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Abstract

The purpose of this research is to investigate the role of international trade in the process of regional convergence in Croatia. Previous empirical and theoretical studies usually argued that international competitiveness and export orientation promotes regional convergence and enables less developed regions to increase economic growth through enhanced productivity and efficiency. The main hypothesis tested is that international trade is less significant in explaining regional growth differentials in Croatia. The method used for the analysis is a panel data model which is based on conditional convergence hypothesis. The model is oriented to identification of factors which explain growth differentials of Croatian counties, including variables related to international competitiveness. The fundamental result obtained is empirical evidence for conclusion that international trade is not to be assumed as a key determinant of the regional convergence process in Croatia. Regional growth in Croatia is primarily determined by quality of human capital, investments in fixed assets and structural features of individual Croatian counties. The main conclusion on the basis of the results is that in the past period, regional growth was primarily determined by domestic demand of households and government. The highest growth was recorded in counties in which public funds were invested in infrastructural projects and counties specialised in production of services for personal consumption. However, the role of international trade in the regional economic growth can be more pronounced in the future as a result of limited domestic demand. Improved international competitiveness is a prerequisite for successful and sustainable regional development.

Key words: *regional growth, international competitiveness, economic growth, Croatia*

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1. Introduction

Openness and trade in economic literature are identified as the most important factors that enable to promote economic growth and job creation in globalised economy. Increasing the competitiveness of the EU, member states and regions in global markets is considered to be of the key importance to a trade policy that fits EU's 2020 strategy (European Commission 2010). Croatia is a small economy with limited domestic demand and international trade could significantly contribute to economic growth and employment. Having in mind persistent differences in regional development, enhancement of international competitiveness can be crucial for less developed Croatian counties to increase economic performance and speed up the overall process of regional convergence.

The role of international trade in convergence process is explored for Croatian economy. According to the economic theory, improvement of the international competitiveness and institutional environment in favour of the export led growth are crucial determinants of successful convergence of less developed regions (Grossman and Helpman, 1991; Romer, 1990). *The main hypothesis* tested in this paper is that the role of international trade in explaining regional growth in Croatia is only limited. Model of panel analyses which is theoretically based on conditional convergence hypothesis (Beenstock and Felsensteint, 2008; Mankiw et al., 1995) is applied on NUTS 3 level (Croatian counties) in research of regional growth sources for period 2000 – 2011. Croatian regions are lagging behind in trade integration in comparison to new EU member states which joined EU in 2004 and there is potential to exploit advantages of international trade in more appropriate manner in future period.

The rest of the paper is organized as follows. After introductory remarks, the second chapter presents a short literature review on relationship between regional growth and international competitiveness. The third chapter describes the method applied, followed by chapter on data sources and descriptive statistics on indicators of international competitiveness and growth in Croatia. Empirical relationships between analysed indicators and regional growth are tested by model based on panel data analyses is chapter five, while last chapter concludes.

2. Literature review

Theoretical and empirical research on regional income convergence has become especially popular two decades ago. The first studies on convergence were presented in Baumol (1986), Barro (2000) and Barro and Sala-i-Martin (1992). In the economic literature, three different concepts of convergence can be found: absolute, conditional and club convergence.

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 conditional convergence hypothesis (Beenstock and Felsensteint, 2008; Mankiw et al., 1995) assumes that in the long run per capita incomes of economies converge with one another if the main features as technological structure, quality of human capital and institutional environment of those economies are similar. Conditional convergence hypothesis which presents theoretical background for model applied in this paper will be discussed in more detail in chapter 3.

In addition to the absolute and conditional 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 and the club convergence hypothesis allows multiple and local stable steady-state equilibriums only.

According to neoclassical growth theory, the decrease of disparities in income levels is expected because of decreasing returns to capital. Paas and Schlitte (2007) highlighted the theoretical background for convergence/divergence process. Contrary to the neoclassical growth theory, endogenous growth theory and new economic geography (NEG) are theoretical concepts which explain persistence of regional disparities. 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. According to Martin (1998) there are two different types of endogenous growth theory: endogenous broad capital models and endogenous innovation models. Endogenous capital models are further divided in those which are based on investment externalities and those related to human capital and positive impacts of knowledge spillovers. The endogenous innovation models emphasize the role of technological improvements and production innovations.

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. In the theoretical and empirical papers, the capacity of regions to attract labour and capital from other regions are often recognised as crucial factor explaining growth differentials. NEG explores the major influences on inter-regional capital and labour flows and regional economic

activity shares (Potter, 2009). While traditional neoclassical models suggest that capital and labour flows will lead to the convergence in the competitiveness and growth, NEG claims that persistent regional disparities could prevail even in the long run. This could be a result of a broad set of regional competitiveness policies which influence mobility of production factors.

In 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 labour. 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 (Grossman and Helpman, 1991). First group of models shows that lower-income economies benefit more from international trade (supports convergence), while another group of models maintains that developing regions do not benefit from trade with rich regions.

The most important arguments in favour 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 regions 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 regions 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 (1996) found that trade liberalization in the EU resulted in decreased dispersion of per capita income. He explained that by price equalization theorem. Additionally Ben-David and Loewy (1998) 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 and Yigit (2007) 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 labour productivity. FDI and exports are found to increase productivity growth, while imports reduce it.

Awokuse (2007) used a neoclassical growth modelling 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.

Antunes and Soukiazis (2009) in the empirical research based on panel data found that the balance-of-payments constraint hypothesis and the degree of openness can be considered as conditioning factors which explain the convergence process between the early EU countries. They showed that foreign trade in combination with human capital (especially higher levels) can be considered as important determinants of economic growth. Antunes and Soukiazis (2011) conducted the similar research of the conditional convergence for the sample of the NUTS3

regions in Portugal and found significant role of foreign trade. Ramos (2007) found that that the sustainability constraints which states that in the long term investment cannot be higher than savings, that limit countries from running important external deficits, do not apply for regions or at least they are not as pressing for them as they are for countries.

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 Ridao-Cano (1999) elaborated a consequence of trade specialization; less developed economies are specializing in products that intensively use unskilled labour 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.

Empirical studies for Croatia found no evidence on convergence of Croatian counties (Mikulić, Lovrinčević and Galić Nagyszombaty, 2013; Mikulić and Kovač, 2012). In those studies a cross section analyses is used, while this paper employs panel data analyses which is more convenient and allows control for individual heterogeneity.

3. Methodology

In the formulation of the model used in this paper a conditional convergence hypothesis is employed. This hypothesis assumes that in the long run per capita incomes of economies or regions converge with one another if the main features of those economies are similar (Beenstock and Felsensteint, 2008). 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 regions, each particular region 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 the set of explanatory variables certain variables related to international trade as openness, export growth and share of exports in GDP are included and their significance in explaining growth differentials is tested in order to confirm or reject initial hypothesis that explanatory power of international trade is limited in explaining regional growth differentials in Croatia.

In the modelling of regional growth differentials, Croatian counties (NUTS III level) are used as cross-section units and the panel data method was applied. Baltagi (2001) pointed to the benefits related to the use of panel data. This method allows control for individual heterogeneity and is more informative with respect to pure time series or pure cross-sectional data. Additional panel data present more variability and less collinearity and in general result with more efficient estimates. Units are observed through certain period and this allows a more in-depth analysis of economic developments in comparison to simple cross sections. On the other hand, due to the fact that counties differ in size some estimation bias might occur. Panel data are characterized by the joint presence of both the cross-section and the time dimensions (Arbia, Galo and Piras, 2008).

Equation used in this paper can be considered as a modified version of the original conditional β-convergences specification where the growth rate (expressed as logarithm of ratio of GDP in current and previous period) and is considered as variable which depends on the set of explanatory variables including initial level of GDP per capita, indicators of regional trade features and other determinants of regional growth which are traditionally used in testing conditional convergence hypothesis. The estimation strategy consists in pooling together spatial and temporal observations, thus leading to a single convergence parameter β.

Therefore, the estimated equations have the following form:

$$\frac{\ln Yit}{Yi_{t-1}} = \alpha i + \beta \ln Yi_{t-1} + \Upsilon j Xji + \varepsilon it$$

where:

Yit – GDP per capita in EURO PPS in region i (21 Croatian counties) in current period, i = 1 to 21,

Yi_{t-1} – GDP per capita in EURO PPS in region i in previous period, t goes from 0 (year 2000) to 11 (for 2011),

Xji – set of other explanatory variables,

αi – individual effects to be estimated in panel data model,

β – convergence parameter to be estimated in model,

Υj – parameters to be estimated in model and related to explanatory variables other than GDP from previous period,

εit – error term.

Xji is a set of explanatory variables. Besides indicators of international trade additional socioeconomic determinants as educational level, investment activity or structural features of regional economy (share of agriculture, industry and services in regional gross value added) are used as potential explanatory variables. Selection of potential explanatory variables was based on factors presented in the literature review having in mind regional data availability constraint. In all of the specifications a GDP per capita in previous year is used as control variable because of convergence hypothesis.

Although there is a growing body of literature acknowledging the importance of developments within one region on its neighbouring regions, those effects are not included in this study. The more on recent spatial analysis of export competitiveness of Croatian regions can be found in Stojčić et al. (2014).

4. Data sources and descriptive statistics

Regional policy oriented to reduction of regional disparities is one of the most important parts of economic agenda of EU strategy and data requirements in that area are constantly increasing. Publication of GDP on level of NUTS 2 and NUTS 3 regions is scheduled in $t + 2$ period and data currently available from Eurostat database cover period to 2011. In the period prior to recession, Croatia gradually reduced the development gap and reached 63 percentage of European GDP per capita in 2008 but as consequences of recession development gap increased in recent period. There are significant regional differences both in GDP per capita level and in economic growth of Croatian counties. Grad Zagreb according to GDP per capita is above EU average while the least developed region (Brodsko-posavska) is slightly above of one third of EU average. While some of counties primarily situated along the Adriatic Sea recorded significant growth of GDP, convergence to EU average is absolutely absent in some counties situated in Kontinentalna Hrvatska[3].

[3] In Eurostat databases and publications the NUTS regions, when referred to as such, are not translated. The translations should be used only in other contexts and therefore in this paper the original names of regions downloaded from Eurostat web page are used.

Table 1: Regional GDP per capita, expressed in terms of purchasing power parities

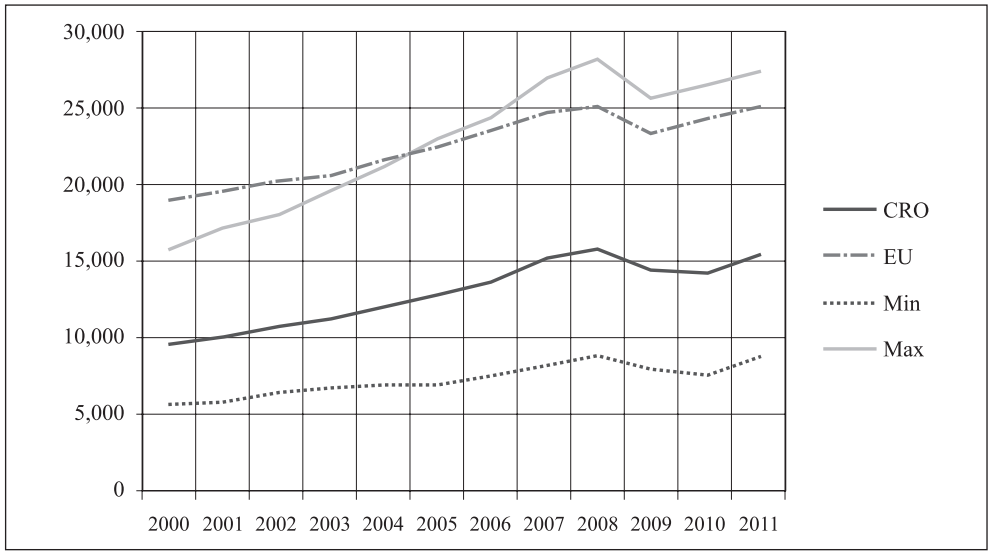
– EU = 100

Region/County	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Croatia	50	51	53	55	56	57	58	61	63	62	59	61
Jadranska Hrvatska	49	49	50	54	56	56	56	60	61	60	56	59
Primorsko-goranska	65	60	60	66	65	69	70	71	75	75	72	75
Ličko-senjska	42	42	48	58	75	53	52	50	56	55	50	48
Zadarska	37	40	42	47	47	48	46	51	54	52	47	49
Šibensko-kninska	36	35	37	41	44	46	43	49	49	44	44	47
Splitsko-dalmatinska	40	40	41	43	46	45	46	51	50	48	45	48
Istarska	66	68	72	75	78	76	75	79	78	78	74	77
Dubrovačko-neretvanska	45	46	45	49	54	55	55	63	62	61	57	58
Kontinentalna Hrvatska	51	52	54	55	56	58	59	61	64	63	60	62
Grad Zagreb	83	87	89	95	99	103	104	108	113	109	109	109
Zagrebačka	40	36	42	42	43	45	42	46	47	48	43	46
Krapinsko-zagorska	38	40	40	40	39	42	41	44	43	39	35	37
Varaždinska	46	47	51	51	48	47	49	51	54	52	47	49
Koprivničko-križevačka	51	50	51	51	49	49	54	56	55	56	48	50
Međimurska	41	42	45	44	44	43	46	47	52	51	47	50
Bjelovarsko-bilogorska	37	38	41	40	40	40	42	41	47	46	40	42
Virovitičko-podravska	37	39	40	40	39	37	41	42	42	39	35	37
Požeško-slavonska	36	37	37	40	40	39	37	39	38	38	36	37
Brodsko-posavska	30	31	32	32	33	31	32	33	36	34	32	35
Osječko-baranjska	39	39	42	41	43	43	44	49	51	51	46	49
Vukovarsko-srijemska	29	30	31	32	32	33	35	35	38	37	33	37
Karlovačka	39	45	46	44	42	43	45	49	49	46	43	45
Sisačko-moslavačka	47	44	43	43	43	45	48	44	49	51	49	48

Source: Eurostat database http://epp.eurostat.ec.europa.eu/portal/page/portal/region_cities/regional_statistics (downloaded in May 2014)

Figure 1 presents GDP per capita in Euro expressed in terms of purchasing parity standards for Croatia, European union, the most developed Croatian county (City of Zagreb) and the least developed county (Vukovarsko-srijemska till 2003, Brodsko-posavska in recent period). One can noticed that the economic activity in Croatia is recorded similar trend as in EU, but line denoting the most developed county is steeper than line related to minimum regional level of GDP per capita which indicates further regional divergence.

Figure 1: GDP per capita in Euro in terms of PPS



Source: Eurostat database http://epp.eurostat.ec.europa.eu/portal/page/portal/region_cities/regional_statistics (downloaded in May 2014)

Regional convergence/divergence can be better identifying by the measure of dispersion of regional GDP per inhabitant[4] (Table 2). In the European Union, disparities in economic development are more evident in new member states. 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 which probably resulted in lower level of regional dispersion in

[4] According to Eurostat definition, the dispersion of regional GDP (at NUTS level 3) per inhabitant is measured by the sum of the absolute differences between regional and national GDP per inhabitant, weighted with the share of population and expressed in percent of the national GDP per inhabitant. The indicator is calculated from regional GDP figures based on the European System of Accounts (ESA95). The dispersion of regional GDP is zero when the GDP per inhabitant 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 inhabitant and the country mean.

group of old member states. However, only a limited number of countries succeeded in reduction of regional disparities, while process of divergence is evident in group of new member states including Croatia.

Table 2: Dispersion of regional GDP per inhabitant (at NUTS 3 level)

Country	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Difference 2011 – 2001
OLD MS												
Belgium	28.4	28.4	27.6	28.0	28.2	27.6	27.7	27.0	26.5	26.8	26.2	-2.2
Germany	30.9	30.7	30.7	30.5	30.0	30.0	30.0	29.0	28.3	28.3	28.4	-2.5
Austria	25.7	25.8	25.2	24.3	24.3	23.9	22.9	22.7	23.0	22.5	21.4	-4.3
Finland	20.9	20.0	17.9	18.0	17.9	18.8	18.8	18.8	20.9	21.1	18.7	-2.2
Ireland	29.6	29.3	29.2	28.1	30.3	27.3	28.0	29.3	32.6	35.5	35.1	5.5
Spain	20.2	20.4	19.5	19.0	18.6	18.5	18.2	18.2	19.0	19.0	19.5	-0.7
France	23.8	23.5	23.6	22.7	23.2	23.1	23.9	25.8	25.7	26.8	26.9	3.1
Sweden	14.9	15.2	14.8	15.6	16.2	15.2	15.5	15.9	18.3	16.5	17.3	2.4
United Kingdom	30.4	29.9	29.5	28.9	29.9	29.3	30.5	32.1	32.1	31.8	32.5	2.1
Portugal	27.7	27.9	28.4	28.9	29.5	28.7	29.0	29.2	28.4	28.1	27.9	0.2
NMS												
Bulgaria	28.8	30.0	30.2	30.9	32.9	38.0	42.7	44.4	46.7	47.6	45.5	16.7
Czech	23.4	24.1	25.0	24.8	25.3	25.5	26.5	27.3	26.8	27.2	26.2	2.8
Estonia	39.0	40.4	41.5	44.3	42.0	44.2	41.9	41.0	43.8	40.9	42.1	3.1
Poland	31.6	32.8	32.2	32.4	32.9	34.2	34.4	33.5	34.5	35.1	34.9	3.3
Romania	28.5	31.6	30.5	30.3	35.7	35.5	36.1	38.2	37.4	37.8	40.0	11.5
Slovenia	19.4	19.3	21.2	21.3	21.8	22.7	22.3	21.7	22.8	22.4	21.6	2.2
Slovakia	27.3	28.1	28.7	29.2	33.7	34.4	34.9	32.6	35.2	35.0	35.2	7.9
Latvia	44.4	44.7	45.5	45.4	47.0	51.3	46.5	46.5	42.7	43.0	36.9	-7.5
Lithuania	21.7	24.4	24.0	23.4	24.6	27.0	28.1	26.0	27.1	26.2	24.8	3.1
Hungary	36.8	38.9	37.3	37.8	39.2	41.3	40.7	42.0	43.7	43.0	44.0	7.2
Croatia	31.1	29.9	32.2	33.2	34.2	33.8	32.8	32.8	32.8	36.3	35.0	3.9

Source: Eurostat database http://epp.eurostat.ec.europa.eu/portal/page/portal/region_cities/regional_statistics (downloaded in May 2014)

In this paper regional trends in GDP per capita will be treated as dependant variable while a set of explanatory variables includes international trade indicators, quality of human capital, investment activity and structural features of regional economies. International trade data on regional level are available from international trade statistics regularly published by Croatian Bureau of Statistics. Besides regional GDP data for total activity, CBS also publish data on gross value added (GVA) by economic activities and total regional economy can be divided on agriculture, industry and services. Data on gross fixed formation by regions and education are also available from regular CBS surveys and will be used in the model as potential explanatory variables which determine regional growth.

Table 3: Indicators of international trade by Croatian counties

Region/County	Exports, per capita		*Index*	Exports, as share in GDP		*Change in period Diff. 2011 – 2001*	Opennes, exports + imports as share in GDP		
	2001	2011	*2011/2001*	2001	2011		2001	2011	*Diff. 2011 – 2001*
Croatia	8,766	16,489	*188.1*	20.4	21.5	*1.1*	60.5	57.9	*-2.6*
Jadranska Hrvatska	*8,208*	*13,534*	*164.9*	*19.9*	*18.3*	*-1.6*	*46.4*	*36.5*	*-9.9*
Primorsko-goranska	1,.623	14,703	*138.4*	21.0	15.5	*-5.5*	49.9	35.9	*-14.0*
Ličko-senjska	691	1,512	*218.8*	1.9	2.5	*0.6*	2.7	5.7	*3.0*
Zadarska	2,313	7,640	*330.3*	6.9	12.4	*5.5*	20.6	22.6	*2.0*
Šibensko-kninska	5,066	14,251	*281.3*	17.2	24.2	*7.0*	43.0	50.0	*7.0*
Splitsko-dalmatinska	4,816	9,792	*203.3*	14.4	16.3	*1.9*	40.7	33.0	*-7.7*
Istarska	24,979	34,213	*137.0*	43.3	35.4	*-7.9*	83.4	62.5	*-20.9*
Dubrovačko-neretvanska	1,649	2,011	*121.9*	4.3	2.8	*-1.5*	13.8	7.2	*-6.6*
Kontinentalna Hrvatska	*8,832*	*17,943*	*203.2*	*20.0*	*23.0*	*2.9*	*58.7*	*67.9*	*9.2*
Grad Zagreb	16,820	29,933	*178.0*	23.3	21.8	*-1.5*	93.1	86.6	*-6.5*
Zagrebačka	2,550	6,910	*271.0*	8.2	11.9	*3.7*	49.1	62.3	*13.2*
Krapinsko-zagorska	8,695	17,242	*198.3*	25.1	36.8	*11.7*	49.6	66.7	*17.1*
Varaždinska	13,084	30,704	*234.7*	32.3	49.9	*17.6*	72.0	88.1	*16.1*
Koprivničko-križevačka	7,999	16,012	*200.2*	18.2	25.3	*7.1*	35.5	44.2	*8.7*
Međimurska	9,565	25,755	*269.3*	26.4	41.0	*14.6*	60.3	73.8	*13.5*
Bjelovarsko-bilogorska	3,255	6,136	*188.5*	9.6	11.7	*2.1*	22.6	25.6	*3.0*
Virovitičko-podravska	5,081	8,614	*169.5*	14.6	18.3	*3.7*	22.9	32.3	*9.4*
Požeško-slavonska	4,775	8,740	*183.0*	14.8	18.7	*3.9*	24.2	31.9	*7.7*
Brodsko-posavska	2,741	5,743	*209.5*	10.1	13.1	*3.0*	21.8	32.3	*10.5*
Osječko-baranjska	6,751	11,363	*168.3*	19.9	18.5	*-1.4*	41.0	35.3	*-5.7*
Vukovarsko-srijemska	1,698	6,432	*378.8*	6.4	13.9	*7.5*	14.3	30.1	*15.8*
Karlovačka	5,503	11,669	*212.0*	14.6	20.4	*5.8*	39.7	37.6	*-2.1*
Sisačko-moslavačka	9,479	23,332	*246.1*	25.0	38.2	*13.2*	47.3	59.3	*12.0*

Source: Croatian Bureau of Statistics, international trade and regional GDP data

Indicators of international trade point to relatively high heterogeneity regarding regional importance of exports. In some counties exports presents almost one half of GDP, while on the other hand some counties recorded only marginal importance of international trade. One can notice that three most developed NUTS 3 regions recorded reduction of exports measured as share in GDP. On the other hand, counties which recorded significant increase of exports (Varaždinska, Međimurska, Krapinsko-zagorska and Sisačko-moslavačka) at the same time recorded disappointing results in GDP trends (Table 1). Even descriptive statistics points to the conclusion that exports performance is not significantly related to regional economic growth in Croatian case which is to be formally tested in next chapter.

Table 4: Regional differences in economic structure, gross fixed capital formation and educational level

County	Services, as % of GVA	Agriculture, as % of GVA	Industry, as % of GVA	Investment, as % of GDP	Students in tertiary education – as % of total population at regional level
County of Zagreb	66.9	6.3	26.8	19.7	2.5
Krapinsko-zagorska	51.3	8.3	40.4	21.5	2.1
Sisačko-moslavačka	46.6	9.6	43.8	19.5	2.1
Karlovačka	57.8	7.5	34.7	22.0	2.7
Varaždinska	52.8	11.2	36.0	19.6	2.3
Koprivničko-križevačka	41.7	20.4	37.9	15.6	2.3
Bjelovarsko-bilogorska	51.0	25.5	23.5	13.6	2.2
Primorsko-goranska	67.0	1.5	31.5	26.0	3.3
Ličko-senjska	56.3	11.0	32.7	64.0	2.2
Virovitičko-podravska	46.3	27.1	26.6	12.5	2.1
Požeško-slavonska	53.3	20.2	26.5	16.7	2.4
Brodsko-posavska	54.6	15.7	29.7	16.5	2.4
Zadarska	71.4	6.4	22.2	26.4	2.8
Osječko-baranjska	55.8	15.6	28.6	22.1	2.5
Šibensko-kninska	71.9	4.3	23.8	24.2	3.0
Vukovarsko-srijemska	53.9	21.7	24.4	24.6	2.1
Splitsko-dalmatinska	69.4	2.7	27.9	26.0	3.4
Istarska	64.0	3.2	32.8	24.1	2.7
Dubrovačko-neretvanska	72.7	5.1	22.2	24.7	3.4
Međimurska	45.1	13.0	41.9	15.9	2.3
Grad Zagreb	76.6	0.2	23.2	26.1	3.8

Source: Croatian Bureau of Statistics, international trade and regional GDP data

Table 4 presents economic structure of Croatian counties, investment as share in regional GDP and proportion of population in tertiary education as proxy for quality of human capital.

5. Empirical results and discussion

An impact of international trade on regional growth in the context of conditional convergence hypothesis is tested in final part of the paper. The empirical analysis comprises pattern of regional growth in Croatia in period 2000 – 2011. Methodological background and specification of equation based on panel data methods with fixed effects are described in chapter three. All variables in each specification were pre-tested for multicollinearity. Set of potential explanatory variables were selected based on findings presented in the literature review and also presented in previous chapter.

When applying the panel data method, it is necessary to decide between the random effects and fixed effects specification. The procedure requires that both specifications are estimated. In the random effects specification model the number of cross-sections should be higher than the number of coefficients for a between estimator which impact the number of independent variables in the model. In order to test whether fixed effect specification is appropriate, the Hausman test was used. The hypothesis that random effects is preferred due to higher efficiency was not confirmed (based on results on redundant cross section fixed effects LR test presented in tables) so fixed effects are used in all specification presented.

The estimation results, including such a specification, are presented in Tables 5 and 6. In the first set of equations (model 1, 2 and 3) besides GDP per capita in previous period, international trade indicators is used as only explanatory variables, while other specification (Table 6, model 4-9) includes the impact of additional socioeconomic variables which could potentially influence growth rates according to conditional convergence hypothesis.

As in many other empirical studies noted in literature review, results for Croatian regional growth support the convergence hypothesis. The level of GDP in certain region in previous period is significant in explaining current GDP growth. Negative and significant parameter means that higher development level is related to lower economic growth when panel data with fixed effects method is applied. Among the set of international trade indicators, export per capita is only variable which estimated parameter is significant while openness and export propensity are not able to explain growth differentials in Croatian case. As GDP and export per capita are both expressed in the terms of logarithm, estimated parameter can be interpreted as elasticity. Low level of estimated parameter points to conclusion that although relation between export and GDP growth is positive, elasticity is very low meaning

that only significant improvements in export activity can impact regional economic growth.

Table 5: Results – estimated impact of international trade on regional growth

Variables	Results		
Model (panel data, fixed effects)	Model 1	Model 2	Model 3
Constant (α)	1.657*** (7.725)	1.758*** (8.14)	1.714*** (7.54)
Ln (lagged GDP per capita) (β)	-0.535*** (-8.197)	-0.449*** (-8.092)	-0.445*** (-7.883)
Ln (Export per capita)	0,0473** (2.388)		
Export share in GDP		-0,000741 (-0.458)	
Openness			0.000384 (-0.454)
R2	0,335	0,313	0,313
Prob (F-stat)	0,0000	0,0001	0,0001
Redundant cross section fixed effects LR test F statistics (p-value)	4.071 (0.000)	3.698 (0.000)	3.661 (0.000)
Number of observation	210 (21 cross section units, 10 years)		

Note: Value of t-statistics are presented 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 and CBS

Limited role of international trade in regional development can be explained by the Croatian growth model which has been dominant in the last decade. Economy was primarily driven by changes in domestic demand (personal and government consumption, investment in road infrastructure). From statistical point of view, non-availability of data for export of services on regional level 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.

Next table presents results of estimation which besides lagged GDP and export per capita includes additional socioeconomic variables. Inclusions of additional explanatory variables do not change significantly parameters for lagged GDP per capita and role of export in regional growth.

Table 6: Results – impact of international trade, economic structure, investment and education on regional development in Croatia

Variables	Results					
Model (panel data, fixed effects)	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Constant (α)	1.572*** (7.83)	1.447*** (6.578)	1.662*** (7.116)	1.734*** (8.112)	1.411*** (5.977)	1.378*** (6.231)
Ln (lagged GDP per capita) (β)	-0.527*** (-8.65)	-0.501*** (-7.743)	-0.536*** (-8.11)	-0.562*** (-8.609)	-0.571*** (-8.631)	-0.556*** (-8.955)
Ln (Export per capita)	0,0478** (2.585)	0,072** (3.445)	0.0472** (2.347)	0.062*** (3.031)	0,057*** (2.849)	0.0554*** (2.962)
Investment	0.002*** (5.088)					0.002*** (4.902)
Education (share of population in tertiary education)		-0.054*** (-3.088)				
Agriculture (share in GVA)			-0,000741 (-0.458)			
Industry (share in GVA)				-0.004** (-2.443)		
Services (share in GVA)					0.0044** (2.367)	0.00352** (2.012)
R2	0,425	0,371	0,335	0,358	0,357	0,439
Prob (F-stat)	0,0000	0,0000	0,0000	0,0000	0,0000	0,0001
Redundant cross section fixed effects LR test F statistics (p-value)	4.67 (0.000)	4.761 (0.000)	3.767 (0.000)	4.336 (0.000)	4.103 (0.000)	4.742 (0.000)
Number of observation	210 (21cross section units, 10 years)					

Note: Value of t-statistics are presented 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 and CBS

Econometric properties for equations related to regional growth in Croatia are slightly better in comparison to previous models in terms of proportion of variance explained by the model. Economic structure of Croatian regions turned out to be significant in explaining growth differences. Croatian counties specialised in service sector recorded higher growth rates, while regions with more significant

share of industry recorded slower growth while share of agriculture is not able to explain growth differences. In accordance to previous empirical research (Rodríguez-Pose, Psycharis, Tselios, 2013; Drezgić, 2011), investment activity has significant and positive impact on economic growth. Besides direct impact on regional growth through demand channel, higher level of investment in long-term increase productive capacities of regional economy and therefore potential growth of region in which investment took place. In opposition to most of empirical studies (Antunes and Soukiazis, 2011) education measured as share of persons in process of tertiary education in overall population of the region cannot be identified as determinant with positive impact on economic regional growth in Croatia based on specified model. It can be explained by the fact that higher proportion of persons in tertiary education in the short run means lower activity of the population in county of student residence. Positive impact of tertiary education on economic growth can be expected in the long run, while analysis in this paper is oriented on relatively short period.

6. Conclusion

The results of the analysis have confirmed the stated hypothesis that international trade is less significant in explaining regional growth differentials in Croatia. Panel data model results suggest that international trade has not been identified as dominant factor promoting convergence of Croatian regions. Regional indicators as export propensity and openness turned out to be insignificant, while parameter for export in per capita terms, although technically significant has low explanatory power in describing regional growth pattern indicating that the elasticity of regional economic growth on regional exports trends is rather low. The obtained results contribute to the economic literature respectively science as a new facts that regional convergence is a complex process influenced by different processes. Although international openness could positively contribute to economic development of regions which lag behind, other factors as quality of human capital, structural features of economy on regional level and economic policy conducted on national level in Croatian case had a more pronounced role in regional growth differentials. Limited role of the international trade in modelling regional growth differences in Croatia can be explained by economic growth based on domestic demand. In the set of other socioeconomic variables, investment activity and specialisation in service sector turned out to be most significant and positively affect economic growth.

Limitations of the research are primarily related to the data availability. Unfortunately, official data for exports of services in monetary terms are not available on county level. Increase of revenues from tourism could be factors behind successful convergence of some counties along Adriatic Sea but due to lack of reliable data impact of tourism is not estimated in this paper. Limitation of the research is also related to the significant time lag between the reference period and the time when

official data are available. A role of international trade is currently more pronounced because of prolonged recession and weak domestic demand due to high indebtedness and credit constraints for household and government sector. A changing regional growth pattern will be recorded in official statistics with certain time lag and is not covered in period analysed in this work. In the future research, a longer time series and more sophisticated econometric methods able to take spatial aspects in consideration should be applied.

From the viewpoint of economic system and economic policy, negative consequences of economic growth model based on strong domestic demand financed by foreign financial resources are proved to be in place not only on national but also on regional level while international competitiveness could be crucial for successful regional convergence in the future.

References

Antunes, M., Soukiazis, E. (2009) "Foreign trade, human capital and economic growth: an empirical approach for the EU countries", *CEUNEUROP Discussion Paper no. 51*, FEUC.

Antunes, M., Soukiazis, E. (2011) "Is foreign trade important for regional growth? Empirical evidence from Portugal", *Economic Modelling,* Vol. 28, No. 3, pp. 1363–1373.

Arbia, G., Le Gallo, J., Piras, G. (2008) "Does Evidence on Regional Economic Convergence Depend on the Estimation Strategy? Outcomes from Analysis of a Set of NUTS2 EU Regions", *Spatial economic analysis*, Vol. 3, No. 2, pp. 209–224.

Awokuse, T. (2007) "Causality between exports, imports, and economic growth: Evidence from transition economies", *Economics Letters*, Vol. 94, No 3, pp. 389–395.

Baltagi, B.H. (2001) *Econometric analyses of panel data*, New York: John Wiley & Sons.

Barro, R. (2000) "Inequality and Growth in a Panel of Countries", *Journal of Economic Growth,* Vol. 5, No 1, pp. 5–32.

Barro, R., Sala-i-Martin. X. (1992) "Convergence", *Journal of Political Economy,* Vol 100, No 2, pp. 223–251.

Baumol, W. J. (1986) "Productivity growth, convergence and welfare: What the longrun data show", *The American Economic Review,* Vol. 76, No. 5, pp. 1072–1085.

Baumont, C., Ertur. C. and Le Gallo. J. (2002) "The European Regional Convergence Process 1980–1995: Do Spatial Regimes and Spatial Dependence Matter?", University of Burgundy, available at: http://cournot2.u-strasbg.fr/users/j-econometres02/papers/SR1101.pdf, (accessed 15 March 2014).

Ben-David, D. (1996) "Trade and convergence among countries", *Journal of International Economics,* Vol..40, pp. 279–98.

Ben-David, D., Loewy, M. B. (1998) "Free trade, growth, and convergence", *Journal of Economic Growth*,Vol. 3 No 2, pp. 143–70.

Beenstock, M., Felsensteint, D. (2008) "Regional heterogeneity, conditional convergence and regional inequality", *Regional studies*, Vol. 42, No. 4, pp. 475–488.

De Loecker, J. (2007) "Do exports generate higher productivity? Evidence from Slovenia", *Journal of International Economics* Vol. 73, No 1, pp. 69–98.

Drezgić, S. (2011) "Public investments and regional income convergence: empirical analysis of Croatian regions", *Social research* Vol. 3 No. 24, pp. 43–55.

European Commission (2010) *Trade, growth and world affairs. Trade policy as a core component of the EU's 2020 strategy*. COM(2010)612, DG Trade: Brussels.

Fischer, M. M., Stirböck, C. (2004) "Regional Income Convergence in the Enlarged Europe 1995–2000: A Spatial Econometric Perspective", *ZEW Discussion Paper*, No. 04, Zentrum für Europäische Wirtschaftsforschung (ZEW), June, 42p.

Galor, O., Mountford, A. (2006) "Trade and the Great Divergence: The Family Connection", *CEPR Discussion Papers*, No. 5490, Centre for Economic Policy Research, London, April.

Grossman, G. M., Helpman, E. (1991) *Innovation and Growth in the Global Economy*, Cambridge: MIT Press.

Keller, W. (2004) "International Technology Diffusion," *Journal of Economic Literature*, American Economic Association, Vol. 42, No. 3, pp. 752–782.

Kutan, A.M., Yigit, T.M. (2007) "European integration, productivity and convergence", *European Economic Review*, Vol. 51, pp. 1370–1395.

Mankiw, N.G., Phelps, E.S., Romer, P.M. (1995) "The Growth of Nations", *Brookings Papers on Economic Activity*, Vol. 26, No 1, pp. 275–326.

Martin, R. (1998) "Slow Convergence? The New Endogenous Growth Theory and Regional Development", Economic Geography, Vol. 74, No. 3, pp. 201–227.

Melitz, M. (2003) "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity*," Econometrica*, Vol. 71, No. 6, pp. 1695–1725.

Mikulić, D., Lovrinčević, Ž., Galić Nagyszombaty A. (2013). "Regional convergence in the European Union, new member states and Croatia", *South East European Journal of Economics and Business*. Vol. 8, No. 1, pp. 7–19.

Mikulić, D., Kovač, I. (2012) "The Role of International Trade in Convergence Process", *Montenegrin Journal of Economics*, Vol. 8, No. 2; pp. 7–25.

North, D. (1990) *Institutions, Institutional Change and Economic Performance*, Cambridge: Cambridge University Press.

Paas, T., Schlitte (2007) "Regional Income Inequality and Convergence Processes in the EU25", *HWWI_Research_Paper*, No. 1–11.

Potter, J. (2009) "Evaluating Regional Competitiveness Policies: Insights from the New Economic Geography", *Regional Studies*, Vol. 43, No. 9, pp. 1225–1236.

Ramos, P. (2007) "Does the trade balance really matter for regions?", *The Annals of Regional Science*, No. 41, pp. 229–43.

Rodríguez-Pose, A., Psycharis, J., Tselios, V. (2013) "Public investment and regional growth and convergence: Evidence from Greece", *Papers in Regional Science; Special Issue: Productivity and financing of regional transport infrastructure*, Vol. 91, No. 3, pp. 543–568.

Romer, P.M. (1990) "Endogenous Technological Change", *Journal of Political Economy*, No. 98, pp. 71–102.

Sachs, J. D, Warner, A. (1995) "Economic reform and the process of global integration", *Brookings Papers on Economics Activity,* Vol. 26, No 1, pp. 1–118.

Sala-i-Martin, X. (1996) "Regional Cohesion: Evidence and Theories of Regional Growth and Convergence", *European Economic Review,* Vol. 40, No 6, pp. 1325–1352.

Stojčić, N., Benić, Đ., Karanikić, P. (2014) "Regional determinants of export competitivenessin Croatian manufacturing industry", *Zbornik radova Ekonomskog fakulteta u Rijeci: časopis za ekonomsku teoriju i praksu,* Vol. 32, No. 2, pp. 193–212.

Wood, A., Ridao-Cano, C. (1999) 'Skill, trade, and international inequality', *Oxford Economic Papers,* Vol. 51, No. 1, pp. 89–119.

Jesu li razlike u regionalnom razvitku u Hrvatskoj određene međunarodnom razmjenom?

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Sažetak

Cilj ovog istraživanja je ispitivanje značaja međunarodne razmjene u procesu regionalne konvergencije u Hrvatskoj. Ranija teorijska i empirijska istraživanja uobičajeno su utvrdila da međunarodna konkurentnost i izvozna otvorenost potiču regionalnu konvergenciju i omogućuju slabije razvijenim regijama ubrzani gospodarski rast putem unapređenja proizvodnosti i učinkovitosti. Osnovna hipoteza testirana u radu je da je međunarodna razmjena u slučaju Hrvatske manje značajna u objašnjavanju regionalnih razlika u ekonomskom rastu. Korištena je ekonometrijska analiza nad panel podacima, a kao teorijsko ishodište za formuliranje modela korištena je hipoteza uvjetne konvergencije. Modelom se utvrđuju faktori koji objašnjavaju razlike u brzini rasta hrvatskih županija, uključujući i varijable vezane za međunarodnu razmjenu. Temeljni rezultati sastoje se u davanju empirijske podloge za donošenje zaključka da međunarodna razmjena nije bila ključna determinanta koja je utjecala na proces regionalne konvergencije u Hrvatskoj. Umjesto međunarodne razmjene, regionalne razlike u gospodarskom rastu primarno su određene kvalitetom ljudskog kapitala, razinom investicija u fiksni kapital i strukturnim obilježjima pojedinih hrvatskih županija. Osnovni zaključak temeljem rezultata analize jest da je u dosadašnjem razdoblju, regionalni rast bio određen primarno kretanjem domaće potražnje kućanstava i javnog sektora. Najbrži rast zabilježen je u županijama u kojima su javna sredstva investirana u infrastrukturne projekte, te županijama koje su specijalizirane za pružanje usluga namijenjenih osobnoj potrošnji. Međutim, uloga međunarodne razmjene bit će naglašenija u budućem razdoblju kao posljedica ograničene domaće potražnje. Unaprjeđenje međunarodne konkurentnosti je preduvjet uspješnog i održivog regionalnog razvoja.

Ključne riječi: *regionalni rast, međunarodna konkurentnost, ekonomski razvoj, Hrvatska*

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Appendix

Map of Croatian NUTS III regions (counties)

Source: http://www.explorecroatia.info/discover-croatia/