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Entrepreneurial activity and regional development

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There are many global and national analyses that provide conclusive scientific support to various theses which stress the importance of entrepreneurship. In this article, based on the relevant data from Croatian counties, we specifically examine the mutual dependence and dual causality of the concepts of regional development and entrepreneurial activity. We apply correlation and dynamic panel data analysis on the set of data from Croatian counties with levels and relative changes of the selected regional growth indicators (GDP per capita, registered unemployment rate, development index) and the indicators of entrepreneurial activity (the number of entrepreneurs per 100 residents).

The results of these analyses show the complexity and ambiguity of impact of level of regional development and economic growth on the growth of entrepreneurial activity Croatian counties, depending on the studied indices and the manner of observing them either through their particular levels or their relative changes in time. Results of testing the impact of level and growth of entrepreneurial activity on economic growth are however consistent and robust to different indicators reflecting economic growth. Showing that there exists a significant positive impact of entrepreneurial activity on economic growth.

Keywords: entrepreneurial activity; regional development; Croatian counties

JEL classification: L26; O11; O47

1. Introduction

The thesis that entrepreneurial activity significantly influences the development of economy and society is widely accepted, as well as the existence of reverse causality. Nevertheless, there is still no systematic scientific theory or complete synthesis of the existing insights on the interaction between entrepreneurship and regional development. To date, many authors have studied entrepreneurship as an economic and social phenomenon, but the interaction between entrepreneurial activity and regional development has yet not been sufficiently researched. Judging by the reviews and studies that look at entrepreneurship as a modern phenomenon, we have noticed a lack of research on entrepreneurship in its natural environment – the local community.

The general purpose of this article is to examine more closely the connection and interaction between the entrepreneurial activity and the regional development of Croatian counties. Firstly, we give a short overview of certain conceptual models of entrepreneurship and economic growth or development. Next, we review the existing research on the topic and define our hypotheses. We continue by presenting the data

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and the methods used, followed by the results of testing our hypotheses, and end with a synthesis of the results and a conclusion.

The scientific contribution of this article arises primarily from the fact that to the best of our knowledge, in the Republic of Croatia there is no study that analyses the interrelationship between entrepreneurial activity and regional development by using statistical methods, which is somewhat surprising given the recognised importance of entrepreneurial activity to regional development and vice versa. The complexity and ambiguity of relationships between regional development and entrepreneurial activity that the results of this research reveal could encourage relevant future studies, which would significantly contribute to the development of this field as a whole. In addition, it is expected that the research contributes to entrepreneurial activity and regional development in practical terms. In this respect it is expected that the research findings obtained will be useful to policymakers and regional entrepreneurs, with the aim of promoting mutual positive impact.

2. Literature review and hypotheses

Entrepreneurial activities as well as regional development are dynamic processes with great interrelation. In this sense, entrepreneurial activity involves a dynamic process in which new firms are starting up, existing firms are growing and unsuccessful ones are restructuring or closing-down (Fischer & Nijkamp, 2009; Van Stel, Carree, & Thurik, 2005) which substantially depends on regional development. In turn, regional development is a dynamic phenomenon with a permanent change in business activities.

Considering stated, in the past three decades many researchers in the field have shown an increased interest in the topic of the nature of relationship between entrepreneurial activity and regional development. Based on a detailed analysis of the literature on entrepreneurship and regional development, we can conclude that the relationship between these two fields is rather complex and multifaceted (Müller, 2011) and that the resulting effects can be either direct (short-term) or indirect (long-term) (Fritsch & Mueller, 2004; Van Stel & Suddle, 2008). The direct or short-term effects of starting a business usually refer to creating new jobs, while the indirect or long-term effects are negatively reflected in the crowding-out of competitors and increased competitiveness, which results in business closures and job losses. Considering ambiguous nature of relationship between entrepreneurial activity and regional development it is necessary to develop adequately entrepreneurial environment (access to sources of financing, favourable government policies and programmes, and access to professional services) as the basis for stimulating entrepreneurial activity. Important role in this process have regional support institutions. One of the most important functions of this institutions is providing access to professional services, although they also facilitate access to sources of funding, enable transfer of knowledge and skills necessary for successful launching of new ventures, provide information necessary for making all the important decisions related to starting a business or planning growth and development of a business (Delić, Alpeza, & Peterka, 2012). Hence, the role of regional institutions should be focused on creating the prerequisites for the emergence and development of entrepreneurial ventures through providing information, transfer of knowledge, development of skills, and facilitating the process of networking of entrepreneurs.

The regional development literature mostly focuses on determining the surrounding conditions that encourage the process of starting an entrepreneurial venture, while the literature on entrepreneurship emphasises the activities of entrepreneurs and community

involvement as the key determinants of regional development. The latter sources focus on entrepreneurs as the initiators of regional development.

2.1. The impact of entrepreneurial activity on regional development

Since the theory indicates that entrepreneurial activity is important for regional development, it is therefore necessary to prove empirically that those countries, regions or counties which rank higher in this context actually do develop relatively faster. Of course, the usual condition of *ceteris paribus* applies here because many other explanatory factors exist that are helpful in describing economic growth and development. This includes such factors as the education level, inflation, fixed asset investments, climate, quality of institutions and property rights (Van Stel et al., 2005). Muštra and Škrabić (2011) examined the link between institution and regional growth inequalities for 18 European countries and found that the most important processes are those that elevate the respect of citizens and the state for the institutions that govern economic and social interactions among them.

Although we can generally find a rather limited number of studies on the econometric connection between national economic growth and entrepreneurship in the context of starting new entrepreneurial ventures, recently we have seen an increasing number of studies on this topic that base their research on the national level and try to determine what impact entrepreneurial activity has on the economic growth of a country. One such study was conducted by Van Stel et al. (2005), who were researching the impact of entrepreneurial activity on national economic growth. This study shows that the entrepreneurial activity (measured by the TEA index¹), while also bearing in mind the influence of technology, public institutions and the macroeconomic environment, measured by the GCI index², negatively affects the growth of relatively poor countries and positively affects the growth of relatively rich countries.

Another significant piece of research about the impact of entrepreneurship on national economic growth was conducted by Wong, Ho and Autio in 2005. In their study, they set up and empirically tested five basic hypotheses relevant to this problem. Interestingly, the authors included in their model two variables that reflected the influence of entrepreneurship on national economic growth rates. These were the two aspects of entrepreneurship – the creation of new companies (measured by the TEA index) and innovation (relation between the number of patents and the GDP values during the five-year period from 1997 to 2002). Such splitting of the concept of entrepreneurship is in line with Davidsson's (2003) and Kirzner's (1973) view of entrepreneurship as an embodiment of new companies entering the market and the imitative or innovative exploits of the existing ones. In their model of the impact of entrepreneurship on economic growth, as a dependant variable Wong et al. (2005) use the average GDP growth rate per capita in the observed Global Entrepreneurship Monitor (GEM) countries from 1997 to 2002. In order to eliminate the problem of conditional convergence or the difference in countries' initial economic growth rates, the model also included two control variables: the GDP per employee in the initial year and the average capital increase per employee in the five-year period (1997–2002). The results show that, in the context of overall TEA indices, higher levels of entrepreneurship or more newly created companies do not guarantee a better economic performance or greater economic growth. Nevertheless, a rapidly increasing TEA index proved to be significant in this model, which means that fast-growing companies are important for generating economic growth. Likewise, as an important aspect of entrepreneurship, in this model innovativeness is considered to be significant for explaining the variability of economic growth rates among the observed countries.

The creation of new jobs (direct effect) and economic growth are the two most often studied effects of entrepreneurship on regional growth and they expectedly dominate the quantitative studies of large data sets. In the paper called *How Our Smallest Companies Put the Most People to Work*, Birch (1989) concludes that, in the US, small- and mid-sized companies create many more jobs than big companies. After this discovery the interest for studying the effects of entrepreneurship on job creation started to grow sharply. Many subsequent studies (Acs & Armington, 2003; Audretsch & Thurik, 2000; Audretsch & Fritsch, 2002; Baptista, Escária, & Madruga, 2007; Mueller, Van Stel, & Storey, 2008; Reynolds, 1999; Thurik, 2003) show that starting new companies potentiates the creation of new jobs and regional growth, even after accounting for the eventual company closures. Acs and Armington (2003) studied the factors that influence economic growth on a sample of 394 US regions. According to their models, the economic growth of a region is a function of entrepreneurial activity, agglomeration effects and human capital. The results of this research suggest a significant positive correlation between the creation of new companies and the growth of local economies, which is consistent with the results of Reynolds' research (1999). Using the data on company setups and closures in 382 US job markets, Reynolds found a clear connection between the process of creative destruction and the economic growth measured by the rate of new job openings. Kalantaridis and Bika (2006) also looked at how entrepreneurial activities influence economic growth and noticed that the entrepreneurs who generated new jobs had a tendency to employ the local population, which was crucial for the enhancement of regional development.

Besides the short-term and direct effects of entrepreneurship, which are primarily reflected in creating new jobs, Fritsch and Mueller (2004) also noticed the existence of two indirect effects of starting new companies. Those are the mid- to long-term effect also known as *replacement effect* in the literature, which causes 'old' companies to fail and results in job losses, and the so called *induced effect*, which restores higher rates of employment after the new and surviving existing companies enhance their performance, thus stimulating the growth of employment. Therefore, we can see that the effects of new entries are threefold: the first effect increases employment, the second effect decreases employment and the third one increases it again. So, the final impact on employment can be either positive or negative, depending on the magnitude of each of the three mentioned effects.

Considering the aspect of time when speaking about the effects of entrepreneurship on regional development, the first econometric studies that took the time lag into consideration appeared at the beginning of this century (Fritsch & Mueller, 2004; Georgellis & Wall, 2000). They show that the positive effects on employment that the new (start-up) companies have in countries like Germany, the UK, US, Portugal and the Netherlands are relatively small in the first three years, but that they increase significantly after the sixth year (Caliendo & Kritikos, 2010; Fritsch & Mueller, 2004; Mueller et al., 2008) or the eighth year (Baptista et al., 2007), as in the case of Portugal.

In their study, Mueller et al. (2008) looked at how founding new companies affected employment rates in the UK. They examined the connection between entrepreneurship and job creation over a period of time by econometrically analysing British longitudinal data sets. Their conclusions show that the regions with low rates of new entrepreneurial ventures, generally in the rural and peripheral areas, are characterised by the strong direct effect of new job creation and the negative long-term effect of employment growth. New companies replace the existing ones, so the employees of the latter lose their jobs. The authors claim that less prosperous areas lose more jobs than they are

capable of creating and permanently keeping, which eventually affirms their stance about the wrong kind of entrepreneurship being practiced in the rural areas, judging by the negative employment rates. These results are consistent with the results of Fritsch and Mueller (2004), who conducted their research on a sample of German regions. Despite occasional differences, the sources generally agree that the creation of new companies positively affects regional development, especially when it comes to job creation and growth, and that these effects occur over the long-term (Audretsch & Fritsch, 2002; Fritsch, 2007; Müller, 2011; Nelson & Winter, 1982).

2.2. Impact of regional development on entrepreneurial activity

Studies that deal with the impact of regional development on entrepreneurial activity usually focus on the regional context and socioeconomic factors that influence the development of entrepreneurship. It is well known that entrepreneurial activity varies among different regions of a country and numerous studies support this claim (Davidson, Lindmark & Olofsson, 1994; Fritsch, 1992; Fritsch & Falck, 2007; Garofoli, 1994; Hart & Gudgin, 1994; Reynolds, Storey & Westhead, 1994). The results of those studies, conducted in the Swedish, Irish, Italian, British and German regions, show that the rates of initiating new entrepreneurial ventures in these regions range from 3.6 to 20.7 new entrepreneurial ventures per 1000 residents, with the exception of the UK reaching up to 59.5 new entrepreneurial ventures per 1000 residents. In general, all the studies above establish that the cities and urban regions are the focal points of entrepreneurship, while the rural areas typically fall behind when it comes to their rates of initiating new entrepreneurial ventures.

Previous empirical studies that focused on the determinants of regional entrepreneurship and the local differences of urban, peripheral and rural regions indicated many explanatory variables or factors of influence. For example, Audretsch and Fritsch (1994) note that more densely populated areas usually have higher rates of founding new companies because the infrastructure is generally more developed in highly populated regions. They also saw higher company founding rates in the regions with greater GDP per capita. Davidsson et al. (1994) established that unemployment rates negatively influenced company founding and that the regions where small companies prevailed were characterised by higher company founding rates in comparison with the regions where large companies prevailed. The studies of Audretsch and Fritsch (1994) and Garofoli (1994) support the claim that the employment structure of a region also influences its entrepreneurial potential. This means that the areas with greater proportions of production workers (or blue-collar workers) exhibit lower rates of founding new companies, while the areas with greater proportions of highly educated or highly specialised workers usually exhibit higher founding rates.

2.3. Hypotheses

Based on the theoretical grounds and the empirical research on the relationship between entrepreneurial activities and regional development, and numerous examples of economically developed and entrepreneurial active regions, for example, the Marche region, Italy (Mucelli, Micozzi, Rubens, & Jackson, 2015), County Kerry, Ireland, Helsinki-Uusimaa region, Finland, Trnava Self-Governing region, Slovakia, Nord-Pas de Calais region, France, Region of Southern Denmark, Province of Styria, Austria (EU, Committee of the

Regions, EER, n. d.), Zeeland, the Netherlands (European Entrepreneurial Region [EER] 2011, 2010), we propose the following hypotheses and the ensuing sub hypotheses:

H1:The entrepreneurial activity and the regional development of Croatian counties are significantly positively correlated.

*H1a:*The level of entrepreneurial activity and the level of regional development of Croatian counties are significantly positively correlated.

*H1b:*The growth of entrepreneurial activity and the economic growth of Croatian counties are significantly positively correlated.

H2:The relationship between the entrepreneurial activity and the regional development of Croatian counties is characterised by significantly positive double causality.

*H2a:*The development level of Croatian counties has a significant positive impact on the growth of entrepreneurial activity.

*H2b:*The economic growth of Croatian counties has a significant positive impact on the growth of entrepreneurial activity.

*H2c:*The level of entrepreneurial activity of Croatian counties has a significant positive impact on their economic growth.

*H2d:*The growth of entrepreneurial activity in Croatian counties has a significant positive impact on their economic growth.

3. Data and methods

In order to analyse the relationship between the entrepreneurial activity and the regional development of Croatian counties, statistical regions according to NUTS 3 classification (Ministarstvo regionalnog razvoja šumarstva i vodnoga gospodarstva, 2010), we tested the interconnection and interdependence of the selected regional development indicators (GDP per capita, unemployment rate, development index³) and the approximated measure of entrepreneurial activity (the number of entrepreneurs per 100 residents). For the purposes of this research, we used the panel data about Croatian counties for the period of 2006 to 2012.

The sources of the data we used are the data bases of the Croatian Bureau of Statistics (DZS), Financial Agency (FINA), Croatian Employment Service (HZZ) and the Ministry of Regional Development and EU Funds, together with different development strategies and other relevant documents of Croatian counties.

In order to test our first hypothesis, which says there is a significant positive correlation between the entrepreneurial activity and the regional development of Croatian counties, we conducted a correlation analysis. Considering a possible endogeneity problem and the fact that both entrepreneurial activity and regional development are dynamic processes, to test the second set of hypotheses, we used an Arellano–Bond linear dynamic panel data estimation.

We defined the time distances between the dependent and independent variables in our models to emphasise the direction of causality in the analysis. Statistical and data analyses were done using Excel and the software package STATA 12.

4. Findings of hypothesis testing and synthesis of results

Correlation between the economic development and the level of entrepreneurial activity has been the subject of study of many researchers for some time and regardless of whether it is conducted at the level of individual industries, region, or at the national level, the common conclusion of all research is that those countries which have

increased (or experienced) a higher level of entrepreneurial activity, enjoy greater economic growth at the same time (Delić i ostali, 2012). The results of testing our first hypothesis, proposing the existence of correlation between the regional development and entrepreneurial activity of Croatian counties, are mainly in line with this previous result and are presented in Tables 1 and 2. Table 1 shows the Pearson's coefficients for the linear correlation between the entrepreneurial activity or the change of entrepreneurial activity and the GDP pc or %diffGDP pc (percentage change in GDP per capita) of Croatian counties in the period from 2006 to 2012. The coefficients reaching the significance level of 5% ($p\text{-value} < 0.05$) are marked in red. At the level of significance of 5%, we can see from Table 1 that there is a significant positive correlation between the entrepreneurial activity, measured by the number of entrepreneurs per 100 residents, and the GDP pc throughout the observed period. However, at the same significance level, we can see no consistent relationship between the relative change in entrepreneurial activity and %diffBDP pc. Based on these results, H1a is accepted and H1b is rejected.

Results of testing the second set of hypotheses are given in Tables 3, 4, 5 and 6. Table 3 gives the results of testing hypothesis H2a, about the impact of regional development level on the growth of entrepreneurial activity. All model specifications in Table 3 use growth of entrepreneurial activity as dependent variable and lagged dependent variable as independent variable. Besides that, model 1 as an independent endogenous variable includes GDP per capita in the preceding period; model 2 includes the rate of unemployment in the preceding period; model 3 includes the rate of unemployment in the preceding period and the interaction term of rate of unemployment in the preceding period and the development index; model 4 includes the rate of unemployment in the preceding period and the interaction term of rate of unemployment and GDP per capita in the preceding period; model 5 includes GDP per capita and the rate of unemployment in the preceding period; model 6 includes GDP per capita and the rate of unemployment in the preceding period as well as the interaction term of rate of unemployment in the preceding period and the development index; and finally model 7 includes GDP per capita, the rate of unemployment and the interaction term of rate of unemployment and the GDP per capita in the preceding period.

If we take a look at the results of H2a hypothesis (Table 3), about the impact of regional development level on the growth of the entrepreneurial activity, we can generally see negative and significant values of the regression coefficients for independent variables (level of regional development and rate of unemployment). This shows that the level of regional development has a significant but also a multifaceted impact on the level of entrepreneurial activity which is consistent with the conclusion made by Müller (2011). The results of testing pretty consistently suggest that a higher level of regional development, measured by the GDP per capita, results in less growth of entrepreneurial activity and conversely that lower levels of GDP per capita results in higher growth of entrepreneurial activity. This result suggests people tend to engage in entrepreneurship out of necessity and are not surprising if one takes into account that based on the motivational index⁴ Croatia is at the bottom of all countries involved in the GEM research (Singer, Šarlija, Pfeifer, & Oberman Peterka, 2012). In addition necessity-driven entrepreneurship, particularly in less developed regions or those experiencing declines in employment, can help an economy benefit from self-employment initiatives when there are fewer work options available (Singer i ostali, 2012). Contrary to this result, the results of the impact of unemployment rates on the growth of entrepreneurial activity indicate that higher rates of registered unemployment decrease the growth of entrepreneurial activity and vice versa which is consistent with the results of a study conducted

Table 1. Pearson's coefficients for the linear correlation between the entrepreneurial activity (EA) or the change of entrepreneurial activity (%diffEA) and the GDP pc or the %diffGDP pc of Croatian counties in the period from 2006 to 2012.

	GDP pc	GDP pc	GDP pc	GDP pc	GDP pc	GDP pc	GDP pc	GDP pc	%diffGDP pc	%diffGDP pc	%diffGDP pc	%diffGDP pc	%diffEA
	2006	2007	2008	2009	2010	2011	2012	2007 - 2006	2008 - 2007	2009 - 2008	2010 - 2009	2011 - 2010	2012 - 2011
EA_2006	0.8421	0.8964	0.8711	0.8910	0.8947	0.8945	0.0000	-0.2241	0.6403	0.2935	-0.4289	0.1545	
EA_2007	0.8317	0.8880	0.8633	0.8831	0.8885	0.8867	0.0098	-0.2187	0.6377	0.3029	-0.4425	0.1667	
EA_2008	0.8264	0.8856	0.8600	0.8786	0.8874	0.8843	0.0267	-0.2238	0.6267	0.3216	-0.4557	0.1832	
EA_2009	0.8207	0.8812	0.8528	0.8720	0.8816	0.8769	0.0317	-0.2397	0.6279	0.3236	-0.4655	0.1746	
EA_2010	0.8257	0.8860	0.8598	0.8777	0.8876	0.8842	0.0354	-0.2276	0.6210	0.3254	-0.4568	0.1891	
EA_2011	0.8078	0.8724	0.8435	0.8637	0.8742	0.8705	0.0602	-0.2401	0.6308	0.3218	-0.4496	0.2091	
EA_2012	0.8125	0.8775	0.8480	0.8680	0.8781	0.8733	0.0600	-0.2436	0.6329	0.3224	-0.4609	0.2022	
%diff	0.2917	0.3500	0.3738	0.3733	0.4095	0.3723	0.1787	-0.0985	0.2778	0.3676	-0.5788	0.3550	
EA_2007_2006													
%diff	0.0407	0.0836	0.0794	0.0446	0.1124	0.0869	0.2016	-0.0334	-0.2109	0.4270	-0.3386	0.2572	
EA_2008_2007													
%diff	-0.3876	-0.4125	-0.4481	-0.4455	-0.4256	-0.4423	0.0114	-0.1975	-0.2650	-0.0801	0.1137	-0.2403	
EA_2009_2008													
%diff	-0.0557	-0.0621	-0.0137	-0.0387	-0.0390	-0.0181	0.0295	0.3277	-0.2110	-0.0292	0.2223	0.2421	
EA_2010_2009													
%diff	-0.4542	-0.4144	-0.4498	-0.4061	-0.4131	-0.3899	0.3315	-0.1144	0.0573	-0.2501	0.5040	0.3169	
EA_2011_2010													
%diff	0.2857	0.3054	0.2954	0.2964	0.2743	0.2344	0.0053	-0.1239	0.2483	0.0664	-0.5378	-0.1987	
EA_2012_2011													

Source: Author's research and calculation.

Table 2. Pearson's coefficients for the linear correlation between the entrepreneurial activity (EA) or the change of entrepreneurial activity (%diffEA) and the registered unemployment rate (u.r.) or the change of registered unemployment rate (%diffu.r.) in Croatian counties for the period from 2006 to 2012.

	u.r.	u.r.	u.r.	u.r.	u.r.	u.r.	u.r.	u.r.	u.r.	u.r.	u.r.	u.r.	%diffu.r.	%diffu.r.	%diffu.r.	%diffu.r.	%diffu.r.	%diffu.r.	%diffu.r.
	2006	2007	2008	2009	2010	2011	2012	2006	2007	2008	2009	2010	2008 - 2007	2009 - 2008	2010 - 2009	2011 - 2010	2012 - 2011	2007 - 2006	2007 - 2006
EA_2006	-0.7805	-0.7720	-0.7566	-0.7787	-0.7975	-0.7959	-0.7993	-0.0398	-0.4864	0.3777	0.3806	0.1367	-0.4864	0.3777	0.3806	0.1367	-0.1038	-0.0398	0.2639
EA_2007	-0.7838	-0.7754	-0.7608	-0.7840	-0.8043	-0.8036	-0.8077	-0.0405	-0.4909	0.3779	0.3691	0.1245	-0.4909	0.3779	0.3691	0.1245	-0.1150	-0.0405	0.2543
EA_2008	-0.7753	-0.7667	-0.7543	-0.7795	-0.8023	-0.8034	-0.8077	-0.0369	-0.4964	0.3609	0.3502	0.1058	-0.4964	0.3609	0.3502	0.1058	-0.1192	-0.0369	0.2300
EA_2009	-0.7788	-0.7698	-0.7565	-0.7806	-0.8034	-0.8029	-0.8076	-0.0307	-0.4893	0.3712	0.3460	0.1191	-0.4893	0.3712	0.3460	0.1191	-0.1251	-0.0307	0.2389
EA_2010	-0.7704	-0.7625	-0.7511	-0.7771	-0.7999	-0.8005	-0.8063	-0.0410	-0.4996	0.3555	0.3478	0.1111	-0.4996	0.3555	0.3478	0.1111	-0.1344	-0.0410	0.2261
EA_2011	-0.7627	-0.7545	-0.7435	-0.7699	-0.7920	-0.7913	-0.7964	-0.0336	-0.4949	0.3471	0.3428	0.1196	-0.4949	0.3471	0.3428	0.1196	-0.1261	-0.0336	0.2227
EA_2012	-0.7684	-0.7595	-0.7486	-0.7750	-0.7978	-0.7975	-0.8029	-0.0274	-0.4979	0.3500	0.3409	0.1187	-0.4979	0.3500	0.3409	0.1187	-0.1324	-0.0274	0.2222
%diffEA_2007_2006	-0.4894	-0.4924	-0.5163	-0.5595	-0.5996	-0.6245	-0.6504	-0.1247	-0.5020	0.0867	0.0355	-0.2093	-0.5020	0.0867	0.0355	-0.2093	-0.3304	-0.1247	-0.1431
%diffEA_2008_2007	0.0958	0.1007	0.0558	0.0128	-0.0389	-0.0896	-0.0852	0.0592	-0.1966	-0.3052	-0.3176	-0.4694	-0.1966	-0.3052	-0.3176	-0.4694	-0.0391	-0.1966	-0.4874
%diffEA_2009_2008	0.2740	0.2813	0.3139	0.3517	0.3644	0.4118	0.4102	0.1956	0.4730	0.0142	-0.1789	0.3723	0.4730	0.0142	-0.1789	0.3723	-0.0033	0.1956	0.1585
%diffEA_2010_2009	0.2937	0.2648	0.2224	0.1831	0.1860	0.1542	0.1293	-0.2495	-0.1285	-0.3272	-0.0672	-0.3129	-0.1285	-0.3272	-0.0672	-0.3129	-0.2312	-0.2495	-0.3228
%diffEA_2011_2010	0.3521	0.3568	0.3691	0.3734	0.3983	0.4270	0.4424	0.1474	0.3481	-0.1781	-0.1156	0.2109	0.3481	-0.1781	-0.1156	0.2109	0.2038	0.1474	0.0072
%diffEA_2012_2011	-0.4073	-0.3745	-0.3829	-0.3926	-0.4239	-0.4416	-0.4482	0.2518	-0.2856	0.1269	0.0216	-0.0697	-0.2856	0.1269	0.0216	-0.0697	-0.1445	0.2518	-0.0271

Source: Author's research and calculation.

Table 3. Results of panel analyses of how development level indicators influence counties' growth of entrepreneurial activity.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	%diff_EA _t	%diff_EA _t	%diff_EA _t	%diff_EA _t	%diff_EA _t	%diff_EA _t	%diff_EA _t
%diff_EA _{t-1}	-0.378***(-3.65)	-0.284***(-3.12)	-0.286***(-3.15)	-0.390***(-4.76)	-0.420***(-5.00)	-0.396***(-4.82)	-0.396***(-4.86)
GDPpc _{t-1}	0.000306(1.02)				-0.00116***(-4.34)	-0.000977***(-3.88)	-0.000817***(-1.91)
u.r. _{t-1}		-2.010***(-7.10)	-1.954***(-4.16)	0.454(-1.01)	-2.874***(-8.99)	-2.982***(-6.12)	-2.250*(-2.47)
u.r.*DI			-0.000681(-0.11)			0.00441(0.80)	
u.r.* GDPpc _{t-1}				-0.0000379***(-4.15)			-0.00000691(0.49)
cons	-11.81(-0.61)	44.59***(8.65)	44.35***(8.60)	57.52***(10.42)	135.5***(6.31)	120.8***(5.97)	109.5***(3.62)
N	63	63	63	63	63	63	63

Note: t statistics in parentheses.

*p<0.05; **p<0.01; ***p < 0.001.

Source: Author's research and calculation.

Table 4. Results of panel analyses of how economic growth indicators influence countries' growth of entrepreneurial activity.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	%diff_EA _t	%diff_EA _t	%diff_EA _t	%diff_EA _t	%diff_EA _t	%diff_EA _t	%diff_EA _t	%diff_EA _t	%diff_EA _t
%diff_EA _{t-1}	-0.728*** (-6.66)	-0.690*** (-7.17)	-0.691*** (-6.84)	-0.384* (-3.04)	-0.430*** (-3.40)	-0.415*** (-3.33)	-0.511*** (-3.11)	-0.456*** (-3.48)	-0.483*** (-3.73)
%diff_GDPpc _{t-1}	-0.351*** (-3.60)	-0.291 (-2.34)	-0.715 (-2.34)				-0.763*** (-3.88)	-0.758*** (-3.53)	-1.370** (-2.87)
%diff_GDPpc _{t-1} *DI		-0.00000402(-0.00)						0.00323(1.02)	
%diff_GDPpc _{t-1} GDPpc _{t-1}			0.00000709(1.33)						0.0000140(1.68)
%diff_ur _{t-1}				-0.0300(-0.50)	-0.0168(-0.14)	0.0323(0.22)	-0.365** (-3.07)	-0.657*** (-3.36)	-0.715*** (-3.07)
%diff_ur _{t-1} *DI					0.0000619(0.07)			0.00428** (2.66)	
%diff_ur _{t-1} GDPpc _{t-1}						-0.000000763(-0.42)			0.00000683* (2.43)
cons	10.26*** (11.91)	9.962*** (12.67)	9.731*** (11.41)	7.940*** (10.31)	8.121*** (10.66)	8.054*** (10.69)	11.12*** (8.82)	10.09*** (10.69)	9.892*** (9.44)
N	63	63	63	63	63	63	63	63	63

Note: t statistics in parentheses.
 *p<0.05; **p<0.01; ***p < 0.001
 Source: Author's research and calculation.

Table 5. Results of panel analyses of how growth of entrepreneurial activity influence countries' economic growth.

	(1)	(2)	(3)	(4)	(5)	(6)
	%diff_GDPpc _t	%diff_GDPpc _t	%diff_GDPpc _t	%diff_u.r. _t	%diff_u.r. _t	%diff_u.r. _t
%diff_GDPpc _{t-1}	-0.156(-0.98)	-0.0634(-0.35)	0.0405(0.24)			
EA _{t-1}	22.44*(2.06)	76.19***(2.61)	62.90***(3.37)	-92.50***(-6.25)	-159.7***(-5.98)	-156.0***(-6.70)
EA _{t-1} * DI		-0.440*(-2.14)			0.445*(3.04)	
EA _{t-1} * GDPpc _{t-1}			-0.000536**(-2.71)			0.000589*** (3.54)
%diff_u.r. _{t-1}						0.671*** (4.72)
cons	-11.81(-0.61)	-53.25***(-2.61)	-39.31*(-2.48)	158.0*** (6.74)	193.5*** (7.37)	189.2*** (7.44)
N	42	42	42	42	42	42

Note: t statistics in parentheses.

*p<0.05; **p<0.01; ***p < 0.001

Source: Author's research and calculation.

Table 6. Results of panel analyses of how growth of entrepreneurial activity influences counties' economic growth indicators

	(1)	(2)	(3)	(4)	(5)	(6)
	%diff_GDPpc _t	%diff_GDPpc _t	%diff_GDPpc _t	%diff_u.r. _t	%diff_u.r. _t	%diff_u.r. _t
%diff_GDPpc _{t-1}	-0.793 ^{***} (-4.06)	-0.792 ^{***} (-4.01)	-0.782 ^{***} (-3.96)			
%diff_EA _{t-1}	-0.818 ^{**} (-2.88)	-1.121 ^{**} (-2.88)	-1.166 (-1.69)	1.510 ^{***} (3.57)	0.680 (1.65)	-0.0952 (-0.12)
%diff_EA _{t-1} * DI		0.00522 (1.13)			0.0167 [*] (2.40)	
%diff_EA _{t-1} * GDPpc _{t-1}			0.00000655 (0.59)			0.0000284 [*] (1.98)
%diff_u.r. _{t-1}				-0.710 ^{***} (-4.34)	-0.865 ^{***} (-5.32)	-0.774 ^{***} (-5.24)
cons	3.420 (1.76)	3.022 (1.51)	3.160 (1.60)	5.223 [*] (2.26)	3.998 (1.91)	5.020 [*] (2.57)
N	42	42	42	42	42	42

Note: t statistics in parentheses.

*p<0.05; **p<0.01; ***p < 0.001

Source: Author's research and calculation.

by Davidsson et al. (1994). This suggests that entrepreneurial activities in Croatian counties are driven by opportunity. Namely, although small, the motivational index for the Republic of Croatia in the period 2006–2011 is continuously greater than 1, moving from 1.15 to 2.52, indicating however that opportunity driven entrepreneurial activity is greater than that driven by necessity (Singer i ostali, 2012). Finally, the insignificance of interaction terms indicates that the impact of unemployment rate on growth of entrepreneurial activity does not depend upon level of county development. The said findings suggest that the hypothesis H2a should be partially accepted.

This conclusion is further supported by results of testing the hypothesis H2b given in Table 4. All model specifications in Table 4 use growth of entrepreneurial activity as a dependent variable and a lagged dependent variable as an independent variable. Besides that, model 1 includes an independent endogenous variable includes relative change of GDP per capita in the preceding period as independent variables; model 2 includes the relative change of GDP per capita in the preceding period and interaction term of relative change of GDP per capita in the preceding period and index of development; model 3 includes the relative change of GDP per capita in the preceding period and interaction term of relative change of GDP per capita and GDP per capita in the preceding period; model 4 along lagged the dependent variable as an endogenous independent variable includes the relative change of the unemployment rate in the preceding period; model 5 includes relative change of the unemployment rate in the preceding period and the interaction term of relative change of the unemployment rate in the preceding period and the development index; model 6 includes relative change of the unemployment rate in the preceding period and the interaction term of relative change of the unemployment rate and GDP per capita in the preceding period; model 7 includes relative change of GDP per capita and relative change of the unemployment rate in the preceding period; model 8, along the variables in model 7, also includes interaction terms of this variable with the development index; while model 9 includes this variables and its interactions terms with GDP per capita.

The results of testing these models suggest that the relative change of GDP per capita has a significant negative impact on the relative change of entrepreneurial activity while interaction terms are not significant. In line with this, on average we can say that the higher the economic growth rates (expressed through % Δ GDP pc), the lower the entrepreneurial activity growth rates. This may be so because after reaching a certain level of development, slowdown of entrepreneurial activity may occur, and further economic growth does not lead to further growth of entrepreneurial activity. In other words, lower economic growth rates mean higher entrepreneurial activity growth rates, potentially indicating entry into entrepreneurship because of necessity, where individuals create businesses primarily because of involuntary job loss and the scarcity of vacancies. The results of testing impact of relative change of unemployment rate on growth of entrepreneurial activity, although insignificant in models 4, 5 and 6, becomes significant after taking into account the impact of relative change in GDP per capita. In addition to what was already said, the relative change of registered unemployment rates has a significantly negative impact on the relative change of entrepreneurial activity. So, on average we see that the higher the increase in the rate of registered unemployment, the lower the growth rate of entrepreneurial activity. However, a significant positive effect of interaction terms of relative change of unemployment rates and level of regional development indicates that the impact of relative change of unemployment rate increases with level of regional development. Taking into account both individual as well as interaction terms effect of relative change of unemployment rate means that the growth of unemployment rate decreases the

rate of entrepreneurial activity in less developed counties. The greater relative increase in the unemployment rate decreases more entrepreneurial activity in the less developed areas, and vice versa. The impact can be written as: $-0.657 + 0.00428*DI$ or $-0.715 + 0.0000683* GDP_{pc,t-1}$ respectively. In accordance with mentioned above, we partially accept the hypothesis H2b, which says that the economic growth of Croatian counties significantly positively influences the growth of entrepreneurial activity.

Results of testing impact of level of regional development and economic growth on growth of entrepreneurial activity although mixed, are significant and in consensus with the idea of Wenekers & Thurik's (1999) model which linking entrepreneurship and economic growth implies the linking of individual, enterprise-level and macro level. Although entrepreneurship derives from the individual level, the implementation of the same is achieved at the level of companies and it is influenced by the context in which it operates. One does not take action in a vacuum without a defined time and place of action, but is influenced by the cultural and institutional context in which it operates, the business environment and macroeconomic conditions (Sanyang & Huang, 2009). Based on these findings regional institution should – through providing information, transfer of knowledge, development of skills, and facilitating the process of networking of entrepreneurs – develop the entrepreneurial environment as the basis for encouraging and stimulating entrepreneurial activity. The results of testing reverse causality are presented in Tables 5 and 6, and show the impact that the level and relative change of the entrepreneurial activity of Croatian counties have on the relative change of the regional development of Croatian counties. The first three model specifications in Table 5 use relative change of GDP per capita as a dependent variable and lagged dependent variable as an independent variable. These models also include the following endogenous independent variables: model 1 includes the level of entrepreneurial activity in the preceding period; model 2 includes the level of entrepreneurial activity and its interaction term with development index; and model 3 includes a level of entrepreneurial activity and its interaction term with GDP per capita in preceding period. The significantly positive value of the regression coefficient for the independent variable EA_{t-1} in these models suggests that the absolute increase in level of entrepreneurial activity has a significant positive impact on the economic growth. However, according to the significantly negative coefficient of related interaction terms it can also be concluded that this effect depends on the level of regional development and is greater for lower levels of regional development. Hence, the impact of entrepreneurial activity decreases with levels of regional development which contradicts the results obtained by Van Stel et al. (2005) on national level analysis.

Further, results of significantly positive impact levels of entrepreneurial activity on economic growth are also confirmed by results of testing the models (model 4, 5 and 6 in Table 5) of impact of entrepreneurial activity on relative change of unemployment rate. These results indicate that the level of entrepreneurial activity in Croatian counties significantly decreases growth of unemployment, or in other words it significantly increases growth of rate of employment. However, it should be taken into account that this impact significantly depends on the level of regional development, indeed the positive impact of entrepreneurial activity on the growth of rate of employment is greater for lower levels of entrepreneurial development.

The results of testing the models presented in Table 5 are generally consistent with the results and conclusion of Nelson and Winter (1982); Reynolds' research (1999), Audretsch and Fritsch (2002), Acs and Armington (2003), Kalantaridis and Bika (2006), Fritsch (2007) and Müller (2011). Going forwards these results can be attributed to the greater magnitude of the direct effect and the so called *induced* effect in

comparison with the magnitude of the *replacement* effect (Fritsch & Mueller, 2004; Fritsch, 2007). According to these results, it could be concluded that the most important mid-term impact of new venture entry in Croatian counties is that it spurs competition and market selection, which, if it works according to a survival of the fittest scenario, leads increased productivity. Although, at a given level of output, this increase in productivity should lead to a decline in employment, not to additional jobs, ultimately due to improved competitiveness of the regional economy that is induced by supply side effects, such as increased efficiency, more rapid structural change, amplified innovation and increased variety it leads to economic and employment growth (Fritsch, 2007) which is in line with results of testing H2c. The latter points out that the level of entrepreneurial activity is a significantly positive predictor of counties' economic growth, measured by the relative change of GDP per capita and relative change of the rate of unemployment. Thus, the results of testing H2c allow for this hypothesis to be fully accepted.

Finally, the results of testing the hypothesis H2d that growth of entrepreneurial activity in Croatian counties has a significant negative impact on their economic growth are given in Table 6. The first three model specifications in Table 6 use the relative change of GDP per capita as a dependent variable and lagged dependent variable as the independent variable. These models include the following endogenous independent variables: model 1 includes level growth of entrepreneurial activity in the preceding period; model 2 includes level growth of entrepreneurial activity and its interaction term with development index; and model 3 includes level growth of entrepreneurial activity and its interaction term with GDP per capita in the preceding period. Interestingly, it can be noted that despite the higher level of entrepreneurial activity determining higher economic growth measured by relative change of GDP per capita, impact of growth of entrepreneurial activity on economic growth is significantly negative. This means that although positive magnitude of entrepreneurial activity is greater than that potentially negative, increasing impact of replacement effect can be observed (Fritsch, 2007; Fritsch & Mueller, 2004). In addition it can be noted from results that there is negative effect of economic growth in the preceding period confirming existence of catch-up effect (Van Stel i ostali, 2005).

The results of testing the impact of growth of entrepreneurial activity on the relative change of the rate of unemployment are given in Table 6 (model 4, 5 and 6) and point out that this impact is mixed, and loses significance after adding interaction terms of growth of entrepreneurial activity and level of regional development in preceding period. Interaction terms are however significantly positive indicating that the impact of growth of entrepreneurial activity on the relative change of rate of unemployment depends on level of regional development. Hence, the impact of growth of entrepreneurial activity increases with the level of regional development. This suggests that growth of entrepreneurial activity at higher levels of regional development increases growth of unemployment rate more than at lower levels of regional development. In the end, it may be noted that the impact of the rate of growth of unemployment in the past adversely affects the rate of growth of unemployment in the future. In other words, the relative decline in the unemployment rate in the previous period has been accompanied by its relative growth in the future. This also supports the thesis of the catch-up effect (Fritsch, 2007; Fritsch & Mueller, 2004). Subject to the results hypothesis H2d can partially be accepted.

5. Conclusion

In summary, we need to emphasise several key aspects of this research, as well as some of its limitations. Firstly, in the context of this research, the concept of regional development has been equated with the concept of regional growth. At the same time, it excludes the constructs that are difficult to measure such as social transformation, social change, regional learning and the development of regional culture. Neglecting these non-material aspects of regional development and looking at it strictly through the prism of regional growth, we can reach only partially acceptable conclusions.

Furthermore, this research is limited to a mid-term period, which consequently means that it does not capture all the potential effects that entrepreneurship has on regional growth or development which, the literature agrees, are positive and mainly manifest in creating new jobs and growth (Audretsch & Fritsch, 2002; Fritsch, 2007; Nelson & Winter, 1982). Finally, there are limitations to what can be measured by quantitative studies. The interdisciplinary nature of entrepreneurship and regional development demands deeper qualitative analyses in order to elucidate the mechanisms and connections between entrepreneurship and the regional environment. It should be noted that processes at the individual level influence the process at the aggregate level, and vice versa. Entrepreneurs make use of their local innate resources, which may be historical, natural, or cultural in nature and in this way engage and interact with their immediate environment. On the other hand, the processes at the aggregate level are associated with the individual level through feedback, thus ensuring the important mechanisms (providing information, transfer of knowledge, development of skills, facilitating networking, access to sources of financing and professional services) for individual entrepreneurs.

Therefore, we suggest that future studies encompass a longer period of time in order to capture the long-term effects and that they focus on those types of entrepreneurship which contribute to sustainable regional development. In addition, it might be advisable to broaden the research to include the non-measurable and more complex effects that entrepreneurship has on the local and regional environment. In this case, a combination of qualitative and quantitative methods might contribute to creating a holistic explanation of the phenomena of entrepreneurship and regional development which is clearly multifaceted, but important and significant. The analysis of effects of entrepreneurial activity on regional development have an important policy implication given significant positive impact of level or entrepreneurial activity, but significant negative impact of growth of entrepreneurial activity on economic growth. This opens up questions about whether policy measures should be encourage development of existing or entering of new businesses. Although results are indicating that policy should stimulate growth of incumbents this may be considered as questionable given the potential distortion of market selection process (Fritsch, 2007). Even though the results suggest the contrary we believe that it is necessary to stimulate the entry of new business through fueling the entrepreneurial spirit, providing advice for nascent entrepreneurs, lowering administrative hurdles for start-ups etc. Namely, our results are based on mid-term period, and are not taking into account possible effect of growth of entrepreneurial activity in the long run in which growth of entrepreneurial activity expands and transforms the productive potential of the regional or national economy by encouraging higher productivity and expansion of new niche and industry (Sanyang & Huang, 2009). The outcome of this series of variables that connect the individual with the macro level will be economic growth.

Ultimately, though mixed, results of impact of regional development and economic growth on growth of entrepreneurial activity are also important and require further study of the drivers of entrepreneurial activity. Potentially it can be concluded that at higher levels of regional development prevails necessity driven entrepreneurial activity, while at the lower ones entrepreneurial activity is more a matter of perceived opportunities.

Disclosure statement

No potential conflict of interest was reported by the authors.

Notes

1. The TEA (Total Early-stage Entrepreneurial Activity) index shows the number of newly initiated business ventures which are not older than 42 months per 100 adults aged 18 to 64.
2. The GCI (Global Competitiveness Index) measures countries' competitiveness on the basis of 12 pillars, organised into three separate sub-units that represent the key ways of managing an economy: the basic requirements, efficiency enhancers and innovation factors.
3. The development index is used to assess the degree of development of the local and regional self-government units in Croatia on the basis of five indices: average income per capita, average source income per capita, average unemployment rate, population mobility and the proportion of educated people aged 16 to 65 in the general population (Ministry of Regional Development and EU Funds, 2013).
4. The Motivation Index (i.e. the TEA Opportunity to TEA Necessity ratio) is an important indicator of the entrepreneurial capacity, indirectly indicating the level of optimism and long-term expectations of entrepreneurs (Singer, 2007).

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