The Influence of Foreign Direct Investments on Regional Development in Croatia

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Abstract

The aim of this study was to determine the influence of foreign direct investments (FDI) on regional development in Croatia and to contribute to previous studies that deal with regional FDI re-allocations. Our analysis was conducted at the NUTS 3 level (21 Croatian counties) and applied panel data analysis to determine the influence of FDI as well as other factors that proved to be significant in regional development in Croatia. The results point out that investment (i.e., both domestic and foreign direct investments), labor productivity, and export have a positive and significant influence on regional development, while absorptive capacity has a negative influence. It is therefore important to strengthen the absorptive capacity of Croatian regions to create a favorable investment environment and to provide good preconditions for the development of other factors of regional development. Findings are relevant for policy makers who

should take more proactive roles in attracting FDI as a way of strengthening regional development in Croatia. This may help policy-makers to act locally to achieve cohesion, but it can also be important for foreign investors that observe regional FDI determinants in the European Union.

1 Introduction

The main idea of this study is to find the importance of foreign direct investment (FDI) inflows in regional development in Croatia. Croatia consists of 21 counties (NUTS 3 regions) that have achieved different growth and development – there is a huge area of divergence among them – and there are numerous significant determinants for their growth and competitiveness. One significant determinant is certainly the inflow of foreign capital that has an ambiguous influence on regional development, and so this study seeks to quantify this relation to give conclusions that can help in creation of a more favorable and equalized investment environment. The impact of FDI on growth is expected to be manifold (Romer, 1993; De Mello, 1997), and its influence depends on the sector orientation and on the type of FDI (Damijan, Kostevc and Rojec, 2013). Greenfield FDI is considered to be more desirable for the host country because it points to new production that leads to additional and new employment; it brings new technologies, know-how, and higher levels of efficiency and productivity. This can have a positive impact on domestic firms. On the other hand, Mencinger (2003) warns that the effects of FDI inflows can also be negative and can be seen in decreasing employment or bankruptcy of local (domestic) enterprises because foreign ownership may crowd out inefficient domestic firms. Therefore, the final effect of FDI inflows remains uncertain.

Regional disparities represent a common problem of every country, and countries make a lot of efforts to create regional policy in a way to achieve cohesive growth and convergence of their regions. Croatia is faced with the existence of significant regional disparities (Puljiz and Maleković, 2007) that characterize a milestone in strengthening regional development and convergence towards the more developed European Union (EU) countries. Underdeveloped areas can induce cumulative negative effects not only for a specific region, but for the whole country, if adequate measures for reducing these disparities are not implemented. The presence of foreign firms and better absorption of FDI can help to reduce the development gap and improve regional growth; however, positive effects cannot be taken "for granted". Negative or insignificant effects of FDI on regional development should not be overlooked. Here the possibility arises for local and regional policy-makers to act on lower levels and contribute to development on a national level where it is first necessary to investigate the possible positive or negative effects of FDI (Pavlínek, 2004) on regional development. FDI cannot be the main source of solving the development problems in the regions; instead, it is a valuable supplement to levels of domestically provided fixed capital and other external finance (Ögütçü, 2002). Additionally, new regional policy should be oriented towards more investment in business and technological infrastructure, education, and information technology infrastructure (Maleković, Puljiz and Bartlett, 2011) where FDI will have an inevitable role.

Croatia, as a small southeast European country, needs foreign investments in the expectation that they will spur the domestic economy. According to WIIW (2013), Croatia received EUR 26.8 billion in the period from 1993 till the end of 2012; this is a very large amount of FDI considering it is EUR 5,994 per capita.[1] About 90 percent of the total investments in Croatia come from the EU-27. FDIs are unequally distributed among Croatian regions. The highest share of FDI (72 percent of total FDI) is located in the City of Zagreb, Primorje-Gorski Kotar County (6.5 percent), and Split-Dalmatia County (5 percent) (Croatian

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[1] In the group of Central and East European (CEE) countries Estonia, the Czech Republic, and Hungary have received a greater amount of FDI per capita.

National Bank, 2013), thus confirming the need to analyze the influence of regional investment allocation in Croatia. In Croatia brownfield investments prevail compared to the amount of greenfield investments.

The goal of this paper is to determine the relationship between the amount of received FDI in Croatian regions and the level of regional development, where a panel data analysis will be employed to estimate this relationship. The given estimation will be used to rank Croatian counties according to their level of regional development regarding the influence of FDI as well as to compare their rank with the ranking presented in the Croatian index of regional development, which is based on Ministry of Regional Development and EU Funds (2014).

There are many papers that analyze FDI flows in the Croatian economy, but most of them are conducted at the national level (Babić and Stučka, 2001; Lovrinčević, Buturac and Marić, 2004; Lovrinčević, Marić and Mikulić, 2005; Vukšić, 2005; Kersan-Škabić and Zubin, 2009; Bogdan, 2010), while only few are focused on FDI at the regional level.[2] There is a need and unrealized research potential to investigate the effects of FDI on the level of regional development, while at the same time considering that a variety of regional determinants can have different influences on regional development and should not be omitted in regional growth policies or strategies focused on attracting FDI. These effects can have implications on national development, while they are also important in terms of the objectives of the EU's cohesion policy.

This paper is organized as follows: the following section presents the literature review; the third section indicates the characteristics of regional development in Croatia; and the fourth section describes the data and methodology of our empirical analysis and explains the results. The final section gives the concluding remarks in line with the main goal of this paper.

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2   Škuflić and Botrić (2009) analyze FDI determinants on the county level (for the first time in Croatia) and Derado, Škudar and Rakušić (2011) present a strong positive connection between local economies' performance and the amount of inward FDI.

2 Literature Review

Regional economic growth disparities are in the focus of regional science. In the 1990s, spatial issues gained importance in the economic field of research and theoretical explanation. From this emerged the "new economic geography" that explains the concentration of economic activities as a result of agglomeration and dispersion influences (forces). The FDI trends in CEE countries (which are mainly oriented to capital cities and to the developed regions) indicate the existence of core-periphery and east-west disparity (Nemes-Nagy, 2000; Petrakos, Psycharis and Kallioras, 2005).

FDI is one of the most important channels through which financial globalization benefits the economy (Prasad et al., 2003), and it has significant impact on the regional economic growth and creation of new employment. Because of this, each region should consider the FDI promotion policy as an integral part of regional growth policies. The gains from FDI include the following: economy-wide efficiency through technology and knowledge transfer, sharing business practices, and easier access to foreign markets that results in rises in production and increases in employment opportunities. In that way, the firms, industries, and the nation can become more competitive.

Borensztein, De Gregorio and Lee (1998) note that the growth rate of host economies depends on the extent to which they adopt superior technologies. FDI inflows may complement local investment and can thus add to production capacity. FDI can promote growth through productivity gains resulting from spillovers to local firms provided that the host country has a minimum threshold of human capital. Mullen and Williams (2005) found that the impact of FDI in stimulating regional growth is similar to that in the national context.

Girma and Wakelin (2001) explain arguments for why FDI should have a regional dimension. They suggest that FDI-related spillovers (e.g., demonstration effects, the acquisition of skills, technology transfers) are expected to primarily benefit regions where FDI is located. Accordingly, less developed regions should have

better chances of catching up economically to more advanced regions if they succeed in attracting FDI. Using a panel analysis, Lessmann (2013) finds that FDI inflows increase regional inequality in low- and middle-income countries, while there are no negative redistribution consequences in high-income economies.

For Croatia, it is more important to see the results of researches made in the case of European countries and especially in European transition countries. Kokko and Gustavsson (2004) found no evidence that FDI has contributed to reducing income and development gaps in Sweden. They suggest that remote provinces that qualify for support for FDI have not performed better in terms of employment, labor productivity and educational levels. They also noted an exception that concerns the research and development intensity of firms, which tends to be higher in supported than in unsupported remote regions. Monastiriotis and Jordaan (2012) confirmed that FDI does not raise the productivity of domestic firms in Greece, neither contemporaneously nor over a longer time-horizon. The concentration of FDI in the most developed regions in the country is not a constraint to regional growth and convergence for the less-developed regions. Crespo, Fontoura and Proença (2009) found that geographical proximity between the locations of multinational firms and domestic firms facilitates the occurrence of FDI spillovers in Portugal. The impact depends on the type of externalities (i.e., horizontal and vertical externalities, with negative and positive effects, respectively).

Different explanations about the influence of FDI on GDP have also been determined by Carkovic and Levine (2002); they found no evidence of positive influence of FDI on GDP. Ran, Voon, and Li (2007) dispute that more FDI always brings more output growth and they determine that relatively developed regions benefit from FDI inflow, while domestic industries without foreign participation were relatively disadvantaged compared to those with significant foreign ownership. One of the conclusions in Menghinello, De Propris and Driffield (2010) was that inward FDI generates a productivity increase in the

home country, while Tiwari and Mutascu (2011) highlight that FDI enhances the growth process.

The effects of FDI depend on the characteristics of a particular region, therefore, we have highlighted few researches that were conducted on some Central and Eastern European countries. European Commission-Directorate General for Regional Policy (2006) pointed out strong empirical support for the economic benefits of FDI across all types of regions and industries: local firms increase productivity as a result of foreign investment in their region; FDIs increase demand for labor, promote cohesion in regions. The regions in Eastern Europe have benefited from FDI through productivity spillovers, and this has led to more convergence. Bijsterbosch and Kolasa (2009), using a new industry-level data set, confirmed that FDI inflows played an important role in accounting for productivity growth in Central and Eastern European regions. Svetličić (2013) warned that developed regions (within a country) are more attractive to foreign investors, so there is a challenge of how to reconcile the positive effects of FDI on the economic growth with their negative impact on regional inequalities. Policy-makers should consider ways in which FDI could foster convergence among regions. Moore and Vamviskidis (2007) emphasize the importance of attracting more greenfield FDI, together with other reforms to reduce the role of the state in the economy (through fiscal consolidation) to be able to reach sustainable development.

Wisniewski (2005) investigated the impact of FDI inflows on regions in Poland through case studies and found that the overall impact of FDI inflows on regional development has been adverse; regional disparities have widened as a result of FDI allocation. Pavlínek (2004) investigated the regional effects of FDI in Central European countries (i.e., Czech Republic, Hungary, Poland, and Slovakia) during the 1990s and pointed to some potential adverse effects for regional development such as regional divergence process (i.e., uneven development) and development of dual economies. FDI inflows can be unfair, and from the example of Czech automotive industries, the mentioned author

shows that FDIs have benefited from cheap and skilled labor, but there are no new research and development activities in the Czech affiliates; instead, these activities are located in the home country.

In Croatia, there is only one study that tries to connect FDI inflows with regional development. Derado, Škudar, and Rakušić (2011) found that despite large inflows of FDI, Croatia failed to realize sector- and region-specific spillover effects of foreign capital. There are also other numerous regional characteristics that we should have in mind when observing the development of regional economies.

Crespo Cuaresma, Doppelhofer and Feldkircher (2014) have investigated the determinants of economic growth in European regions, and they found that regions containing capital cities and with a large share of workers with a higher education are growing faster, particularly in the Central and East Europe.[3] Cambridge Econometrics (2012) provides quantitative and qualitative research of basic determinants of regional development and their interaction on the sample of NUTS 2 regions in Europe. They found that the productivity growth, the share of highly educated population, and investments are accelerators of the GDP per inhabitant growth rate in most EU member states. Puljiz (2010) synthesizes different determinants of regional development according to the theories of regional development and emphasizes the key aspects in new approaches to regional development that have changed over the past 20 years.

Regional development in Croatia has also been influenced by specific conditions: war in the first half of 1990s (resulting in depopulation and direct and indirect devastations), a transition period including privatization and FDI inflows, and the reform of the local administrative system and adjustment towards EU regional policy. Today, the regional policy in Croatia should be observed from two perspectives: how to decrease the divergences among the regions that proved to be a significant development problem for a longer time and how to

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3   They have included explanatory variables divided into groups: factor accumulation and convergence, human capital, technological innovation, sectoral structure and employment, infrastructure, and socio-geographical variables.

prepare Croatian regions for better absorption of the EU funds and FDI[4]. This implies that absorptive capacity and development differences among Croatian regions must be included in investigations that deal with regional development in Croatia.

Regional disparities in Croatia, as confirmed in numerous papers and according to the data presented below, motivate the authors to observe a regional dimension in the analysis. In addition, the regional dimension has an inevitable role in national development. Puljiz and Maleković (2013) point to the increasing role of regions (and the role of regional and local actors in managing regional development policy) in the EU, which have become the key drivers of national growth and competitiveness.

3 Heterogeneity among Croatian Regions

To present regional development differences in Croatia in more detail, Table 1 lists the comparison among Croatian (NUTS 3) regions (i.e., Croatian counties) according to the main indicators of regional development: GDP per capita, Regional Competitiveness Index of Croatia, Croatian Development Index and unemployment rate. In comparison, the averages were used for GDP per capita (2002-2011) and unemployment rate (2002-2013), while data for indices refer to the last available data.

The data shown confirm that there are significant development differences among Croatian regions. Based on the data for average GDP per capita, the most developed Croatian county (City of Zagreb) has an average GDP per capita that is three times higher than the least developed Croatian county (County of Slavonski Brod-Posavina). The most competitive Croatian regions are City of Zagreb, County of Varaždin and County of Istria, while the least competitive are County of Požega-Slavonia, County of Vukovar-Sirmium and Sisak-Moslavina County.

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4   Proper absorption of funds became important especially after the Croatian EU membership.

Table 1: *Regional Disparities in Croatia Based on GDP Per Capita, Regional Competitiveness Index, Croatian Development Index, and Unemployment Rate*

NUTS 3 region County of	GDP per capita in HRK (average 2002-2011)	Ranking based on Regional Competitiveness Index of Croatia (2013)	Croatian Development Index (2013)	Unemployment rate in % (average 2002-2013*)
City of Zagreb	116,163.51	1	186.4	9.37
Istria	85,113.10	3	156.8	9.98
Primorje-Gorski kotar	78,324.74	5	139.2	14.58
Zagreb	49,278.76	7	124.2	16.55
Dubrovnik-Neretva	63,761.26	10	120.8	19.53
Zadar	54,004.98	6	106.4	22.58
Split-Dalmatia	52,104.70	9	93.8	24.05
Varaždin	55,802.55	2	86.3	14.30
Šibenik-Knin	50,152.70	14	80.9	26.67
Krapina-Zagorje	44,639.73	12	73.2	15.72
Međimurje	52,090.25	4	69.7	16.28
Lika-Senj	59,919.37	17	64.8	21.94
Koprivnica-Križevci	57,617.97	8	59.2	18.25
Karlovac	50,617.36	13	56.3	26.31
Osijek-Baranja	50,846.72	11	41.6	27.69
Sisak-Moslavina	51,713.37	19	38.7	30.41
Požega-Slavonia	42,227.38	21	33.8	22.13
Bjelovar-Bilogora	46,330.38	15	23.3	27.13
Vukovar-Sirmium	38,197.52	20	18.7	32.99
Slavonski Brod-Posavina	36,690.01	16	18.4	31.39
Virovitica-Podravina	43,385.00	18	5.6	31.02

Notes: HRK = Croatian Kuna, the currency of Croatia.
Regional Competitiveness Index is described in United Nation Development Programme and National Competitiveness Council (2014), while more regarding the methodology of calculation of the Croatian Development Index can be seen in Ministry of Regional Development and EU Funds (2014).
* It will be more precise and methodologically correct to use averages for the period 2004-2013 (due to the changes in methodology), but the conclusions regarding the differences between the counties with the lowest and highest unemployment rate are the same.
Source: Croatian Bureau of Statistics (2005b, 2008b, 2011b, 2014a, b), Ministry of Regional Development and EU Funds (2014), United Nations Development Programme and National Competitiveness Council (2014).

In the United Nations Development Programme and National Competitiveness Council (2014), high correlation is confirmed between the ranking based on

development levels measured with GDP per capita and the ranking based on the mentioned competitiveness index. Croatian Development Index is calculated for Croatian counties and local units, and it aggregates data based on income per capita, budget incomes of county and local units per capita, unemployment rate, population change, and educational attainment rate (year group 16-65) (Ministry of Regional Development and EU Funds, 2014). Table 1 shows that this index also confirms significant differences among Croatian regions. It classifies Croatian counties into four groups:[5] counties that have development index value below 75 percent of the national average, counties with development index value between 75 percent and 100 percent of the national average, counties with development index value between 100 percent and 125 percent of the national average, and counties that have development index value above 125 percent of the Croatian average. This categorization is determined to have more reliable criterion for regional development incentives' allocations (as can be seen in Puljiz, 2006 and Ministry of Regional Development and EU Funds, 2014). The most developed counties according to Croatian Development Index are City of Zagreb, County of Istria, and County of Primorje-Gorski kotar, while County of Vukovar-Sirmium, Slavonski Brod-Posavina, and County of Virovitica-Podravina are the least developed counties. Unemployment rate differences among Croatian counties are also important, where the County of Vukovar-Sirmium has a 3.5 times higher rate of unemployment in comparison with City of Zagreb, which has the lowest unemployment rate. County of Istria that follows City of Zagreb has approximately three times higher unemployment rate in comparison with County of Vukovar-Sirmium.

It can be assumed that this heterogeneity relies on different regional determinants that will be empirically examined in the next section with special emphasis on FDI, which can represent an important driver of regional prosperity, especially in small open economies.

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5   Local units are categorized into five groups (Ministry of Regional Development and EU Funds, 2014).

The choice of variables (i.e., the determinants of regional development and FDI) in our analysis is based on the described theoretical considerations. The important determinants of regional development that have been identified previously can be seen from the aspects of FDI determinants such as market, resource and efficiency-seeking, determinants that refer to economic potential, labor conditions, and market size and competitiveness of the regions, as studied in Villaverde and Maza (2012). Škuflić and Botrić (2009) focus on resource-seeking and efficiency-seeking motives of FDI, besides market-seeking, while Boudier-Bensebaa (2005) differentiates four categories of potential determinants of FDI: labor market conditions, demand conditions, agglomeration economies, and incentives, which also represent the basis of our subsequent empirical analysis.

4 Research

4.1 Methodology and Data

This study analyzed the influence of FDI on regional development in Croatia. Relying on the assumption that FDI effects depend on regional characteristics, the investigation included determinants of regional development that can have significant influence. This can have implications for regional and national economic policy measures directed towards attracting FDI and for the evaluation of previous guidelines for strengthening regional development through foreign investment re-allocations, not only in Croatia but also in other EU member countries. To give a more complete discussion of the results, another segment that will be elaborated here is the comparison of rankings of the Croatian NUTS 3 regions based on the Croatian Development Index (Ministry of Regional Development and EU Funds, 2014) and the ranking that is based on the results of our modelling.

The analysis was performed on a sample of 21 Croatian NUTS 3 regions. These regions were chosen because an overview of the FDI regional distribution in Croatia confirms that FDI is unevenly distributed among the Croatian regions

– here, the definition of "regions" refers to Croatian counties – that are NUTS 3 regions according to the classification of the EU. This definition enables us to use comparable statistical data. In addition, the results of this analysis (that deals with new EU member countries) can be compared with other studies on NUTS 3 regions in other EU member countries. This perspective of observation is also important if we look at the regional integration processes where regions have an inevitable role. Regional inequalities in FDI can have significant influence on regional growth and development, while at the same time the empirical analyses regarding the influence of FDI on regional development in Croatia are scarce, as explained previously.

Our investigation applied panel data analysis to estimate the relation among FDI, the chosen determinants of regional development, and regional development in Croatia. Different papers mentioned in the previous sections of this paper confirm that determinants of regional development are numerous, while FDI can have significant influence and enhance regional prosperity. The influence of these determinants on Croatian regional development is still ambiguous and therefore motivates further analysis. The selection of input variables in our analysis relied on the literature presented in the previous section and was driven by data availability. Data availability constraints are especially important in regional analysis and analyses that deal with South-Eastern European countries.

Based on the previous discussion (in Section 2), we formulated the output (i.e., GDP per capita, a proxy of regional development) as a function of FDI, the determinants of regional development according to theory of regional development (i.e., domestic investments, labor productivity, education, unemployment, export, infrastructure, entrepreneurship, and research and development), and interaction between FDI and absorptive capacity. Domestic investments approximated with the gross fixed capital formation per capita are included with a lag because investments need time to materialize into development.[6] The interaction between FDI and absorptive capacity was added in our modelling based on the work of Borensztein, De Gregorio and Lee (1998) who explain that FDI contributes

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6   The authors would like to thank one of the reviewers for this note.

to economic growth when a sufficient absorptive capability is available in the host country. Besides other important variables, they highlight the role of absorptive capability as a determinant of economic growth, and they suggest the investigation of the complementarity between FDI and human capital in the process of productivity growth. An extended version of their model was also estimated in Ford, Rork, and Elmslie (2008). In our analysis, we supplement the model with the interaction of FDI and absorptive capacity expressed as the labor force quality measured by the share of employees with high levels of education in the total number of employees in model (1). To test the robustness of the results, we used an alternative measure of absorptive capacity in model (2), expressed as the share of regional self-government expenditures for research and development in total regional self-government expenditures that also interact with FDI. Due to possible problems of collinearity among independent variables, and with the aim to test if the results will change after excluding absorptive capability from modelling, we estimated model (3) without the interaction between FDI and absorptive capacity. To control the model for the differences between the most developed regions – NUTS 3 regions that have Croatian Development Index above 125 percent of Croatian average[7] – and other NUTS 3 regions, a dummy variable was added to the model. The three basic relationships used in our estimations are shown as follows:

$$GDPpc_{it} = \alpha + \beta FDI_{it} + \sigma_1 INV_{it-1} + \sigma_2 LP_{it} + \sigma_3 EDUC_{it} + \sigma_4 UNEMP_{it} +$$
$$\sigma_5 EXP_{it} + \sigma_6 INFR_{it} + \sigma_7 ENT_{it} + \sigma_8 RD_{it} + \theta ABS_{it} \times FDI_{it} + DUM_i + \xi_t + \varepsilon_{it}$$
(1), (2)

$$GDPpc_{it} = \alpha + \beta FDI_{it} + \sigma_1 INV_{it-1} + \sigma_2 LP_{it} + \sigma_3 EDUC_{it} + \sigma_4 UNEMP_{it} +$$
$$\sigma_5 EXP_{it} + \sigma_6 INFR_{it} + \sigma_7 ENT_{it} + \sigma_8 RD_{it} + DUM_i + \xi_t + \varepsilon_{it}$$
(3)

Table 2 describes the variables used in the panel data analysis for individual region i (i = 1,…, 21, for 21 Croatian NUTS 3 regions) in time t= 2002, …, 2011,

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7   On the basis of Ministry of Regional Development and EU Funds (2014).

and ε_{it} is an error term. ξ_t represents time effects. The time period was chosen due to data availability of the chosen variables at the time of performing the analysis. The sample has some missing variables for some units.

Table 2: *Definition of Variables that are Used in Panel Analysis*

Variable - Code	Description of variable	Expected impact
Dependent variable		
GDPpc	GDP per capita (in HRK, deflated with country-level deflator)	
Independent variables		
FDI	FDI stock (in HRK, deflated with country-level deflator)	+/-
INV	Gross fixed capital formation (in HRK, deflated with country-level deflator) per capita	+
LP	Gross domestic product (in HRK, deflated with country-level deflator)/persons in employment	+
EDUC	Share of employees with secondary and tertiary education in the total number of employees (in %)	+
UNEMP	Number of unemployed persons per capita	-
EXP	Export (in HRK, deflated with country-level deflator) per capita	+/-
INFR	Length of roads (in km) per capita	+
ENT	Number of entrepreneurs per capita	+/-
RD	Regional self-government expenditures for research and development (in HRK, deflated with country-level deflator) per capita	+/-
ABS	Absorptive capacity: share of employees with high education in total number of employees in model (1) Share of regional self-government expenditures for research and development in total regional self-government expenditures in model (2)	+
DUM	Dummy variable: the variable takes the value "1" for NUTS 3 regions that have Croatian Development Index above 125% of Croatian average (belong to the fourth group of regions)	+

Note: HRK = Croatian Kuna, the currency of Croatia.
Databases used in the research: Croatian Bureau of Statistics (2003a, 2003b, 2004a, 2004b, 2005a, 2005c, 2006a, 2006b, 2007a, 2007b, 2008a, 2008c, 2008d, 2009a, 2009b, 2010a, 2010b, 2011a, 2011c, 2012a, 2012b, 2013a, 2013b, 2014a, b), Financial Agency (2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012), Croatian Employment Service (2014), Ministry of Finance (2014), Ministry of Regional Development and EU Funds (2014).

Different panel data estimators were used in analyzing the impact of FDI on economic growth and/or development in Borensztein, De Gregorio and Lee (1998), Carkovic and Levine (2002), Mullen and Williams (2005), Ran, Voon and Li (2007), Ford, Rork and Elmslie (2008), Menghinello, De Propris and Driffield (2010), Monastiriotis and Jordaan (2010), and Tiwari and Mutascu

(2011). Due to the sample characteristics (i.e., cross-section, time series dimension) and the empirical investigations mentioned, panel data analysis was also used in our estimation. Another advantage of panel data analysis that can be emphasized here is the short time period of our analysis due to data availability (2002-2011), so time series analysis cannot be used.

We specified random effects (RE) in this analysis, and they were confirmed with the Hausman test (Hausman, 1978) and the Breusch-Pagan Lagrangian multiplier (LM) test for random effects (Breusch and Pagan, 1980), which will be presented in the next section. Laporšek and Stubelj (2012) also base their decision to apply panel analysis with random effects on the estimation of the Hausman test and the Breusch and Pagan Lagrangian multiplier test for random effects. The random effects models (besides other models) use the work of Fu (2008) in estimating the impact of FDI on the development of regional innovation capabilities. In our paper, equations given above were estimated by using feasible generalized least square method (FGLS) due to the presence of heteroscedasticity and autocorrelation, and to check the robustness of conclusions about the influence of FDI on regional development with another estimator. In the paper that analyzes the importance of agglomerations and inward FDI as drivers of regional development, Menghinello, De Propris and Driffield (2010: 548) explain that FGLS is one of the estimators that progressively relaxes the assumptions about heteroscedasticity across the panels and autocorrelation within the panels. The results of the empirical analysis are given in the next section.

4.2 Empirical Results

The first part of the empirical analysis refers to econometric panel data analysis. The variables described in Table 1 were used as input variables. The results of the panel data analysis, based on RE and FGLS estimators, are summarized in Table 3.

Table 3: *Estimation Results for the Influence of FDI on Regional Development in Croatia Using Panel Models (RE and FGLS)*

Explanatory variables	Model (1)		Model (2)		Model (3)	
	RE	FGLS	RE	FGLS	RE	FGLS
Constant	-3.191373 (0.000)	-0.9471167 (0.165)	-1.631514 (0.021)	0.1402534 (0.833)	-2.366332 (0.000)	-0.781617 (0.268)
FDI	0.6597346 (0.000)	0.5806886 (0.000)	0.1270202 (0.005)	0.2648591 (0.000)	0.0168459 (0.001)	0.224767 (0.001)
INV	0.025278 (0.027)	0.0395692 (0.049)	0.039093 (0.005)	0.0286962 (0.092)	0.0466197 (0.000)	0.0446592 (0.007)
LP	1.030662 (0.000)	0.8353533 (0.000)	0.7801255 (0.000)	0.6134584 (0.000)	0.8712023 (0.000)	0.7572683 (0.000)
EDUC	0.0260094 (0.000)	0.0219326 (0.000)	0.0088794 (0.002)	0.0013097 (0.763)	0.0129696 (0.000)	0.0090601 (0.016)
UNEMP	-0.0847877 (0.000)	-0.0466805 (0.119)	-0.0995983 (0.004)	-0.0295263 (0.321)	-0.1477254 (0.000)	-0.0836965 (0.004)
EXP	0.0356245 (0.052)	0.0529892 (0.002)	0.0386487 (0.059)	0.0662918 (0.000)	0.0342134 (0.097)	0.0571969 (0.001)
INFR	0.0139798 (0.053)	0.010073 (0.285)	0.0128117 (0.092)	0.0059117 (0.593)	0.0204129 (0.010)	0.0112871 (0.269)
ENT	0.0134424 (0.208)	0.025457 (0.007)	0.013314 (0.242)	0.0074426 (0.481)	0.0217299 (0.051)	0.0266445 (0.009)
RD	-0.057591 (0.054)	-0.0037034 (0.222)	0.1124707 (0.014)	0.2560017 (0.000)	-0.0048397 (0.144)	-0.0019204 (0.569)
ABSFDI	-0.6597246 (0.000)	-0.5538954 (0.000)	-0.1162174 (0.010)	-0.2582125 (0.005)		
DUM	0.3841534 (0.000)	0.2785145 (0.000)	0.2429735 (0.001)	0.1810493 (0.000)	0.262789 (0.000)	0.2387061 (0.000)
R-squared	0.76		0.83		0.79	
Wald chi2 Prob > chi2	7280.48 (0.0000)	1640.45 (0.0000)	3665.78 (0.0000)	1482.27 (0.0000)	15591.17 (0.0000)	1264.63 (0.0000)
Number of obs.	105	103	105	103	105	103

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Hausman test Chi2(10) Prob > chi2	7.54 (0.6732)	11.23 (0.3399)	3.89 (0.9229)
Breusch and Pagan LM test for random effects Chi2(1) Prob > chi2	210.05 (0.0000)	127.71 (0.0000)	210.54 (0.0000)
Time effects Prob > chi2	0.1297	0.0779	0.0925
Modified Wald test	Chi2 (20) = 1193.80 Prob > chi2 = 0.0000	Chi2 (20) = 1087.90 Prob > chi2 = 0.0000	Chi2 (20) = 1051.27 Prob > chi2 = 0.0000
Wooldridge test	F (1, 11) = 5.458 Prob > F = 0.0394	F (1, 11) = 5.393 Prob > F = 0.0404	F (1, 11) = 4.958 Prob > F = 0.0478

Notes: Standard errors in RE models are cluster robust. Model (2) allows for group-wise heteroscedasticity and panel specific error autocorrelation.
p-values are reported in parentheses.
The null hypothesis for the Hausman test is that the difference in coefficients between fixed and random effects specification is not systematic.
The null hypothesis for the Breusch and Pagan LM test is that variances across entities are zero.
The null hypothesis for the time effects test is that the coefficients for all years are jointly equal to zero.
The null hypothesis for the modified Wald test is homoscedasticity.
The null hypothesis for the Wooldridge test is no serial correlation.
More about tests can be found in Hausman (1978), Breusch and Pagan (1980) and Greene (2000).
Source: Authors' calculations.

The results of the Hausman test imply that it is appropriate to use random effects over fixed effects, while the results of the Breusch and Pagan Lagrangian multiplier test show that random effects are preferable over pooled regression. According to the modified Wald test, the random effects models suffer from heteroscedasticity, while the results of the Wooldridge test signify autocorrelation; therefore, we have used cluster robust standard errors. More information regarding these tests can be found in Greene (2000). The results of the random effect estimation and FGLS estimation – estimation (1), (2) and (3) – support the hypothesis that FDI has a significant (at 1 percent) positive influence on the Croatian regions. The variables that signify the influence of FDI retain their sign and statistical significance across specifications, but the estimated coefficients of this variable differ in models. It is therefore necessary to note that the magnitude of the FDI influence can be different regarding the inclusion of the interaction term between FDI and absorptive capacity of the regions. In models (1) and (2) the interaction between FDI and absorptive capacity is included, and this influence proved to be statistically significant. However, it is negative and therefore the possibility of FDI absorption should be observed in more detail to contribute to better FDI effects on regional development, in line with Borensztein, De Gregorio and Lee (1998). Labor productivity has also been confirmed to be statistically significant and is a positive variable in all of the observed models (at 1 percent), while the influence of gross fixed capital formation and export has the same sign and was statistically significant in all of the models with 10 percent, 5 percent and 1 percent levels of significance, respectively. Ford, Rork and Elmslie (2008) include year fixed effects to control for changes in legislation and business cycle effects that may impact growth. We have also included time effects due to the theoretical assumptions, but time effects were only significant at a 10 percent level in models (2) and (3). This means that the robustness of the significant influence of time effects is not confirmed. Over the observed period, time-related specific influences did not have a significant impact on regional development. It is, however, possible that the effects of the economic crisis led to significance of this effect at a higher (10 percent) level and will probably be

seen in future investigations that will cover a longer period of time. The results about the influence of the other observed regional determinants (i.e., education, unemployment, infrastructure, and regional self-government expenditures for research and development) are not robust so they will no longer be discussed in more detail in the context of regional development policy. It is interesting to note that the influence of research and development is negative and statistically significant in model (1), but it is positive and statistically significant in model (2) (when using random effects estimation). Due to the differences between model (1) and model (2) it can be assumed that the inclusion of the share of regional self-government expenditures for research and development in total regional self-government expenditures (as the proxy for absorptive capacity) in model (2) has changed the sign of the variable that signifies the influence of research and development. This confirms that expenditures for research and development are important in strengthening regional research and development potential, but it can also refer to the fact that the proxy variable for research and development in this model is not reliable, or it may even imply the existence of a collinearity problem. In model (1), which included the fraction of employees with high levels of education to the total number of employees as a proxy for absorptive capacity, the influence of research and development is negative; this result may signal the unrealized potential of highly educated employees. These conclusions must be observed in line with the previously emphasized results of the negative influence of the interaction between FDI and absorptive capacity. They must also be taken cautiously as the results for the influence of research and development are not robust according to the presented models (which must be observed in future studies).

Our study, conducted at Croatia's regional level and as a new EU member country, has confirmed the results of the European Commission-Directorate-General for Regional Policy (2006) that many European regions have seen benefits from attracting foreign direct investments. European Commission-Directorate-General for Regional Policy (2006) suggests that FDI policies

should form an integral part of regional growth policies aiming to create new employment and to promote economic growth in the regions. They also suggest that it is necessary to enhance the local supply of human capital and modern infrastructure and to improve other fundamentals for economic growth. In a time when FDIs in Croatia are decreasing, the results of the analysis presented in this paper can be especially important because it is necessary to emphasize the influence of significant regional determinants to act on lower levels to attract more investments and/or to strengthen regional-national development. Derado and Rakušić (2008) explain that the pro-investment attitude of local government is important to achieve the full potential of FDI.

In the estimated equations, values were included for each of the 21 NUTS 3 regions to calculate and present the ranking of Croatian regions based on the given models as well as to compare the results with the ranking based on the Croatian Development Index. In this way, we want to compare if the results of the analysis correspond with the development level of the Croatian NUTS 3 regions. The ranking of Croatian NUTS 3 regions based on model (1)[8] and the Croatian Development Index are presented below.

The most developed NUTS 3 regions – which belong to the fourth group according to the Croatian Development Index – have the same ranking based on the Croatian Development Index and the ranking from our modelling. The same is true for the least developed NUTS 3 region. Similarities also exist among the presented rankings for other regions, even though there are exceptions – for example, in the case of NUTS 3 regions that are ranked at better positions based on the calculation that includes FDI (and other significant determinants of regional development used in our investigation): Split-Dalmatia, Osijek-Baranja County, County of Slavonski Brod-Posavina. This is also true for the case of NUTS 3 regions that have lower rankings in our analysis: Dubrovnik-Neretva County or County of Lika-Senj. These conclusions can be important if we look at these indicators as a signal for further enhancing regional location advantages

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8   Ranking was performed also based on other models but the results do not significantly differ.

and for creating a favourable investment environment. If these indicators are used as a guideline for where to invest, significant determinants of regional development as FDI should not be excluded from the analysis. It is confirmed that the level of regional development in Croatia is in positive correspondence with the FDI. It should be emphasized that this comparison is indicative only, because the variables that are used in our modelling and in the calculation of Croatian Development Index as well as the applied methodology in the construction of this rankings significantly differ. In our panel data analysis, it was not possible to use the Croatian Development Index; instead, we used GDP per capita due to data constraints, i.e., the mentioned index was calculated only in 2010 and 2013.

Table 4: *Ranking of Croatian NUTS 3 Regions Based on Model (1) and the Croatian Development Index*

(NUTS 3 region) County of	Ranking based on the Croatian Development Index	Ranking based on model (1)
City of Zagreb	1	1
Istria	2	2
Primorje-Gorski kotar	3	3
Zagreb	4	7
Dubrovnik-Neretva	5	13
Zadar	6	5
Split-Dalmatia	7	4
Varaždin	8	6
Šibenik-Knin	9	11
Krapina-Zagorje	10	9
Međimurje	11	10
Lika-Senj	12	20
Koprivnica-Križevci	13	14
Karlovac	14	12
Osijek-Baranja	15	8
Sisak-Moslavina	16	16
Požega-Slavonia	17	18
Bjelovar-Bilogora	18	19
Vukovar-Sirmium	19	17
Slavonski Brod-Posavina	20	15
Virovitica-Podravina	21	21

Note: More about Croatian Development Index can be found in Ministry of Regional Development and EU Funds (2014).
Source: Ministry of Regional Development and EU Funds (2014) and authors' calculations.

5 Conclusion and Policy Implications

Regional differences are a development challenge for national economic policy, but they are also needed to achieve cohesion at the EU level. They can represent an issue in harmonization between agglomeration and dispersion forces. The way of overcoming the forces of agglomeration is in the heart of regional policy objectives. There are different approaches to solve the problems of uneven regional development. One of the approaches is presented in this study through analyzing the role of foreign capital (FDI) in the development of Croatian regions. Croatia is a small, open country that is strongly oriented towards foreign capital, which can significantly stimulate new production and employment and thereby reduce the number of economic problems it faces.

Starting from the premise that FDI determinants in Croatia have a strong regional dimension, this article empirically studied the effects of FDI on regional development in Croatia. The results of the study have shown that investments (i.e., both domestic and foreign direct investments), labor productivity, and export have a positive, significant influence on the development of Croatian regions, while the influence of the absorptive capacity is negative. A dummy variable that implies the differences between the most developed NUTS 3 regions and other NUTS 3 regions has been confirmed to be statistically significant and is positive, which was in line with our expectations. However, the robustness of our identified conclusions was not confirmed in the case of some of the regional determinants, even though these determinants are significant in several of the presented models.

In this way, this paper contributes to previous studies directed to FDI re-allocation, while the results can be of interest to those who create measures and incentives for attracting FDI. We highlight that in creating regional policy measures, coupled with specific guidelines directed towards attracting and re-allocating FDI in Croatia, policy makers should pay more attention to regional absorption capacity and examined significant regional determinants that can

lead to strengthening regional development. The implementation of laws and different acts that deal with foreign investments should also be more regionally (and sectorally) oriented. This can help to direct FDI towards regional specificities and to achieve higher efficiency in absorption of investments projects. The results of this and similar studies can help regional authorities to create a favorable environment for attracting FDI to be able to realize their benefits. The results can provide information to foreign investors to enhance their decision-making process when investing in Croatia. Also, the methodology and conclusions of this study can be of interest in developing foreign investment regional policy in other EU member countries that attempt to reduce regional disparities and achieve cohesion through investment absorption.

One of the most important constraints of this study is data limitation considering the short period of observation and data availability. Due to these constraints, at a regional level it was not possible to analyze the influence of FDI on regional development by using data on different types of FDI. In line with Lessmann (2013), in future studies it will be interesting to analyze the impact of FDI on regional inequalities and to differentiate the influence between developed and underdeveloped regions or between two permanently Croatian NUTS 2 regions (i.e., groups of analyzed NUTS 3 regions). It is possible to observe the influence of regional inequalities in FDI on regional development as well as on regional inequalities based on GDP data. The ambiguous influence of some of the regional determinants and FDI on regional development can result from regional inequalities, which motivates detailed studies. There is a question about the breaking point on the positive impact of regional inequalities in FDI because of its positive impact in some of the regions. Also, a further withstanding question is what negative impact do these inequalities have on national development or on development in least-developed regions. These can be investigated in future studies. In addition, it will be useful to analyze the spillover effect in more detail as it is explained in Menghinello, De Propris and Driffield (2010). We have seen that similarities exist between the ranking of Croatian counties based on

the Croatian Development Index and the ranking based on the results of our modelling. It will be interesting to use the same determinants that were used in the Croatian Development Index calculation with an added FDI variable and to apply the same methodology that is used in the construction of Croatian Development Index to have comparative indicators of regional development that also include the significant influence of FDI. More detailed analysis of the results can be given for each of the observed counties whose ranking differs in comparison with the ranking based on the Croatian Development Index.

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