

New firm formation, spatial trends and economic performance: evidences from Rio Grande do Sul, Brazil

Abstract: The purpose of this paper is to identify spatial regimes or clusters of new firm formation and their relationship with economic growth. With this purpose in mind, a method for estimating the rate of new firm formation was developed based on micro data for 496 municipalities in the state of Rio Grande do Sul. The results suggest the presence of clusters of new firm formation in recent years, unlike what occurred in the middle of last decade. Furthermore, our results show that even in developing country regions the formation of new firms has significantly positive effects on economic growth. The effects are lagged, positive and significant for more developed regions with lower new firm formation rate. In contrast, there is no significant effect for less developed regions with higher new firm formation rate.

Keywords: Economic Growth; Rate of New Firm Formation; Entrepreneurship; Rio Grande do Sul.

JEL: R12; O18; M13.

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1. Introduction

Entrepreneurship and regional development are currently in evidence among both policymakers and researchers. Entrepreneurship is being studied because it benefits economic performance and growth. It is recognized that market entrants (entrepreneurs) stimulate competitiveness, and may generate and disseminate ideas, thus influencing development (Bruno et al., 2008). A new business, that is, the formation of a new firm is an important sign of entrepreneurial activity, which both depends on and exerts an influence over the regional economic dynamics (Johnson, 2004). Wennekers and Thurik (1999) describe the positive impact of entrepreneurship on the growth of regional gross domestic product (GDP) and on the reduction of unemployment. This evidences the clear relationship between entrepreneurship and regional development.

If, on the one hand, this relationship is greatly explored in the literature, on the other, studies aiming at understanding spatial variations in the rate of new firm formation within a country and its relationships with regional economic growth still lack some clarifications. Variations in new firm formation among countries are constantly shown in studies by the Global Entrepreneurship Monitor (GEM, 2003), which indicate a high concentration of entrepreneurs in developing countries, driven especially by necessity and not by the opportunity to start a new business. Within each country, spatial variations are also considerable, and, according to Rocha and Sternberg (2005), these variations depend on cultural, economic, and individual reactions, which converge to create an environment that either stimulates or inhibits entrepreneurship.

Entrepreneurship is understood as an essentially regional or local phenomenon, which explains the high variations within a country. For example, in the United States, Reynolds et al. (1994) found that the ratio between the highest and the lowest regional rates of new firm formation was 4.1. In the same perspective, Johnson (2004), calculating the rate of new firm formation for different regions in the United Kingdom, found that the London region presents the highest rate, while the lowest is in Northern Ireland. Later, Ashcroft et al. (2007), also using municipal data for the United Kingdom, found that the rate of new firm formation varies in time and space. According to these authors, the temporal variation in the rate of new firm formation reflects macroeconomic changes in the country, whereas the spatial variation in the rate of new firm formation is more linked to the microeconomic conditions of each region.

Although at the international level there are a number of studies on the relationship of new firm formation with regional development and with the spatial dimension (REYNOLDS et al., 1994; JOHNSON, 2004; VAN STEL, 2005; ASHCROFT et al., 2007), in the case of Brazil this topic needs to be further explored. Recent exceptions are the studies by Barros and Pereira (2008) and Canever et al. (2010). The former, in a seminal study in the country, analyzed the influence of entrepreneurial activity on GDP and unemployment in municipalities in the state of Minas Gerais, and found that a higher rate of entrepreneurship leads to a reduction in unemployment, but not necessarily to better economic performance as measured by local GDP growth. Conversely, Canever et al. (2010), studying the antecedents of the new firm formation rate in the state of Rio Grande do Sul (RS), as well as its consequences on municipal performance, found a positive relationship between entrepreneurial activity and the level of GDP *per capita* in subsequent years. A common feature of the two works, which limits the validity of the results, is the measure of entrepreneurial activity they use. The former measures the rate of entrepreneurship based on the proportion of self-employed workers, while the latter uses as a proxy for entrepreneurial activity the difference in the number of firms *per capita* (considering the adult population only) in a municipality between consecutive years. Although these measures may be related to the formation of new firms, they are indicators of the proportion of entrepreneurs in the total population and of the growth

in the business sector, but not necessarily of the formation of new firms.

The present paper contributes to the research agenda in entrepreneurship by developing a conceptual and operational definition of the rate of new firm formation, based on data from the Annual Report on Social Information (*Relação Anual de Informações Sociais* - RAIS), made available by the Brazilian Ministry of Labor and Employment (*Ministério do Trabalho e Emprego* - MTE). Defining entrepreneurship as the creation of new organizations, in this paper we seek to estimate the rate of new firm formation and to answer four research questions: (1) whether there are spatial regimes or clusters of municipal rate of new firm formation in RS; (2) whether any existing clusters of new firm formation in RS vary in the period 1995-2008; (3) whether there is convergence in the rate of new firm formation in the state; and (4) whether the rate of new firm formation has an impact on municipal economic growth.

We make use of the Rio Grande do Sul's counties data for testing our model (Figure 1). Rio Grande do Sul is the Brazil's most southern state; has an area of approximately 300,000 km² and around 10.8 million inhabitants. This state has two distinct regions in terms of income level and development. The north region, which comprises circa of 80% of the counties and 50% of the total area is considered more developed and more dynamic with an average *per capita* gross product of 10.5 thousand dollars in 2008. The south region located in the border of Uruguay and Argentina is considered less dynamic and poorer with less than 8 thousand dollars *per capita*. Up to now many reasons were proposed as the cause of the disparity, but no study investigated the entrepreneurship as a possible cause of the disparity. Given this characteristic the Rio Grande do Sul's data seems to be appropriated to illustrate the relation between new firm formation and economic growth in the context of developing countries.

Figure 1. The Rio Grande do Sul state.³



Starting from these goals, a literature review is presented on entrepreneurship and its relationship with economic growth. The following section describes the data and the methodological procedures. The results are then described and discussed, and final considerations are presented.

2. Theoretical Framework

The role of entrepreneurship in society drastically changed in the latter half of the 20th century. After the Second World War, the importance of entrepreneurship and the formation of new firms lost strength. While there was a sense that new firms and their

³ The maps were adapted by the authors. Original source: http://pt.wikipedia.org/wiki/Rio_Grande_do_Sul.

formation needed to be preserved and protected for social and economic reasons, few people stressed it from the perspective of the economic efficiency generated by the formation of new firms. New firms, generally small, were basically seen as a luxury and often as a means to ensure a certain level of decentralization in economic decisions, at the cost of a reduction in national economic efficiency (CARREE; THURIK, 2006). It was thought that new and small firms were less capable of generating jobs and income, less engaged in and capable of exporting, and less involved in innovative activities (AUDRETSCH; KEILBACH, 2004). Although there is little evidence of such bias towards new and small firms in Brazil, the emphasis given to the role of large multinationals in the process of industrial modernization in the mid-20th century does not seem to be a mere coincidence.

However, this perspective has been reversed in recent years. The formation of new firms is now seen as instrumental for economic growth (VAN STEL et al., 2005), and as having a relevant role in generating jobs (WENNEKERS; THURIK, 1999). For example, according to the abovementioned authors, economic activity in Europe moved from large to small firms between the 80s and the 90s in the last century. In 1980, large firms employed circa 20% of the workforce, whereas, a few years later, in 1990, they employed only 8.5% of the workforce. In turn, Carree et al., (2002), show that the countries belonging to the Organisation for Economic Co-operation and Development (OECD) gained increased employment with the increase in new firm formation from 1984 to 1994. Also in Brazil the role of the formation of new firms, particularly small and medium enterprises (SMEs), has been significant. This is evidenced by the significant increase, in recent years, in the budget of the Brazilian Service of Support for Micro and Small Enterprises (*Serviço Brasileiro de Apoio as Micro e Pequenas Empresas* - SEBRAE), which is the main system to support this category of firms. SMEs (with less than 250 employees), in most of the states, respond for more than 50% of the total number of jobs. In some states, such as those in the Northern region of the country, SMEs are responsible for almost 100% of job opportunities (Cravo et al., 2010).

Wennekers and Thurik (1999) observed that, in recent years, entrepreneurship has gained renewed attention due to the role it has in economic development. Teece (2005) stated that the stock of useful knowledge and the extension of its applications constitute the essence of modern economic growth, and that these are essentially generated by firms. In this sense, Audretsch et al. (2006) tested the hypothesis that higher entrepreneurial activity should result in higher levels of economic growth, since entrepreneurship serves as a mechanism that facilitates the overflow and commercialization of knowledge. The hypothesis finds empirical support in a survey carried out in the universe of 327 German counties. Many economists and politicians now have the perception that entrepreneurship has a positive impact on GDP growth and employment. This 'restored' interest of politicians and economists coincides with the revival of high entrepreneurship rates in many countries, both developed and developing (VAN STEL, 2005).

There are evidences, however, that the impact of entrepreneurship on economic growth is not the same in countries at different stages of economic development. For example, Van Stel et al. (2005) found that a high rate of new firm formation in countries with high income *per capita* is associated with GDP *per capita* growth. In turn, for low-income countries, they found a negative relationship. For these authors, the effect of the formation of new firms on growth is not trivial and can be understood in a Schumpeterian perspective.

For Schumpeter (1934), the theoretical problem of economic growth resides in changes within the economy that destroy the previous or preexisting equilibrium situation. In this work, Schumpeter defines entrepreneurship as the creation of "new combinations," and entrepreneur as the person whose function is to create them. Thus,

the “innovative entrepreneur” challenges existing firms through the introduction of inventions or productive combinations, which makes current technologies and products obsolete. From this perspective, the status of entrepreneur is intrinsically linked to the innovative role, that is, to the introduction or consolidation of new products or new ways of production or commerce. This process of “creative destruction” is the main characteristic of Schumpeter’s entrepreneur, which occurs more frequently in more developed regions or countries, where a significant part of the firms created have the potential of generating substantial value added to the economy.

However, in poor countries or regions, higher entrepreneurial activity may be the result of high structural unemployment, which would lead to entrepreneurship by necessity. That is, in these regions people have a high propensity to seek business opportunities on their own as an alternative to the scarcity of jobs, and not as an entrepreneurial activity associated with innovation, which is the characteristic of Schumpeter’s entrepreneur. According to data provided by GEM (2003), the proportion of entrepreneurs by necessity in the total of Brazilian entrepreneurs was 50% between 2001 and 2004. Thus, high rates of new firm formation may not necessarily lead to improved economic performance. Therefore, the lesson taught by these authors is that the relationship between “rate of new firm formation” and “economic growth” must be considered from the perspective of the countries’ different development stages.

While it is relatively easy to understand that the formation of a new firm to explore a market opportunity has the potential to promote development, it is also evident that entrepreneurship by necessity - namely, entrepreneurship that arises out of the lack of satisfactory job opportunities - does not necessarily lead to development. Both types of entrepreneurship (by opportunity and by necessity) are present in any one region; however, in the less developed ones, it has been observed that high rates of new firm formation occur fundamentally by necessity (ACS; AUDRETSCH, 2003; VAN STEL et al., 2005). Thus, for these authors, one needs to be careful when comparing countries at different stages of economic development. For example, according to the authors, high rates of new firm formation in developing countries do not necessarily lead to regional economic growth, because a relatively smaller proportion of the firms will become organizations with substantial capacity to generate value added, in comparison with firms formed in more developed countries. Consequently, the main argument by these authors is that the impact of entrepreneurship on economic growth varies according to the different development stages of the country. Even though there is empirical evidence at international level (see, for example, Van Stel et al., 2005; Audretsch et al., 2006) and at national level (BARROS; PEREIRA, 2008) of the negative relationship between entrepreneurial activity and economic growth rates in less developed countries and regions, the hypothesis that higher economic growth levels may result from higher entrepreneurial activity must not be rejected, because the studies are still restricted and often have methodological limitations that do not allow definitive conclusions.

The idea is that in developing regions (countries), such as in RS (GDP *per capita* in 2009 US\$ 10.000), new entrepreneurs are being attracted by the increase in demand. Entrepreneurship growth leads to productivity increases, through both the innovations and the pressure suffered by incumbent firms to improve, given the increased competitiveness (ACS; ARMINGTON, 2004). Thus, even though some regions are not on the frontier of technological development, the role of entrepreneurship in economic growth may be positive. It is possible that the positive effects in those regions are smaller than those observed in regions that are closer to the technological frontier. Nonetheless, this hypothesis still needs to be tested.

3. Data and Methodological Procedures

3.1. Data

This research used the micro database Annual Report on Social Information (*Relação Anual de Informações Sociais* - RAIS) of 496 municipalities in RS from 1995 to 2008 provided by the Brazilian Ministry of Labor and Employment (*Ministério do Trabalho e Emprego* - MTE). To estimate the new firm formation rate, the birth of each firm was considered the year that it appeared for the first time in the database. Thus, a firm that did not report to RAIS in $t-1$ but started report to RAIS in t was considered as having been formed in t , since this was the first year in which it appeared in the database. As for the closure of firms, a firm reporting to RAIS in t was considered to be closed in the first year in which RAIS had no data for that firm.

Only firms that are in the database for consecutive years were considered. That is, it was disregarded those that appear in the database in a certain year, disappear in the following year, and reappear in the subsequent year. A filter was also set up for those that are formed in a certain year, disappear for a longer period ($t+2$, for example), and reappear in subsequent periods. Then, any establishments for which there were irregularly supplied data were excluded. Such procedure was used to clean up the database for the calculation of the rate of new firm formation, which would otherwise be biased. In fact, it is thought that these firms remain active, even if they are not reporting any data. With the exclusions, the population of firms was reduced in about 1% per year, which does not compromise the validity of the results, considering that the sample contains more than 100,000 firms per year.

3.2. Rate of new firm formation

The rate of new firm formation can be measured in two ways. The first way is the "ecological" approach (EA). To calculate EA based on RAIS data, the methodology by Johnson (2004) had to be adapted. EA (Eq. 1) expresses the relationship between new firm registrations (firm formation) and the stock of firms in the year before the registration. It may be calculated either for all sectors or for specific sectors in the region's economy.

$$EA = \frac{\text{No. Firms Formed}_t}{\text{Total No. Firms}_{t-1}} \times 100 \quad (1)$$

EA is important to analyze the extent to which businesses are rejuvenating. This indicator is normally expressed in relation to 100 existing firms, and t represents a given year.

According to Kangasharju (2000), the ecological approach relates the flux of new firm formation to an existing stock. It is based on the idea that new firms are extensions of the existing ones, that is, existing firms act as incubators of new firms, in addition to providing a learning process for new entrepreneurs.

The second method to measure the rate of new firm formation uses population (or workforce) as a denominator (ARMINGTON; ACS, 2002). This labor market approach (LMA) is important to analyze how entrepreneurial the local population is. This paper used as a denominator the total annual number of employees each firm reported to RAIS. LMA in region r aggregated for all sectors is given by the equation below:

$$LMA = \frac{\text{No. Firms Formed}_t}{\text{Total No. Employees}_t} \times 1000 \quad (2)$$

The rate of new firm formation presented in equation (2) uses the workforce employed in a given municipality. This indicator is expressed in relation to 1,000 employees. Therefore, an $LMA = 10$ denotes that ten new firms were created for every 1,000 employees in the region.

In a theoretical sense, the labor market approach is considered appealing, because it is based on the entrepreneurial choice model proposed by Evans and Jovanovic apud Kangasharju (2000). This approach implicitly assumes that entrepreneurs start a new business in the labor market, where they are used to working or looking for jobs. This approach, according to Kangasharju (2000), also implies that the new entrepreneur gained some experience while working. According to previous studies (JOHNSON, 2004; AUDRETSCH; FRITSCH, 1994), the two ways of measuring the rate of new firm formation, although with different meanings, are highly correlated.

3.3. Analytical procedures

Exploratory Spatial Data Analysis (ESDA) was used to identify whether there is spatial correlation and distinct patterns of new firm formation in RS that would support the emergence of clusters. This technique uses spatial autocorrelation and heterogeneity to describe the spatial pattern of the data distribution (ALMEIDA et al., 2005).

Spatial dependence occurs in all directions; however, it is negatively related to geographical distance. Thus, spatial heterogeneity concerns the characteristics of the spatial units, which are naturally different from each other. Global and local spatial autocorrelation indices were calculated, such as Moran's I, the Moran scatter plot, and the Local Indicator of Spatial Association (LISA), through the construction of first-order queen contiguity spatial weight matrices. All units bordering the unit under analysis are considered its neighbors (MONASTERIO; ÁVILA, 2004; OLIVEIRA, 2008).

To describe the existence of convergence in the formation of new firms in RS, we use the absolute convergence model (see Baumol, 1986; Barro and Sala-I-Martin, 1995 for details) as expressed by equation 3.

$$\frac{1}{T} \ln \left(\frac{RNFF_{i,t}}{RNFF_{i,0}} \right) = \alpha + \beta \ln (RNFF_{i,0}) + \varepsilon_{i,t} \quad (3)$$

Where $RNFF_{i,t}$ and $RNFF_{i,0}$ represent, respectively, the rates of new firm formation for the final and initial periods. T represents the number of years between the sample's initial and final period, while $\varepsilon_{i,t}$ is the random error. For there to be absolute β -convergence, the estimated coefficient of this regression must be negative, that is, there must be a negative relationship between the initial level of firm formation and its growth rate. A negative and statistically significant coefficient, therefore, indicates a reduction in entrepreneurial disparity within the state.

Finally, to empirically test the impact of the rate of new firm formation on economic growth, the following model was tested:

$$\Delta GDP = c + GDP_{i,t} + GDPPC_{i,t} + DENS_{it} + AFS_{it} + RNFF_{i,t} + \varepsilon_{i,t} \quad (4)$$

Where i represents a municipality and ΔGDP the variation of municipal Gross Domestic Product (GDP). Since municipal GDP data are not available for all the years in the series, making it impossible to use a panel data methodology, we chose to test the model above with cross-sectional data in some years. The model expresses, therefore, whether the rate of new firm formation, $RNFF_{i,t}$, from 2002-2005, has an impact on the average growth of municipal GDP between 2005 and 2007. The control variables $GDP_{i,t}$ and $GDPPC_{i,t}$ represent the GDP and the GDP *per capita* for the year 2001⁴, while

⁴ The variables $GDP_{i,t}$ and $GDPPC_{i,t}$ capture the catch-up effect throughout the period.

$DENS_{it}$ represents the annual population density and AFS_{it} the average firm size in the municipality.

4. Results and Discussion

Figure 2 presents the spatial correlation of the rate of new firm formation by the two calculation methods for the RS municipalities in 1996 and 2008. Although Moran's I statistic does not allow an analysis of where the spatial clusters are located, the results obtained show the magnitude of the spatial association. The closer Moran's I value is to 1 (one), the more intense is the observed spatial association. The scatter plots show that the spatial relationship was positive and statistically significant for both years. Thus, municipalities with similar rates of new firm formation tend to be spatially associated. It must be stressed that the magnitude of the spatial relationship increases between 1996 and 2008 for both methods of analysis, demonstrating that there was an increase in the importance of the spatial dimension in the rate of new firm formation in RS. Thus, in 2008, municipalities with higher rates of new firm formation (both EA and LMA) tend to be spatially close to other municipalities with rates above the state average. In the same way, municipalities with lower rates tend to be spatially associated with municipalities whose rates of new firm formation are lower than the state average.

Based on cluster maps (LISA) Figure 3 shows the distribution of the statistically significant clusters (p -value = .05) on the RS. In 1996 there were few spatial clusters in RS. For that period the rate of new firm formation, under both approaches of estimation, practically did not present spatial dependence and was not very concentrated.

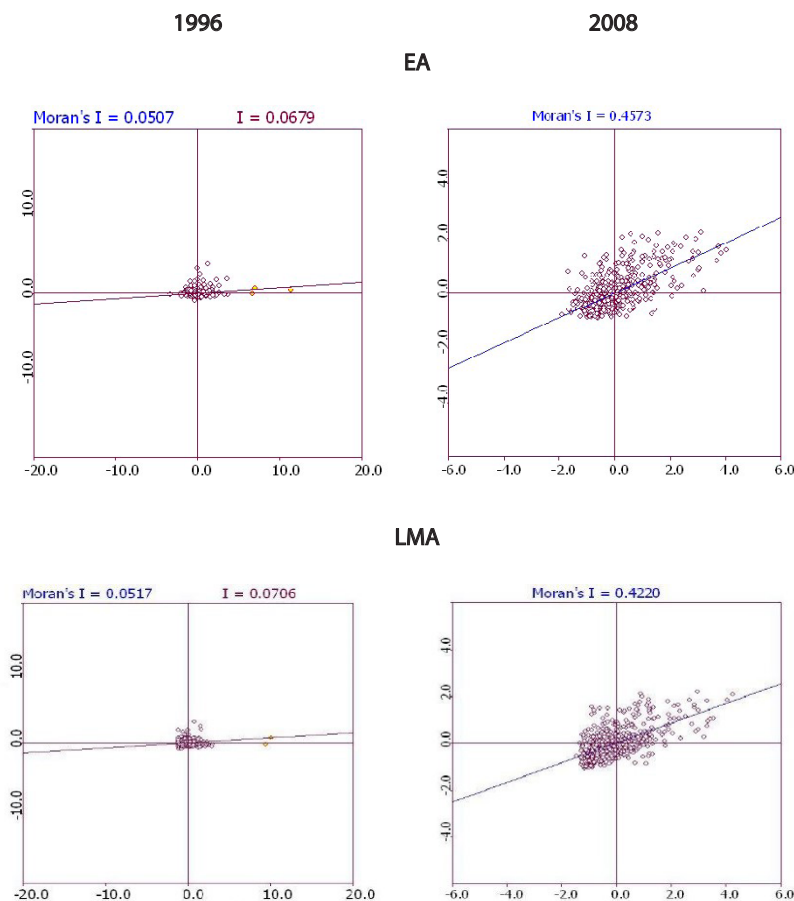
Differently from the mid-90s, when clusters were small and barely noticeable, in 2008 there are at least two big clusters of high rates of new firm formation (HH) visible under both estimation approaches. The first cluster was located in the Campanha Gaúcha region, covering a number of municipalities belonging to the Southeastern, Central-Western, and Northeastern meso-regions, and the second cluster, which is smaller, in the north, near the border with Santa Catarina state. Although the composition of these clusters varies depending on the approach used to estimate the rate of new firm formation, their limits are well-defined and demonstrate that these geographic areas are more entrepreneurial than the rest of the state, with respect to both the stock of firms and the number of entrepreneurs. At the other extreme are municipalities that, in addition to presenting a lower rate of new firm formation, are surrounded by municipalities with lower rates of new firm formation (the LL cluster). These form a cluster of municipalities located in the most industrialized and developed area in the state, belonging to the Porto Alegre Metropolitan and Central-Eastern meso-regions.

In addition to cluster formation, there is convergence of the rates of new firm formation in the state (Table 1). That is, the ratio between the most and the least entrepreneurial municipalities has decreased in time. This means that the inequalities in entrepreneurship are reducing. The results for EA—rejuvenation of businesses—suggest a convergence rate of 7.97% per year. At this rate, it would take municipalities a little over 8 years to cover half the distance to the steady state.⁵ In turn, the results for LMA—entrepreneurial capacity of the population—evidence a lower convergence rate in comparison with EA. In this model, the time necessary for municipalities to cover half the distance to the steady state is approximately 17 years. Thus, we can verify, with the aid of the maps, a change in the entrepreneurial dynamics in RS. Regions considered less dynamic, with an average GDP *per capita* of US\$ 4.000,00 in 2005, currently encompass most municipalities with high rates of new firm formation (HH cluster in Figure 3), whereas part of the municipalities considered more advanced, with an average GDP

⁵ The formula to calculate the half-life is $\frac{\ln(2)}{\beta}$. It measures the time necessary for inequalities in the rate of new firm formation of the municipalities in the sample to be reduced in half. For details, see Barro and Sala-i-Martin (1995).

per capita of US\$ 8.000,00 in 2005, have a lower rate of new firm formation (LL cluster in Figure 4).

Figure 2: Moran's I for the rate of new firm formation under the ecological approach (EA) and labor market approach (LMA) in the years 1996 and 2008.



The results in the regressions obtained from the estimation of Equation 4, which relates the rate of new firm formation to regional economic growth, are presented in Table 2. As two distinct spatial regimes of new firm formation has been observed, the analyses were carried out to verify whether the impact of the rate of new firm formation on economic growth varies between these two groups of municipalities, or whether it is similar to the impact on the state as a whole. First, however, in columns 1 and 2, we report the estimation for the state as a whole.

For the state as a whole, RNFF in 2005 has no effects on GDP growth in the subsequent years. The RNFF coefficient has also been insignificant for the cluster HH, but with positive signal. For the cluster LL the coefficient is significant and positive, showing that the formation of new enterprises favors economic growth. As the effect of new firm formation on economic performance has a lagged structure (AUDRETSCH; FRITSCH, 2002; CARREE; THURIK, 2006), Table 3 presents the coefficients (Beta standardized) of RNFF on GDP growth from 2002 to 2004. Indeed, for the state as a whole the RNFF showed a lagged effect on the GDP growth. The impact is even more lagged for the ecological approach (EA) estimates, which indicates that high rate of business rejuvenation does not favor economic growth in the short run. If business rejuvenation is high, economic

productivity gains do not occur in the short term. That is, it is only after a certain time that entrant firms will be able to influence regional economic development through the successful introduction of new solutions, methods, processes, and products.

Figure 3: LISA for the ecologic and labor market rates of new firm formation (EA and LMA) in 1996 and 2008.

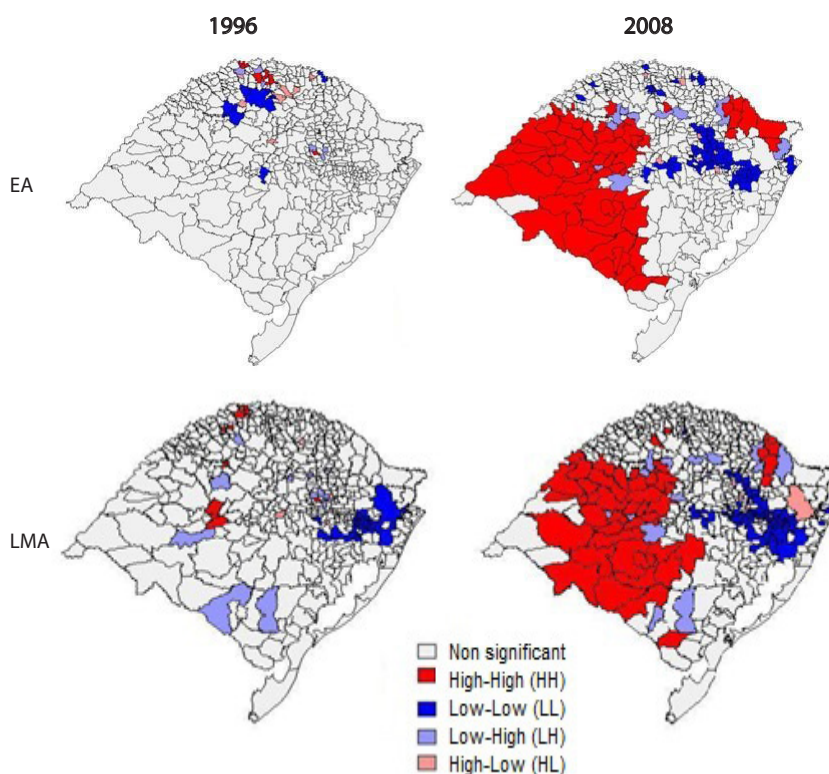


Table 1: Convergence of the rate of new firm formation in RS.

Variables	Convergence	
	EA	LMA*
c	0.276629***	0.156733***
	(-29.3076)	(-14.9341)
$RNFF_{i,0}$	-0.0797935***	-0.0396034***
	(-24.2607)	(-10.6594)
R^2	0.567263	0.201594
F-statistic	588.5809	113.6232

N.B. 1: t statistic in parentheses.

N.B. 2: * Heteroskedasticity corrected by the weighted least squares method.

N.B. 3: *** Significant at 1%.

Table 2. Effect of the rate of new firm formation (2005) on economic growth (2005 - 2007 average).

Variables	State		HH cluster		LL cluster	
	EA	LMA	EA	LMA	EA	LMA
C	-0.04 (-.18)	-0.04 (-0.14)	-3.13* (-2.65)	-3.54** (-3.42)	0.42 -1.37	0.40 -1.17
GDP01	-0.19** (-8.42)	-0.20** (-8.44)	-0.28** (-3.22)	-0.31** (-3.93)	-0.07* (-2.27)	-0.06 (-1.59)
GDPPC01	0.38** -5.33	0.39** -5.35	1.34** -5.00	1.48** -6.41	0.06 -0.58	-0.02 (-0.20)
DENS	0.00 (-0.78)	0.00 (-0.79)	-0.001* (-2.47)	-0.00** (-2.77)	0.00 -1.02	0.00 -0.48
AFS	-0.01** (-4.95)	-0.01** (-4.54)	-0.01 (-0.59)	-0.01 (-0.44)	-0.01** (-3.55)	0.00 -0.53
RNFF	0.00 (-0.11)	0.00 (-0.26)	0.00 -0.23	0.00 -0.17	0.004* -2.39	0.01** -2.58
R ²	0.19	0.19	0.44	0.54	0.28	0.16
F-statistic	24.95	24.96	8.53	12.91	6.79	3.97
No. obs.	494	494	48	51	76	75

N.B. 1: t statistic in parentheses.

N.B. 2: * Heteroskedasticity corrected by the weighted least squares method.

N.B. 3: *** Significant at 1%.

Table 3. Lagged effect of RNFF (2002, 2003 and 2004) on GDP growth (average 2005-2007).

Year	State		HH cluster		LL cluster	
	EA	LMA	EA	LMA	EA	LMA
2002	0.09(2.18)**	0.12(2.76)***	0.19(1.52)	-0.12(-.94)	-0.04(-.36)	0.10(.62)
2003	0.07(1.66)*	0.13(2.81)***	0.27(1.81)*	0.15(1.44)	0.21(2.13)**	0.36(2.37)**
2004	0.05(1.17)	0.15(3.23)***	0.13(1.01)	-0.06(-.36)	0.30(2.99)***	0.36(2.51)**

*** Significant at 1%, ** significant at 5%, * significant at 10%.

The effect of RNFF on GDP growth for the HH cluster was consistently not significant for the lagged period presented on Table 3. High rates of firm formation in a region may be an indicator that such region does not yet have consolidated industries and sectors or an explicit policy to guide new investments. Moreover, it is likely that many of these new firms result from entrepreneurship by necessity. This result is appealing and confirms the complex relationship between entrepreneurship and economic growth, as indicated by Van Stel et al. (2005). Although these municipalities have recently had high rates of new firm formation, their economies are generally based on agriculture and cattle raising, and on small service-sector firms. This geographic area of RS coincides with the predominantly agricultural G14 (a group of 14 Regional Development Councils, *Conselhos Regionais de Desenvolvimento* - Coredes) identified by Porsse et al. (2008), where the demand for regional products is highly linked to the performance of traditional activities.

The effect of entrepreneurship on economic growth as measured by both approaches is predominantly positive and significant for the LL cluster. The results corroborate the conclusion of earlier studies on developed countries (VAN STEL et al., 2005; WENNEKERS et al., 2005), namely, that entrepreneurship matters for economic growth. It is convenient to note that the positive association between RNFF (as estimated by LMA) and GDP growth may be evidence that the quality of entrepreneurs from this region is higher than that of entrepreneurs from the LL cluster or from the state as a whole. In the LL cluster - where there is known to be a high concentration of jobs and industries in the state - the formation of new firms is more productive for the economy, since only the more qualified entrepreneurs choose to start new businesses, as advocated by the entrepreneurial choice model (EVAN; JOVANOVIC apud KANGASHARJU, 2000), because in this cluster there is a higher likelihood of participation in the formal labor market. Although the level of human capital of entrepreneurs cannot be identified based on RAIS data - which may relativize our interpretation - it is likely that the positive and significant effect indicates the existence of innovative and more qualified entrepreneurs in the LL cluster than in the HH cluster. The argument is very similar to the one presented by Van Stel et al. (2005) to explain the different effects of entrepreneurship in countries at different development stages.

5. Final Considerations

This paper aimed at calculating the rate of new firm formation in relation to the stock of existing firms and to the part of the workforce that is able to start new businesses, through a new method developed using data from RAIS. It also aimed at identifying the behavior of these rates since the mid-90s, and their relationship with economic growth in the 496 municipalities in Rio Grande do Sul State, Brazil.

The results evidenced that, in 1996, there were few spatial clusters in RS. However, the magnitude of the spatial correlation increased significantly from 1996 to 2008, indicating that there was an increase in the importance of the spatial dimension of the rate of new firm formation in the RS municipalities.

Using the variable rate of new firm formation, it was possible to investigate the geographic distribution pattern of the clusters in RS from 1996 to 2008, and to conclude that the state is undergoing a change in the business dynamics. The more industrialized regions have lower rates of new firm formation than the traditionally less dynamic regions. Possible causes of this must still be investigated, but we can raise at least two hypotheses. The first hypothesis concerns business convergence in RS, where traditionally less dynamic regions have been gaining space in the business scenario.

The second hypothesis is that the high entrepreneurship level in the less dynamic regions of the southern half of the state has lower quality, because it is associated with entrepreneurship by necessity. That is, individuals residing in these areas, due to the lack of job opportunities, end up opening new businesses, which would increase the rate of new firm formation in these regions vis-à-vis the rest of the state. This hypothesis seems to be the most plausible, since firm formation under the labor market approach, in these municipalities, does not significantly affect their future economic growth.

Thus, the least dynamic regions in RS (mainly those in the southern half, traditionally known as the poorest ones) are converging to the state average, at least with respect to new firm formation. If this result is already interesting from a regional development standpoint, it is even more intriguing that we found for the RS municipalities a positive relationship between the rate of new firm formation and economic growth when firm formation is calculated in relation to the regional workforce. This result corroborates those obtained by other authors in studies on developed countries (VAN STEL et al., 2005; WENNEKERS et al., 2005). This shows that, for developing countries such as Brazil and developing regions such as RS, entrepreneurship matters for economic growth. Theoretically, this study contributes to resolving the ambiguity in the literature, which indicated that, for poor and developing countries, a higher level of entrepreneurship did not necessarily mean higher economic growth.

Even considering the limitations of the data and of the econometric technique used in this study, we believe that the results obtained provide a general idea and a robust approximation of how the rate of new firm formation, that is, entrepreneurship, affects development in Rio Grande do Sul. We believe that the paper contributes to this topic, considering the scarcity of studies on this topic in Brazil. The next step in this analysis is to study new firm formation with stratified economic sectors, aiming at identifying how economic sectors are geographically distributed in RS, reaffirming (or not) the main conclusions of this paper. A second step is to deal with the dual causality in the relationship between entrepreneurial activity and economic growth. Future research may also contribute in better understanding the spatial variation in new firm formation, in order to better specify the determinants of the rate of new firm formation.

One of the main goals of public policy is to generate growth and employment. Significant part of the debate involving these two elements has been based on the macroeconomic theoretical framework and focused on traditional macroeconomic instruments. The results of this work suggest that different and less traditional instruments for the generation of growth and employment have an important role - policies that generate and promote entrepreneurship.

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