution. This aspect is also supported by the Jarque-Bera test.

Further, we tested the non-stationarity of the time series, as they need to be stationary in order not to obtain spurious regressions. In Table 2 we showed the results of the ADF test at the national and international levels.

Table 1. Descriptive Statistics of Food Price Indices – Romanian and International Market, January 2006 – November 2011.

Measure	LN_FOOD_RO_SA	LN_FOOD_INT_SA
Mean	-0.000584	0.007426
Median	-0.000475	0.010280
Maximum	0.024999	0.070874
Minimum	-0.045279	-0.145514
Std. Dev.	0.010959	0.037388
Skewness	-0.774862	-0.865464
Kurtosis	6.109919	5.460199
Jarque-Bera	35.21361	26.39203
Probability	0.000000	0.008292

Source: Authors' calculations in Eviews 7.1.

Table 2. Testing the Non-Stationarity of Food Price Indices – Romanian and International Markets, January 2006 – November 2011.

Null Hypothesis: the series has a unit root

	t-Statistic	Prob.*		t-Statistic	Prob.*
LN_FOOD_RO_SA	-0.963848	0.7662	DLN_FOOD_RO_SA	-11.66081	0.0000
LN_FOOD_INT_SA	-0.215600	0.9332	DLN_FOOD_INT_SA	-10.25621	0.0000

*MacKinnon (1996) one-sided p-values.

Source: Authors' calculations in Eviews 7.1.

For the logarithmic series, the calculated value of the *t*-Statistic shows the series was not stationary. Thus, we constructed the first order differences that proved to be stationary.

Afterward, we estimated the models for each of the two variables, the conditional mean and conditional variance. Equations (1) and (2) were estimated using the maximum likelihood. Based on the information criterion minimization (especially Schwarz) and on the residual test, we chose the appropriate number of lags. When comparing the in-sample forecast with the real values, we noticed that the combined models ARIMA-EGARCH with a GED distribution perform better and produce more accurate estimates.

For the Romanian market, we determined that the most appropriate model took the following form (the z-Statistics and the probabilities are given in parentheses):

$$
\begin{array}{ccccccc}
d\ln food_{Ro,t} = & 0.529 \cdot d\ln food_{Ro,t-1} & - & 0.212 \cdot d\ln food_{Ro,t-2} & + & 0.123 \cdot d\ln food_{Ro,t-12} + \varepsilon_t & \\
 & [17.18] & & [-36.04] & & [3.50] & (3) \\
 & (0.000) & & (0.000) & & (0.005) &
\end{array}
$$

$$
\begin{array}{cccccc}
\log\left(\sigma_t^2\right) = & -17.36 & + 0.69 \cdot \left|\dfrac{\varepsilon_{t-1}}{\sigma_{t-1}}\right| & - 0.38\dfrac{\varepsilon_{t-1}}{\sigma_{t-1}} & - 0.82 \cdot \log\left(\sigma_{t-1}^2\right) & \\
 & [-11.0] & [1.70] & [-1.44] & [-4.83] & (4) \\
 & (0.000) & (0.008) & (0.001) & (0.000) &
\end{array}
$$

For the international market, the appropriate model is:

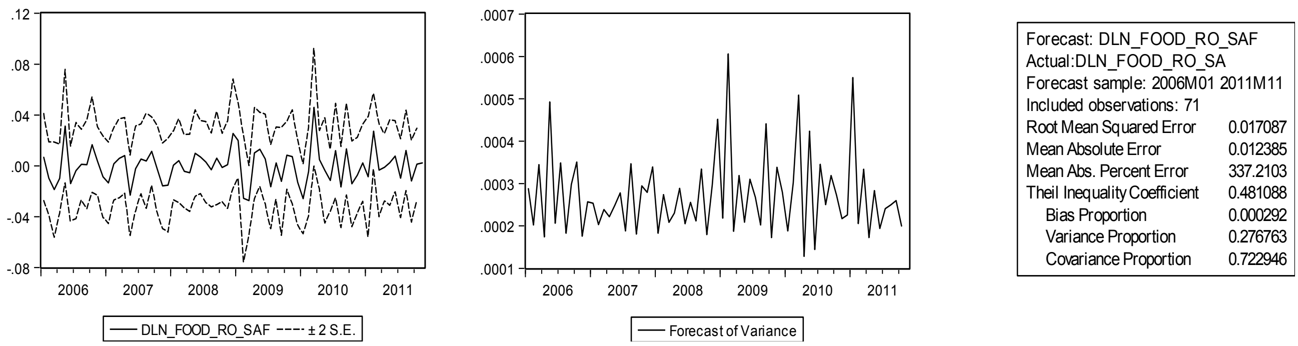
$$
\begin{array}{ccccccc}
d\ln food_{Int,t} = & -0.42 \cdot d\ln food_{Int,t-1} & + & 0.23 \cdot d\ln food_{Int,t-2} & - & 0.55 \cdot d\ln food_{Int,t-3} + \varepsilon_t & \\
 & [-23.47] & & [5.85] & & [-12.96] & (5) \\
 & (0.000) & & (0.000) & & (0.000) &
\end{array}
$$

$$\log\left(\sigma_t^2\right) = -7.02 + 2.60 \cdot \left|\frac{\varepsilon_{t-1}}{\sigma_{t-1}}\right| + 0.01 \cdot \frac{\varepsilon_{t-1}}{\sigma_{t-1}} - 0.33 \cdot \log\left(\sigma_{t-1}^2\right)$$
$$\begin{array}{cccc} [-5.86] \; [5.16] & [0.11] & [-1.51] \\ (0.000) \; (0.000) & (0.001) & (0.01) \end{array} \qquad (6)$$

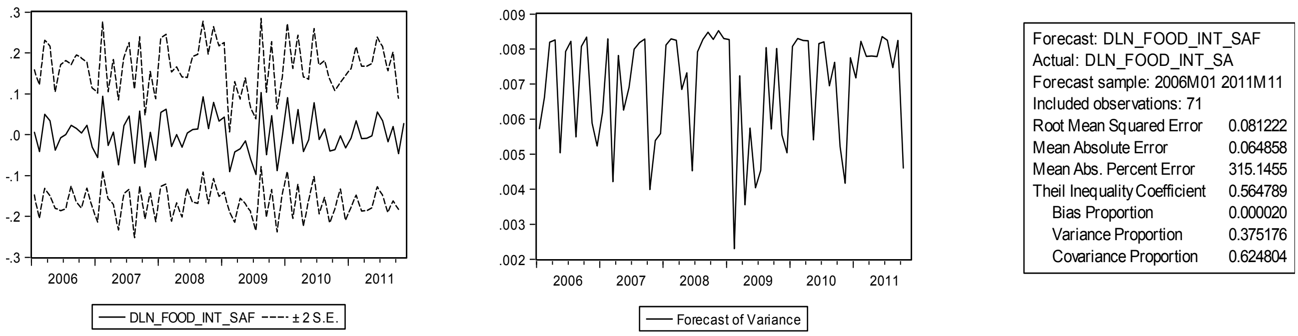
In our case, the most important are equations 4 and 6, which estimate the conditional variances as indicators for price volatility. Based on the estimated equations, we generated the series of conditional volatility in order to compare for the period January 2006 – November 2011 which of the two markets was more volatile. The results are given in Figure 2, the conditional volatility at the international and national levels.

Figure 2. Food Price Volatility Monthly Data: January 2006–November 2011 (2005=100)

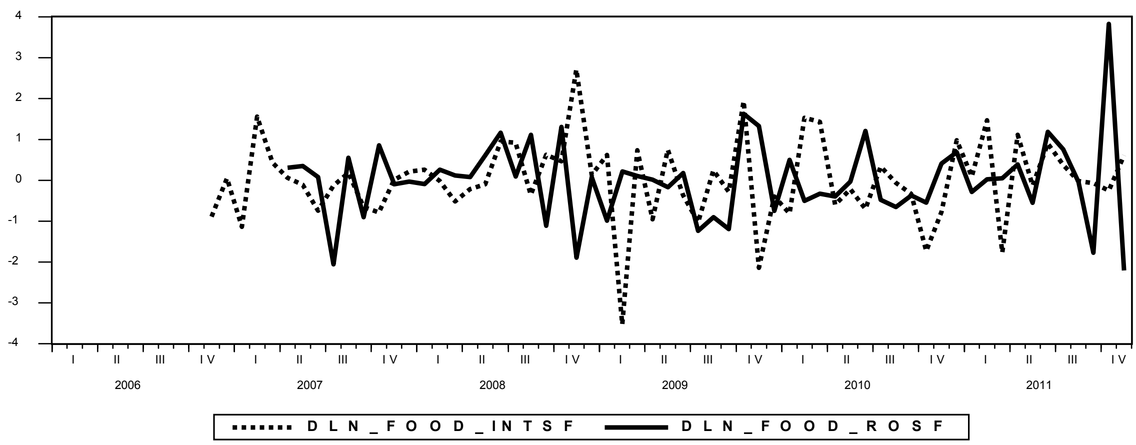
(a) Romanian Market



(b) International Market



(c) Merged Graphs – Romanian and International Market



Source: Authors' calculations and illustrations in Eviews 7.1 based on data released by RNIS and IMF 2012.

Figure 2 illustrates that the estimated values of conditional variances show an increase of volatility between 2008 and 2011 on both food markets. After 2007–2008, the Romanian market appears to be more influenced by the situation than the international one, following the "peaks" generated by different world events, always one step behind. The main reason for this higher synchronization is most probably the fact that by joining the EU in 2007 and opening its markets, Romania became more receptive to international shocks. This finding is also consistent with that of Rovinaru, Rovinaru and Pop (2012) for the combustible market.

Comparing the evolutions of volatility for the two food markets, we can affirm that in the midst of the crisis the food prices volatility was more accentuated on the international market than on the Romanian one. However, in the following period, in 2010 and especially in 2011, the volatility on the Romanian market become more acute than the international one, a sign of the fact that Romania is currently experiencing more severely the consequences of the crisis, and that it is highly affected by the turbulences in the euro aria and the sovereign debt crisis, while also facing a period of turmoil and internal problems that deepen the volatility context in comparison with the international market.

Analyzing the resulting equations for the Romanian market, we observed that the current volatility depends more on past shocks in the system than on past volatility. Thus, the current volatility context has its origins on the shocks and transformations to the Romanian market in general, and the food sector in particular, that were experienced in the recent period. Seven years after joining the European Union, the Romanian food sector is confronted with many difficulties whose effects are reflected in the performance and competitiveness of the sector. Compared to other EU Member States, Romania has significant agricultural potential. However, its organization, its excessive fragmentation of parcels which reduces productivity and discourages investments, combined with inadequate funding, are obstructing the achievement of the adequate level of performance necessary to cope with the increasing competitive pressures (RCC 2010, p. 31). Over the past two decades, this sector has experienced fluctuations in its development owing to structural changes such as privatization, the restitution of land after the communist period, and other external influences and transformations due to the processes of market liberalization and the need for alignment with the requirements of the European Community. All of these transformations had a major effect on the efficiency of the sector and its international competitiveness. Moreover, a significant part of the food products in Romania are imported, from meat to oils, vegetables, fruits, and also cereals in poor agricultural years. This shortcoming is due to the seasonality of agricultural production, which reaches its peak during the summer, and also to the lack of storage capacity and adequate means for the conservation of products. Indeed, the increase of imports of cheaper food products and the need for alignment with EU requirements, combined with the process of price convergence, are the main reasons why the world and European market evolutions in the sector are directly felt on the Romanian market. The Romanian producers adapt with great difficulty to a market environment characterized by the high volatility of demand and prices, especially in the context of the recent economic turmoil. Before accession to the euro zone, it will be necessary for the agricultural system to reduce such volatilities as much as possible. Investments in this sector – through the absorption of EU funds, state funds schemes, banking products and other alternatives that the market economy offers – could contribute to increased productivity, better internal results and, in time, lower import levels.

Nevertheless, the volatility of prices remains a complex phenomenon we have to live with and which we can moderate only up to an extent. By adjusting market structures and specifying regulatory and fiscal policies we can try to limit it, but we will not remove it on the whole. Consequently, an alternative approach should consist in developing means to deal with the price risk and uncertainty that this volatile context creates. By implementing viable price risk management strategies – contractual, market-based, insurance schemes, etc. – the Romanian producers and consumers could attenuate the negative effects of price volatility, while concentrating on reducing the level of the imported volatility by strengthening internal capacities for production.

4. *CONCLUSIONS*

The global economic crisis, through a series of mechanisms, has been identified as having manifested a major impact on the price volatility of commodity markets during 2006-2011, as it brought factors manifesting both sudden pushes downward for prices followed by sudden impulses upwards. Initially increased partly due to "financialization" and reallocation of investments from the housing market, the collapse in commodity prices was intensified by the sharp contraction in demand in the developed and many emerging economies, which caused significant falls in the volume of international trade. The global crisis started as a financial crisis, and so also negatively affected the banking system, which stopped providing credit, leaving both producers and consumers without access to finance. The lack of credit at the height of the crisis caused a further contraction in commodity trade, and thus amplified the price collapse. Moreover, the instability of the U.S. dollar created additional pressure. However, the collapse, although major and sudden, did not persist for long, as commodity prices suddenly restarted their increase at the beginning of 2009. Credited with stimulating price recovery for most commodity groups, the stimulus packages introduced stimulated economic growth and rebuilt confidence in the financial markets. Although the commodity prices recovered temporarily after the crisis, the years 2010 and 2011 brought turbulence that again increased volatility.

With regard to the Romanian situation in terms of food market price volatility, after 2007 Romania become more receptive to price signals from the international food market. Consequently, during the global crisis, its economy followed one step behind the international trend. However, in recent years, 2010 and especially 2011, the volatility on the Romanian market became more acute than the international one. These findings are in accordance with those provided by Rovinaru, Rovinaru and Pop (2012) and Pop, Rovinaru and Rovinaru (2013) for the combustible market and, from the agricultural perspective, for cereal and sugar markets. These findings come as proof of the fact that Romania is currently experiencing more severely the consequences and aftermath of the crisis, while also highly affected by turbulence in the euro area and the sovereign debt crisis; moreover, it is also facing a period of turbulence and internal problems that deepen the volatility context in comparison with the international market. The current volatility context has its origins in the shocks and transformations to the Romanian market in general, and the food sector in particular, that were experienced during the recent period, transformations that had a major effect on the efficiency of the sector and its international competitiveness. Despite Romania's significant agricultural potential, its low productivity levels and inadequate funding are obstructing the achievement of an adequate level of performance necessary to cope with increasing competitive pressures. The increase of imports of cheaper food products and the need for alignment with EU requirements, combined with the process of price convergence, are the main reasons why the world and European market evolutions in the sector are directly felt on the Romanian market. Consequently, Romania's current volatility context is a mixture of imported volatility and internal instability and the lack of maturity of its market structures. As price volatility represents a very complex phenomenon that can be moderated only up to an extent by adjusting market structures and specifying regulatory and fiscal policies, Romania should concentrate on strengthening its internal potential for production in order to reduce the level of imported volatility, while also dealing with the problem through price risk management strategies.

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THE ROLE OF GENDER AND SITUATIONAL FACTORS IN WINE CONSUMPTION OF GENERATION Y

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Abstract

The purpose of this study is to analyze the factors influencing wine consumption of Generation Y consumers in the context of two countries from South-Eastern Europe (Bosnia -Herzegovina, and Croatia). Analysis reveals that self-expression, sociability, tradition and food are significant predictors of wine consumption. Multivariate regressions have been applied in order to explain the influences of the abovementioned factors on wine consumption. Research findings show that specific gender and situational differences exist in the wine consumption behaviour of Generation Y. This paper discusses theoretical, empirical and practical implications, and offers ideas for further research.

Keywords: *wine consumption, wine consumption motivators, Generation Y, Bosnia and Herzegovina, Croatia*

JEL classification: M31

1. INTRODUCTION

Wine is becoming a lifestyle beverage for all generations (Bruwer, Saliba & Miller, 2011), but the image of wine differs among age cohorts (Olsen, Thach & Nowak, 2007). Bearing in mind that each generation has specific values that lead to different behaviours (Inglehart, 1997), age segmentation in the wine business is becoming increasingly important. This can be explained by the fact that wine consumption increases with age, experience and with the maturation of a person's palette (Quester & Smart, 1996; Stanford, Bailey & Rowley, 2008).

Young consumers, especially Generation Y, born in the period between 1977 and 1999 (Lancaster & Stillman, 2003) are experiencing a growing trend of interest in the wine market. However, they are still inexperienced, confused and overwhelmed by having to choose wine (Wine Intelligence, 2010). Euromonitor International (2012) suggests that within the overall alcoholic beverage consumption of Generation Y, wine seems to play a minor role. However it does increase later. As Generation Y is getting older the wine industry is aware of the need to pay more attention to this segment (Kevany, 2008; Mueller, Remaud & Chabin, 2011) if they would like to ensure market growth in the future. Peskett (2006) confirmed that in the coming years Generation Y members will become increasingly important as wine consumers. Generation Y presents an increasing market for alcoholic beverages, with wine in particular benefiting from the fact that it is viewed as fashionable and reflective of a sophisticated image (Euromonitor International, 2012). Furthermore, Generation Y includes many future business people and wine producers should also take into account different factors that influence their habits regarding consuming wine in business situations. However, Charters et al. (2011) assert that little academic research has been carried out regarding the general wine preferences of Generation Y – most of which has focused on the USA.

Atkin, Nowak and Garcia (2007) acknowledge that gender plays an important role in the wine information search as well as in consequent buying behaviour. According to them, males and females show different patterns and this information should be taken into account when approaching

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customers. Therefore, changes in marketing and advertising strategies are required in order to take generational specificities into account (Angoli, et al 2011), as well as consumption situations and gender differences that drive consumers' wine consumption motives. Bearing in mind that factors which influence consumer behaviours are cultural, social, personal and psychological (Kotler and Keller, 2008), one of the goals of this study is to examine the influence of age and gender as a part of personal-demographic factors.

Globally, the wine market and wine consumption are growing (OIV, 2012), with consumption in EU countries accounting for around 65% of the world wine market. Within agricultural production, wine production has GDP value added ranging from 3.6% for Bosnia and Herzegovina and 6.4% for Croatia (FAQ, 2012, EC 2012). These rates are close to the average rate of wine production contributing GDP value added within the EU-27 countries, which is 3.9%. Nonetheless, wine production is identified as an important sector within both national economies. National wine sector development strategies in both countries place emphasis on the production of high quality wine, the development of specialized wine marketing programs for small local wine producers and the promotion of local high quality wine to new markets. Therefore, wine production is seen as an important contributor to economic development in Bosnia and Herzegovina and Croatia. Given the above, we contend that it is important to examine the attributes of wine consumption in local markets, with special focus on Generation Y, which is a growing wine target market and whose tastes are moving towards appreciation of wine as a drink.

The main purpose of the paper is to explain the antecedents of wine consumption in different purchase situations, bearing in mind the gender differences of Generation Y. Hence, this study should help practitioners to create a more appropriate promotional tool in order to adequately target male and female Generation Y consumers in the context of two South-Eastern European countries.

The paper is organized into the following sections. First, a theoretical background and hypotheses development on wine consumption motives are offered. This section is followed by empirical research and hypotheses testing. The final part of the paper consists of a conclusion, proposals for further research and a discussion of the study's limitations.

2. CONCEPTUAL BACKGROUND ON WINE CONSUMPTION PATTERNS

2.1. Motivational Influences

To support the growing trend of the world wine market, wine consumption should be introduced to young consumers during the critical years in their late teens to their early-to-mid-20s, since during those years they form consumption habits for life (Bruwer, 2004). Different motives drive wine consumption. Brunner and Siegrist (2011) identified several groups of wine consumption motives such as self-expression, recreation, sociability, health, style, food, pleasure, tradition, fun and intellectual challenge. Furthermore, these wine consumption motives differ across situations. Vrontis and Papasolomou (2007) found that wine tasting events, word-of-mouth and wine exhibitions are the most important factors influencing consumers' behaviour and in shaping consumer perception and purchase decisions. Hence, researchers acknowledge that different situations shape wine consumption behaviour (Brunner & Siegrist, 2011; Dubow, 1992; Charters, 2006). Wine is consumed because a person wants to be socially accepted or to emphasize her/his status. It aids the aesthetic perception of a person who consumes wine. Furthermore, wine consumption also ensures relaxation and creates a nice, relaxing environment. It aids socializing, connects people and helps establishing sociability. Moreover, for some taking a glass of wine or consuming wine represents connection with tradition. Wine is also considered to enhance hedonic pleasure and is usually taken as a drink that enhances the taste of food. It also represents an intellectual challenge because of the complexity of its tastes (Kolyesnikova et al., 2008).

Generational cohorts are one of the least understood marketing dynamics (Bruwer et al., 2011). Mueller et al. (2011) proved that Generation Y is more oriented towards hedonic success and status and less oriented towards social values. Therefore, it is most promiscuous in its alcoholic beverage consumption, but still having a positive disposition towards wine (Nielsen, 2007; Thach & Olsen, 2006).

2.2. Consumption Situation Influences

Olsen et al. (2007) claimed that Generation Y perceives wine as a social beverage, playing an important role in social occasions for this generation. Young consumers are more likely to consume alcoholic beverages at pubs, bars and in restaurants, compared to older generations who mainly consume alcohol at home (Teagle et al., 2010). Angoli et al. (2011) introduced three levels attributed to the company in which one consumes wine: alone, with family and with friends.

Furthermore, intended usage and consumption situations have a significant influence on purchasing behaviour (Ritchie, 2009). This is reflected in the choice of different buying places when wine is bought as a gift, that is, on special occasions, versus everyday wine that is usually consumed with meals with a family or partner. Also, different explicit and implicit cues influence wine selection depending on the consumption situation (Atkin, Nowak & Garcia, 2007). According to Olsen, Thach and Nowak (2007) generational differences are also evident in different wine consumption situations, indicating that Generation Y will consume wine more than other generations at bars and formal celebrations. Also, the influence of reference groups such as friends, family and co-workers is more evident in the youngest generational cohort, Generation Y. Young people certainly prefer consuming wine with friends or family. Therefore, this research compares the choices that are made therein with choices that are influenced by family and those that spring from individual decisions, like special occasions.

H1: Generation Y exhibits different wine consumption motivators depending on wine consumption occasions.

2.3. Gender Influences

Male and female consumers have different perspectives on evaluating products and services, information searches, decision processes and attitudes towards marketing mix strategies (Gunay & Baker, 2011). These differences result from the biological distinction between male and female (Garst & Bodenhausen, 1997).

Certain products are perceived to be more gender-specific than others, meaning that individuals with stronger masculine or feminine identities tend to associate with them if they appeal to this aspect of their identity (Hall et al., 2001). Spawton (2000) went as far as to state that wine has been generally perceived as a feminine beverage. This conclusion is supported by research Baber et al. (2006) who identify white wine as female drink. A recent qualitative study conducted by Charters et al., (2011) has confirmed that Generation Y perceives champagne and sparkling wine as a woman's drink. Moreover, Richie (2009) asserts that even though wine buying is considered a traditional male role, actually more females buy wine.

Other studies (Schamberg, 2002; Robinson, 2004; Low, 2001; Hoffman, 2004) have examined the gender influence of wine behaviour. However, as Bruwer et al. (2011) argue, these studies did not probe whether the wine behaviours identified through gender research have a relationship with age subcultures (Generation Y, for example).

This also highlights the issue that gender plays an important role in wine segmentation, in addition to age. Atkin, Nowak and Garcia (2007) suggest that a good starting point when evaluating how consumers make wine buying decisions may be looking at demographic and lifecycle variables, with gender in particular as a starting point. Therefore, this research compares gender influences in wine consumption motivators according to different consumption situations.

H2: Generation Y's wine consumption motivators under different wine consumption occasions demonstrate gender influence.

3. EMPIRICAL RESEARCH

Wine consumption in Bosnia-Herzegovina grew 3% in volume during 2010, totalling 13 million litres off-trade and 2 million litres on-trade, implying that an increased interest among consumers for wine culture is evident (Euromonitor International, 2010a). Female consumers aged 18-30 drive the on-trade consumption of wine. Alcohol consumption per capita is at 7.1 litres, while wine consumption is 1.2 litres per capita (WHO, 2014). This data raises the possibly for increasing the wine consumption rate among youngsters, as wine has a lower level of alcohol than spirits and hence can be considered a more appropriate alcoholic drink. Euromonitor International (2010a) assesses that Bosnia-Herzegovina consumers will take an increasing interest in wine culture in the near future, being influenced by subtle media campaigns using television, magazines and the Internet. Even if total wine production in 2010 was at a level of 54 000 HL (FAO, 2012), the geographical position of Bosnia and Herzegovina is what gives importance to the local wine industry as a facilitator of economic development.

Croatia has a long tradition of alcohol consumption, with a per capita consumption of 12.2 litres in 2010, where wine comprised 6.6 litres (WHO, 2010). Generation Y members in Croatia do not usually drink wine with meals and tend to prefer wine mixed with Coca-Cola when in pubs or bars. Women have begun to drink non-grape wine, especially blackberry wine, because of the perceived health benefits of this type of beverage (Euromonitor International, 2012). In urban areas, wine is often replaced by beer, though those with more disposable income consume wine with their main meals. Total wine production in Croatia in 2010 was at 143 300 HL (Gain report, 2014). Different regions are characterized by small local producers that mostly sell wine on the local market, with an emphasis on introducing wine marketing and producing high quality wine can help enhance local development.

Generation Y in both countries comprises more then 20% of the total population, Bosnia-Herzegovina with 22.2% (ASBH, 2013) and Croatia 25.43% (CBS, 2013). Most of them spent their early childhood in the same country, the former Yugoslavia, and had a melting pot experience that included other cultures and nationalities. Their direct and indirect war experience and the quick adoption of new ways of thinking, as well as economic and political crises, have shaped the way they perceive world around them. They are team-oriented and build strong relationships with friends, while having both a strong awareness of the environment they live in and an aversion to accepting universal truths (PWC, 2013). Others argue that Generation Y lack universally accepted attitudes and behaviour around the world except in USA and Western Europe. However Generation Y attitudes and behaviour in Bosnia-Herzegovina and Croatia and their alcohol consumption habits are relatively similar (PWC, 2013).

Alcohol consumption in different religions is diversely perceived. Alcohol consumption is sometimes against cultural norms, especially in countries with primarily Muslim inhabitants. In Bosnia-Herzegovina, Muslims constitute 45%, Orthodox Christians 36% and Roman Catholics 15% of the population (US Department of state, 2010). In Croatia Roman Catholics constitute 86.28% of the population, Orthodox Christians 4.4%, Muslims 1.47% and others 7.8% (CBS, 2013). Still, alcohol consumption in Bosnia and Herzegovina is quite high (7.1 litres per capita) compared to more traditional Muslims societies, where alcohol consumption is around 1.1 litres per capita (WHO, 2014). Hence, all of this contributes toward the validity of researching both countries together.

3.1. Data Collection

To test the proposed hypotheses, field research was conducted in Bosnia-Herzegovina and Croatia. Our research used a highly structured questionnaire for data collection. A non-probability sampling accompanied with a snowball technique was used. Usage of the snowball technique was appropriate because of the sensitivity of the researched topic (Hair et al., 2009), that is, personal alcohol consumption habits. A self-administered online survey was used. As a criterion for identifying participants who could give reliable answers, the first question of the survey determined whether respondents drank wine more than once a month, which if were the case made them eligible to participate in the survey. In total 329 fully completed questionnaires were collected.

Following the definition of Generation Y given by Lancaster and Stillman (2003), the birth years of respondents was taken as a second filter variable. Consequently, 295 out of the 329 collected questionnaires were included in the subsequent research on Generation Y. Sample characteristics are presented in Table 1.

The questionnaire included questions about wine consumption habits and reasons for consuming wine. In defining reasons for wine consumption, different authors were consulted. Items from Brunner and Siegrist (2011), Dubow (1992), Charters (2006) and Thach and Olsen (2004) were used. The survey instrument was developed in English and then translated into the local language. Furthermore, all statements were measured on a five-point Likert scale, where 1 indicated strongly disagree, and 5 indicated strongly agree.

We performed invariance tests across the two samples in line with the literature (e.g., Steenkamp & Baumgartner, 1998). The results of invariance tests confirmed that configural, metric and scalar invariances existed across the Bosnia-Herzegovinian and Croatian samples, suggesting that items were equally reliable across both samples. In addition, we also conducted an independent samples t-test to examine differences in responses coming from the two countries. No significant differences were identified, suggesting that the two samples could be examined together. Therefore, we merged our data into single file for further analysis. To analyze results, the SPSS 20.0 and LISREL 8.80 software packages were used. Multivariate regressions were conducted to test the posited hypotheses.

3.2. Measurement Model Assessment

For determining the underlying structure of wine consumption motivators an explorative factor analysis (EFA) was firstly performed. Common factor analysis using principal axis factoring in SPSS with oblimin rotation was used, according to the suggestion of Hair et al., (2009). The KMO measure and Bartlett test of sphericity were satisfactory and the exploratory factor analysis was further examined. Heavily cross-loaded items were excluded from the analysis and are not presented in the following tables. While checking for factor reliability, items with low item-to-total correlations were also removed from the factors, as keeping them does not assure additional insight into constructs used in the research. Furthermore, to check the internal structure of the wine consumption motivators under examination, and to check their internal consistency, a confirmatory factor analysis (CFA) using LISREL 8.80 was done. In this analysis the maximum likelihood method is used. Results from both factor analyses are presented in Table 2.

Analysis revealed that four different motivators in the wine consumption process exist among respondents. These four factors are sociability, self-expression, tradition and food. Together they explain 76.93% of the variance, meaning that they adequately represent the different wine consumption habits of Generation Y. This shows that through exploring wine consumption habits with sociability, self-expression, tradition and food it is possible to identify different perspectives and motivators in wine consumption patterns.

In addition, all of the composite reliabilities are above the suggested minimal threshold of 0.6 (Bagozzi & Yi, 1988 in Diamantopoulos & Siguaw, 2000). The minimal value for average variances extracted (AVE) should be 0.5 (Fornell & Larcker, 1981). AVEs for the three researched constructs are above the suggested minimal value. The sociability factor falls a little lower value than the 0.5 threshold. Nevertheless, we used these constructs for our research, as the sociability factor is suggested to be an important influence factor among young consumers (Olsen et al., 2007). Hence, the suggested measurement variables represent reliable measures for proposed constructs. All of the t-values of the loadings of measurement variables on the respective latent constructs were statistically significant and above the 0.5 value (Anderson, Gerbing, 1988). Also, AVE values for latent constructs are for three out of the four latent constructs greater than 0.5 (MacKenzie, Podsakoff & Podsakoff, 2011). Therefore, bearing in mind the lower validity of the sociability factor, it can be concluded that convergent validity is

Table 1. Research sample characteristics

	Bosnia and Herzegovina	Croatia
Sex	59.8 % female	69.4 % female
Age group	67 %; 21-30 years	37.7 % 21-30 years
Marital status	40.2 % in a relationship	50.3 % in a relationship
Education level	8.9 % high school 38.4% first Bologna level 52.7% master's or higher level degree	52.5 % high school 30.6 % first Bologna level 16.9 % master's or higher level degree

Table 2. Factor and Reliability Analysis Results for Wine Consumption Motivators

	CFA		EFA - Factors			
Items	Loadings	t-value	Sociability	Self-expression	Tradition	Food
To be respected	0.935	Fixed		-0.934		
Because consuming wine testifies to a mature personality	0.887	20.107		-0.902		
To be distinctive	0.733	15.309		-0.710		
Because it aids socializing	0.594	Fixed	0.682			
Because it creates a nice atmosphere	0.819	6.112	0.699			
Because a glass of wine belongs with a nice meal	0.720	Fixed				-0.709
Because it creates a special dining ambience	0.910	8.047				-0.827
Because of my cultural background	0.861	Fixed			0.886	
Because it is a tradition in my family	0.883	13.268			0.910	
For ritual	0.517	8.792			0.409	
Mean			7.01	4.27	6.53	6.91
Composite reliability (ρc)			0.608	0.937	0.753	0.738
Average variance extracted (ρv)			0.443	0.834	0.516	0.589
Correlations						
Sociability			1	0.276**	0.250**	0.362**
Self-expression				1	0.325**	0.135*
Tradition					1	0.353**
Food						1
Goodness-of-fit statistics: χ^2 = 55.981, df = 29, CFI = 0.928, NNFI = 0.972, Standardized RMR = 0.0487, RMSEA = 0.0582						

Note: *, ** significant at <0.05 and <0.001 level, respectively

present. Discriminant validity is also present as correlations among latent constructs exhibit low to moderate values (MacKenzie, Podsakoff & Podsakoff, 2011). Hence, according to CFA all identified latent constructs have adequate validity and reliability to be used in further analysis.

These results suggest that different drivers of wine consumption are present among Generation Y. Wine is consumed to enhance sociability through socializing and to create a pleasant atmosphere. Olsen et al. (2007) as well as Dubrow (1992) argue that this socialization factor is very much expressed in Generation Y consumers as they are under reference groups' influence and therefore consume wine to help them socialize. Identifying the sociability factor in describing Generation Y wine consumption behaviour will help researchers to identify the extent to which other individuals help create an adequate atmosphere that helps perceiving wine as an important ingredient of a pleasant community. Other characteristics related to consuming wine are connected to a person's desire to be perceived differently. These characteristics are grouped under the self-expression construct. The desire to be respected and distinctive motivates individuals to consume wine. Individuals also consume wine due to their cultural background or family traditions. Hence, tradition also represents one of the motivators of wine consumption (Chaters, 2006). This plethora of different motivators is further extended with the food factor. Generation Y consumes wine during meals because wine creates a special ambience when combined with food. This is consistent with previous work (Thach & Olsen, 2004; Dubrow, 1992) that wine as a food enhancement is present as a motivator in wine consumption. In addition, the findings of Olsen et al. (2007) also support the fact that customers mainly agree that wine and food go together and enhance one another. This characteristic is found to be present in different age cohorts.

3.3. Hypotheses Testing and Discussion

Relationships between different wine consumption occasions and the identified motivators are tested. It is assumed that in different occasions diverse motivators should be expressed. Multivariate regression analysis was used, as we wanted to test the relationships between one dependent metric variable (wine consumption occasions) and four independent variables (wine consumption motivators). Therefore, because three separate wine consumption occasions are examined, three different multivariate regression analyses are conducted. As differences between genders are also posited to influence wine consumption occasions, separate analyses for both males and females were conducted. The Enter method was used for entering independent variables into the model. The results of the multivariate regression analyses are presented in the following tables (Table 3, 4 and 5).

In analyzing the model tested, several characteristics can be noticed. When considering the consumption of wine with friends for both females (β=0.378) and males (β=0.380), sociability is found to be the influencing factor. In addition, males are also under the positive influence of the food factor when consuming wine with friends (β=0.165).

When analyzing wine consumption with a partner or family, the impact of the food factor is evident, while other wine consumption motivators do not contribute in situations where wine is consumed with a partner or family. Therefore, an individual's decision to consume wine with their partner/family influences the belief that wine enhances the taste of food. Nonetheless, the impact is somewhat higher for males (β=0.398) than for females (β=0.359).

The analysis of special occasions in wine consumption shows a different pattern. For females sociability is found to be the influencing factor (β=0.214) when females consume wine on special occasions. At the same time, for males the sample food factor has influence (β=0.221) on consuming wine on special occasions. Hence, when taking into account special occasions like a prom party or business occasions females and males differ in what motivates them to consume wine.

An analysis of the regression residuals was also done for subsamples. The assumption of random errors and homoscedasticity has been met. This is also true for the assumption of the normality of residuals, because the graphs show a normal distribution pattern. Tolerance and VIF were at acceptable levels. Several other tests for analyzing residuals were also done. Analysis reveals that Durbin-Watson test values are at acceptable levels. Cook distances are below

Table 3. Results of Multivariate Regression Analysis for Wine Consumption Occasions (Friends)

	Model 1 (F)			Model 2 (M)		
	B	beta	t-value	B	beta	t-value
Constant	3.079** (0.270)		11.397	2.838** (0.356)		7.970
Self-expression	-0.093(0.104)	-0.063	-0,894	0.108 (0.138)	0.084	0.788
Sociability	0.345** (0.067)	0.380	5.154	0.252** (0.094)	0.378	2.670
Tradition	-0.122(0.067)	-0.133	-1.831	-0.102(0.107)	-0.108	-0.954
Food	0.096 (0.064)	0.110	1.488	0.165*(0.081)	0.221	2.041
Observations	194			101		
R^2	0.163			0.165		
R^2 (adj)	0.145			0.131		
F	9.176**			4.755**		
Effect size (f^2)	0.195			0.195		
Power	0.999			0.955		

Note: F=female, M= male; *, ** significant at <0.05, <0.001 level respectively; standard errors are given in parenthesis; power is calculated at 0.05 level.
Dependent variables: My consumption of wine is mostly related to friends.

Table 4. Results of Multivariate Regression Analysis for Wine Consumption Occasions (Partner/family)

	Model 1 (F)			Model 2 (M)		
	B	beta	t-value	B	beta	t-value
Self-expression	-0.031 (0.143)	-0.016	-0.218	0.284 (0.182)	0.158	1.562
Sociability	0.062 (0.092)	0.050	0.669	-0.156 (0.125)	-0.124	-1.253
Tradition	-0.037 (0.092)	-0.030	-0.409	0.186 (0.141)	0.142	1.318
Food	0.425** (0.089)	0.359	4.791	0.413** (0.107)	0.398	3.855
Observations	194			101		
R^2	0.136			0.242		
R^2 (adj)	0.117			0.210		
F	7.420**			7.642**		
Effect size (f^2)	0.195			0.319		
Power	0.997			0.998		

Note: F=female, M= male; *, ** significant at <0.05, <0.001 level respectively; standard errors are given in parenthesis; power is calculated at 0.05 level.
Dependent variables: My consumption of wine is mostly related to my partner/family

Table 5. Results of Multivariate Regression Analysis for Wine Consumption Occasions (Special occasions)

	Model 1 (F)			Model 2 (M)		
	B	beta	t-value	B	beta	t-value
Self-expression	-0.003 (0.132)	-0.002	-0.021	0.101 (0.128)	0.058	0.540
Sociability	0.262** (0.085)	0.214	3.078	0.106 (0.187)	0.086	0.825
Tradition	-0.063 (0.085)	-0.057	-0.742	0.225 (0.145)	0.176	1.554
Food	-0.004 (0.082)	-0.004	-0.045	0.223* (0.110)	0.221	2.034
Observations	194			101		
R^2	0.054			0.159		
R^2 (adj)	0.034			0.124		
F	2.702 **			4.552**		
Effect size (f^2)	0.057			0.189		
Power	0.758			0.946		

Note: F=female, M= male; *, ** significant at <0.05, <0.001 level respectively; standard errors are given in parentheses; power is calculated at 0.05 level.
Dependent variables: My consumption of wine is mostly related to special occasions

the acceptable cut-off of 1 and average leverage values for residuals are below a less stringent criterion (Field, 2009). The number of cases that fall outside -+2 and -+2.5 standardized residuals is in the ratio between 1-3% of the cases for the male and female subsamples, respectively. Hence, all subsamples conform fairly accurately to the model. Mahalanobis parameters were also below the cut-off point for smaller samples. DFBetas for both the male and female subsamples have values below 1; therefore, no cases will have any influence over the regression parameters.

It should be noted that all of the models explain a relatively low adjusted R^2 indicating that other factors should be considered and included in the model. Nonetheless, power analysis reveals that models exhibit relatively high power, such that type II error is relatively low (Field, 2009). It can be concluded that the researched factors have an influence on different wine consumption occasions.

From the analysis it is evident that Generation Y exhibits different motivators in different wine consumption occasions. Sociability is the motivator of wine consumption for both males and females when consuming wine with friends. For the male subsample food also represents an influencing factor in this consumption occasion. This is consistent with the findings of Olsen et al. (2007) that reference groups, such as friends, are influential factors that support and induce wine consumption.

When consuming wine with a partner/family, both the male and female subsamples experience the food factor as a motivator. Therefore, wine is consumed with partners or family because of its characteristic of enhancing the taste of food. This finding supports previous results (Dubrow, 1992; Brunner & Siegrist, 2011) indicating that wine and food go together for all individuals across different cohorts.

Wine consumption in special occasions is influenced by the sociability factor. This sociability factor is expressed only in the female subsample. Dubrow (1992) reports similar results that identify sociability as the most important factor in occasion-based consumption. Furthermore, in their research, Olsen et al. (2007) emphasize that at celebrations Generation Y are the ones that mostly consume wine. Also interesting is the finding that the food factor has an influence on males when special occasions are analyzed.

Therefore, it can be concluded that Generation Y exhibits different motivators that drive wine consumption. These motivators do differ depending on the wine consumption occasion, and different motivators are exhibited due to gender differences. As a result, it can be concluded that both of the posited hypotheses, H1 and H2, are confirmed.

4. *IMPLICATIONS, LIMITATIONS AND FURTHER RESEARCH*

This paper contributes to the recognition of situational and gender influences on wine consumption motivators. Different motivators of wine consumption are found to be present within Generation Y. The results of this research allow us to infer key factors that wine producers should consider in developing a constructive relationship with a local Generation Y. First, respecting gender differences when building wine marketing mix elements, especially in developing communication with target segments of Generation Y, is important. In planning promotional activities wine producers should use different promotional messages targeting females and males. Moreover, creating a communications message with emphasis on different situations of wine consumption is needed as wine consumption motivators are diverse and situation-specific. By using these insights wine producers would benefit as a more adequate reach of the target market segment is ensured. Second, group dynamics should be used to reach young consumers and enhance the sociability element in relationships. The sociability element is found to be influential in most wine consumption occasions. By appreciating and inducing group dynamics among young customers wine consumption can be increased. Third, education regarding wine consumption should be provided in order to increase the awareness, capacity and confidence with which Generation Y evaluates wine products and combines them with food. By offering diverse educational programmes for inexperienced wine consumers their knowledge about food-wine combinations can be enlarged. As a consequence they will feel more confident in consuming wine with food and experience hedonic pleasures more often. The pleasure perception should be used to study the specific elements of wine, in order to meet the hedonistic expectations of this target group, which are driven by their sensory, psychological and social values.

Fourth, in order to influence and develop wine's image, wine producers should take into account different wine consumption drivers and emphasize those that enhance the desired wine image. Combining the sociability factor and an emphasis on group dynamics, as well as reference groups such as consuming wine with friends in a friendly atmosphere can bring about a desirable, friendly image for wine. Alternately, if wine producer aims to build its image based on hedonic pleasures it can emphasize consuming wine with a partner or family as well as emphasizing that wine enhances the taste of different food combinations.

Furthermore, even if wine production in researched countries is at a low level compared to wine producing countries such as France and the USA, its importance in boosting economic development is immense. Based on specific regional segmentation and the local character of wine production it is important not to neglect this agricultural activity as it induces local and regional development. Generational issues are, however, only one element that marketers should include in planning their marketing strategies (Higgins, 1998). Qualitative research to explore previous consumption behaviour would help to provide a deeper explanation of the findings.

The limitations of this study primarily concern its limited sample size and the sampling method that was used. Also, a relatively limited number of wine consumption motivators are included. In addition, the sociability factor exhibits a somewhat lower AVE value (0.44) and therefore should be tested on a different sample.

Further research should focus on identifying the wine consumption motivators of other age cohorts and how they differ with Generation Y. Also, more wine consumption motivators and consumption locations should be included in the research to obtain more profound knowledge about the wine consumption patterns of Generation Y. This topic will greatly benefit from qualitative research on identifying motivators that were neglected or omitted in previous research. Moreover, combining qualitative research will help also to explore new wine consumption patterns that will offer new insights for wine producers. Further research could also concentrate on researching the wine consumption motivators of Generation Y among different religious groups and to identify their influence on wine consumption patterns.

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