THE ROLE OF INTERNATIONAL TRADE IN CONVERGENCE PROCESS

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Abstract
Over the past decades, the issue of convergence in the European Union has been the subject of a wide range of empirical research. The model most widely used for testing convergence hypotheses is beta-convergence analysis. Beta-convergence is defined as a negative relation between the initial income level and the income growth rate, meaning the less developed regions are expected to record higher growth rates. According to the absolute convergence hypothesis, all regions converge towards the same steady state equilibrium. On the other hand, conditional convergence model controls for other differences in cross-sectional units that could produce different steady-state. Other factors usually included in econometric modelling of convergence are demographic variables, labour market conditions, industrial structure, institutional factors and overall government policy. In this paper, the role of international trade in convergence process has also been investigated.
The main hypothesis tested in this work is that openness and international trade significantly support process of convergence in EU. On the other hand process of convergence is not evident for Croatian's regions and role of international trade is less significant in explaining regional growth patterns. Besides descriptive statistics econometric modelling is used for confirmation of the hypothesis.
Keywords: *convergence, international trade, economic growth, Croatia.*

JEL Classification: R 11; F 40;
Preliminary communications
Received: *April 24*, 2012
Accepted: September 23, 2012

1. Introduction – convergence definition

In the European Union, disparities in economic development are more evident after the recent wave of EU enlargements. The most developed EU countries are approximately eight times richer than the least developed countries. Due to significant differences in regional development, EU introduced a set of policy measures to promote integration and convergence of less developed areas of the Member States.

A broad literature on convergence is mainly concerned with one of the three well-known competitive convergence hypotheses:

- the absolute (unconditional) convergence hypothesis,
- the conditional convergence hypothesis and
- the club convergence hypothesis.

According to the absolute convergence hypothesis, per capita incomes of countries or regions converge with one another in the long-term regardless of the 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 the initial income level and growth rate and imply all economies converge to the same unique and stable

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steady state equilibrium. Theoretical background for this hypothesis is explained in the traditional neoclassical growth theory, which states that economic growth depends on main three production factors: population, capital accumulation and technology. As more capital is engaged in more developed regions, therefore lower marginal returns to capital and slower economic growth is 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.

Some empirical research confirms the unconditional convergence hypothesis, however the majority of this research applies 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 vector of per capita GDP average growth rate (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 main features of those economies are similar. The main factors which are assumed to be similar as a prerequisite for convergence are technological level of economies, socio-demographic features (as educational level and population growth) and overall institutional environment. This paper is specifically oriented to the role of international trade in convergence. International competitiveness in the broadest sense can be viewed as an additional factor which could explain the speed of convergence.

If those above mentioned factors (including international trade) 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 model because agents are assumed to be homogeneous. It means there are no different initial conditions and therefore no club convergence, but if 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 in the case of the 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, 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 et al (2007) highlighted the theoretical background for 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. Short review of literature on convergence and the role of international trade

Convergence hypothesis has been broadly empirically tested in economic literature and although there are more studies which found strong evidence on convergence, some surveys concluded that there is not unique result but conclusions depend on sample and period included in analyses. 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 of 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 inter-regional dispersion of income over time. 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 in the sample period (1977-1996).

Neven and Gouyette (1994) analyzed 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 divergence pattern in Northern Europe, while after that period clear and strong convergence can be found. Regions in Southern Europe converged in 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, factors behind those results are trade liberalization and 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. Authors concluded that EU regional policy has a direct impact on labour productivity but effects on GDP per capita are less evident.

Boumont et al. (2002) on the 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 on 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 growth rate in a certain region is positively affected by the average growth rate of neighboring regions.

Paas and Shclitte (2007) based on *beta*-convergence analysis during the period 1995-2002 concluded that 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 county dummies they found no evidence for conditional convergence (models with country dummies) neither between the EU15 regions nor the NMS regions. Contrary, for the new member states conditional divergence can be found and regional disparities increased. It implies that despite an overall convergence in the EU (among countries), there was no convergence within individual countries.

In the economic literature we often can find arguments in favor of the causality flows from exports to economic growth which are called the export-led growth (ELG) hypothesis (Balassa, 1978). Export expansion and openness to foreign markets is viewed as a key determinant of economic growth because of the positive externalities it provides: efficient resource allocation, greater capacity utilization, exploitation of economies of scale, and increased technological innovation stimulated by foreign market competition

In recent economic literature there is usually argued that trade liberalization enables developing countries to speed up process of convergence, but still there are also arguments that free trade has a negative impact on developing countries because of depletion of natural resources and negative impact on domestic labor. In theoretical and empirical studies, the findings are not conclusive. Most studies examine the impact of trade on convergence while ignoring likelihood of two-way causality. In most cases theoretical models agree on conclusion that international trade increase income level and growth (Rodrik, 1996, Grossman an Helpman, 1990). First group of models shows that lower-income economies benefit more from international trade (supports convergence), while another group of models maintains that developing countries do not benefit from trade with rich countries.

The most important arguments in favor of convergence through international trade are spillover effects and price equalization. Large literature on knowledge spillovers from Foreign Direct Investment (FDI) has subsequently emerged, both theoretically (e.g. Romer, 1990; Grossman and Helpman, 1991) as well as empirically (Keller, 2004). Conceptual grounds on which these knowledge spillovers are based argument that international trade supports flow of technology and knowledge from developed countries to regions lagging behind. As implementation of already existing technologies is easier and less costly than invention, lower income countries benefit from the international liberalization which positively influences overall convergence process.

The proposition of factor price equalization is a well-known process grounded on Hecher-Ohlin work. According to that model, the equalization of commodity prices and factor prices could be expected as a result of trade liberalization. As a consequence, total income in less developed countries is expected to record higher growth rates.

On the other hand, an infant industry argument is the most important in the papers which identify international trade liberalization as negative for income convergence. Some authors pointed out that infant industry needs to be protected in less developed countries. According to that opinion free trade undermines industrial development because of low initial level of competitiveness in comparison to developed countries. Additionally, due to lack of capital and technology, there is a possibility that in the process of trade liberalization, less developed countries will be specialized in production of primary products which could limit their growth potential.

In line with theoretical literature, empirical studies are also inconclusive. While some empirical studies found evidence supporting argument of positive role of international trade on convergence, the other founds no significant or even negative relationship between trade and economic growth. In one of the seminal empirical papers on the role of trade in economic Sachs and Warner (1995) divided countries in two groups – “open” and “closed” and found that only in the group of open economies, less developed countries tent to record higher growth rates over the period from 1970 to 1989. Ben-David (1993) found that trade liberalization in the EU resulted in decreased dispersion of per capita income. He explained that by price equalization theorem.

Additionaly Ben-David (1996) examined group of developed countries and confirmed income convergence for the period 1960 to 1989.

Melitz (2003) found that greater trade openness and especially export performance has impact on industry productivity primarily through the effects of production re-allocation effects. In his model trade will induce only the more productive firms to enter the export market and force the least productive firms to exit. Due to that process overall productivity of an economy should increase. De Loecker (2007) used data on Slovenian manufacturing firms in his analysis of the changes in firm productivity when they start exporting. He concluded that export entrants become more productive in the period after they start exporting and that the productivity gap between exporters and companies oriented to domestic market increases over time.

Kutan, Yigid (2009) investigated impact of international integration on the group of new member states for period after EU accession and found that all factors related to international trade have a significant role in explaining labor productivity. FDI and exports are found to increase productivity growth, while imports reduce it.

Awokuse (2007) used a neoclassical growth modeling framework and multivariate cointegrated VAR methods to investigate the contribution of both exports and imports to economic growth in Bulgaria, Czech Republic, and Poland. In the case of Bulgaria, the results suggest that empirical evidence exists for both export led growth and growth-led exports hypotheses. In the Czech Republic, Granger causality indicated that both exports and imports influence economic growth. In the Polish data he found imports as main driver of growth.

Although in most studies a positive relationship between international trade and convergence are found, there are papers arguing that the expansion of international trade is a cause of divergence in income per capita. Wood and Rodao-Cano (1999) elaborated a consequence of trade specialization; less developed economies are specializing in products that intensively use unskilled labor and rich countries to specialize in products that intensively use skilled labor. Widening a difference in human capital influences further divergence.

Galor and Mountford (2006) pointed to the fact that trade significantly influences the demographic transitions across countries. Their analysis suggests that international trade had an asymmetrical effect on the evolution of industrial and non-industrial economies. In the industrial nations, gains from trade were directed primarily towards investment in education and growth in output per capita, while the gains from trade in non-industrial nations was resulted in population growth diminishing impact on growth in per-capita terms.

3. Economic growth and international trade in the European Union and Croatia

3.1 Initial level of development, economic growth and socio-economic features

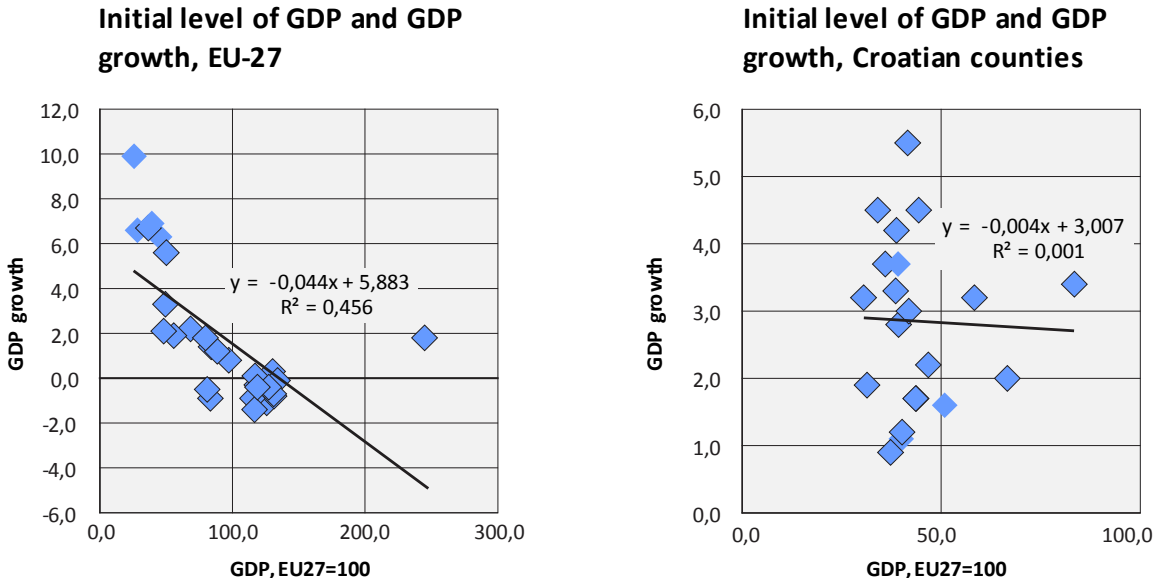
This chapter presents an overview of basic economic indicators for EU, and Croatian counties. The role of various indicators in convergence process will be tested in next chapter, but some conclusions can be drawn even using simple descriptive statistics. Main data source are Eurostat database. On national level, period from 2000 to 2010 are covered, while data on regional level for Croatia cover period 2000-2008.

In base year (2000) GDP per capita[3] has been highest in Luxembourg (244.9), followed by Netherlands (134.1), Denmark (131.5) and Austria (131.2). With 49.6 GDP per capita Croatia is in group of less developed countries. It is obvious that Romania (26.0) and Bulgaria (28.4) have the lowest GDP per capita in 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 period 2000-2008 the lowest average annual growth of GDP per capita (-1.4) was recorded in Italy. Average annual growth of GDP per capita in Croatia was 3.3%.

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

Picture 1 presents differences in convergence process for EU countries, and Croatian counties. As can be seen, a clear negative relation between initial development level and growth can be noticed for EU 27 counties, while in Croatian case no relationship can be found.

Picture 1: Initial development level and growth, EU, new member states and Croatia



Source: Eurostat database and authors' calculations.

Economic literature on convergence, besides initial GDP level, as other relevant variables for explaining differences in development see economic structure, education and fixed capital. Those additional variables are presented in Tables 2-4. As can be seen, on average, more developed countries have higher share of services in GVA. The most significant share of services in gross value added is recorded for Luxembourg (82.4), France (76.3), Greece (75.6), United Kingdom (74.9) and Belgium (74.2). On the other hand, share of agriculture is higher in less developed countries. Agricultural production is very important economic sector in two new EU countries (Bulgaria and Romania) which only have above 10% of agriculture in gross value added. With 6.9% of agriculture in gross value added Croatia is on third place. The highest share of industry is registered in Czech Republic (37.7) and Ireland (37.1). With 30.8% of GDP investments are very important in Estonia, Latvia (28.2) and Spain (28.1). Average share of investments in analysed period in Croatia are 23.8% of GDP. Scandinavian countries (Finland and Sweden) and Belgium have the most favourable educational level, measured as share of pupils and students (more than 26%) in the total population. With only 18.4% Croatia, along with Bulgaria (17.7) and Italy (18.7), is placed in the group of countries which have the smallest share of persons in education in total population.

Table 3 presents main economic indicators and structural features of economic development of Croatian counties. GDP per capita in base year (2000) of all Croatian counties is below the EU 27 county average. City of Zagreb (83.5), County of Istria (66.7) and County of Primorje – Gorski Kotar (58.4) have the highest GDP per capita. Counties of Lika – Senj (5.5), Šibenik – Knin and Dubrovnik – Neretva (4.5) have the highest average annual growth of GDP per capita. The highest share of services in gross value added is found in the City of Zagreb and three counties (Dubrovnik – Neretva, Šibenik – Knin and Zadar). On the other hand, industry is significant in County of Sisak – Moslavina, County of Međimurje and County of Krapina – Zagorje. Agricultural production is the most representative for Central and East (Panonian) Croatia. Three counties in this region have average share of gross value added above 20%.

Table 2: Initial level of GDP, average annual growth rate and structural features of economic development, EU 27 countries and Croatia

	GDP, p.c. EU27=100, 2000.	Average annual growth of GDP, 2000-2011.	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	1,5	74.2	1.0	24.8	20.6	26.7
Bulgaria	28.4	3,9	61.4	10.0	28.6	23.0	17.7
Czech Republic	68.4	3,3	59.2	3.1	37.7	27.0	20.7
Denmark	131.5	0,6	72.5	1.9	25.7	20.2	25.6
Germany	118.4	1,2	69.4	1.0	29.6	18.6	20.0
Estonia	45.1	4,1	67.5	3.8	28.7	30.8	22.9
Ireland	130.4	2,3	60.8	2.0	37.1	23.9	24.0
Greece	84.0	1,3	75.6	4.9	19.4	22.4	19.2
Spain	97.3	2,0	67.3	3.5	29.2	28.1	20.5
France	115.2	1,2	76.3	2.4	21.2	19.4	23.2
Italy	116.7	0,4	70.1	2.4	27.5	20.9	18.7
Cyprus	88.7	2,6	77.9	3.0	19.1	19.4	21.4
Latvia	36.7	4,2	73.3	4.0	22.6	28.2	22.0
Lithuania	39.3	4,7	63.5	4.9	31.6	22.8	24.5
Luxembourg	244.9	2,6	82.4	0.5	17.1	21.2	19.6
Hungary	55.8	2,0	65.3	4.5	30.1	22.7	19.6
Malta	83.5	1,6	73.8	2.6	23.6	20.1	20.1
Netherlands	134.1	1,4	73.3	2.2	24.5	20.0	23.0
Austria	131.2	1,7	68.3	1.8	29.9	22.3	20.4
Poland	48.2	3,9	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	4,0	53.3	11.0	35.8	23.9	21.2
Slovenia	79.7	2,5	62.5	2.8	34.7	25.8	21.5
Slovakia	50.1	4,7	59.2	4.3	36.6	26.0	22.3
Finland	117.0	1,9	63.7	3.0	33.3	20.0	26.4
Sweden	127.5	2,3	70.2	1.8	28.0	18.1	26.1
United Kingdom	118.9	1,6	74.9	0.8	24.2	16.9	22.5
Croatia	49.6	2,5	65.0	6.9	28.1	23.8	18.4

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

These are: Virovitica – Podravina (27.1), Bjelovar – Bilogora (25.5) and Vukovar – Sirmium (21.7) counties. As a result of large infrastructural projects and low share in GDP County of Lika - Senj recorded the highest average share (76.7) of investments in GDP. As the most developed region, North West Croatia has 20.3% of pupils and students in total population of that region, followed by Adriatic Croatia with average share of 17.8%, while Central and East (Panonian) Croatia has only 16.5% of educated persons at regional level.

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.
*Data on pupils and students are available only for NUTS II region.
**ISCED - International Standard Classification of Education (ISCED) of the UNESCO.

3.2 Trends in international trade in EU 27 and Croatia

3.2.1 Export performance in EU

Data in table 4 presents basic indicators for export performance for the period 2000-2011. In last decade new member states recorded in general higher export growth in comparison to the old member states. The main factors behind significant export growth are relatively low initial level of export, trade liberalisation and significant FDI inflow from old member states in export sector of new member states. Besides that, most of NMS are small open economies which by theoretical and empirical evidence have a significant potential to explore all benefits of tree trade. In the group of NMS countries, the worst export performance is recorded in Malta and Cyprus. Croatia is positioned somewhere in between NMS and old member states with average export growth of 5 per cent.

Significant export growth in the most of NMS resulted in higher share of export in GDP, and openness indicator. All of NMS (besides Poland and Romania) recorded openness (as share of sum of export and import in GDP) higher than 100 while in the same group only two old member states can be classified – Ireland and Netherlands. Despite high growth in recent period, there is a significant potential for further growth of NMS export as can be seen from export in per capita terms.

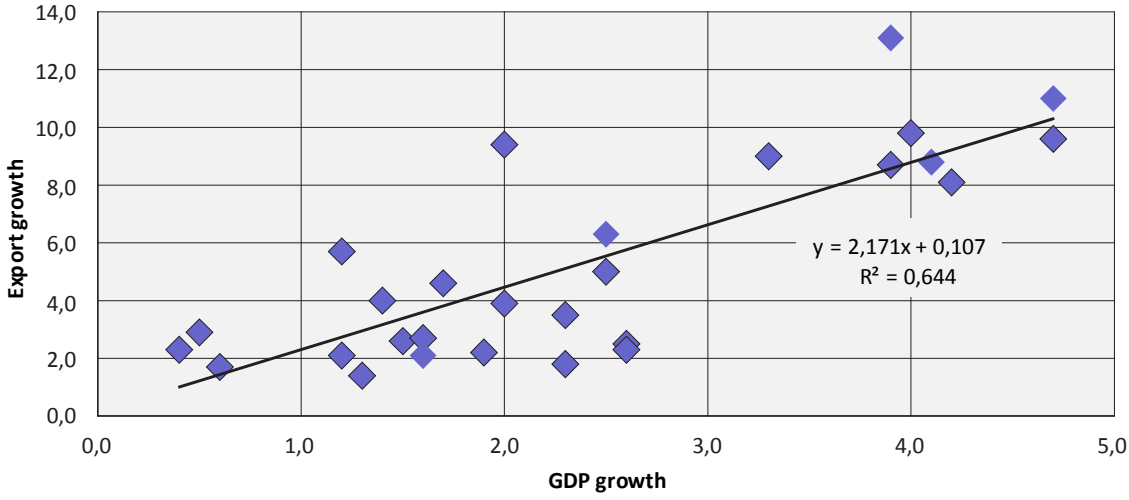
Table 4: Indicators of export performance and openness for EU 27 countries and Croatia for period 2000-2011

	Average export growth	Average share of export in GDP	Openness, period average	Export per capita PPS, 2010.
Belgium	2,6	78,9	153,2	29.000
Bulgaria	13,1	53,2	117,5	10.700
Czech Republic	9,0	64,1	125,6	19.400
Denmark	1,7	49,3	93,4	31.000
Germany	5,7	41,6	77,9	28.800
Estonia	8,8	75,2	150,3	15.700
Ireland	1,8	89,8	162,0	31.100
Greece	1,4	22,6	56,6	21.900
Spain	3,9	27,0	57,1	24.500
France	2,1	26,6	53,6	26.300
Italy	2,3	26,6	52,8	24.600
Cyprus	2,5	48,0	100,0	24.200
Latvia	8,1	45,6	101,4	13.000
Lithuania	11,0	56,6	118,9	14.000
Luxembourg	2,3	158,1	290,7	66.300
Hungary	9,4	74,8	147,8	15.800
Malta	2,7	87,2	174,8	20.100
Netherlands	4,0	71,1	133,5	32.500
Austria	4,6	52,7	101,0	30.800
Poland	8,7	36,4	75,7	15.300
Portugal	2,9	29,8	67,6	19.600
Romania	9,8	33,5	74,1	11.400
Slovenia	6,3	61,4	123,0	20.700
Slovakia	9,6	78,1	159,1	17.900
Finland	2,2	41,7	78,7	28.100
Sweden	3,5	48,3	89,7	30.300
United Kingdom	2,1	27,8	57,4	27.400
Croatia	**5,0**	**41,2**	**88,3**	**14.800**

Source: Eurostat database.

The relationship between GDP and export growth is presented by Picture 2. It is clear that there is a positive relation, meaning that countries with higher growth rates of export at the same time recorded higher overall economic growth.

Picture 2: Relationship betwen GDP and export growth for EU 27 countries



3.2.2 Export performance in Croatia

Following tables presents basic indicators of export performance in Croatian counties. As main indicators of foreign trade competitiveness, export per capita, share of export of goods in GDP and openness are used. Unfortunately, data for export and import of services are not available on county level, so all data cover trade in goods only.

Average export per capita in Croatian economy in analysed period was approximately 12 thousands of kunas. In period prior to global recession, a trend of continuous growth can be noticed, while a significant drop in 2009 was only partially compensated in 2010. However, level of overall Croatian export in 2010 was 67.6 higher in comparison to initial year. Significant differences can be noticed on county level. While County of Vukovar-Sirmium recorded four times higher export in 2010 in comparison to 2001 the lowest growth of export can be found in Primorje-Gorski kotar, Dubrovnik-Neretva, Osijek-Baranja and Istria. As can be noticed, we cannot found a strong relationship between economic development and export growth. While some beforementioned developed counties (Primorje-Gorski kotar, Istria and Dubrovnik-Neretva recoreded low rates of export growth, the most developed region City of Zagreb increased export above Croatian average.

Although export of goods increased in analysed period as can be seen from Table 6, its share in GDP has not changed significantly. After decrease in 2002 share of export in GDP was increasing to 2006-2007. As international trade is a very sensitive to overall economic phase in which global economy is situated, decrease of export share could be noticed in 2008 even before recession in Croatia started.

According to this indicator, leading Croatian counties were: County of Varaždin, (34,9%), Istria (34,2), County of Sisak-Moslavina (32,5%), County of Krapina-Zagorje (27.4%) and Međimurje (26,6%). In general, this group comprises counties with average economic development. The lowest share of export in GDP was recorded in Lika-Senj and Dubrovnik-Neretva in which export of goods has only marginal impact on overall economic activity.

Table 5: Export per capita, Croatian counties

County	Exports per capita in Croatian kunas										Average	Index 2010/2001
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010		
County of Zagreb	2.550	2.884	3.155	3.460	3.710	4.226	4.846	5.771	4.747	5.642	4.099	221,3
Krapina-Zagorje	8.695	8.719	10.722	10.934	11.143	12.697	14.842	15.770	14.287	15.872	12.368	182,5
Sisak-Moslavina	9.479	11.236	13.502	18.697	16.456	17.105	19.761	21.184	14.604	18.480	16.050	195,0
Karlovac	5.503	5.243	5.399	9.290	8.562	8.123	9.934	11.070	10.331	10.450	8.390	189,9
Varaždin	13.084	13.080	13.375	17.288	17.607	21.864	24.692	25.437	21.912	24.939	19.328	190,6
Koprivnica-Križevci	7.999	8.115	8.496	8.765	9.084	10.130	10.663	11.129	11.475	12.799	9.866	160,0
Bjelovar-Bilogora	3.255	3.248	3.535	3.769	4.190	5.156	6.205	7.141	5.647	5.786	4.793	177,8
Primorje-Gorski kotar	10.623	5.778	5.195	7.864	7.935	10.151	10.201	13.244	8.615	10.706	9.031	100,8
Lika-Senj	691	577	697	705	747	772	1.189	849	674	877	778	126,9
Virovitica-Podravina	5.081	5.861	8.143	6.165	7.118	9.201	9.356	9.703	7.340	8.507	7.647	167,4
Požega-Slavonia	4.775	5.030	5.625	6.018	6.303	7.513	9.079	7.531	6.757	7.496	6.613	157,0
Slavonski Brod-Posavina	2.741	2.528	2.396	2.891	3.491	3.630	5.326	7.097	5.887	5.427	4.141	198,0
Zadar	2.313	3.975	4.302	4.993	4.724	6.394	6.699	6.254	5.860	6.002	5.152	259,5
Osijek-Baranja	6.751	7.669	8.520	8.237	9.755	10.354	9.458	8.730	7.005	8.319	8.480	123,2
Šibenik-Knin	5.066	4.466	3.200	6.614	8.505	9.866	11.106	12.535	8.948	12.680	8.299	250,3
Vukovar-Sirmium	1.698	2.223	2.891	1.939	4.032	5.006	5.587	4.989	4.115	7.673	4.015	451,9
Split-Dalmatia	4.816	5.855	7.882	8.654	7.993	9.424	11.439	11.725	7.279	9.830	8.490	204,1
Istria	24.979	24.778	23.916	26.426	25.139	28.551	30.843	30.922	23.265	31.476	27.029	126,0
Dubrovnik-Neretva	1.649	1.053	900	903	1.586	1.619	1.826	2.153	1.433	1.774	1.490	107,6
Međimurje	9.565	8.844	9.521	10.938	11.268	13.747	17.303	19.121	17.058	19.678	13.704	205,7
City of Zagreb	16.820	16.290	17.251	20.453	24.583	28.499	29.983	31.013	26.124	28.735	23.975	170,8
Total	**8.766**	**8.653**	**9.314**	**10.894**	**11.770**	**13.612**	**14.888**	**15.606**	**12.479**	**14.689**	**12.067**	167,6

Source: authors calculation based on CBS dana.

Table 6: Share of export in GDP, Croatian counties

County	Export/GDP										Average
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	
County of Zagreb	8,2	7,6	7,9	8,1	7,9	8,9	9,0	9,9	8,4	10,0	8,6
Krapina-Zagorje	25,1	24,3	28,3	28,3	25,1	27,3	28,3	29,6	27,2	30,2	27,4
Sisak-Moslavina	25,0	28,8	33,4	44,1	35,1	31,6	37,4	34,8	24,1	30,2	32,5
Karlovac	14,6	12,7	13,2	22,2	18,9	16,0	17,3	18,1	17,1	17,1	16,7
Varaždin	32,3	28,5	27,9	36,6	35,5	39,5	40,9	37,4	32,8	37,4	34,9
Koprivnica-Križevci	18,2	17,1	17,4	17,7	17,2	16,5	15,9	15,8	16,6	18,5	17,1
Bjelovar-Bilogora	9,6	8,6	9,1	9,1	9,7	10,6	12,6	12,0	9,6	9,8	10,1
Primorje-Gorski kotar	21,0	10,9	8,6	12,4	11,1	13,1	12,4	14,5	9,6	11,9	12,5
Lika-Senj	1,9	1,3	1,3	1,0	1,3	1,3	2,0	1,2	1,0	1,2	1,4
Virovitica-Podravina	14,6	15,8	20,8	15,2	17,5	19,3	18,4	17,9	13,7	15,8	16,9
Požega-Slavonia	14,8	14,7	14,8	14,9	15,2	17,7	19,0	15,4	14,0	15,4	15,6
Slavonski Brod-Posavina	10,1	8,6	7,8	8,7	10,5	10,0	13,6	15,9	13,4	12,3	11,1
Zadar	6,9	10,7	9,8	10,7	9,5	12,6	11,4	9,6	9,2	9,5	10,0
Osijek-Baranja	19,9	20,1	21,7	19,1	21,5	20,9	16,4	13,6	11,1	13,2	17,8
Šibenik-Knin	17,2	13,5	8,4	15,5	17,6	20,5	19,4	21,3	15,5	21,8	17,1
Vukovar-Sirmium	6,4	7,7	9,3	5,9	11,3	12,4	13,2	10,4	8,7	16,1	10,1
Split-Dalmatia	14,4	16,3	20,1	19,5	17,2	18,6	19,5	19,3	12,2	16,6	17,4
Istria	43,3	38,9	34,1	34,6	32,0	34,3	33,7	32,4	25,0	33,9	34,2
Dubrovnik-Neretva	4,3	2,6	2,0	1,7	2,8	2,6	2,5	2,8	1,9	2,4	2,6
Međimurje	26,4	21,7	22,7	24,9	24,9	26,5	31,1	29,5	26,9	31,1	26,6
City of Zagreb	23,3	20,9	19,8	21,5	23,4	25,0	24,4	23,1	20,0	22,1	22,3
Total	**20,4**	**18,5**	**18,2**	**19,7**	**19,8**	**21,1**	**21,0**	**20,2**	**16,5**	**19,4**	**19,5**

Source: authors calculation based on CBS dana.

Average openness of Croatia is expressed as share of sum of export and import of goods in GDP. It has to be stressed again that export and import of services are not included due to lack of available data and because of that data presented are not fully comparable with the same indicator for EU27. Average openness of Croatian economy according to this indicator was 59.7. If we compare this indicator with data from previous table, openness was increasing at higher pace than export as a consequence of higher import growth in prerecession period. On the other hand, openness is reduced even more than export in recession.

The most open for international trade are Grad Zagreb, County of Varaždin, Istria and County of Sisak-Moslavina. In general this group comprises more developed regions. However, one has bear in mind that Grad Zagreb is main distribution centre and the great proportion of import in Grad Zagreb is redistributed in other counties. According to this indicator Lika-Senj and Dubrovnik-Neretva are the less open counties.

Table 7: Openness of Croatian counties

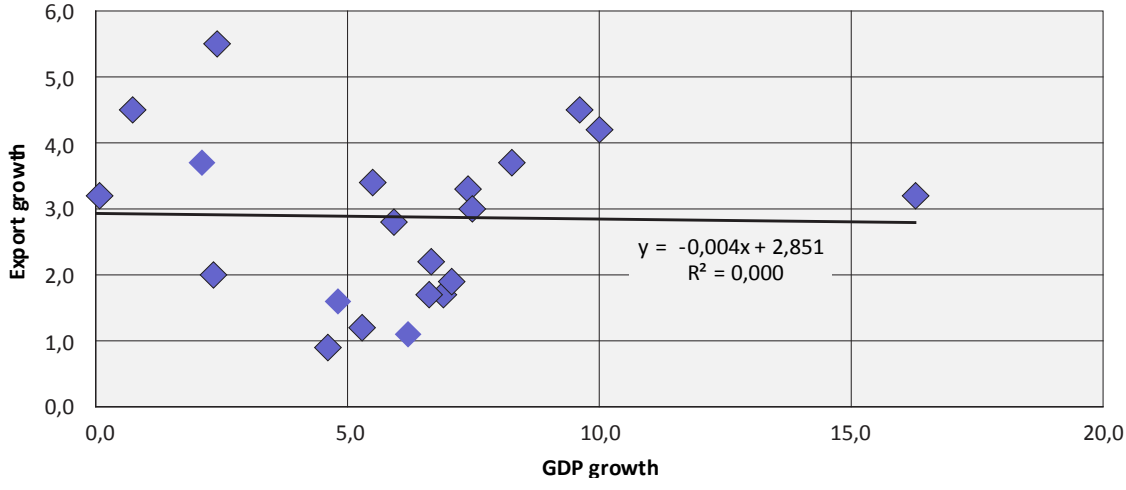
Županija	(Export+import of goods)/GDP										Ave-rage
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	
County of Zagreb	49,1	52,2	58,0	57,0	54,9	62,5	62,5	62,5	47,5	46,7	55,3
Krapina-Zagorje	49,6	52,5	59,4	57,1	49,9	57,3	58,4	61,4	50,6	53,8	55,0
Sisak-Moslavina	47,3	55,5	69,8	83,1	65,3	58,3	65,9	66,3	42,5	52,7	60,7

Karlovac	39,7	28,5	32,8	39,7	37,7	34,2	35,7	34,6	31,3	31,4	34,6
Varaždin	72,0	65,7	66,7	80,5	75,6	77,7	77,7	70,4	58,8	64,6	71,0
Koprivnica-Križevci	35,5	35,6	38,8	36,2	34,8	33,0	31,9	32,2	32,1	32,5	34,3
Bjelovar-Bilogora	22,6	24,4	26,0	24,6	24,7	24,2	27,9	25,5	23,9	21,0	24,5
Primorje-Gorski kotar	49,9	34,0	31,7	35,4	32,6	35,5	36,1	41,4	27,6	32,2	35,6
Lika-Senj	2,7	3,3	3,1	2,4	2,3	2,6	4,1	2,7	2,1	3,0	2,8
Virovitica-Podravina	22,9	24,3	30,1	25,5	28,8	31,1	31,1	29,3	21,3	21,7	26,6
Požega-Slavonia	24,2	26,5	24,9	26,8	25,6	30,5	31,9	26,0	23,7	27,0	26,7
Slavonski Brod-Posav	21,8	21,3	20,6	20,6	21,5	23,0	28,6	30,1	25,0	22,7	23,5
Zadar	20,6	27,9	25,7	24,5	23,3	26,9	24,9	21,5	17,8	18,6	23,2
Osijek-Baranja	41,0	35,5	37,5	33,4	39,0	38,5	32,4	29,0	23,1	26,3	33,6
Šibenik-Knin	43,0	32,0	23,3	35,7	40,1	47,5	42,1	44,1	30,3	45,6	38,4
Vukovar-Sirmium	14,3	16,8	19,8	15,7	22,9	27,9	27,9	25,4	23,9	27,3	22,2
Split-Dalmatia	40,7	44,6	52,8	48,0	44,2	47,8	48,0	48,1	30,2	35,6	44,0
Istria	83,4	74,2	69,4	69,8	70,9	71,7	73,4	70,4	54,3	61,6	69,9
Dubrovnik-Neretva	13,8	12,9	11,0	9,7	12,7	12,7	12,2	11,0	6,9	6,6	10,9
Međimurje	60,3	52,3	55,9	56,7	54,6	57,0	64,8	60,0	51,3	56,7	57,0
City of Zagreb	93,1	96,8	95,5	95,5	100,3	106,2	106,7	106,5	84,7	84,9	97,0
Total	**60,5**	**58,7**	**60,0**	**60,4**	**61,6**	**64,8**	**65,0**	**64,2**	**49,8**	**52,4**	**59,7**

Source: authors calculation based on CBS dana.

Picture 3 presents relationship between growth of GDP and export on the level of Croatian counties. Opposite to Picture 2 which points to straightforward positive relationship, no conclusion on type of the relationship cannot be brought in Croatian case. In the next chapter the role of international trade in convergence will be explored using econometric models.

Picture 3: Relationship between GDP and export growth for Croatian counties



4. Model for testing convergence hypothesis in the European Union, new member states and Croatia

In this chapter various models for testing hypothesis 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 hypothesis on absolute β-convergence we used the following model:

$$\frac{\ln Yit}{Yib} = \alpha + \beta \ln Yib + \varepsilon i$$

where:

Yit – GDP *per capita* in EURO PPS in region *i* in 2010 (EU27) or 2008 (Croatian regions),
Yib – 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,

ε – error term.

Data sources, descriptive statistics and graphical presentation of relevant data were presented in the previous chapter. In order to determine whether there is evidence on absolute β-convergence, two equations are estimated, each comprising of a different unit sample. In the first equation, model is tested on the national level for group of EU countries including Croatia which will formally join EU in 2013. As can be seen from Table 5, strong evidence on absolute β-convergence can be found on national level for EU countries. Estimated parameter for β-convergence is significant and has an expected sign.

Two additional indicators for the convergence speed are presented in the table. Both of them 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.

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

Table 8: Results for testing absolute β-convergence hypothesis

	EU+Croatia	Croatia
	$\frac{\ln Yit}{Yi2000} = \alpha + \beta \ln Yi2000 + \varepsilon i$	
Constant (α)	3.4182*** *(10.062)*	0.271 *(-0.843)*
Initial level of GDP (β)	-0.3159*** *(-9.019)*	-0.016 *(-0.189)*
R^2	0.758	0.002
Prob (F-stat)	0.0000	0.8520
Number of units	28	21
Speed of the convergence	0.038	0.0020
Half-life period	21,6	346.2

t-statistics are in the parentheses under the estimated coefficients.
Significance levels: ***p<0.001. **p<0.01 and * p<0.1.
Source: authors' calculations based on data from Eurostat.

As can be seen from Table 8, convergence process on the national economy level is relatively strong in EU. Econometric equation has satisfactory properties: estimated parameters are highly significant and is model is able to explain relatively great proportion of variation of GDP growth (R^2 = 0,758). Less developed countries recorded higher growth rates and are converging to EU average. According to our results, half of the initial lag will be covered in less than 20 years.

On the other hand, estimated equation for Croatia has very poor econometric properties. Estimated parameters are absolutely insignificant and model is completely unable to explain any differences of development of Croatian regions (R^2=0.002). Estimated parameter, although insignificant, still has an expected sign. If it is used for calculation of period in which half of regional differences in economic development will disappear, result of more than 300 years has very low economic sense. If regional trends in further period will follow the same pattern as in last decade, virtually no regional convergence can be expected in Croatia. Although growth rates of Croatian GDP in 2000-2008 period have been above EU 27 average, less developed Croatian counties had not recorded better economic performance in comparison to more developed counties. Counties with lowest level of economic development which are mainly situated in Slavonia, have not recorded higher growth than most developed counties – City of Zagreb, County of Istria and County of Primorje-Rijeka. Those results are partially in line with previous researches for the other NMS countries. Foster and Smeeding (2005) found that regional income inequality in Czech Republic is increasing. Paas and Shclitte (2007) using models with county dummies found conditional divergence and increasing regional disparities in new member states. It implies that despite an overall convergence in the EU (among countries), there was no convergence within individual countries. Capital cities and major urban areas which are generally the most developed areas recorded higher growth of income, while less developed regions are lagging behind.

Tables 9-11 present results for testing 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 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). Additionally, we add a control variable for export performace measuring impact of international trade.

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

Besides above defined symbols, Xj stands for additional development factor (education, investment, share of agriculture in GVA, share of industry in GVA and share of services in GVA, international trade) and Yj are parameters to be estimated for each of relevant factors.

In the first equation we used only international trade indicators as control variables. As can be seen, after controlling for international trade, estimated equation for EU has even better econometric properties in comparison to results for testing absolute β-convergence hypothesis. In all three model specification, proportion of explained variations in growth rates are higher than in equation related to absolute convergence hypothesis (Table 8). Addition of any of international trade indicators improve R^2 statistics to approximately 0,85 but overall econometric properties are best if export growth variable is used. An initial GDP parameter become even more significant and speed of convergence increased when export growth and openness variables are included. All three equations indicate a positive impact of international trade on GDP growth. Countries with better international competitiveness (expressed in higher export growth rates) recorded higher GDP growth.

The equations for Croatian economy have very poor econometric properties even after inclusion of international trade variables. While inclusion of export growth or openness variable

has a very limited impact on proportion of explained variations in economic growth (R^2= 0,013 and 0,045), export share of GDP is partially successful in modelling of GDP growth differences (R^2=0,281). However in all three specifications estimated parameter for initial level of GDP is insignificant and positive indicating regional divergence. Export share in GDP is only variable with significant parameter but the equation pointed to negative relationship between export intensity and speed of growth – counties with higher share of exports in gross value added on average recorded slower economic growth. Factors behind different conclusions can be summarised in the following:

- Although Croatia in terms of trade protection of EU market had better position than other non-EU countries, countries which become new members in 2004 better exploited their full member status and attract more export-oriented investments,
- Non-availability of data for export of services does not allow testing of impact of total export of goods and services. Croatian counties along Adriatic sea in general recorded higher economic growth rates which are probably result of export in tourism sector, but there are no reliable data on total revenues on county level,
- According to various surveys on aspects of international competitiveness (WB Doing Business, WEF Index of Global Competitiveness, and Index of Economic Freedom) Croatia has rank far behind the most successful new member states. As a result of lower competitiveness, export contribution to growth has been limited,
- Economic growth in Croatia in last decade has been in great proportion result of increasing domestic demand (personal and government consumption, investment in huge infrastructural projects).

Table 9: Results for testing conditional β-convergence hypothesis (control variables for international trade)

	EU+Croatia			Croatia		
	$\frac{\ln Yit}{Yi2000} = \alpha + \beta \ln Yi2000 + \varepsilon i$					
Constant (α)	3,6001*** (13,029)	2,1608*** (4,907)	3,485*** (12,612)	0,169 (0,426)	0,0502 (0,1715)	0,08921 (0,234)
Initial level of GDP (β)	-0,347*** (-11,89)	-0,199*** (-4,652)	-0,336*** (-11,61)	0,0062 (0,0616)	0,0674 (0,0833)	0,0434 (0,401)
Export growth	0,0021*** (3,929)			0,0319 (0,454)		
Export share in GDP		0,287** (3,689)			-0,0054** (-2,644)	
Openness			0,00112*** (3,801)			-0,001 (-0,903)
R^2	0,850	0,843	0,846	0,013	0,281	0,045
Prob (F-stat)	0.0000	0.0000	0.0000	0,887	0,0513	0,6601
Number of units	28			21		
Speed of the convergence	0,0426	0,0222	0,0409	-	-	-
Half-life period	19,6	34,5	20,3	-	-	-

t-statistics are in the parentheses under the estimated coefficients.
Significance levels: ***p<0.001. **p<0.01 and * p<0.1.
Source: authors' calculations based on data from Eurostat.

Results for beta-convergence parameter after investment and education are included as control variables and presented in Table 10. As can be seen from the equation comprising EU countries, education and investment are not significant factors in explaining difference in economic development. Econometric properties of equations in which education and investment variables are added, indicate that their inclusion is not necessary for description of convergence process. After those variables are included, the proportion of explained variations in economic growth is practically the same (R^2 = apps 0,85) as in the model comprising only export growth variable. 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 analysed period. Variable for international trade are highly significant in those model specifications.

Table 10: Results for testing conditional β-convergence hypothesis
(control variables for investment and education)

	EU+Croatia			Croatia		
	$\frac{\ln rit}{rit2000} = \alpha + \beta \ln rit2000 + \varepsilon t$					
Constant (α)	3,538*** (8,215)	3,579*** (8,709)	3,5728*** (12,344)	0,0538 (0,168)	0,084 (0,289)	0,0162 (0,0503)
Initial level of GDP (β)	-0,3475*** (-9,508)	-0,3455*** (-9,725)	-0,3496*** (-11,455)	0,0352 (0,3967)	0,0421 (0,5112)	0,0594 (0,6789)
Investment	0,0006 (0,1099)	0,0004 (0,071)		0,0018 (1,183)	0,0018 (1,225)	
Education	0,0025 (0,397)		0,00246 (0,396)	0,003188 (0,259)		0,00361 (0,2904)
Export growth (EU) Export share (CRO)	0,00212** (3,6258)	0,00211** (3,679)	0,00213*** (3,879)	-0,0043* (-1,892)	-0,0042* (-1,928)	-0,00547** (-2,589)
R^2	0,851	0,843	0,846	0,342	0,339	0,285
Prob (F-stat)	0.0000	0.0000	0.0000	0,1309	0,0644	0.1189
Number of units	28			21		
Speed of the convergence	0,0427	0,0424	0,0430	-	-	-
Half-life period	19,6	19,7	19,5	-	-	-

t-statistics are in the parentheses under the estimated coefficients.
Significance levels: ***p<0.001. **p<0.01 and * p<0.1.
Source: authors' calculations based on data from Eurostat.

Model for Croatia has a low power for explaining development differences even after accounting for education and investment as additional variables. In Croatian case inclusion of those variables slightly improve R^2 statistics but overall econometric properties are still unsatisfactory. Share of export remains only variable for which estimated parameter is significant. On average, Croatian counties with higher share of export in GDP recorded lower growth rates.

Results for testing impact of structural features on convergence process are presented in Table 11. In a model for EU countries, economic structure has low impact on growth and inclusion of control variables does not significantly change conclusion on convergence process and the role of international trade. As in the case of investment and education variables, inclusion of variables for economic structure do not improve econometric power of the conditional convergence model (R^2 remain at the approximately same level as in the model with only international trade variab-

les). Other indicators reflecting speed of convergence are also very similar as in Table 8. Again, variable for international trade (growth of export of goods and services) is significant and has positive impact on overall economic growth rate.

On the other hand, econometric properties for equations related to regional growth in Croatia are better in comparison to previous models, although overall power of the model is not very strong in explaining differences in regional growth. Inclusion of variables share of agriculture or share of service sector result in R^2 statistics slightly higher than 0.5. Estimated parameter for initial development level is again insignificant in all three specifications. That parameter points to very slow convergence in the case when agriculture or service variable is added. Contrary, in the model with industry variable positive relation between initial development and economic growth is estimated (divergence).Economic structure of Croatian regions is significant in explaining growth differences. Croatian counties specialised in service sector recorded higher growth rates, while regions with higher share of agriculture recorded slower growth. Parameter for export share in GDP again has a negative sign while the significance level changes depending on the model specification. Due to low value of estimated parameter for initial level of GDP, estimated period in which half of regional differences in economic development will disappear is again extremely long. If recent regional growth pattern will be continued, virtually no regional convergence can be expected in Croatia.

Table 11: Results for testing conditional β-convergence hypothesis
(economic structure and international trade used as control variables)

	EU+Croatia			Croatia		
	$\frac{\ln Yit}{Yi2000} = \alpha + \beta \ln Yi2000 + \varepsilon t$					
Constant (α)	3,285*** (5,395)	3,696*** (10,987)	3,603*** (12,757)	0,478 (1,663)	0,196 (0,629)	0,0771 (0,327)
Initial level of GDP (β)	-0,281*** (-5,383)	-0,353*** (-11,165)	-0,3603*** (-9,499)	-0,0289 (-0,381)	0,0533 (0,6625)	-0,0328 (-0,4568)
Share of agriculture	0,0169 (1,519)			-0,006** (-2,892)		
Share of industry		-0,00149 (-0,5177)			-0,00418 (-1,243)	
Share of services			0,000424 (0,1506)			0,005223** (3,279)
Export growth (EU) Export share (CRO)	0,00218*** (4,139)	0,00213*** (3,887)	0,00212*** (3,853)	-0,0052** (-3,049)	-0,00342 (-1,342)	-0,00279 (-1,539)
R^2	0,851	0,843	0,846	0,518	0,3411	0,5596
Prob (F-stat)	0.0000	0.0000	0.0000	0.0052	0.0633	0.0025
Number of units	28			21		
Speed of the convergence	0,0329	0,0435	0,0431	0,0029	-	0,0033
Half-life period	24,4	19,3	19,4	239,4	-	210,5

t-statistics are in the parentheses under the estimated coefficients.
Significance levels: ***p<0.001. **p<0.01 and * p<0.1.
Source: authors' calculations based on data from Eurostat.

5. Conclusion

Based on evidence of significant disparities in regional development, EU introduced a set of policy measures to promote integration and convergence of less developed areas of the Member States. Consequently, according to GDP per capita data on national level, overall disparities in the EU have recently diminished.

According to our model, absolute β-convergence can be found on the national level for EU countries which is in mainly line with previous studies. No evidence on regional convergence (on county level) can be found in Croatia and regional disparities have been highly persistent in period 2000-2008.

After including of international trade indicators estimated equation for convergence in EU has even better econometric properties in comparison to results for testing absolute β-convergence hypothesis. Parameter for initial development become even more significant and speed of convergence increased when export growth and openness variables are included and indicate a positive impact of international trade on GDP growth. Countries with better international competitiveness (expressed in higher export growth rates) recorded higher GDP growth and this process is especially evident in the group of new member states.

Other control variables as education, investment and structural features of European economies are not significant in explaining difference in economic development. In the first years of EU membership, benefits from free movement of goods, significant capital inflow and availability of structural funds dominated over traditional factors like availability of human and fixed capital.

Models for testing conditional convergence for Croatia have low power in explaining differences in economic growth and we can conclude that in the case of Croatia, regional convergence process is absent. The most developed counties in Croatia have a higher proportion of GVA in industries with high growth potential. In our model international trade has not been identified as factor promoting convergence of Croatian regions. Besides statistical reasons (non-availability of regional data for export of services) this can be explained by economic model based on growth of the domestic demand and lower overall international competitiveness of the Croatian economy.

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