Regional interplay of factors informing SMEs' density in Romania. A panel data analysis

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Abstract

The aim of this paper is to provide an understanding of several factors associated with the SMEs' density distribution across Romania, and to discuss how some of the variables acknowledged in the international literature as determinants in SMEs' dynamic are related to SMEs' density in this case. We fitted four static panel models, one for each category of SMEs, and found a positive impact of both GDP per capita and FDI per capita on the SMEs' density in each category, which may confirm our initial assumption that SMEs' density can act as a signal for business opportunity. The density of employees in the research – development sector did not account for any significant contribution, while the percent of people in the 25 – 34 age group is statistically significant but holds an opposite sign to what was expected. Last, but not least, the crisis had an unexpected impact on our dependent variables.

Keywords: panel data econometrics, fixed effects models, SMEs density, regional inequality

Introduction

According to the President of the Chamber of Commerce and Industry of Romania, among the total number of companies operating in Romania in 2015, 99.7% were SMEs[1]. While this figure may look impressive, it seems that only 50 percent of the added value in the Romanian economy yields from SMEs contribution, a value that lies below the European average of 58 percent. The total

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[1] Capital (2015), Half of the existing added value in the Romanian economy is brought by SMEs, retrieved from http://www.capital.ro/jumatate-din-valoarea-adaugata-existenta-in-economia-romaneasca-este-adusa-de-imm-uri-.html

number of SMEs includes about 87.4% micro firms, which provide no more than 23% of the private employment in Romania, and less than 14% in economic added value. A comparison with the EU 28, presented by the European Commission in the "Enterprise and Industry: 2014 SBA Fact Sheet – Romania", shows that, while the percent of total number of employees in the EU 28 is decreasing with firm category, from 29.1% for micro – firms, to 20.6% for small firms and 17.2% for medium firms, in Romania the micro and the small category are characterized by the same percent, 22.9% while medium companies share 20.9% of the employees. Similar differences in distribution hold also for the added value: in the EU – 28 micro, small and medium enterprises contribute with 21.6%, 18.2% and 18.3% respectively, while in Romania the distribution seems to be reversed: 13.4%, 16.3% and 18.3% respectively. This difference suggests once again that Romanian SMEs hold far less economic strengths compared to EU average.

A study conducted by the Post Privatization Foundation reveals that Romania ranks last in the EU28 as far as the SME density is concerned, with an average of only 2.71 employees in the small and medium-sized enterprises (Wall-Street, 2015). The same source reads that in Romania there are 21.3 SMEs per a thousand inhabitants, the EU average being of 42.7 companies. The highest densities are registered in Czech Republic, with 95.9 SMEs per a thousand inhabitants, Portugal (73.5 SMEs/1000 inhabitants), Malta (73 SMEs/1000 inhabitants) and Slovakia (70.2 SMEs/1000 inhabitants). There are nevertheless strong economies in the EU where the SME density is not very high. Such is the case with the United Kingdom, having only 27.2 SMEs/1000 inhabitants, and with Germany, which has 27.7 SMEs/1000 inhabitants, in opposition to traditional market economies with a high density, such as Spain (48.1), Italy (62.6), and Sweden (70.2) (Wall-Street, 2015).

A specific feature of Romanian entrepreneurship is the poor performance of small companies in rural areas (Burcea, Curteanu and Papuc, 2010). The number of small companies in the countryside is extremely low: the SME density per 1000 inhabitants is 9.64 SMEs per 1000 inhabitants, compared to the national average of 21.3 (Rural On-line, 2014). The result is not surprising, given the demographic characteristics of the majority of Romanian rural population: aged people, weak economic power, low incomes, and unskilled labour force naturally result in fewer opportunities for business development, as well as a low interest for entrepreneurs to invest in such areas. Data show however that it is not only the rural area that faces problems, as we will see in what follows.

The SME sector in Romania underperforms, this being a natural consequence of several problems, such as: critical mass, dimension, domain profile and rate of survival (Pîslaru and Modreanu, 2012). The issue of critical mass is directly observable in statistical data: for instance, Bucharest – Ilfov is a special case of high concentration, which lies far above the European benchmark. The percent of foreign direct investment in Bucharest – Ilfov area is 59.3% out of the total, according to a report of the National Bank (National Bank of Romania, 2016). The vast majority of big national and multinational companies are running their businesses here, providing large business opportunities for SMEs, as well. The business environment in this area also provides research and development resources, at its highest intensity.

Romania has a weak and outdated research – development infrastructure, as well as low innovation performance. The innovative process has gradually slowed down since the transition to market economy started, as a result of the progressive decrease in human resources, institutional support and public investments (Radu, Badea and Mocuta, 2008). According to Eurostat, in 2015 Romania falls on the last position in the European Union in respect to expenditures for research and development as a percent of GPD (R&D intensity): only 0.38% in 2015. Similar low figures (R&D intensity under 1%) are recorded in Greece (0.83%), Bulgaria (0.8%), Malta (0.85%), Slovakia (0.89%) and Poland (0.94%). The top positions are held by Finland (3.17%), Sweden (3.16%) and Denmark (3.08%).

Employment and added value to an economy through SMEs contributions are crucial issues, among others, not only to be discussed, but also to be explained. The differences between Romania and EU – 28 may be the key to understanding, but so are the differences within the country as such.

As the literature review will show, previous research on Romanian SMEs is either focused on basic statistical insights regarding their distribution across the country, or on descriptive considerations regarding Romanian entrepreneurship, therefore favouring a qualitative approach. Unlike this perspective, the aim of our paper is to estimate the association between several variables acknowledged in the international literature as determinants in SMEs dynamic, and in the SMEs' density in Romania. The importance of our study is twofold. Although the variables that we took into account as explanatory for the variations in SMEs' density across Romania are not only discussed in previous international research, but also intuitive and so is the nature – direct or indirect – of their relation with the dependent variable, a clear measurement of their influence provides a concrete ground for prospective governmental policies for SMEs support in those areas where they are already developed, as well as in areas where they need to be developed. Secondly, our study is important because it contributes to the rather few quantitative studies regarding the particular case of Romanian SMEs and helps the reader to make a clearer image of how various macroeconomic factors interplay and result in SMEs disparities. Being able to measure the joint evolution of some variables of interest and SMEs' distribution creates room for informed decision-making, as well as for public or private interventions.

The study is structured as follows: the next section provides an overview on the literature addressing the factors that explain the SMEs' density and its relation to some other economic variables. The next section presents the data and methodology we used, followed by a section in which the models and their diagnosis are discussed. The last section presents our conclusions, research limitations, and suggests directions for further investigations.

1. Literature review

In general, new entrepreneurs tend to start a small business, which has been defined as "one that is privately owned by one individual or a small group of individuals and has sales and assets that are not large enough to influence its environment" (Griffin, 2006, p. 144). The small and medium-sized enterprises capitalize on the people manifesting the entrepreneurial spirit, on those for whom innovation and creativity generate new and important business opportunities, on those who manage to use the advantages of an entrepreneurial environment that is beneficial to this domain (Burdus, Cochina, Craciun and Istocescu, 2010). The entrepreneurial spirit is manifested in entrepreneurial activities. The panel of variables which might significantly influence entrepreneurial activities is large and diverse: some experts (e.g., Baum, Locke and Smith, 2001; Delmar, Davidson and Garner, 2003) emphasize the individual and the organizational factors, while others (e.g., Audretsch and Mahmood, 1994; Nicolescu and Nicolescu, 2008) also underline the importance of environmental determinants.

For instance, Nicolescu and Nicolescu (2008) believe that there are personal, or internal variables that vary from one entrepreneur to another and depend on their entrepreneurial construction (the size of the company, the nature of the organization, the entrepreneur's personality and training or the culture and professional characteristics of the people involved and of the organization as a whole), and external variables (the characteristics and the performance of the economic system, the national economic culture, as well as the culture of the area and the market the entrepreneur has access to). If, for the well-established economies, the entrepreneur represents the most influential variable, for the former communist countries, those with an emerging economy, other equally important external variables emerge, such as: level of corruption, legal environment, financial institutions, taxes or infrastructure.

Pîslaru and Modreanu (2012) suggest that, in Romania, the SMEs' key contribution to employment cannot be achieved in the absence of a favourable ecosystem. There is an entire entrepreneurial ecosystem that needs to be developed, with sectorial and regional components, because, on the one hand, there are studies (Cojanu, 2006; Isaic-Maniu, 2008; Nicolae, Ion and Nicolae, 2016), which draw attention to the fact that entrepreneurship is unevenly developed across Romanian counties, and on the other hand, according to the White Charter of SME's in 2014, the share of SMEs involved in trade and construction is too big in comparison with other developed countries, the SMEs in industry and services being the ones which have the potential to make the greatest contribution to the sustainable growth of the GDP (Pîslaru and Modreanu, 2012).

On the other hand, Armeanu, Istudor and Lache (2015) showed that the productivity of SMEs in the six main sectors of the national economy was substantially reduced during the crisis (so their contribution to the GDP has also declined), but "what is more worrying is the fact that even after the recession, the field of SMEs is operating under its potential level in almost all sectors of the economy (with the exception of trade, which is only natural, given the aggregate demand revival)" (Armeanu et al., 2015, p. 213).

Carter (2006) has shown that there is a debate over whether it really matters how many small firms exist in a country. What may matter more is whether successful firms are able to grow, and whether new firms can enter markets easily. Using a sample of 45 countries, Beck, Demirgüç-Kunt and Levine (2005) have found a strong association between the importance of SMEs and the GDP per capita growth. However, they did not find evidence that SMEs alleviate poverty or decrease income inequality.

The literature does not fully support the hypothesis of the higher efficiency of SMEs, of their superior productivity in comparison with large companies' or of their important contribution to economic growth. There are authors (Pagano and Schivardi, 2001; Brown, Medoff and Hamilton, 1990) who are skeptical about pro-SME policies and who question the relationship between the firm's size and its contribution to economic growth. This relationship is influenced by many factors, such as the endowment with natural resources, the orientation and effectiveness of economic policies, the degree of economic openness and the competitiveness of local products on international markets (Ayyagari, Demirgüç-Kunt and Maksimovic, 2011).

It must also be revealed, though, that, given their characteristics, SMEs provide the economy with benefits that large companies cannot offer (higher flexibility, lower access and exit costs in and out of the market, very active within the labour market), which are not really related to economic growth, but rather to the SMEs' regional distribution, or density.

While the importance of the variables that we took into consideration to explain SMEs' regional density was discussed in the literature, to our knowledge, there is no clear quantification of their impact for the particular case of Romania. The next section presents the methodological framework that we used in order to assess the contribution of the level of economic development, foreign direct investments, and some demographic characteristics on four categories of Romanian SMEs. More precisely, we explored the regional SMEs' density - total and by three size classes – depending on GDP/capita, FDI/capita, the density of employees in research – development sector, the share of several entrepreneurially-relevant age groups (25 – 34, 35 – 44 and 45 – 54) as numerical independent variables, and a categorical variable accounting for the years before, during and after the economic crisis. Our analysis draws on official statistics at county (NUTS 3) level, recorded between 2001 and 2014.

2. Methodological framework

Our research endeavour towards identifying some of the main factors associated with regional density in the entrepreneurial activity relies on panel data modelling, preceded by a comparative analysis based on GINI index of spatial differences in the density distribution of the SMEs categories.

The GINI index. The first step was to calculate the GINI index for the SMEs' density by categories. The ground of GINI index calculation is Lorenz curve, a cumulative frequency distribution of SMEs' density across counties meant to compare it with the uniform distribution of complete equality. We used the following formula for calculation:

$$G = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n}\left|x_i - x_j\right|}{2n\sum_{i=1}^{n} x_i} \qquad (1)$$

where we denoted by x_i the SMEs' density in a particular county i, where i = 1,.., 42.

Panel data analysis. The general form of the basic econometric panel model employed in this paper is described in (2):

$$y_{it} = \alpha_{it} + \beta_{it}^{\gamma} x_{it} + \varepsilon_{it} \qquad (2)$$

where i = 1,...n is the cross – sectional unit index (in our case Romanian counties), t = 1,...,T is the time index (in our case we have T = 13) and ε_{it} is a random error, or disturbance term, that is assumed to be of mean 0 (Baltagi, 2001).

Depending on the model we pursue to estimate, several assumptions are usually made about the parameters, the errors and the regressors. If the parameters are assumed to be homogenous, meaning that they are invariant in time and by individuals, the resulting model is a standard pooling model that does not account for any kind of specificities, either in cross – sectional units, or across time. If we admit that the individuals are heterogeneous, we account for their specificities and we assume that the disturbance term consists of two components, among which one is specific to the individual and is invariant in time. The functional form of this model as well as the components of the error term are presented in (3):

$$y_{it} = \alpha + \beta^{T} x_{it} + \mu_i + \varepsilon_{it} \qquad (3)$$

The term ε_{it} is the idiosyncratic error, and μ_i is the individual error component. Usually, the idiosyncratic error is considered to be independent both from the regressors and from μ_i, while μ_i can be either dependent, or independent from the regressors. Model (3) is known in the literature as the unobserved effects model, which can take two different forms: if the individual error component is correlated with the regressors, the pooled model based on OLS does not provide consistent estimators for the regression coefficients. The fixed effects model estimated in this case treats the individual errors as separate parameters, and fits an OLS method with individual dummy variables.

If individual errors are not correlated with the regressors, the sum between μ_i and the idiosyncratic error is also uncorrelated with the regressors, which means that in terms of model (2) and (3) notations, the overall disturbance term is uncorrelated with the regressors. We are, therefore, under the basic conditions of a consistent OLS estimation, a situation called in the literature random effects models. However, due to the repeated presence of the individual error term across observations, another assumption of the OLS regression is violated: correlations between error terms occur. The solution lays in the generalized least squares estimators for which different procedures have been proposed.

To summarize, the assumptions over the parameters and the error term of the models are at the core of specifying the right model to be estimated. To test whether or not a particular model is the right choice, we first have to consider whether the same coefficients apply across all individuals or not. If the answer is yes, then the pooled model is the right choice. If the coefficients are specific to each individual and the unobserved effects are confirmed, then we must make a choice between fixed and random effects. The Hausman test is designed to help make the choice between the two types of models, under the null hypothesis that there is no significant difference between them. If the null hypothesis is rejected, the fixed effects model will be chosen. If we fail to reject the null hypothesis, we will accept the random effects estimators.

Even if a choice between the fixed and random effects has been made, further investigations are required to test the robustness of the estimators. The "plm" package in R provides tools for estimating random and fixed effects, as well as for testing between pooled models and unobserved effects models, and for testing between random and fixed models. As stated before, we run four panel models, in three versions each: OLS, fixed and random effects. The Hausman test shows p-values below the critical value of 0.05, and therefore the null hypothesis stating that there are no differences between fixed and random effects, is rejected in each case. We accept that one model is inconsistent and therefore the fixed effect models are chosen, indicating that the errors are correlated with the regressors (Croissant and Millo, 2008). The tests indicate in each case the presence of heteroscedasticity and cross – sectional correlation; therefore we applied the required corrections.

Data description. Data comprise twelve numerical variables recorded between 2001 and 2014, for each Romanian county and for Bucharest Municipality, and one dummy variable indicating the year being analysed. The numerical variables are: GDP/capita, FDI/capita, the density of employees in the research – development sector, the percent of the 25 – 34, 35 – 44 and 45 - 54 age groups, the density of total number of SMEs, as well as the density for three subcategories: 0 – 9 employees, 10 – 49 employees and 50 – 249 employees. First, we present the descriptive statistics of each of SMEs' density, in three forms specific to a panel data analysis: overall, which means that all data were pooled together without any consideration for the time dimension; between, which means that we calculated the yearly average for all districts and then took the minimum and the maximum of them; within, meaning that we calculated the average within each district over 13 years and then recorded the minimum and maximum of the resulted values.

Data were analysed in R, an open source statistical software, using in particular the following packages: "foreign", "ggplot" and "car" for plots; "plm" for the panel models we run; "lmtest" to test for fixed and random effects, as well as for serial correlation, and heteroscedasticity; "tseries" to conduct the unit roots tests. Croissant and Millo documented the use of the "plm", along with the related packages (Croissant and Millo, 2008). We also used the "ineq" package to calculate the GINI index values.

The models. In an attempt to explain the huge inequalities in density distribution within each category of SMEs, we fitted four regression models, in which we preferred the variables in log for three reasons. Beside the skewness issue that will become evident in the next section, the comparability of results is easier when the variables capture relative changes (Gujarati, 2012); also, by taking the variables in log they become smoother, the chances for stationarity increase and the heteroscedasticity decreases. In fact, in our case, the Augmented Dickey Fuller tests for each of the time series involved shows indeed that, in their logged form, they are all stationary but, as we will see later, we still need to correct for heteroscedasticity.

We fitted four models, one for each category of SMEs. The dependent variables of these models are described below, where we defined the SMEs' density as the number of SMEs per 100,000 inhabitants.

Model 1: Log of density – total number of SMEs.

Model 2: Log of density – number of SMEs with 0 – 9 employees.

Model 1: Log of density – number of SMEs with 10 – 49 employees

Model 1: Log of density – number of SMEs with 50 – 249 employees

The independent variables were GDP/capita, FDI/capita, the density of employees in the research – development sector, and the percentage of the 25 – 34, 35 – 44 and 45 - 54 age groups, all of them in logarithmic form, and the crisis as a factor variable, taking the value 0 for years before 2008, then value 1 for 2009 and 2010, and value 2 starting with 2011.

The GDP per capita in this paper is defined as GDP of each county, divided by the corresponding number of residents in that county. According to the Romanian National Institute of Statistics[2], gross domestic product (GDP) is equal to the sum of final uses of goods and services by resident institutional units (actual final consumption, gross fixed capital formation) plus exports and minus imports of goods and services and it is, in our case, a proxy for economic development level. We expect this variable to positively impact the density of SMEs in all four categories; therefore in each model we expect a positive sign to its estimated coefficient (Beck et al., 2005, Pîslaru and Modreanu, 2012; Armeanu et al., 2015).

There are contradictory findings regarding FDI's contributions to economic growth in host countries (Imbrisca, 2016), but we still consider them relevant as a proxy for new business opportunities related to firm creation/expansion. We expect a point estimator with a positive sign, similar with the case of GDP per capita. We took the percent of employees in the research – development area as a proxy for resources for innovation and potential for entrepreneurship. To our knowledge, this variable is not documented in the literature as being a confirmed measure of the entrepreneurial inclination, but we test its contribution on an intuitive basis. We would expect it to be not only statistically significant, but also to have a positive estimated coefficient, a result that may hold under the assumption that the research and development area is intimately related to the business sector, the later acting as a recipient for the former's output deliveries.

The reason we decided to include age characteristics in our study roots in two streams of previous knowledge: on the one side, entrepreneurship seems to be related to a higher availability to take risks (Cummings, 2015). In fact, assuming risks was included in the early stages of economic theory as one of the main characteristics of an entrepreneur (e.g., Richard Cantillion, 1697 – 1734). Meanwhile, other sources suggest that entrepreneurs are, more often than expected, risk averse (Forbes, 2013). On the other side, risk taking and risky decision-making are documented as decreasing with age (Gardner and Steinberg, 2005), which may create the premise for younger population to have a stronger positive impact on SMEs' density than elder segments. However, previous research indicates that in Romania the average age of an entrepreneur is 40 years old. Among them, 41% are of ages that range between 36 and 45; 25.5% are represented by people in the 26 – 35 age group, while 23.06% are of ages ranging between 46 and 55 years (Grigore, 2006). The White Cart of SMEs indicates that 34% of entrepreneurs are 35 – 45 years old, while 22% are between 25 and 35 years old. We therefore include in our study all these age groups in an attempt to assess their contribution to SMEs' density by categories. The correlation matrix showed however that the 45 – 54 age group is correlated up to 93% with the other

[2] National Institute of Statistics (2016), Tempo online, retrieved from http://www.insse.ro/cms/

age groups. Although, according to some authors, a panel data analysis may ignore multicollinearity due to the specific format of the data, we decided to remove it and keep the 25 - 34 years and 35 - 44 segments. Since both groups are documented as related to entrepreneurial behaviour, we expect a positive sign to the corresponding estimated coefficient.

Crisis is a categorical variable that indicates the year studied: it takes the value 0 for the years up to 2008, 1 for 2009 and 2010, and 2 starting with 2011. We expect that its contribution is negative for 2009 and 2010, but as things turned better starting with 2011, the estimated coefficient for 2011 onward is expected to be positive (Burcea, Toma and Papuc, 2011).

3. Results

The following table presents the descriptive statistics of each of the four dependent variables. They display high ranges both in overall and within statistics, which suggests that there may be significant differences across districts over time. However, since we work with panel data, the overall statistics may not be relevant in our interpretation. We therefore chose to look into a different indicator that illustrates the differences in density distribution: the GINI index of density inequalities. In the next stage we calculated the evolution of GINI index for SMEs' density by category over the studied years. Figure 1 graphically presents the evolution of this variable across categories, both for the absolute number of SMEs and for their density.

This simple calculation reveals that in Romania the inequalities in SMEs' distributions by category score high in absolute terms, ranging between 0.35 and 0.43, but that in terms of density the inequalities are lower. Significant similarities can be observed between total and 0 – 9 SMEs, a result that can be supported by the vast majority of 0 – 9 SMEs in total (87.4%, as already mentioned). Less similarity is observed between the 10 – 49 and 50 – 249 SMEs.

Table 1. Overall, between, and within statistics for the dependent variables

Variable	Type	Min	Median	Mean	Max	Sd
SMEs' density: total	Between	16.91	-	-	19.03	-
	Within	4.893	-	-	41.49	-
	Overall	6.434	16.24	17.620	54.57	7.48
	Between	12.58	-	-	21.62	-
	Within	8.167	-	-	44.21	-
SMEs' density: 0 – 9 employees	Overall	5.383	14.22	15.52	48.82	6.646
	Between	10.91	-	-	19.26	-
	Within	6.972	-	-	39.240	-
SMEs' density: 10 – 49 employees	Overall	0.638	1.546	1.684	4.604	0.713
	Between	1.271	-	-	1.929	-

	Within	0.804	-	-	3.896	-
SMEs' density: 50 – 249 employees	Overall	0.122	0.311	0.351	1.041	0.162
	Between	0.3122	-	-	0.3913	-
	Within	0.1722	-	-	0.858	-

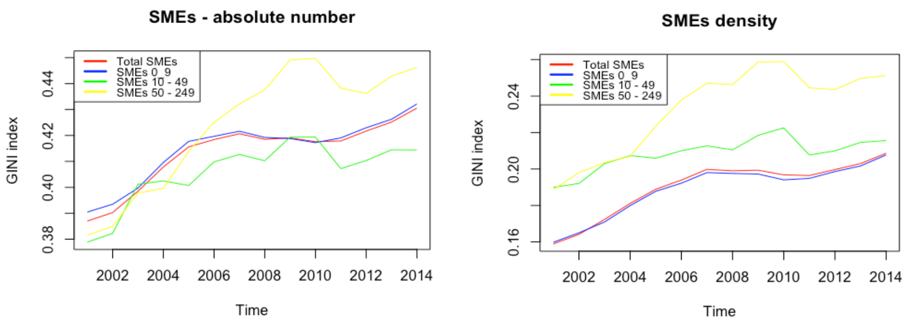
Source: own processing

The estimated coefficients of the four regression models are presented in Table 2 where we included the coefficients corrected for heteroscedasticity in the presence of both serial correlation and cross – sectional dependence (Arellano method) (Zeileis, 2004). The findings confirm our initial expectations regarding GDP per capita and FDI per capita: the estimated coefficients have positive signs and are statistically significant. Different than expected results correspond to the density of employees in the research – development area: the variable is not statistically significant, proving that there is no relation between the percent of people employed in the research – development field and the SMEs' density. This result may pinpoint toward the idea that the research and development activities are not conducted in businesses' benefit.

Equally surprising is the result concerning the 25 – 34 age group. This variable shows a statistically significant negative impact on SMEs' density in each category, unlike the 35 – 44 age group, which seems to comply with our initial expectations. In each model, Table 3 shows that the 35 – 44 group has a positive and statistically significant impact on SMEs' density, which is in line with the age characteristics of a significant percent of Romanian entrepreneurs.

Another interesting result is related to the categorical variable: compared to the reference level, which is the period until 2008, we found that for all four categories the estimated coefficients are negative and highly significant not only for 2008 and 2009, which are crisis years and for which we expected such a result, but also for the post – crisis years.

Figure 1. The evolution of GINI index for SMEs' absolute number and density, by categories, across Romania



Source: own representation

Table 2. The coefficients of the four fixed effects models, corrected for heteroscedasticity in the presence of both serial correlation and cross – sectional dependence (the Arellano method)

Model	**Log of density – total number of SMEs**	**Log of density – 0 – 9 persons SMEs**	**Log of density – 10 – 49 persons SMEs**	**Log of density – 50 – 249 persons SMEs**
Intercept	Dropped	dropped	dropped	dropped
Log of GDP/capita	0.65*** (p-value < 2e-16)	0.68*** (p-value = 1.36e-15)	0.522*** (p-value < 2e-16)	0. 65*** (p-value = 6.814e-16)
Log of FDI/capita	0.022** (p-value = 0.002)	0.022* (p-value = 0.04)	0.03*** (p-value = 0.0001)	0.022* (p-value = 0.031)
Log of density of employees in research – development sector	-0.004 (p-value = 0.5)	-0.004 (p-value = 0.69)	-0.004 (p-value = 0.524)	-0.004 (p-value = 0.66)
Log of percent of the 25 – 34 age group	-1.09*** (p-value < 2e-16)	-1.18*** (p-value = 0.0005)	-0.6319*** (p-value = 5.284e-12)	-1.1** (p-value = 0.0013)
Log of percent of the 35 – 44 age group	0.65*** p-value < 2e-16)	0.683*** (p-value = 0.0004)	0.57*** (p-value < 2.2e-16)	0.646*** (p-value = 0.00062)
Economic crisis (Reference category: 2001 to 2008)				
2009 and 2010	- 0.06*** (8.376e-06)	-0.058*** (0.00016)	-0.1*** (3.617e-12)	-0.063*** (1.862e-05)
2011 to 2014	-0.245*** (< 2e-16)	-0.267*** (< 2.2e-16)	-0.08*** (2.202e-07)	--0.2447*** (< 2.2e-16)
Adjusted R – Squared (%)	75.79%	75. 5%	70.208%	75.79%
F - statistic	353.062 on 7 and 497 DF, p-value: < 2.22e-16	345.211 on 7 and 497 DF, p-value: < 2.22e-16	239.445 on 7 and 497 DF, p-value: < 2.22e-16	353.062 on 7 and 497 DF, p-value: < 2.22e-16

Source: own processing

Moreover, each category, except for the 10 – 49 one, shows that, after 2011, the situation gets worse. For the first category, including the total of Romanian SMEs, we found that the coefficient of the categorical variable for 2008 and 2009 is 4 times higher than after 2011, indicating that the total density after 2011 decreased even more than in 2008 and 2009. The same result holds for 0 – 9 SMEs as well as for 50 – 249. The only category that seems to have improved its situation is the 10 – 49 one, for which the coefficient after 2011 is slightly better than between 2008 and 2009.

4. Discussions, conclusions and research limitations

The intended by product of any private sector is a better life for those who will benefit from job creation, as well as from the economic added value that will result from firms' activity. Whatever hopes the SMEs' creation may raise, the inequality in their distribution across the geographic boundaries may shed the doubt that SMEs are not necessarily the driver of economic development, but rather the result of favourable contexts and market opportunities.

In this paper we conducted a static panel data analysis to explain the variation in SMEs' density across the Romanian districts and the Bucharest Municipality, based on the following explanatory variables: GDP per capita, FDI per capita, density of employees in the research – development sector, the percent of people in the 25 – 34 age group and a categorical variable that accounts for the year. The categorical variable was an indicator that differentiated between the years until 2008, the 2009 – 2010 crisis, and the 2011 onward period, after the crisis.

Some of our findings are in line with what we expected: we found a positive impact of GDP per capita and FDI per capita on the SMEs' density in each category. The density of employees in the research – development sector did not account for any significant contribution, while the percent of people in the 25 – 34 age group shows opposite signs to what was expected. Last, but not least, the crisis had an unexpected impact on our dependent variables, pointing most likely toward the idea that the economic crises have lasting effects, long after the source of the disturbance has ended.

Our findings support the idea that the economic development level, proxied in our analysis by GDP, is closely related to the SMEs' density in all categories, which may confirm our initial assumption that SMEs' density can act as a signal for business opportunity and results in more business creation. On the other hand, the areas with low SMEs' density have fewer and fewer chances to develop: the scarce job supply pushes people toward more developed areas, which leads to depopulation and lack of specialized labour force. In addition, scarce local budgets expenditures, and weak commercial flows make these areas even less attractive and as a consequence, the low-density trap evolves toward a downward slope of SMEs creation and available investments.

The previous perspective can be supported in our research by the direct relation between the dependent variables in all four models; the level of FDIs per capita is also in line with our initial belief that SMEs will tend to flourish where the opportunity for capital already exists. Another important observation to be noticed in Table 2 is that for all four SMEs categories, the independent variables hold very similar values for the estimated coefficients, except for the 10 – 49 category and the variables related to the age groups. The 10 – 49 category shows a slightly lower impact of GDP per capita than the rest of categories, but a higher contribution of FDI per capita, as far as the density of these SMEs is concerned.

Regarding the limits of our models, two problems are worth to be discussed: the serial correlation, as well as the cross – sectional correlation. The Breusch - Godfrey/Wooldridge test for serial correlation in panel models sets a null hypothesis of no serial correlation, but in this case we get a p – value < 2.2e-16. We must therefore admit that the alternative is true, meaning that the model suffers from serial correlation in idiosyncratic errors. While our models provide the estimated coefficients corrected for this issue (the Arellano coefficients), a dynamic panel model may also be of interest.

Another important direction that deserves attention arises from the already mentioned differences between rural and urban entrepreneurship. Future research might compare a model concerning the rural area versus a model concerning the urban area. Equally relevant is a comparison between the results that we obtained in this paper, and results derived from a similar model, but built on urban variables only.

Looking back to the limits of our research, the Breusch-Pagan LM test for cross-sectional dependence in panel data shows a chisq statistic of 2172.901 with a corresponding p-value < 2.2e-16. This results in accepting the alternative hypothesis, which states that the model suffers from cross-sectional dependence. The Pesaran CD test for cross-sectional dependence in panels leads to the same conclusion, with a z – value of 28.7396, and a corresponding p-value < 2.2e-16. The alternative hypothesis of cross-sectional dependence has to be accepted. Further research will address cross – sectional dependence through spatial models, to avoid potential biases in the unit root tests (Baltagi and Pesaran, 2007).

The problem of panel spatial models is however more complicated and there is currently an increasing stream of research that aims to develop in the first instance the theoretical background on which the application can be conducted. For the time being, there are several seminal works in the field (see for example Baltagi, Song and Koh, 2003 or Anselin, Le Gallo and Jayet, 2008) as well as a few statistical software able to handle panel data models (for example R, with its dedicated packages like “smpl”, to name one of them), but the literature regarding the tests that help to choose between various models that the theory proposes is still scarce.

Whatever directions for further research will be identified in the future, and no matter how complicated alternative methodologies may be, at least for now, the conclusion is that the results of this study confirm in any case the expectations regarding the role of economic development on the SMEs’ distribution across the country, and clearly quantifies the relation between several key factors and the regional density of these enterprises.

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