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DETERMINANTS OF NEW BUSINESS FORMATION – SOME LESSONS FROM THE CZECH REPUBLIC

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Abstract. This paper concerns with determinants of new business formation. The determinants are related to relevant theoretical concepts dealing with the issue. The Czech Republic in the time period 2011-2012 is the area of interest. Spatial approach is used to identify the impact of the determinants on new business formation. Thus, the data are related to 206 Czech microregions. The methods of regression analysis are employed to gain results. These show the positive impact of agglomeration economies and the quality of entrepreneurial climate on new business formation. Moreover, human capital and the presence of foreign-owned businesses positively influence new business formation. On the contrary, the relationship between unemployment and new business formation is ambivalent. Altogether, the findings support path-dependency of new business formation with important implications for entrepreneurship policy. Finally, regression results point out the relevance of spatial spillovers in explaining variation in new business formation.

Keywords: Entrepreneurship, new business formation, OLS regression, spatial regression, the Czech Republic

JEL classification: R12, M13, R15

Introduction

Entrepreneurship is firmly embedded in the theory and practice of economic growth and development. Lee, Florida and Acs (2004) regard new enterprises as one of the sources of employment and innovations. Wang (2006) points out the positive relationship between entrepreneurship, economic efficiency and technological progress. Delfmann, Koster, McCann and Van Dijk (2014) connect entrepreneurship with quality of life. Fotopoulos (2014) emphasizes the importance of entrepreneurship for regional equity and efficiency. Fritsch and Mueller (2007) note the importance of entrepreneurship for economic growth. Van Stel and Suddle (2008) note the positive relationship between entrepreneurship and employment growth. Bernat and Korpysa (2013), Sobeková, Solík and Sipko (2014) perceive entrepreneurship as strategy for solving unemployment problems of young people. Altogether, demand for knowledge about the determinants of new business formation arises.

There is a vast literature dedicated to the determinants of new business formation now. Generally, two strands of research may be distinguished (see, e.g., Lee, Florida and Acs, 2004; Andersson and Koster, 2011). The first strand is focused directly on decision-making process of

new entrepreneurs. Thus, the determinants of new business formation are identified from these processes (see, e.g., Belás, Bilan, Demjan and Sipko, 2015). The second strand deals with the determinants of new business formation in the spatial perspective. The essence of this approach rests on spatial variation in new business formation rates. Subsequently, the determinants of this variation are searched (see, e.g., Armington and Acs, 2002). However, despite the vast literature, the findings on the impact of particular determinants on new business formation are ambivalent. This fact substantiates comparative research on the issue because important insights are provided for policy decisions (see, e.g., Sutaria and Hicks, 2004).

The main purpose of this paper is to extend the knowledge on the determinants of new business formation. The spatial approach is followed in the paper. The analyzed determinants were chosen in accord with recent development of theory. Thus, the determinants related to the theoretical concepts of agglomeration economies, entrepreneurial choice, entrepreneurial climate and evolutionary economic geography were included into the analysis. The goal of the paper is then to identify the impact of these determinants on new business formation, with the Czech Republic and new business formation in the years 2011 and 2012 as the case study. The paper is structured as follows. The first part introduces theoretical background of the paper. The second part presents empirical methodology and data. The third part summarizes empirical results and findings. The last part concludes.

1. Theoretical background

New business formation is spatially uneven process (see, e.g., Stam, 2010). In this regard, various theoretical ideas have been suggested in explanation of this phenomenon. Audretsch and Fritsch (1994), Van Stel and Suddle (2008) point out the positive relationship between new business formation and agglomeration economies. They claim that pooled labour market, pecuniary externalities, and information and technological spillovers provide benefits for new business formation. Moreover, the discussion about the role of agglomeration economies considers the impact of Marshall-Arrow-Romer (MAR) and Jacobian externalities on new business formation. MAR externalities emphasize the benefits of intra-sectoral spillovers while Jacobian externalities the benefits of inter-sectoral knowledge exchange (see, e.g., Bishop 2012). A unanimous conclusion on the importance of these two types of agglomeration economies on new business formation has not been found in empirical literature (see, e.g., Audretsch and Keilbach, 2007). However, Delfmann, Koster, McCann and Van Dijk (2014), Fotopoulos (2014) show the positive relationship between specialization (MAR externalities) and new business formation. Therefore, less diversified economies indicate higher values of new business formation.

The theory of entrepreneurial choice is another influential idea in explanation of regional variations in new business formation. The essence of the theory is that a person may choose either wage work or self-employment. The decision is based on the comparison of wage with expected payoff from self-employment (see, e.g., Evans and Jovanovic, 1989; Burke, Fitzroy and Nolan, 2000). Various factors influence the decision, including human capital, unemployment, foreigner status, and employment in a large firm:

– Burke, Fitzroy and Nolan (2000) claim that the quality of human capital improves the probability of high-wage employment. Nevertheless, human capital is also connected with the skills to find and use market opportunities (see, e.g., Fotopoulos, 2014). Despite the theoretical ambivalence, empirical literature points out the positive relationship between human capital and new business formation (see, e.g., Audretsch

and Fritsch, 1994; Fotopoulos, 2014; Armington and Acs, 2002; Delfmann, Koster, McCann and Van Dijk, 2014; Lee, Florida and Acs, 2004).

- Research on the relationship between unemployment and new business formation provides ambivalent results. Unemployed people may be an important source of potential entrepreneurs because their expected payoff from self-employment is likely to be higher than social allowances. On the contrary, unemployment may decrease aggregate demand and cause less business entry (see, e.g., Delfmann, Koster, McCann and Van Dijk, 2014; Sutaria and Hicks, 2004; Fotopoulos, 2014; Audretsch and Fritsch, 1994).
- There are some theoretical insights into the relationship between foreigner status and new business formation. It is claimed that foreigners are discriminated in the waged sector (see, e.g., Cowling and Taylor, 2001). Consequently, self-employment is the way out of unemployment for them and it is supported by the willingness to accept higher risk (see, e.g., Delfmann, Koster, McCann and Van Dijk, 2014; Bilan, 2012).
- Workers employed in a large firm are less likely to start a business (see, e.g., Bishop, 2012; Armington and Acs, 2002) because of the differences in wage and uncertainty levels (see, e.g., Fotopoulos, 2014). Moreover, SME employees have more diverse skills and experience for self-employment (see, e.g., Fotopoulos, 2014). Large firms also influence potential competitiveness of new businesses. Bishop (2012), Lee, Florida and Acs (2004) note the negative influence while Sutaria and Hicks (2004) emphasize the stabilization effect of large firms.

Several studies embed the research on new business formation within territorial variations in entrepreneurial climate. Armington and Acs (2002), Delfmann, Koster, McCann and Van Dijk (2014), Fotopoulos (2014) claim that social climate and entrepreneurial culture influence the decision for self-employment through, e.g., imitation of behavior. Davidsson and Wiklund (1997) point out the relationship between cultural determinants (e.g. values, behavior) and new business formation. Burke, Fitzroy and Nolan (2000) note the importance of lifestyle, e.g. the desire to be own boss, and family ties. Altogether, a suitable combination of cultural factors creates an environment supportive for new business formation (see, e.g., Davidsson and Wiklund, 1997; Belás, Bartoš, Habánik a Novák, 2014). Consequently, a high share of entrepreneurs in population may be regarded as a proxy of entrepreneurial climate. Moreover, this thinking is related to evolutionary economic geography and path-dependancy. It is claimed that history matters in new business formation (see, e.g., Fotopoulos, 2014; Andersson and Koster, 2011; Fritsch and Mueller, 2007). Therefore, new business formation is influenced by entrepreneurial climate that has been created in the past (see, e.g., Fotopoulos, 2014).

2. Data and methods

The methodology of this paper is based on spatial regression models in common with a number of other studies (see, e.g., Bishop, 2012). All data refer to 206 SO ORPs in the Czech Republic and the territory of Prague (microregions hereafter). The data on new business formation cover the period 2011-2012. Explanatory variables are measured either at the end of 2010 or at the beginning of 2011.

2.1 Data – dependant variable

New business formation is measured by the number of new businesses registered in the official Business Register of the Czech Republic in 2011 and 2012. The situations at the end of 2011 and 2012 are considered for categorizing new businesses into microregions. Note that

the term business includes both legal entities and natural persons with the status of an entrepreneur. The labour-market approach is used to control for the different size of microregions (see, e.g., Delfmann, Koster, McCann and Van Dijk, 2014; Lee, Florida and Acs, 2004; Bishop 2012 for the use of this approach). Thus, the number of new businesses is expressed per 10 thousand economically active people (NEW). Moreover, the variable is log-transformed (LNNEW) to reduce the influence of outliers. The 2011 Census is the source of data on economically active people.

2.2 Data – explanatory variables

Explanatory variables are defined as follows (see Table 1 for review and expected signs). Population density (DENS) is included in the analysis to explore the role of positive and negative spillovers from agglomeration economies. Several scholars point out positive impact of population density on new business formation (see, e.g., Bishop, 2012; Fotopoulos, 2014; and Audretsch and Fritsch, 1994). Data for the variable come from the official Czech Statistical Office (CZSO) Public Databases (2010). The entropy measure of diversity (DIV) is added to regression models to identify the relevance of industrial diversity for new business formation. In this regard, Shannon's entropy function is used (see, e.g., Shannon and Weaver, 1949). Thus, the entropy measure of industrial diversity is defined as

$$DIV = \sum_{i=1}^{n} I_i * \ln \frac{1}{I_i},$$

where I_i is the share of the i*th* 2-digit NACE-CZ code in SO ORP's employment and n is the number of 2-digit NACE-CZ codes (see also Bishop, 2012 for this approach). The maximum value of the entropy measure is connected with the highest industrial diversity – equal shares of all industries. The literature is ambivalent about the relationship between industrial diversity and new business formation. Fotopoulos (2014), and Delfmann, Koster, McCann and Van Dijk (2014) point out positive impact of less diversified economies on new business formation. However, spatial concentration of specialized producer services may be of crucial importance in this regard (see, e.g., Sutaria and Hicks, 2004; Lee, Florida and Acs, 2004). Data for the entropy measure come from the 2011 Census.

Four explanatory variables are related to the theory of entrepreneurial choice as introduced in the theoretical background:

- The share of people with tertiary education in population over 15 years of age (TERTIARY) is chosen as a proxy of human capital. Fotopoulos (2014), Armington and Acs (2002), Delfmann, Koster, McCann and Van Dijk (2014), and Lee, Florida & Acs (2004) empirically show positive relationship between this proxy of human capital and new business formation. Data for the variable come from the 2011 Census.
- The relationship between unemployment and new business formation is ambivalent. Audretsch and Fritsch (1994), Armington and Acs (2002), and Lee, Florida and Acs (2004) find positive impact on unemployment on new business formation. On the contrary, Fotopoulos (2014), Delfmann, Koster, McCann and Van Dijk (2014), and Sutaria and Hicks (2004) do not find such the impact. Thus, unemployment rate (UNEMPLOY) is included in the analysis. Data for the variable come from the 2011 Census and official Czech Statistical Office (CZSO) Public Databases (2010).
- The theory of entrepreneurial choice points out positive relationship between the share of immigrants in population and new business formation (see, e.g., Lee, Florida and Acs, 2004). However, reliable data of this kind are missing in the Czech Republic. Instead, the share of foreign owned businesses in the total number of businesses

is included in the analysis (FOREIGN). Data for the variable come from the Business Register of the Czech Republic (2010).

– New business formation is influenced also by the presence of large firms. Lee, Florida and Acs (2004), and Armington and Acs (2002) note negative relationship between size of firms and new business formation. Sutaria and Hicks (2004) show the opposite relationship. Thus, we include the share of large businesses with more than 249 employees in population of all businesses in the analysis (LARGE). Data for the variable come from the Business Register of the Czech Republic (2010).

The share of entrepreneurs in economically active population (ENTREP) expresses the entrepreneurial climate of microregions. In the theory, the quality of entrepreneurial climate positively influences the decision to become an entrepreneur. Armington and Acs (2002), and Delfmann, Koster, McCann and Van Dijk (2014) note the relevance of this relationship. In addition, the share of entrepreneurs in economically active population is relevant also for evolutionary economic geography and path-dependancy. The positive relationship between ENTREP and new business formation is expected also from this viewpoint (see, e.g., Fotopoulos, 2014; Anderson and Koster, 2011; Fritsch and Mueller, 2007). Data for the variable come from the 2011 Census.

Table 1. Variables – expected sign

Variable	Expected Sign	Variable	Expected Sign
DENS	+	LARGE	+ / -
DIV	+ / -	TERTIARY	+
ENTREP	+	UNEMPLOY	+ / -
FOREIGN	+		

Source: compiled by the authors.

2.3 Methods

Three regression models were computed to explain the spatial pattern of the dependant variable. First, multiple ordinary least square (OLS) regression was run with LNNEW as the dependant variable and DENS, DIV, ENTREP, FOREIGN, LARGE, TERTIARY, and UNEMPLOY as the explanatory variables. Variance inflation factors, Jarque-Bera and Shapiro-Wilk tests, and Breusch-Pagan and White tests were applied to check for the OLS multi-collinearity, non-normality, and heteroscedasticity assumptions, respectively. In all instances, test statistics were insignificant at the 10 percent level providing no evidence of non-normality in the residuals and of heteroscedasticity. Variance inflation factors and correlation matrix indicated rather low correlations among the independent variables (less than 0.5). The only correlation above 0.5 was between the DENS and TERTIARY variables. Nevertheless, the results were not changed after excluding either of these variables. Thus, the both variables were retained in the model.

Besides multi-collinearity, non-normality and heteroscedasticity, the OLS results may be biased also by spatial autocorrelation (see, e.g., Anselin and Rey, 1991). The Moran's test was performed to check for the presence of spatial dependence. Various weight matrix definitions were used in this regard (see also Bishop, 2012 for this approach). The results confirmed the presence of spatial autocorrelation within our data (see Table 2 for selected results), indicating the need to specify spatial regression model. The methodological approach based on the Lagrangian multiplier (LM) tests was applied (see, e.g., Anselin, Bera, Florax and Yoon, 1996). The results of these tests (see Table 2) led to the choice of spatial lag regression models. In this regard, the spatial autocorrelation was caused by spatial interdependency of new business for-

mation across neighboring territories. The essence of this interdependency was analyzed using the local indicators of spatial association (LISA) technique (see, e.g., Anselin, 1995). Finally, the results of the OLS and spatial regression models were discussed.

Table 2. Spatial autocorrelation – test statistics

Test	Queen contiguity – 1st order		Queen contiguity – 2nd order	
	Value	Probability	Value	Probability
Moran's I	4.50	0.000	5.11	0.000
LM (lag)	21.12	0.000	26.68	0.000
Robust LM (lag)	6.01	0.014	11.42	0.001
LM (error)	16.18	0.000	16.92	0.000
Robust LM (error)	1.07	0.300	1.67	0.197

Source: compiled by the authors.

3. Empirical results and discussion

OLS regression and spatial lag regression results are presented in Table 3. The fit of the models is satisfactory with the R^2 measures close to 0.7. However, the spatial lag models fit the data better than the OLS model as indicated by the log-likelihood and Akaike information criterion statistics. The findings confirm the relevance of spatial interdependency in explaining the spatial pattern of new business formation (see also Bishop, 2012; Delfmann, Koster, McCann and Van Dijk, 2014).

Four explanatory variables are statistically significant at the 1 percent level with expected signs. New business formation is positively associated with population density (DENS). This suggests that agglomeration economies in densely populated areas (e.g. pooled labour market, pecuniary externalities, information and technological spillovers, entrepreneurial infrastructure) contribute to new business formation (see also Audretsch and Fritsch, 1994; Fotopoulos, 2014; Armington and Acs, 2002; Bishop, 2012; Van Stel and Suddle, 2008). The relationship stays significant also in spatial lag models. Unlike several other studies (see also Fotopoulos, 2014; Delfmann, Koster, McCann and Van Dijk, 2014) our results show positive association between new business formation and industrial diversity (DIV). Thus, the opportunity to combine knowledge from various industries (Jacobian externalities) contributes to new business formation. However, this relationship is statistically significant only in the OLS model at the 5 percent level. The significance is lost in spatial lag models, indicating the relevance of spatial knowledge spillovers.

New business formation is positively associated with the quality of human capital as measured by the share of people with tertiary education in population over 15 years of age (TERTIARY). Thus, well-educated people take market opportunities for new business formation more easily than less-educated people (see also Audretsch and Fritsch, 1994; Fotopoulos, 2014; Armington and Acs, 2002; Delfmann, Koster, McCann and Van Dijk, 2014; Lee, Florida and Acs, 2004). The relationship stays significant also in spatial lag models. Moreover, new business formation is also positively associated with the share of foreign owned businesses in the total number of businesses (FOREIGN). Therefore, the presence of foreigners and their businesses contributes to new business formation in a territory (see also Lee, Florida and Acs, 2004; Cowling and Taylor, 2001). The relationship stays significant also in spatial lag models. Altogether, entrepreneurial choice is positively influenced by the quality of human capital and foreigner status.

New business formation is positively associated with the quality of entrepreneurial climate as measured by the share of entrepreneurs in economically active population (ENTREP). Moreover, the relevance of path-dependency for new business formation is supported in this way (see also Fotopoulos, 2014; Anderson and Koster, 2011; Fritsch and Mueller, 2007). Thus, the presence of entrepreneurs in a territory positively influences also new business formation. Subsequently, self-reinforcing process is created. The relevance of path-dependency is connected also with the positive relationship between new business formation and the share of foreign owned businesses in the total number of businesses (FOREIGN). Altogether, a vibrant entrepreneurial climate characterized by spatial concentration of entrepreneurs and foreign owned businesses has positive impact on new business formation. Spatial lag models confirm the significance of these findings.

Table 3. Regression results – OLS regression and spatial lag regression

Variable	OLS regression	Spatial lag regression Contiguity 1st order	Spatial lag regression Contiguity 2nd order
CONSTANT	4.4349**	2.9066**	2.0764**
	(14.03)	(6.17)	(4.99)
DENS	0.0001**	0.0001**	0.0001**
	(3.64)	(3.14)	(3.70)
DIV	0.7875*	0.5555	0.6026
	(2.00)	(1.52)	(1.66)
ENTREP	0.0322**	0.0274**	0.0274**
	(8.10)	(7.12)	(7.23)
FOREIGN	0.0015**	0.0013**	0.0012**
	(6.87)	(6.45)	(6.11)
LARGE	-0.0013	-0.0003	0.0000
	(-0,62)	(-0.13)	(0.04)
TERTIARY	0.0141**	0.0158**	0.0163**
	(3.61)	(4.35)	(4.50)
UNEMPLOY	-0.0006	0.0024	0.0027
	(-0.24)	(0.97)	(1.10)
Spatial coefficient	-	0.3031**	0.4382**
		(4.37)	(4.99)
Observations	206	206	206
Log likelihood	196.902	206.169	207.363
Akaike information criterion	-377.803	-394.338	-396.725
R^2	0.675 (adjusted R^2)	0.718 (pseudo R^2)	0.721 (pseudo R^2)

Notes: t values in parentheses for OLS regression, z values for spatial lag regression

* statistically significant results at the 5 percent level, ** statistically significant results at the 1 percent level

Source: compiled by the authors

Two explanatory variables are statistically insignificant in all three regression models. The ambivalent impact of unemployment (UNEMPLOY) on new business formation is confirmed (see also Armington and Acs, 2002; Sutaria and Hicks, 2004). Unemployed people may be an important source of new entrepreneurs (see also Audretsch and Fritsch, 1994; Lee, Florida and Acs, 2004). However, unemployment is also connected with socioeconomic and structural problems, discouraging entrepreneurship (see Fotopoulos, 2014; Bishop, 2012). Unlike several other studies (see Armington and Acs, 2002; Lee, Florida and Acs, 2004; Bishop, 2012)

the negative impact of the presence of large firms (LARGE) on new business formation is not confirmed in the models. The stabilization influence of large firms in regional economies is noteworthy in this regard (see Sutaria and Hicks, 2004).

The statistical significance of spatial coefficients in the both spatial lag models indicates spatial interdependency of new business formation across neighboring microregions. Therefore, the LISA technique was applied to examine "hotspots" and "coldspots" of new business formation. Figure 1 shows statistically significant clusters of high and low values of new business formation rates. Note that the clusters are derived from the relationship between the LNNEW variable and its spatial lag. Thus, the high-high cluster means high values of both the LNNEW variable and its spatial lag.

Two important clusters of high-high values may be identified from Figure 1. The first cluster includes the Czech largest city, Prague, and its hinterland. The second cluster is located around the Moravian metropolis, Brno. It is striking that the area of the Prague's cluster is substantially larger than the area of the Brno's cluster. This finding suggests that the positive impact of the Moravian metropolis is spatially limited and the potential of Brno's hinterland for new business development low. Figure 1 shows also one spatially extensive cluster of low-low values. This area corresponds to inner periphery of Northwestern Moravia. It is noteworthy that two outliers of high values may be observed in close proximity to the area. These outliers are microregions of two largest cities of the area (Ostrava and Olomouc). Altogether, the LISA results support the relevance of spatial hierarchy for new business formation.

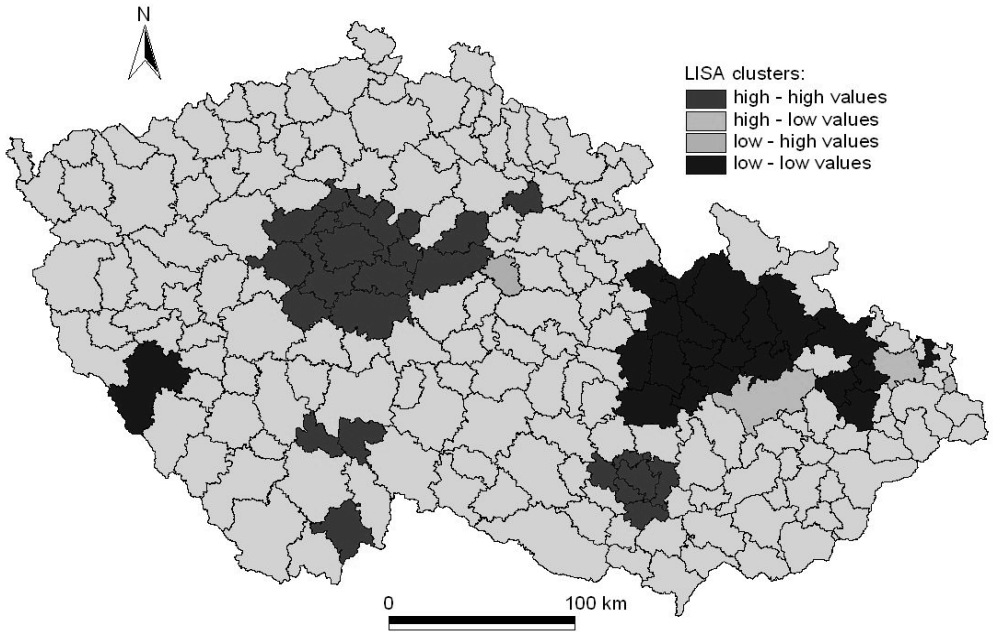

Figure 1. LISA results – cluster map (LNNEW); weight matrix – Queen Contiguity, 1st order

Source: compiled by the authors.

Conclusion

The goal of this paper was to identify the impact of the determinants related to relevant theoretical concepts dealing with new business formation. The methods of regression analysis were employed to meet the goal of this study. The Czech Republic in the years 2011 and 2012 was chosen as the case study.

Regression results reveal the positive impact of agglomeration economies and the quality of entrepreneurial climate on new business formation. Spatial concentration of people and entrepreneurs creates environment that is supportive to new business formation. Consequently, self-reinforcing process arises. Agglomeration economies and the quality of entrepreneurial climate contribute to new business formation. Simultaneously, new business formation creates environment that is attractive for people and entrepreneurs. Thus, new business formation is path-dependent (see, e.g., Fotopoulos, 2014; Anderson and Koster, 2011; Fritsch and Mueller, 2007). These findings are of political importance, precisely because explicit entrepreneurship policy for lagging regions may be inefficient due to the influence of agglomeration economies (see, e.g., Van Stel and Suddle, 2008).

Regression results support the ideas related to the theory of entrepreneurial choice. Human capital positively influences new business formation. Thus, human capital is important for identification of market opportunities. Moreover, increasing importance of knowledge in recent economy substantiates this relationship (see, e.g., Armington and Acs, 2002). New business formation is positively associated also with the presence of foreign owned businesses in a territory. This confirms the idea that foreigners are self-employed more likely because of discrimination in the waged sector against them. Finally, regression results point out ambivalent impact of unemployment on new business formation. Unemployment is not only a source of potential entrepreneurs but it also decreases demand. Consequently, entrepreneurial choice is influenced in opposite directions.

Moran's I indicates the presence of spatial autocorrelation in the data. Therefore, spatial lag regression models were computed and compared with OLS regression results. This comparison shows that spatial regression models fit data better than OLS regression model. Consequently, spatial interdependency is relevant in explaining variation in new business formation. The LISA results point out the decisive influence of the Czech capital city of Prague. Moreover, large continuous area of low new business formation rates is identified in the inner periphery of Northwestern Moravia. Overall, spatial hierarchy seems to play crucial role in explaining the spatial pattern of new business formation.

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