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## The Changing Determinants of New Business Formation in the Czech Republic

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### ABSTRACT

This paper is concerned with the connection between new business formation rates and their theoretically substantiated regional determinants, using regression modelling. The dynamics of new business formation is evaluated comparing the influence of regional determinants in two time periods – 2001-2002 and 2011-2012. The Czech Republic is the area of interest. Empirical results indicate the coexistence of persistent and changing influences of regional determinants on new business formation. The quality of the entrepreneurial environment, industrial diversity and population change have a persistent and positive impact on new business formation. There is also a positive connection between agglomeration economies and new business formation. The increasing influence of agglomeration economies is indicated. The presence of foreigners is not a statistically significant determinant of new business formation in the 2001-2002 models. Nevertheless, the importance of this determinant is increasing. It is suggested that unemployment vulnerability has a negative impact on new business formation but has increasing importance on entrepreneurship in disadvantaged regions. Finally, spatial interactions are an inevitable part when considering the determinants of new business formation.

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## 1. INTRODUCTION

The discussion on the relationship between entrepreneurship and economic development is historically embedded (see e.g., Acs et al., 2008). Acs et al. (2008) distinguish two periods of this discussion. The first period, efficiency-driven, attributes the decisive importance of economic development to large firms. The second period, innovation driven, beginning in the 1970s, emphasises the strengthening role of small and medium enterprises - quite to the contrary. Several reasons are given to explain this shift. The first reason, the importance of econo-

mies of scale has been weakened in more uncertain global markets since the 1970s. Secondly, technological change and flexibility have become crucial factors of economic development. Thirdly, the service sector share of developed economies has significantly grown (see, e.g., [Baptista et al., 2008](#); [Acs et al., 2008](#)). All these reasons favour small and medium enterprises that are perceived as the new engines of economic development. Consequently, there is more interest in forming new businesses.

Traditionally, politicians speak about the positive association between new business formation and economic development. There are clear favourable impacts of new business formation on employment, competitiveness and innovation (see e.g., [Acs, 2006](#); [Fritsch, 2011](#)). Note that this idea is the sole essence of entrepreneurship policies. [Acs \(2006\)](#) points out more complex relations between new business formation and economic development. These relations might be either positive or negative, either direct or indirect (see e.g., [Fritsch, 2011](#); [van Stel and Suddle, 2008](#)). New job creation resulting directly from new business formation is one direct positive effect. Job loss resulting from increasing competition and productivity is regarded as a direct negative effect. Indirect effects include increasing productivity, more innovations and the introduction of those innovations, opening of new markets, and structural changes (see e.g., [Fritsch, 2011](#); [van Stel and Suddle, 2008](#)). Moreover, all the direct and indirect effects might be time lagged, which further complicates the reasoning (see e.g., [van Stel and Suddle, 2008](#)). Accordingly, scholarly literature is not unanimous about the impact of new business formation on economic development. Nevertheless, [Fritsch \(2011\)](#) speaks about sufficient evidence on the positive impact of new business formation on economic development. Research then becomes highly relevant on the determinants of new business formation.

This paper reflects how relevant these issues are, and evaluates the connection between new business formation rates and their theoretically substantiated determinants at the sub-national level. The area of interest is the Czech Republic and its regions. Moreover, this paper concerns the dynamics of new business formation in the Czech Republic, comparing the importance of specific determinants in two time periods – at the start of the first and second decades of the 21<sup>st</sup> century. There are many studies that deal with this issue in the United States and in Western Europe (see e.g., [Anderson and Koster, 2011](#); [Armington and Acs, 2002](#); [Lee et al., 2004](#); [Sutaria and Hicks, 2004](#); [Bishop, 2012](#)). Research on the determinants of new business formation in post-socialist countries is, on the contrary, quite scarce (see e.g., [Fritsch et al., 2014](#); [Lafuente and Vaillant, 2010](#); [Hájek et al., 2015](#); [Belás et al., 2015c](#); [Smékalová et al., 2014](#) for some exceptions). This paper contributes to this scarce, limited knowledge. Its goal is to evaluate the changing influence of theoretically substantiated determinants on new business formation in the Czech Republic in the time periods from May 2001 to April 2002, and from May 2011 to April 2012. The article is structured as follows: the second section introduces the theoretical framework. The third section presents data and research methods. The fourth section summarizes empirical results that are discussed in the following section. The last section gives a conclusion.

## 2. THEORETICAL FRAMEWORK

The thesis of a positive relationship between new business formation and economic development was mentioned in introducing this paper. Moreover, new business formation is a regionally uneven process. Some regions are more successful in forming businesses, which increases development potential. Therefore, interest in assessing determinants of new business formation is relevant for both scientific and political reasons (see e.g., [Wagner and Sternberg, 2004](#)). Note that the influence of these determinants differs across regions. Consequently, there is no one-size-fits-all solution for entrepreneurship development (see e.g., [Wagner and Sternberg, 2004](#)).

Research on determinants of new business formation has been embedded in several theoretical frameworks. Agglomeration economies are the first framework of our interest. Audretsch and Fritsch (1994) and Van Stel and Suddle (2008) point out the positive relationship between agglomeration economies and new business formation. This is based on mechanisms such as the market size, market growth dynamics, a pooled labour market, pecuniary externalities and knowledge spillovers. Note that the idea of knowledge spillovers is based on the assumption that new knowledge is not completely commercialized by its developer. Thus, market opportunities arise from knowledge that is not utilized (see e.g., [Audretsch et al., 2010](#)). New business formation is further influenced by the industrial structure of regional economies because some industries are more dynamic in new business formation than others. Moreover, the importance of industrial structure is also related to considering the influence of regional specialization and regional diversification. Fotopoulos (2014), and [Delfmann et al. \(2014\)](#) note the positive impact of regional specialization on new business formation because of the strong agglomeration economies in one industry. The alternative viewpoint postulates that regional specialization contributes only to imitation behaviour. Regional diversification is therefore preferred. It is claimed that regional diversification develops diversified and complementary knowledge that is supportive in the search for and utilization of market opportunities (see e.g., [Audretsch et al., 2010](#)).

The theory of entrepreneurial choice is another theoretical framework relevant for explaining regional differences in new business formation (see e.g., [Evans and Jovanovic, 1989](#)). Spatially, this framework is related to considering the quality of the entrepreneurial environment. Thus, an individual's decision to become an entrepreneur is influenced by the environment around them and simultaneously such decisions contribute to changing the entrepreneurial environment. At the heart of the theory of entrepreneurial choice is a potential entrepreneur choosing between two employment strategies – wage-work and self-employment (see e.g., [Verheul et al., 2002](#)). The final decision is based on comparing potential wage income and income from self-employment (see e.g., [Evans and Jovanovic, 1989](#); [Burke et al., 2000](#)) in respect to the theory of an individual's utility maximization (see e.g., [Verheul et al., 2002](#)). The evaluation of an individual's utility is moreover influenced by various determinants that are related to both the individual's personality and the individual's entrepreneurial environment. These determinants may be summarized as follows:

- Scholarly literature often cites human capital as a determinant of new business formation. [Lee et al. \(2004\)](#), [Bishop \(2012\)](#) and [Anselin et al. \(1997\)](#) point out the positive relationship between the quality of human capital and new business formation. [Bishop \(2012\)](#) and [Fotopoulos \(2014\)](#) give the rationale for this relationship as follows: the quality of human capital, proxied e.g. by the level of education, positively influences an individual's ability to perceive, evaluate and exploit entrepreneurial opportunities. However, there is also the other side of the coin. Namely, better educated and skilled individuals tend to have higher wages. For these people, starting your own business might be accordingly connected with risking income loss. Consequently, entrepreneurship is not necessarily the most attractive life strategy for them (see, e.g., [Wang, 2006](#); [Burke et al., 2000](#)).
- Scholarly literature also often cites unemployment as another determinant of new business formation. However, the impact of unemployment on new business formation is rather ambiguous. Unemployed people, including foreigners, might be perceived as a wide source of potential entrepreneurs. In this case, the income from entrepreneurship is higher than social assistance for the unemployed. Entrepreneurship is then a way of escaping unemployment (see e.g., [Cheng and Li, 2012](#)). Nevertheless, unemployment also reduces purchasing power and the size of internal markets. Unemployment therefore indicates some structural disadvantage in regional economies. Then, potential entrepreneurs might be discouraged from entering the market (see, e.g., [Delfmann et al., 2014](#); [Fotopoulos, 2014](#); [Audretsch and Fritsch, 1994](#)).

- An individual's decision to start a new business is further influenced by his/her degree of risk aversion, individualism and dissatisfaction with the current labour market position. Scholarly literature evaluates potential entrepreneurs' personal characteristics and its impact on new business formation. These characteristics include, among others, gender, age, marital status, ethnic status and nationality (see e.g., Cowling and Taylor, 2001; Delfmann et al., 2014). [Audretsch et al. \(2010\)](#) emphasize the positive impact of cultural/social diversity on new business formation. They claim that the accumulation of a pool of culturally/socially diverse knowledge and skills enhances the likelihood of exploiting market opportunities. Note that inferior position in the labour market because of gender, age, language, or cultural differences may push people to start a new business.
- Scholarly literature also shows how employment history is another determinant of new business formation (see e.g. Stam, 2010). [Bishop \(2012\)](#), [Armington and Acs \(2002\)](#) claim that employees of large firms are less likely to start a new business than employees of small firms, reflecting the fact that employees of small firms are better equipped with skills in entrepreneurship. A more diversified workload and imitative behaviour in small firms are of importance in this regard. Moreover, small firm employment is more susceptible to economic fluctuations than large firm employment (see e.g., [Fotopoulos, 2014](#)). However, [Sutaria and Hicks \(2004\)](#) note that large firms may also have stimulating effects on regional entrepreneurship because they are embedded in the local economy.

Finally, the path dependence theory of evolutionary economic geography is another concept relevant to research on the determinants of new business formation (see e.g., [Anderson and Koster, 2011](#); [Fritsch and Mueller, 2007](#); [Fotopoulos, 2014](#)). As mentioned above, an individual's decision to become an entrepreneur is influenced by the entrepreneurial environment surrounding them. This environment consists of cultural, social, economic and institutional elements such as values, opinions, norms, traditions, capital availability, governance and others (see e.g., [Davidsson and Wiklund, 1997](#); [Delfmann et al., 2014](#); [Wagner and Sternberg, 2004](#); [Brühlhart et al., 2012](#); [Devereux et al., 2007](#); [Malecki, 1993](#); [Belás et al., 2015a](#); [Belás et al., 2015b](#)). These elements are very stable, changing only slowly in time. Therefore, the determinants of new business formation are also changing slowly, resulting in persisting regional disparities in new business formation (see e.g., [Anderson and Koster, 2011](#); [Fotopoulos, 2014](#)). Overall, the quality of the entrepreneurial environment measured by new business formation influences new business formation in subsequent years. Spatial spillovers may strengthen this persistence (see e.g., [Fotopoulos, 2014](#); [Anderson and Koster, 2011](#)).

### 3. DATA AND METHODS

The goal of this paper is to evaluate the changing influence of theoretically substantiated determinants on new business formation in the Czech Republic in the time periods from May 2001 to April 2002 (hereafter referred to as the period 2001-2002) and from May 2011 to April 2012 (hereafter referred to as the period 2011-2012). Multiple regression modelling was used to meet the goal. New businesses were defined as both legal entities (firms) and physical entities, with the status of an entrepreneur. All variable values were assigned to the so-called administrative districts of municipalities with extended power (hereafter referred to as MEPs). These districts are administrative territorial units corresponding to the areas between LAU1 and LAU2 levels.

The dependent variable of all regression models is the number of newly established businesses in the periods 2001-2002 and 2011-2012, divided by 10,000 economically active people to account for the different size of MEPs (NEW\_BUSS). This definition follows the so-called labour-market approach which perceives all economically active people as potential entrepreneurs (see e.g., [Delfmann et al. 2014](#)). There is an alternative, the so-called ecological approach which uses the number of businesses as a denominator. However, this approach is bi-

ased by different average sizes of businesses. Therefore, scholarly literature prefers the labour-market approach (see e.g., [Bishop, 2012](#)). Two techniques were used to reduce the impact of outliers. First, the Empirical Bayes smoothing technique was applied to solve the problem of spurious outliers. These are MEPs, where the extreme rate is likely due to a small economically active population (see e.g. [Anselin et al., 2004](#)). Secondly, the dependent variable was logarithmically transformed to correct the excessive positive skew (LN\_NEW\_BUSS). The data were obtained from the official Statistical Business Register of the Czech Statistical Office (hereafter referred to as SBRCOS) concerning the situation in the years 2002 and 2012.

The choice of explanatory variables was motivated by using the theoretical framework from section 1. All explanatory variables relate to the years 2000 and 2010, or to the beginning of the years 2001 and 2011, to avoid the problem of endogeneity. The variables are defined as follows:

- The first explanatory variable is population density (DENSITY). This variable is often used as a proxy for agglomeration economies. Densely populated areas benefit from their market size, pooled labour market, pecuniary externalities and technological and information spillovers. Moreover, the impact of population dynamics is evaluated by the second explanatory variable, namely, population change between the years 1996 and 2000, and 2006 and 2010 (POP\_CHANGE). The data for both variables were obtained from the Czech Statistical Office (hereafter referred to as CSO).
- The Theil index for eleven NACE1 industries is the third explanatory variable. The relationship between industrial diversification of regional economies and new business formation is evaluated using this variable. The Theil index (IND\_DIVERSITY) is defined as:

$$TI_i = - \sum_{j=1}^n s_{ij} \times \ln s_{ij} \quad (1),$$

whereby  $s_{ij}$  expresses the share of employment in industry  $j$  in MEP  $i$  (see e.g., [Audretsch et al., 2010](#)). Note that the higher the  $TI$ , the more diversified the MEP's economy. The data for the variable was obtained from the census of population and housing in the Czech Republic in the years 2001 and 2011 (hereafter referred to as Census 2001 and Census 2011).

- The three further explanatory variables relate to the theory of entrepreneurial choice. Firstly, the quality of human capital is expressed as the share of people with tertiary education in the population, older than 15 years of age (EDUCATION). Secondly, the unemployment rate is expressed as the number of unemployed people per 100 economically active people (UNEMPLOYMENT). Thirdly, national/ethnic diversity is expressed as the share of the six most common national/ethnic minorities (Germans, Poles, Russians, Slovaks, Ukrainians, and Vietnamese) in the total population (NATIONALITIES). The data for the three variables was obtained from Census 2001 and Census 2011.
- Finally, the last variable – the share of employers and self-employed people within all economically active people (ENTREPRENEUR) – was included as a proxy of the quality of the entrepreneurial environment. The data for the variable was obtained from Census 2001 and Census 2011.

The conceptual approach of this paper considers mutual interactions between the seven explanatory variables. Therefore, principal component analysis (PCA) was used to form new variables for inclusion into statistical models. The multicollinearity problem was solved in this way. Six components were extracted by PCA and rotated by varimax with Kaiser normalization. This number of components is suitable for retaining the crucial information from the theoretical framework. The rotated solutions for the periods 2001-2002 and 2011-2012 are given in tables 1 and 2. The components are interpreted by examining their loading on the original explanatory variables.

**Table 1.** PCA coefficients (Varimax rotation with Kaiser normalization); 2001-2002

| Variable      | Component's coefficients |        |        |        |        |        |
|---------------|--------------------------|--------|--------|--------|--------|--------|
|               | 1                        | 2      | 3      | 4      | 5      | 6      |
| DENSITY       | 0.929                    | -0.084 | -0.046 | 0.198  | 0.128  | 0.001  |
| EDUCATION     | 0.839                    | -0.027 | 0.338  | -0.229 | -0.090 | 0.160  |
| ENTREPRENEUR  | 0.116                    | 0.076  | 0.208  | -0.306 | -0.154 | 0.906  |
| IND_DIVERSITY | 0.137                    | 0.071  | 0.961  | 0.063  | -0.066 | 0.165  |
| NATIONALITIES | 0.050                    | 0.005  | -0.070 | 0.198  | 0.967  | -0.131 |
| POP_CHANGE    | -0.081                   | 0.993  | 0.064  | -0.023 | 0.004  | 0.059  |
| UNEMPLOYMENT  | 0.032                    | -0.027 | 0.070  | 0.914  | 0.227  | -0.291 |

Source: own elaboration based on the CSO and Census 2001 data

**Table 2.** PCA coefficients (Varimax rotation with Kaiser normalization); 2011-2012

| Variable      | Component's coefficients |        |        |        |        |        |
|---------------|--------------------------|--------|--------|--------|--------|--------|
|               | 1                        | 2      | 3      | 4      | 5      | 6      |
| DENSITY       | 0.941                    | -0.023 | 0.001  | 0.091  | 0.168  | -0.040 |
| EDUCATION     | 0.761                    | 0.213  | 0.289  | -0.321 | -0.058 | 0.230  |
| ENTREPRENEUR  | 0.079                    | 0.221  | 0.264  | -0.236 | -0.154 | 0.891  |
| IND_DIVERSITY | 0.134                    | 0.204  | 0.938  | -0.030 | -0.056 | 0.224  |
| NATIONALITIES | 0.114                    | 0.005  | -0.052 | 0.079  | 0.981  | -0.117 |
| POP_CHANGE    | 0.082                    | 0.924  | 0.217  | -0.226 | 0.009  | 0.200  |
| UNEMPLOYMENT  | -0.051                   | -0.207 | -0.029 | 0.945  | 0.087  | -0.195 |

Source: own elaboration based on the CSO and Census 2011 data

The first component (AGGLOMERATION) is strongly associated with population density and education. We regard just these factors as crucial for the presence of agglomeration economies. The second component (POPCHANGE\_QUALITY) is strongly associated with population change, with the other variables influencing the quality of this change. The third component (INDDIVER\_POTENTIAL) primarily relates to the potential that is created by more or less diversified MEPs' economies. The fourth component (UNEMPLOY\_VULNER) indicates how MEPs are vulnerable to unemployment. The fifth component (FOREIGNERS) characterizes the MEPs with a high share of foreigners. Finally, the sixth component (ENTREP\_ENVIRON) is understood as the quality of the entrepreneurial environment. There is expected to be a positive relationship between the first, second, fifth and sixth components on one hand, and new business formation on the other hand, in accordance with conclusions from previous research. Scholarly literature has found the influence of the third and fourth components on new business formation as ambiguous.

Multiple regression analysis was used to reveal the influence of the above-mentioned components (determinants) on new business formation in the Czech Republic in the periods 2001-2002 and 2011-2012. Note that MEPs' PCA component scores were computed by standardising the original variables, and then entered into a regression analysis as predictors. Firstly, two cross-section OLS regression models were estimated to determine the effects of particular components on new business formation in the period 2001-2002 (model 1) and 2011-2012 (model 2). The OLS regression models had the form:

$$y_i = \alpha_0 + \sum_{l=1}^L \alpha_l COMP_{li} + u_i \quad (2),$$

where  $y_i$  was LN\_NEW\_BUSS in MEP  $i$ ,  $COMP_{li}$  was the explanatory variable  $l$  in MEP  $i$ , and  $u_i$  was the error term. Traditional regression assumptions were checked by referring to the residuals from the fitted models. Shapiro-Wilk and Jarque-Bera tests were used for the normality assumption, and White's test was used for the homoscedasticity assumption. There was no evidence that the normality assumption was violated. However, the regression diagnostics indicated the presence of heteroscedasticity in the residuals. To correct for this heteroscedasticity, robust standard errors were calculated (White's corrections).

Spatial autocorrelation is another concern for biased and inconsistent OLS estimates. The presence of spatial autocorrelation was therefore tested using Moran's I and Lagrange Multiplier tests based on the residuals of the OLS regression models (see e.g., Anselin et al., 1996). These tests confirmed the presence of spatial autocorrelation in our data. To control this effect, spatial regression models were developed. Following the methodology suggested by Anselin and Florax (1995), and Anselin et al. (1996) among others, Lagrange Multiplier test statistics were used to form decisions based on the specification of spatial regression models. Thus, the spatial lag models were estimated in the form:

$$y_i = \alpha_0 + \sum_{l=1}^L \alpha_l COMP_{li} + \rho W y_i + u_i \quad (3),$$

where  $\rho$  was a spatial autoregressive coefficient,  $W$  was a spatial weights matrix,  $W y_i$  was the spatial lag term for MEP  $i$ , and the other notation is as stated above. The generalized method of moments with heteroscedasticity consistent (White's corrections) standard errors was applied. Row-standardized first-order queen contiguity weights were used for calculation purposes. Note that the Kelejian-Anselin test did not reveal the presence of residual spatial autocorrelation.

The robustness of findings was further explored using panel regression models that included observations from both 2001-2002 and 2011-2012 periods. A new variable (PERIOD) was defined as a dummy variable with a value of "1" if the observation was related to the period 2011-2012. Moreover, interaction terms between the PERIOD variable and the components were added into the models, that checked how important particular components changed between the two periods. Thus, the panel regression models were estimated in the form:

$$y_{it} = \alpha_0 + \sum_{l=1}^L \alpha_l COMP_{lit} + \beta_1 PERIOD_{2011-2012,t} + \delta_m INTERACTION_{mit} + u_{it} \quad (4),$$

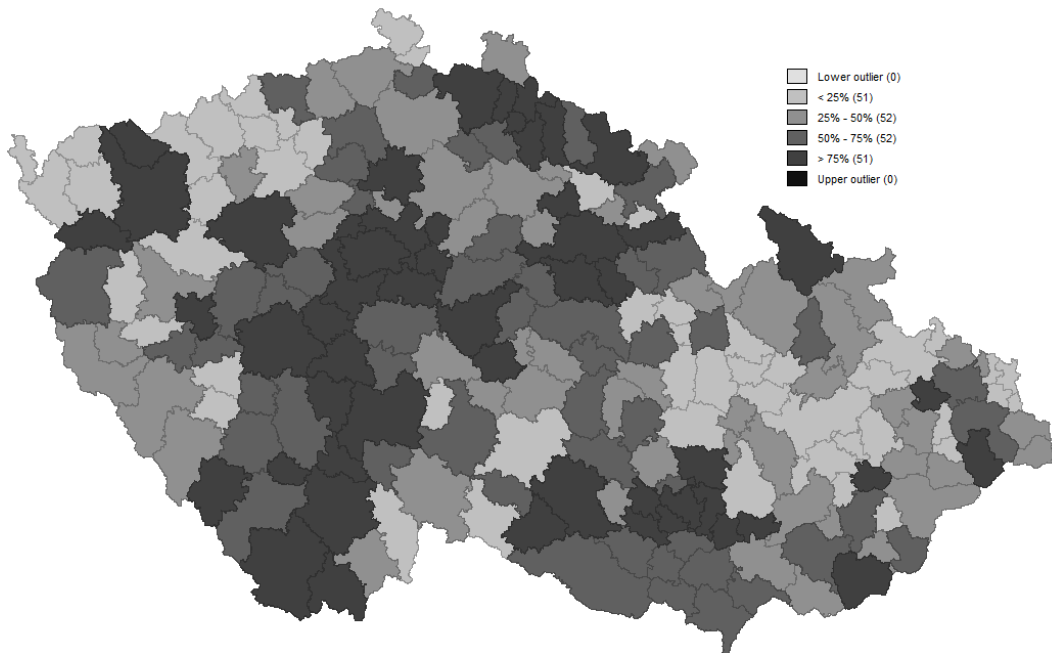
where  $y_{it}$  was LN\_NEW\_BUSS in MEP  $i$  and time period  $t$ ,  $COMP_{lit}$  was the explanatory variable  $l$  in MEP  $i$  and time period  $t$ ,  $PERIOD_{2011-2012,t}$  controlled the fixed effects of the year of observations,  $INTERACTION_{mit}$  was the interaction term  $m$  in MEP  $i$  and time period  $t$  and  $u_{it}$  was the error term. Note that panel regression models were estimated using OLS with heteroscedasticity consistent (White's corrections) standard errors.

## 4. EMPIRICAL RESULTS

Figures 1 and 2 provide introductory information about spatial differentiation of new business formation at the MEP level. Figure 1 (period 2001-2002) demonstrates the presence of spatial clusters of high and low new business formation rates. The largest agglomerations (e.g. the Prague and Brno agglomerations) belong to the former type of spatial clusters. However, high values are indicated also for some peripheral border territories. On the contrary, low business formation rates are typical for the so-called structurally affected regions in parts of north-western Bohemia, northern Moravia, and for the inner periphery near the Bohemia-Morava borders.



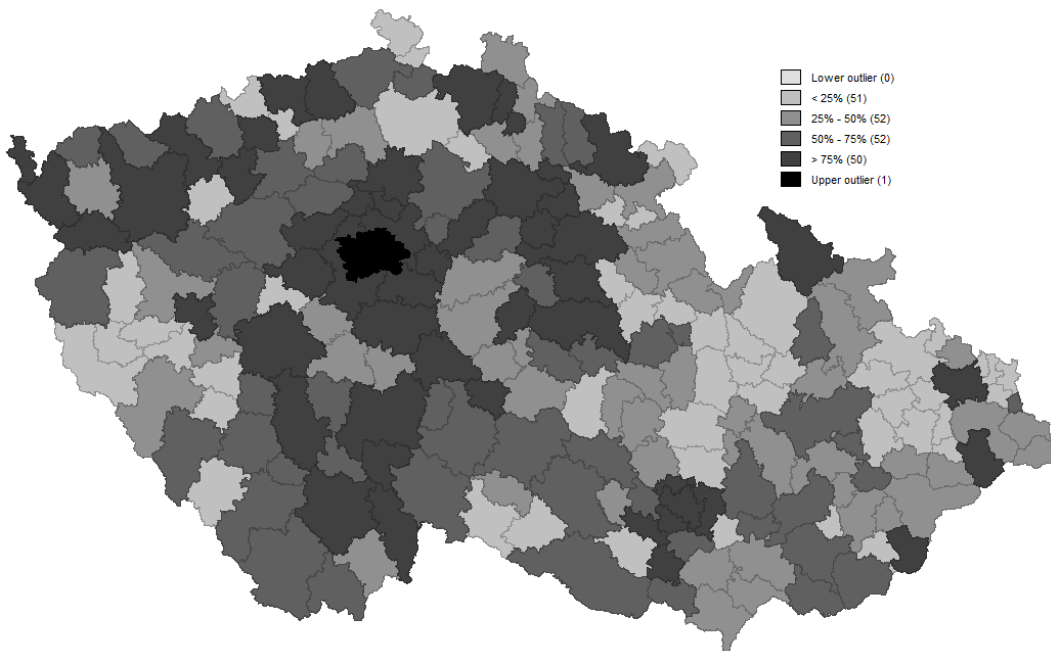
**Figure 1.** New business formation in the period 2001-2002 (LN\_NEW\_BUSS); MEPs



Source: own elaboration based on SBR CSO and CSO data

Some changes can be noticed in figure 2 (period 2011-2012). Firstly, the position of the largest agglomerations was strengthened. Secondly, while the low values of structurally affected regions in northern Moravia remained unchanged, new business formation rates of structurally affected regions in north-western Bohemia increased significantly. The value of Moran's I, statistically significant at the 0.01 level, provides further support for the existence of spatial clusters of high and low new business formation rates (see table 3).

**Figure 2.** New business formation in the period 2011-2012 (LN\_NEW\_BUSS); MEPs



Source: own elaboration based on the SBR CSO and CSO data

**Table 3.** Moran's I for new business formation rates (LN\_NEW\_BUSS); MEPS

|           | 2001-2002 | 2011-2012 |
|-----------|-----------|-----------|
| Moran's I | 0.3354**  | 0.2908**  |

Note: \*\*significant at the 0.01 level

Source: own elaboration based on the SBR CSO and CSO data

Cross-section regression model results are summarized in table 4. Note that the results of OLS regression models and also spatial lag regression models are included in table 4. The regression coefficient estimates indicate a positive and statistically significant connection between agglomeration economies, the quality of the entrepreneurial environment and also the quality of population change on one hand, with new business formation on the other hand in each model except the quality of population change in the 2011-2012 spatial lag regression model. This is in accord with expectations. The positive relationship between the share of foreigners in the population and new business formation was confirmed in the 2011-2012 models but not in the 2001-2002 models. Moreover, the positive relationship is only statistically significant in the OLS regression model. Unemployment vulnerability has a negative influence on new business formation in all these models. However, this influence is only statistically significant in the 2001-2002 models. Finally, the regression coefficient estimates indicate a positive and statistically significant connection between the potential industrial diversity and new business formation in all models.

**Table 4.** Regression model results

| Variable                                       | OLS model           |                    | Spatial lag model   |                    |
|--|---------------------|--------------------|---------------------|--------------------|
|  | 2001-2002           | 2011-2012          | 2001-2002           | 2011-2012          |
| AGGLOMERATION                                  | 0.029**<br>(0.007)  | 0.066**<br>(0.012) | 0.024**<br>(0.006)  | 0.063**<br>(0.008) |
| ENTREP_ENVIRON                                 | 0.073**<br>(0.009)  | 0.066**<br>(0.009) | 0.064**<br>(0.010)  | 0.051**<br>(0.010) |
| FOREIGNERS                                     | -0.011<br>(0.006)   | 0.016*<br>(0.008)  | -0.007<br>(0.006)   | 0.011<br>(0.006)   |
| INDDIVER_POTENTIAL                             | 0.036**<br>(0.007)  | 0.054**<br>(0.008) | 0.031**<br>(0.007)  | 0.043**<br>(0.009) |
| POPCHANGE_QUALITY                              | 0.022**<br>(0.005)  | 0.027**<br>(0.006) | 0.019**<br>(0.005)  | 0.010<br>(0.007)   |
| UNEMPLOY_VULNER                                | -0.037**<br>(0.007) | -0.013<br>(0.008)  | -0.024**<br>(0.009) | -0.007<br>(0.008)  |
| $\rho$   | -                   | -                  | 0.312*<br>(0.139)   | 0.470**<br>(0.138) |
| Adjusted R <sup>2</sup> /Pseudo R <sup>2</sup> | 0.475               | 0.494              | 0.521               | 0.546              |
| N  | 206                 | 206                | 206                 | 206                |
| Moran's I                                      | 0.1093**            | 0.1643**           | -                   | -                  |

Note: \*\*significant at the 0.01 level; \*significant at the 0.05 level; heteroscedasticity robust standard errors in parentheses

Source: own elaboration based on the SBR CSO, CSO, Census 2001 and Census 2011 data

The value of Moran's I is positive and statistically significant at the 0.01 level in both OLS regression models, indicating the presence of spatial autocorrelation in the OLS residuals. This is supported by a positive and statistically significant spatial autoregressive coefficient in both spatial lag models, suggesting that there is a spatial dependence among new business formation rates. Thus, new business formation in an MEP is influenced by the characteristics of neighbouring MEPs. When comparing OLS with spatial lag regression results, some additional insights might be gained. Firstly, the quality of population change is not statistically significant

in the 2011-2012 spatial lag regression model. Residential suburbanization seems to be important in order to understand this finding because spatial interactions increase based on an individual's decision to locate a new business in a core MEP, and to locate to live in its hinterland. Secondly, the share of foreigners in the population is statistically significant in the 2011-2012 OLS regression model, but not in the spatial lag regression model. It seems therefore, that the share of foreigners positively influences new business formation also in neighbouring MEPs. Labour mobility across administrative borders form spatial interactions of this type. Thirdly, agglomeration economies and the quality of the entrepreneurial environment have spillover impacts on new business formation in neighbouring MEPs.

## 5. DISCUSSION

The empirical results of the previous section indicate both a persistent and changing influence of determinants analyzed on new business formation between the periods 2001-2002 and 2011-2012. It appears that the following factors are unchanging over time: the positive impact of the quality of the entrepreneurial environment, of the potential of industrial diversity, and also of the quality of population change on new business formation. The changes relate to the influence of agglomeration economies, to the presence of foreigners in the population and also to unemployment vulnerability. Firstly, there is an increasing positive influence of agglomeration economies on new business formation. Thus, large agglomerations were the more favourable location for new business formation in the period 2011-2012. This corresponds to the process of increasing spatial polarization between core and peripheries in post-communist Czech Republic.

Secondly, the variable relating to the presence of foreigners in the population changed its sign, indicating a positive influence on new business formation in the period 2011-2012. Thus, the importance of foreigners for new business formation increased in the Czech Republic. Note the shift of post-communist Czech Republic among immigration countries.

Thirdly, the negative impact of unemployment vulnerability on new business formation was weakened in the period 2011-2012. It seems that rapidly growing entrepreneurial opportunities in the early phase of post-communist transformation were exhausted in core MEPs. Moreover, forming new businesses may be seen as an increasingly important way of escaping unemployment in disadvantaged MEPs (see the position of MEPs in north-western Bohemia).

The robustness of the findings was examined by panel regression models that included observations from both periods 2001-2002 and 2011-2012. Interaction terms between the dummy variable relating to the time periods (PERIOD) and the determinants of new business formation were added into the models. The changing importance of the determinants of new business formation was controlled in this way. Panel regression model results are given in table 5. The main findings include the following:

- There is confirmation of a positive and statistically significant connection between the quality of the entrepreneurial environment, the potential of industrial diversity, and also the quality of population change on one hand, with new business formation on the other hand. Moreover, the interaction terms related to these determinants (Model 2, Model 4 and Model 5) are not statistically significant. Thus, these three determinants have a persistently positive impact on new business formation.
- There is confirmation of a positive and statistically significant connection between agglomeration economies and new business formation. Moreover, the regression coefficient of the interaction term AGGLOMERATION\*PERIOD (Model 1) is positive and statistically significant, thus supporting the thesis that agglomeration economies have an increasing and positive influence on new business formation.

- The relationship between the presence of foreigners and new business formation is not statistically significant in the panel regression model. This is not surprising when considering the signs of the regression coefficients of the FOREIGNERS variable in the two OLS regression models in table 4. However, the regression coefficient of the interaction term FOREIGNERS\*PERIOD (Model 3) is positive and statistically significant, indicating a positive impact of the presence of foreigners on new business formation.
- There is confirmation of a negative and statistically significant connection between unemployment vulnerability and new business formation. However, the regression coefficient of the interaction term UNEMPLOY\_VULNER\*PERIOD (Model 6) is positive and statistically significant, indicating the increasing importance of entrepreneurship in disadvantaged regions.

**Table 5.** Panel regression model results

| Variable                      | Model               |                     |                     |                     |                     |                     |
|-------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
|                               | 1                   | 2                   | 3                   | 4                   | 5                   | 6                   |
| AGGLOMERATION                 | 0.029**<br>(0.007)  | 0.048**<br>(0.010)  | 0.048**<br>(0.010)  | 0.048**<br>(0.010)  | 0.048**<br>(0.010)  | 0.048**<br>(0.010)  |
| ENTREP_ENVIRON                | 0.070**<br>(0.006)  | 0.073**<br>(0.009)  | 0.070**<br>(0.007)  | 0.070**<br>(0.010)  | 0.070**<br>(0.007)  | 0.070**<br>(0.010)  |
| FOREIGNERS                    | 0.003<br>(0.004)    | 0.003<br>(0.004)    | -0.011<br>(0.007)   | 0.003<br>(0.004)    | 0.003<br>(0.004)    | 0.003<br>(0.004)    |
| INDDIVER_POTENTIAL            | 0.045**<br>(0.006)  | 0.045**<br>(0.006)  | 0.045**<br>(0.006)  | 0.036**<br>(0.007)  | 0.045**<br>(0.006)  | 0.045**<br>(0.007)  |
| POPCHANGE_QUALITY             | 0.025**<br>(0.004)  | 0.025**<br>(0.004)  | 0.025**<br>(0.004)  | 0.025**<br>(0.004)  | 0.022**<br>(0.005)  | 0.025**<br>(0.005)  |
| UNEMPLOY_VULNER               | -0.025**<br>(0.007) | -0.025**<br>(0.005) | -0.025**<br>(0.005) | -0.025**<br>(0.005) | -0.025**<br>(0.005) | -0.037**<br>(0.007) |
| PERIOD                        | 0.194**<br>(0.011)  | 0.194**<br>(0.011)  | 0.194**<br>(0.011)  | 0.194**<br>(0.011)  | 0.194**<br>(0.011)  | 0.194**<br>(0.011)  |
| AGGLOMERATION<br>*PERIOD      | 0.037**<br>(0.014)  | -                   | -                   | -                   | -                   | -                   |
| ENTREP_ENVIRON<br>*PERIOD     | -                   | -0.007<br>(0.013)   | -                   | -                   | -                   | -                   |
| FOREIGNERS*PERIOD             | -                   | -                   | 0.027*<br>(0.011)   | -                   | -                   | -                   |
| INDDIVER_POTENTIAL<br>*PERIOD | -                   | -                   | -                   | 0.019<br>(0.011)    | -                   | -                   |
| POPCHANGE_QUALITY<br>*PERIOD  | -                   | -                   | -                   | -                   | 0.006<br>(0.008)    | -                   |
| UNEMPLOY_VULNER<br>*PERIOD    | -                   | -                   | -                   | -                   | -                   | 0.023*<br>(0.010)   |
| <i>Adjusted R<sup>2</sup></i> | 0.629               | 0.619               | 0.624               | 0.621               | 0.619               | 0.623               |
| <i>N</i>                      | 412                 | 412                 | 412                 | 412                 | 412                 | 412                 |

Note: \*\*significant at the 0.01 level; \*significant at the 0.05 level; heteroscedasticity robust standard errors in parentheses

Source: own elaboration based on the SBR CSO, CSO, Census 2001 and Census 2011 data

Overall, these findings are consistent with the empirical results of the previous section. The findings suggest that new business formation should be considered in a broader socio-economic context in countries undergoing post-communist transformation. Thus, agglomeration processes, suburbanization, international migration, accumulation and exploitation of human capital all influence new business formation. Note that these processes have a long-term nature which should be taken into account to develop political strategies focused on new business formation.

## 6. CONCLUSION

The goal of this paper was to evaluate the changing influences of theoretically substantiated determinants on new business formation in the Czech Republic in the time periods 2001-2002 and 2011-2012. The empirical results indicate that a persistent and changing influence co-exists. Namely, the quality of the entrepreneurial environment, industrial diversity and population change have a positive impact on new business formation in both time periods. There was also a positive connection between agglomeration economies and new business formation. The importance of agglomeration economies increased significantly. The relationship between foreigners present in the population and new business formation was not statistically significant in the period 2001-2002, but this determinant had significantly greater influence in the period 2011-2012. Finally, the relationship between unemployment and new business formation was negative in both periods. Nevertheless, entrepreneurship was increasingly important in disadvantaged regions.

The empirical results in this paper point out the importance of the broader socio-economic context in countries undergoing post-communist transformation for explaining MEPs' differences in new business formation. Spatial polarization between core and peripheries, suburbanization, international migration, industrial restructuring, accumulation and exploitation of human capital all influence new business formation. Moreover, new business formation also has its spatial dimension, namely spatial interactions between neighbouring MEPs created by labour market mobility, spatial spillovers, imitation behaviour and the like. Note that the relevance of spatial interactions was confirmed by a positive and statistically significant spatial autoregressive coefficient in the spatial lag models. On the whole, spatial interactions are inevitable when considering the determinants of new business formation.

The conclusions of this paper have important political implications. Firstly, agglomeration economies, population change, the quality of the entrepreneurial climate and industrial diversity are all statistically significant determinants of new business formation. These determinants are very persistent and any significant change in any of these factors is a long-term process. The impact of policies targeted at new business formation in lagging regions therefore might only be observed in the long-term, or possibly never. Secondly, it seems to be desirable to break the structural disadvantage created by the determinants of new business formation in lagging regions. The principle of spatial concentration might therefore be considered beneficial when formulating policies targeted at new business formation in lagging regions (see e.g., [Hájek et al., 2014](#); [Hájek and Smékalová, 2015](#); [Novosák et al., 2013](#)). Thirdly, the impact of spatial interactions should be considered e.g. when choosing territories to support.

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