ANALYSIS OF FACTORS INFLUENCING DEVELOPMENT OF REGISTERED BUSINESSES IN THE CZECH REPUBLIC

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Abstract

The following study is focused on analysis of registered businesses in the 14 regions of the Czech Republic during the period of years 1995-2013. The aim of the study was to quantify factors which may have impact on the rate of registered businesses across regions. To achieve this aim, data were obtained from the Czech Statistical Office and they were used for construction of panel regressions estimated with fixed effects method. The results proved positive impact of GDP per capita on the rate registered businesses per capita. The positive impact was also confirmed for the average age, population density and share of economically active population between 15-64 years. Positive relationship was also proved for R&D workplaces per thousand of inhabitants. Models suggested positive impact of unemployment rate, but this influence was not statistically confirmed for period of years 2005-2013. We were also unable to find empirical support for impact of economic recession during years 2008-2010 and for the impact of real R&D expenditures by enterprises.

Introduction

Enterprises are important part of economy. Results of study by Van Praag et al. (2007) confirm that entrepreneurs significantly contribute to country´s GDP. Firms also affect regional employment and contribute to the regional development. Hence it is interesting to investigate which factors may contribute to growth of the firm´s activities on both state and regional level. This article aims to quantify factors which may affect amount of registered businesses in the Czech Republic´s regions during the period of years 1995-2013, following previous research, such as article written by Menčlová (2014). The article has following structure: in the first section, several theoretical concepts are mentioned, the second section is dedicated to introduction of the data set and dealing with stationarity of variables. Third section employs econometric analysis and discuss results of the regression analysis, which are summarized in conclusions.

1   Theoretical Background

As remarks Karlsson et al. (1993), every business is linked to its environment, which consists of all relevant socio, economic and cultural variables. Coleman (1989) explains that every entrepreneur needs to be equipped with resources, which include physical, financial, human and socio-cultural capital. It has been stated by Gartner (1985) that venture creation is a multi-dimensional phenomenon and should be looked upon with all the complexities. Sandberg (1985) mentions that performance of a newly established venture is influenced by the structure of the industry, where the business operates, its organisational structure and strategy. Stuart & Sorrenson (2003) perceive the geographical location of newly established venture as a key determinant of success as some areas have better infrastructure and access to resources. Besides all forms capital, entrepreneur needs to have certain level of self-confidence, willpower and ability to build networks. Entrepreneurs typically build networks in the region where they are involved in their activity, and hence their ability to succeed in networking may be affected by regional characteristics (Karlsson et al. 1993), which is crucial for development of that particular reason since entrepreneurs cooperate for reaching mutual goals and contribute to society (Bourdieu & Wacquanta, 1992). Karlsson et al. (1993) further introduce four types of models to explain differences in regional entrepreneurial activity (market model, resource model, milieu model and career model).

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Market model represents demand characteristics, marketing systems, networks production, and was in their study; which investigated differences among entrepreneurial activity in 24 Swedish regions for years 1985-1989; represented by GDP per capita, population density and share of economically active population. The dependent variable was quantified as newly established firms per thousands of households. Market model confirmed positive relationship with all above mentioned variables. Resource model covers local control over resources and was quantified as portion of families having house, portion of population employed in financial and consulting services, share of population with tertiary education, public expenditures for the regional development and regional industry support. The most significant variable of the resource model was the share of population with tertiary education with positive impact on the newly established firms. Portion of families having house revealed negative impact, contrary to portion of population employed in financial and consulting services that indicated positive relationship. Milieu model tries to cover socio-economic variability, creativity and investments into leisure and culture. As variables authors used share of population employed in artistic professions, location of university, share of foreign citizens, budget for spending on culture per capita and number of sports associations. Most of those variables indicated positive impact on newly established firms. The last model was career model which covers labour market, sociobiological and sociocultural factors represented by unemployment rate, proportion of employees in manufacturing industry, ratio between existing businessmen and households and share of employees in small firms. Results of the model indicated negative impact of all variables represented in career model. Karlsson et al. (1993) found the market model as the one that explains the variation of the business activity across Swedish regions mostly. Finally the most important variables according to their regression analysis were following variables: the share of population 16-64 years, college education, ration between businessmen and households, total income per capita, public expenses for the regional development. In the study of Pyke et al. (1990) importance of technology centres and business incubators as a crucial resources for encouragement of socio-cultural resources such as networking was stressed. All those variables are crucial for empirical part of the paper.

The relationship between the amount of registered (also newly registered and shut down businesses) and selected macroeconomic variables for the Czech Republic was

conducted by Menčlová (2014). Menčlová (2014) investigated relationship between different forms of enterprises in the Czech Republic for period of years 1992-2011 and GDP growth and unemployment rate using bivariate correlation analysis. Author was unable to prove statistically significant relationship with GDP on level base. Some relationship was proven for the GDP growth lagged by one year for newly registered companies with more than 20 employees. For the unemployment rate, negative correlation coefficient was statistically proved for joint-stock companies and companies with limited liabilities. Menčlová (2014) did not find any empirical support for impact of economic recession in 2009 on the amount of registered businesses. Empirical part of the paper builds up on this article.

2 Data

Data were obtained from different parts of Czech Statistical Office database (ČSÚ, 2015) and formed into a panel of 14 regions of the Czech Republic for period of years 1995-2013. Unfortunately not all variables mentioned in previous studies were available for our analysis so we tried to obtain as many relevant variables as possible and for the longest available period. The dependent variable was set up as amount of registered businesses per capita (*REG_BUSINESSES_CAP*), which allows us to compare regions of the Czech Republic in panel regression. The variable is graphically depicted in the Figure 1. As expected the highest rate of registered businesses is in the Capital Praha which may affect results of regression analysis as outlier, so we notice that for validity of regression models.

Figure 1: Amount of Registered Businesses per Capita in time across regions
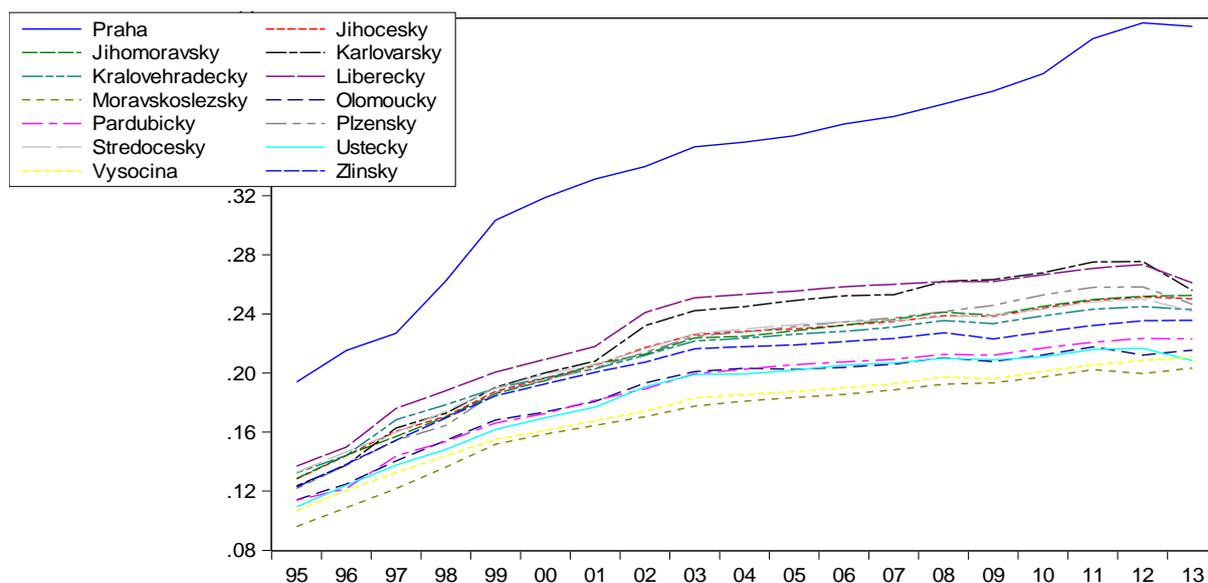
Source: EViews, own elaboration

Among explanatory variables we were able to collect for all regions average age of population (*AVERAGE_AGE*), unemployment rate (*UNEMPLOYMENT_RATE*), business enterprise R&D expenditures in mil. CZK calculated per capita (*REAL_EXP_RD_CAPITA*), GDP per capita in CZK (*REAL_GDP_PER_CAPITA*), number of Business enterprise workplaces (subjects mainly focused on R&D) in responding units per thousands of inhabitants (*WORKPLACES_RD_THINH*), share of economically active population between 15 and 64 years (*SHARE_PUPULATION_1564*) and population density (*POPULATION_DENSITY*), GDP per capita and business enterprise R&D expenditures had to be converted into real variables using Consumer Price Index (CPI) with base year 2005. Unfortunately data for variables representing R&D workplaces and real R&D expenditures of business enterprises were available only for period of years 2005-2013. Descriptive statistics for all variables are presented in Table 1.

Table 1: Descriptive Statistics

Variable	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
AVERAGE_AGE	39.48635	39.67	42.02564	35.99624	1.499855	266
REG_BUSINESSES_CAP	0.211515	0.208659	0.436998	0.095999	0.056188	266
UNEMPLOYMENT_RATE	6.705675	6.319143	15.97497	1.897916	2.865103	266
REAL_EXP_RD_CAPITA	0.002000	0.001620	0.007563	0.000173	0.001462	126
REAL_GDP_PER_CAPITA	276369.2	249999.7	766349.1	194983.4	100161.7	266
WORKPLACES_RD_THINH	0.209525	0.180877	0.549388	0.052584	0.109038	126
SHARE_POPULATION_1564	0.698492	0.699577	0.722803	0.666657	0.012276	266
POPULATION_DENSITY	287.7385	118.2254	2533.923	62.10590	597.5967	265

Source: EViews, own elaboration

2.1   Stationarity

We are working with panel data which are combination of time series and cross sections. From 1980s econometricians wrote articles about estimation of econometric models on non-stationary data that led into so called spurious regression giving misleading results. Stationarity is tested using joint Dickey-Fuller test for all regions of the Czech Republic. The null hypothesis states non-stationarity of the variable (existence of unit root). By rejecting the null hypothesis, we are able to accept alternative hypothesis of stationarity of the variable (Verbeek, 2012). All variables were tested for stationarity and for all of them we were able to reject the null hypothesis of non-stationarity on 5% level of statistical significance and conclude that we are working with stationary data (results are presented in Table 2).

Table 2: Stationarity Testing Results

Variable	Stat. Significance	P-Value	Result
AVERAGE_AGE	5%	0.00	Stationary
POPULATION_DENSITY	5%	0.049	Stationary
REAL_EXP_RD_CAPITA	5%	0.05	Stationary
REAL_GDP_PER_CAPITA	5%	0.001	Stationary
REG_BUSINESSES_CAP	5%	0.00	Stationary
SHARE_POPULATION_1564	5%	0.00	Stationary
UNEMPLOYMENT_RATE	5%	0.00	Stationary
WORKPLACES_RD_THINH	5%	0.03	Stationary

Source: EViews, own elaboration

3   Regression Analysis

For quantification of the relationships among variables, regression analysis is employed. All econometric models were estimated using software EViews. As we mentioned before, the aim of regression analysis is to investigate, which factors affect rate of registered businesses in the Czech Republic.

3.1   Estimation of Econometric Models

Firstly we had to choose suitable estimation technique. Usually for legal entities, fixed effects estimation is used, because those entities remain the very same over the time. To support our expectations, we used Hausman test which helps us to decide between estimation with fixed and random effects. Hausman test confirmed for our data estimation with fixed effects that helps us to control unobserved heterogeneity in our models (Verbeek, 2012). Then the econometric models were estimated with Fixed Effects and White cross-section standard errors & covariance (d.f. corrected) which helps us to avoid consequences of heteroscedasticity and autocorrelation. In all regression estimates we controlled the level of multicollinearity and also checked the normality of residuals. Unfortunately, most of our models violate assumption of normality of residuals which restrict our options to generalize results on other states and regions. Estimated models are depicted in Table 3. Model 1 covered whole period but lacks the variables R&D workplaces and real R&D expenditures for that were estimated separate econometric Models 2 and 3 to satisfy assumptions of acceptable level of multicollinearity. To make sure that region Praha does not bias the results of the regressions the presented models were estimated without this region, however results of estimated reduced regressions brought us the same results so finally region Praha was kept in the final models. The following section interprets results of regression analysis.

3.2   Interpretation of Results

The first model (Model 1) covers period of years 1995-2013 and by explanatory variables explained 95.6 % of variability of dependent variable rate of registered businesses. The most of the explained variability was explained by GDP per capita of the region mirroring economic situation of the region. Contrary to results obtained by Menčlová (2014) we were able to confirm positive impact of GDP on the rate of registered businesses during

the analysed period ceteris paribus. Positive impact was confirmed[1] for variables representing population density, share of economically active population, average age and surprisingly unemployment rate which was also against the results obtained by Menčlová (2014). Generally it is not difficult to derive that increase in share of economically active population may lead to higher enrolment into entrepreneurship by inhabitants. The positive sign of average age variable may be interpreted as proxy variable for increase in experience of population which could be used for engagement into business activity. Increase in population density leads to higher volume of interactions among economic agents and increase in networking which is according to previous research positively associated with entrepreneurial activity. Unemployment rate growth led to increase of registered businesses. Two explanations could be used. Firstly the rate of registered businesses was constantly increasing over the analysed and secondly, high rates of unemployment forced economic agents into becoming self-employed or into business engagement. Positive sign was also obtained for lagged value of unemployment rate by one year which was not statistically significant. In the model was also involved dummy variable representing economic recession during years 2008-2010. Variable was not found statistically significant but the coefficient suggested negative impact of economic recession in comparison with other years on the rate of registered businesses per capita.

The second (Model 2) and third model (Model 3) were constructed with control variables unemployment rate and population density for period of years 2005-2013. Other variables had to be excluded from the regressions because of multicollinearity. Both models confirmed positive impact of population density. However variable representing unemployment rate was not found statistically significant and the coefficient was negative. This relationship should be further tested to confirm the impact of unemployment rate on business activity. In the Model 2 the impact of R&D workplaces was tested. The results confirmed positive impact of research institutions on business activity through improving socio-cultural networks, mentioned previously by Pyke et al. (1990). The result was also confirmed for the lagged variable by one year. On the other hand, Model 3 did not find empirical support for positive impact of real R&D expenditures of business enterprises on the rate of registered businesses and the coefficients were contrary for level and lagged variable.

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[1]   On at least 5% level of statistical significance.

Table 3: Model Table

Variable / Model Dependent Variable:	Model 1	Model 2	Model 3
	REGISTERED_BUSINESSES_PER_CAPITA		
CONSTANT	**-0.911148***** (0.132290)	**0.090528***** (0.025345)	**0.222678***** 0.011256
REAL_GDP_PER_CAPITA	**2,74E-07***** (7.93E-08)		
POPULATION_DENSITY	**0.000317***** (0.000103)	**0.000352***** (9.00E-05)	**6.15E-05***** (6.00E-06)
AVERAGE_AGE	**0.017217***** (0.001315)		
SHARE_POPULATION_1564	**0.359884**** (0.141904)		
UNEMPLOYMENT_RATE	**0.003073***** (0.001025)		
UNEMPLOYMENT_RATE(-1)	**0.000816** (0.000701)	**-0.000181** (0.000463)	**-0.001056** (0.001170)
ECONOMIC_CRISIS	**-0.002367** (0.003404)		
WORKPLACES_RD_THINH		**0.160620***** (0.052373)	
WORKPLACES_RD_THINH(-1)		0.078859* (0.047350)	
REAL_EXP_RD_CAPITA			**6.585336** (5.264646)
REAL_EXP_RD_CAPITA(-1)			**-2.147151** (5.866725)
R-squared	0.956025	0.987089	0.784540
Adj. R-squared	0.952201	0.984729	0.776409
F-statistic	250.0093	418.2457	96.49261
Observations	251	111	111
Standard Errors are in paranthesis, *** stat. significance on 1%, ** stat. significance on 5%, * stat. significance on 10%.			

Source: EViews, own elaboration

Conclusions

This paper aimed to investigate relationship between the rates of registered businesses in the 14 regions of the Czech Republic during the years 1995-2013. Following previous studies, existing models explaining differences in business activity (market model, resource model, milieu model and career model) across regions were discussed. The empirical part of the paper estimated regression models for the dependent variable rate of registered businesses per capita across regions of the Czech Republic. All variables were obtained from

Czech Statistical Office. Positive impact of GDP per capita on rate of business activity was statistically proved together with positive influence of share of economically active population, population density and average age. The first model contained also variable representing unemployment rate, which proved positive impact of unemployment rate on rate of registered businesses. This impact was not confirmed in models for years 2005-2013 where impact of R&D workplaces and impact of real R&D expenditures was quantified. The positive relationship between rate of registered businesses and R&D workplaces per thousand of inhabitants was statistically proved. However there was no empirical evidence for positive impact of real R&D expenditures of business enterprises on the rate of registered businesses. Our results should be challenge for further research with involvement of other relevant variables such as share of population with tertiary education and rate of cultural and creative associations supporting innovative behaviour on both state and regional level. More detailed testing of impact of unemployment rate is requested and finally different categories of businesses should be investigated separately. Unfortunately not for all factors it is possible to obtain relevant data which may be limitation of such analysis. One must also admit that not all registered businesses are economically active.

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