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Ease of Doing Business and Its Implications for Firm Survival in India's Dynamic Economic Landscape

[1]Dr. Shivangi Gera, [2]Dr. Pooja Nagpal

[1]Assistant Professor, Faculty of Management Studies, CMS Business School, JAIN (Deemed-to-be University), Bengaluru, Karnataka, India, Shivangi_gera@cms.ac.in

https://orcid.org/0000-0002-5287-4098

[2]Associate Professor, Faculty of Management Studies, CMS Business School, JAIN (Deemed-to-be University), Bengaluru, Karnataka, India, dr.pooja_nagpal@cms.ac.in

https://orcid.org/0000-0003-0772-0943

Abstract

The main motive of this research is to study the spatial pattern of firm survival in India on manufacturing and service sector (both collectively and individually) firms in context of agglomeration externalities across the different regions of India over the period 1900-2024. It further emphasizes on ease of doing business variable as a main regressor. Our results show that there is spatial dependence across states leading to global tendency of geographical clustering i.e. the states with similar firm survival rates are located close to each other. Our results also indicate that higher score of ease of doing business in a state helps sustain the firms not just within that particular state but also in the neighboring states.

Keywords*:* Ease of doing Business, Firm Survival, Spatial Pattern

1. Introduction

Firms' entry and survival determine the structure of productive system and market competition based on market share of the firms and how long they are able to last. Traditionally the researchers have been studying the determinants of the emergence of firms but they had not much to tell about the success of firms after their foundation phase. Given the potential impact of firm entry and its post entry performance, it became quite important to understand and determine the factors responsible for firm survival. Firm survival refers to the ability to adapt activities in line with the market needs so as to maintain and sustain the organization for a longer period (Yague & March, 2012). The earlier researches focused on the firm specific and industry specific determinants of firm survival but with the observations of various researches it was found that there are certain region-specific determinants and due to it the economic activity also tends to be clustered in space (Audretsch & Feldman, 1996; Cooke, 2002). Firm survival can be of spatial nature as the survival or exit of a firm may not be limited to a certain region, they can spill over to other regions as well which is in accordance with the concept of spatial autocorrelation. This spatial pattern of the firm survival becomes important to look into, in order to identify if there is a positive spatial autocorrelation i.e. a state with a particular firm survival rate is surrounded by states having similar firm survival rates. In other words, whether there is clustering of neighboring states with similar values which, if present, signifies the strong support provided by individual firms to each other across the neighboring states for survival. This support is referred to as agglomeration externalities or economic benefits of clusters. Clusters represent a new form of spatial organization and are a striking feature of every national, regional, state and metropolitan economy. A cluster allows each of its members to benefit as if they had a greater scale or as if they had joined with others without compromising their own flexibility (Porter, 1998).

Alfred Marshall (1890) identified three types of agglomeration externalities (Philippe Martin, Thierry Mayer, Florian Mayneris)

- Externalities related to inputs- which include specialized suppliers located closely and as a result it leads to lower transportation costs.
- Externalities related to labor- clusters induce labor pooling of specialized workers.
- Knowledge externalities- clusters help diffuse the knowledge or having knowledge spillovers.

Giving few examples (e.g., Marshall 1920; Saxenian 1985; Storper 1997), it is pointed out that the agglomeration externalities are those mechanisms which amplify the productivity of individual firms when they are located closely to other firms (Wennberg & Lindqvist, 2010) and these clusters do enhance the probability of entry, survival and growth of the firms (Dumais et al., 2002; Rosenthal & Strange, 2005). From this discussion we can imply that similarly the firms of one region or state help enhance the survival of firms in neighboring regions or states. The above discussed externalities help the regions support each other and thus formation of the regional/state clusters with similar firm survival rates. These agglomeration externalities can also be referred to as the immediate business environment outside the firm, which plays a vital role to enhance competitive advantage. The firms in a cluster cannot employ the advanced logistical techniques, for instance; if they don't have a high quality transport infrastructure and the business cannot operate efficiently if there is court system that fails to resolve the disputes efficiently and quickly. So, some of these aspects of business environment, such as the legal system affect all the industries. The sophistication with which the firms operate is influenced by the local business environment and more decisive aspects of the business environment are often cluster specific which forms most important foundation for competitive advantage (Porter,1998).This supportive regional business environment is important for firm survival as it improves the survival probabilities of firms. However, there can be substantial differences among the regions within a country and so is in the business environment. A good business environment reduces the rent seeking activities, encourages skill acquisition, supports productive activities and encourages capital accumulation and innovation (Casero & Udomsamph, 2009). When the business environment of a country flourishes, it creates employment and also generates income. Over the years, the Ease of Doing Business (EODB) report, published by World Bank annually has been ranking the business environment for about 200 countries based on ten criteria to evaluate the business environment in a country: starting a business, dealing with the construction permits, getting electricity, registration of property, access to credit, protection of minority interests, payment of taxes, trade across cross borders, enforcing the contracts and resolving insolvency. The aggregate ease of doing business scores are used to determine ease of doing business ranking (www.worldbank.org). It has been investigated in the theoretical and empirical literature that the parameters of ease of doing business– individually or in group contribute to business growth and overall economic development (for instance; Levine,2005; Klapper & Love;2010; Rodrcik, Subramanian & Trebbi,2004). However, the existing literature has focused mainly on the effects of business environment on firm creation, development and economic growth and we do find a positive effect of ease of doing business on firm creation but this relation has not been examined in context of firm sustainability and whether the firms that are spatially closely located have better survival prospects.

It becomes important to examine that if this positive spatial autocorrelation of firm survival amongst different states of India is a result of efficient business environment measured by Ease of Doing Business parameters, prevalent both within the state and the neighboring states. This forms the fundamental motivation of this research paper. So, the objective of the research is, to study the effect of ease of doing business on spatial pattern of firm survival. Perhaps more importantly, research is also needed on the geographic aspects of the firms to clarify how the firms when they are co-located are able to survive. The value added of the present research is threefold. Firstly, the contribution of this paper is an attempt to find the spatial pattern of firm survival in Indian manufacturing and service sector which has yet not been explored by previous researchers and to deepen the understanding and fill this gap we perform an empirical analysis on a large dataset on manufacturing and service sector firms spanning over 1900 to 2024. The second main contribution of the paper is that the role of ease of doing business in the spatial pattern of firm survival has not been studied yet and this forms a major research gap in the existing literature and we are able to contribute to the research that ease of doing business has positive impact on spatial pattern of firm survival in India. The third main contribution of this paper is that it is a comprehensive study based on a complete and unbiased population of all firms located in the Indian manufacturing and service sector. We are thus

certain that our results are not driven by any sampling procedure. The remaining of the paper has been laid out as follows. Section 2 illustrates the theoretical background of the study. In section 3, we present the econometric methodology. In section 4, we describe the data and summary statistics. Section 5 presents the results. Section 6 concludes the research paper.

2. Theoretical Background

Firm survival and exit have been a theme for various researches over the past years. There is a large theoretical and empirical literature on firm survival (exit). Starting with the work in this area, researchers have tried to determine the factors that are contributing to survival probability of the firms and they pointed out that at the firm specific factors were firm age and size (Evans,1987; Hall,1987) while most of them pointed out market structure and market growth (Bradburd & Caves,1982). Other studies have investigated firm survival with Research & Development (Caves,(1998) , Audrestch (1991), Perez(2004) , Cefis and Marsili (2004) , Helmers and Rogers (2010) , Zhang, Zheng & Ning (2018) , productivity (for instance, Frazer (2005), Farinas & Ruano (2005), Wagner (2010), Casacuberta & Gandelman (2015), financial constraints (for instance; Musso & Schiavo,2008; Bridges & Guariglia,2008; Liu & Honglin Li,2015) and these studies have generated quiet significant results. The previous researches on firm survival were of non-spatial nature, but there can be a spatial dimension to firm survival as well. In the recent years with the studies (for instance; Fotopulous & Louri,2000 ; Cainelli, Montresor & Marzetti, 2014) the focus has been shifted to understand firm survival(exit) behavior across geographical regions.

2.1. Spatial Pattern and Firm Survival

In the recent years, researchers have started analyzing the local contexts to understand the firm survival (exit) over the geographical regions. To incorporate a spatial perspective into the research, a number of studies have been conducted to study the mechanism of agglomeration and what are the effects of this phenomenon on firm survival as these spatial factors also shape the survival probabilities. Over the years, the importance of spatial agglomeration is undisputed and with the increasing intensity of research in the regional economics, its effects have been extensively studied from various perspectives. The literature provides with the long and short run benefits that spatial agglomeration creates. In the short run, the firms in clusters are able to reduce their variable production costs typically transportation costs and logistics costs (Cainelli, Montresor & Marzetti, 2014). Furthermore, the geographical proximity of firms in a cluster facilitates knowledge sharing because of the extensive local networks and the same institutional environment which creates knowledge externalities (Wal,A.L. & Boschma, 2011). With the repeated interactions among the co-located firms, spatial agglomeration creates knowledge spillovers and learning by interacting (Bathelt,2010). As the time passes, these knowledge base expands and the concentration of firms grow, the firms tend to enjoy economies of scale, which contributes to higher growth rates of those firms. The literature also emphasized on the externalities that agglomeration creates. With geographical proximity, firms are able to exchange knowledge which requires them face to face interactions allow the firms to build mutual trust. In the long run, with the repeated interactions of the firms, spatial agglomeration can generate knowledge spillovers and learning by interacting among the firms that are located nearby **(**Bathelt,2010**)** and some vectors like trade relations, inter-company debts or the outsourcing may cause termination of a firm spread from one territory to the other by marking these links in the form of geographical proximities (McCann,2017).

The agglomeration of industrial activities in particular geographical areas has garnered a substantial attention from the geographers and researchers (Marshall,1920; Storper ,1995, 1997; Smith,2003). These studies have dealt with the nature of clusters; regional agglomeration and have looked into the various factors that have led to competitive advantages for the businesses in the clusters. These clusters enhance productivity of the individual firms that are in proximity to other firms (Marshall,1920; Storper,1997). The economic benefits derived from cluster represents labor pooling, knowledge spillovers, access to specialized labor, an indirect benefit to the regional economy by allowing the firms to have higher rate of innovation, pay higher salaries and expand rapidly and new firms are attracted to the cluster of firms by the access of capital, favorable demand conditions, pool of skilled labor, trained personnel and reduced transaction costs (Krugman, 1991; Marshall, 1920). The formation of a cluster of firms not

only provide them competitive advantage but also have an impact on firm dynamics. Fotopulous & Louri (2000) in their study show that firms had lower hazard rates in urban areas rather than those firms that were located outside those areas. While certain other studies also found that survival prospects of firms increase when they are co-located in a region where there is high concentration of similar or related firms and firms located nearby are able to survive (for example, Falck 2007 ; Wennberg and Lindqvist, 2010). However, certain other studies found opposing effects of spatial proximity on survival chances and prospects of new firms and concluded that higher concentration was leading to higher failure rates. Shaver & Flyer (2000) found that firms had little motivation in opting for geographical clustering despite of the benefits of agglomeration. Staber (2001**)** in his study studied the survival chances of firms located in geographical proximity and found that location of firms in the similar sectors in clusters increased the bankruptcy rates and while locating firms in complementary sectors reduced the hazard rates. Keeble & Walker (1994) found that start-ups in UK experienced agglomeration diseconomies and constrained on their growth which diminished their chances of survival. De Silva, D.G & Mc Comb (2012**)** found that greater was the firm density within the close proximity i.e. within one mile of firms in the same industry increased the mortality rate while greater concentration over larger distances decreased mortality rates for firms locates in Texas. Boschma & Wenting (2007) found that spatial distribution of related industries had a significant and negative effect on hazard rates of the firms. However, the findings of all these studies are in sharp contrast to each other. It is quite common to observe different results on spatial pattern of firm survival depending upon the type of agglomeration and we find that these results are country specific. No such study has been conducted in India so far. Nevertheless, we expect to confirm our results to those of obtained from other studies.

So, based on the above studies we have framed the following hypothesis:

H1: There is a spatial pattern of firm survival

2.2. Ease of Doing Business and Spatial Pattern of Firm Survival

Porter (1998) defines clusters as a result of improvements in the immediate business environment. The smoothness with which any firm operates in a particular region is supported and influenced by the local business environment and for firms to be a part of clusters, they need to be supported by a favorable business environment. Modern competition is shaped by productivity of the firms and it depends on how these firms operate but for firms to be competitive they need to apply sophisticated methods and latest technologies but they can only apply these if there is a supportive business environment. These aspects of business environment tend to be cluster specific and they constitute the foundation for competition (Porter,1998). However, there can be substantial differences among the regions within a country and so is the business environment. An unclear effect of agglomeration on firm dynamics could be due to its correlation with the immediate business environment (Schindele, Fritsch & Noseleit, 2010). Therefore, it becomes important to study the regional business environment and the role it plays in sustainability of clusters.

So, a further factor of importance for spatial pattern of firm survival is a supportive regional business environment. Over the years, Ease of doing Business (EODB) report is ranking the business environment based on ten criteria to evaluate the business environment in a country: starting a business, dealing with the construction permits, getting electricity, registration of property, access to credit, protection of minority interests, payment of taxes, trade across cross borders, enforcing the contracts and resolving insolvency. The aggregate ease of doing business scores are then used to determine the ease of doing business ranking. Various researchers have analyzed EODB from different viewpoints the implications of ease of doing business for countries' economy. The literature on ease of doing business centers around development, growth or the elements of development and growth. Mainly it has been studied in context of entrepreneurial entry and its impact on their business (for instance; Stel, Storey & Thurik ,2007 ; Klapper, Lewin & Delgado, 2011). In addition to this, impact of ease of doing business has been studied on foreign direct investment (Corcoran & Gillanders, 2012). The past research has also recognized a dynamic relationship between the operating business environment characteristics and firm performance and it has been found to play a positive role in firm creation (Canare, 2018).

If we look at the literature on ease of doing business, we find that each of its criteria has been extensively studied individually in relation to certain variables of firm formation, growth & success and to the overall economy. A

very essential aspect of Ease of doing business, access to credit, has also garnered enormous attention from the researchers. The reviews on it conclude that access to finance and financial development does promote economic growth of an economy (for instance; Levine, 2005 ; Beck & Kunt,2006). A few recent studies by King & Levine,1993; Beck, 2002; Jenkins & Thomas, 2002; Kinda,2010; Bittencourt; 2010 conclude that access to credit leads to promotion of various important variables such as innovation, foreign direct investment, reduction of income inequality and international trade.

Enforcement of contracts and institutional quality as another dimension of ease of doing business has been extensively studied in terms of its impact on growth and development. A poor contract enforcement does affect a firm's incentive to grow (Giacomelli & Menon, 2017) and decreased output (Hall & Jones, 1999**)**. The institutional environment leads to business creation and positively promotes its growth (Aghion, 2004) and an efficient market is identified by three essential elements that make up the institutional quality: Security of property rights, Enforcement of contracts and a collective action (Dixit, 2009). It is found that institutional quality does play a positive role in growth (Barro,1996), per capita income (Acemoglu, Jonson & Robinson, 2001) & productivity (Hall & Jones, 1999). On corporate level, we find that institutions impact firm performance (Ghoul et al; 2017) and firm productivity (Egert, 2016) that ultimately plays a positive role in firm survival. A recent dimension of institutional quality has been explored in context of firm survival and it was found that it plays a positive role in new firm survival (Che, Lu & Tao,2017) and lack of rules with inconsistent enforcement of regulations does impact firm entry and survival (Aidis & Adachi,2007).

Another aspect of ease of doing business, Cross border trade has been studied in detail as to how with trade liberalization new firms are encouraged to enter the market (Ying Ge *et.al*;).Globalization of markets and the industries significantly changes the competitive environment for the firms which determines the firm entry into and exit from the market (Colantone & Sleuwaegen,2010) and firms engaging globally are able to shield themselves from global constraints which in turn increases their survival (Bridges & Guariglia,2008). In terms of payment of taxes, this criteria has been studied more in context of tax rates than of its administration. Another very important criteria, investor protection, is found have an impact on firms' resource allocations (McClean, Zhang & Zhao,2012) and it plays a positive role in growth.

There has been a lot research on ease of doing business and its criteria but its effect on firm survival and on spatial agglomeration has not been studied yet. The above studies make it very clear that ease of doing business and its criteria is an important determinant to be considered in the firm creation and growth and we can expect similar results to be depicted in the firm sustainability and survival and we can ascertain that a supportive regional business environment can facilitate regional firm survival.

Based on the above literature, we framed the following hypothesis

H2: **Ease of doing business significantly affects regional firm survival**

Apart from this, there are other regional variables that have an impact on firm survival. The variables used as control variables included in the study are Population density, GDP per capita, innovation and financial development. Each of this variable has been found to have an impact on firm survival (For instance; Audrestch,1991; Caves,1998; Cefis & Marsili,2004; Tsoukas, 2011; Arcuri, Brunetto & Levratto,2018).

3. Data & Methodology:

The data for the research on Indian economy has been drawn from different sources. Data regarding surving firms for each of 29 states and 5 union territories over the period of 1900 to 2024 is obtained from the Indian government website of "Ministry of Corporate Affairs". The main variable of interest is ease of doing business (independent variable), covering various business environment factors and we have included certain control variables. Ease of doing Business is an aggregate index based on ten criteria: starting a business, dealing with the construction permits, getting electricity, registration of property, access to credit, protection of minority interests, payment of taxes, trade across cross borders, enforcing the contracts and resolving insolvency. Ease of doing business (score)

state-wise was obtained from Reserve Bank of India website (www.rbi.org). The various control variables included in our study are financial development, patents, population density and GDP. Among the different possible indicators of measuring financial development, we use the value of credit by financial intermediaries to the private sector divided by GDP which as per availability of data has been adapted as value of credit by commercial banks divided by GDP .This ratio has been used in several studies (for instance; Rajan & Zingales,1998; Kendall, 2012; Arcuri, Brunetto & Levartto, 2019) . The data to calculate financial development ratio for each state has been drawn from Reserve Bank of India website. Following the earlier studies, we use patent count data to depict innovation activity (Varsakelis,2006; Hagerdoon & Cloodt, 2003) . The data on no. of patent applications filed in each state has been drawn from Economic Survey Report 2015 published by Ministry of Commerce & Industry, Government of India. The data for GDP and Population density was drawn from the website of RBI. The population density for the year 2024 was calculated based on census 2011 and adjusting it with year wise net birth rate.

Table1. Presents the variables used in our study

Table1. Variables

Variable	Definition	Source
Y (Firm Survival)	*No. of firms surviving/Total no. of firms*	Ministry of Corporate Affairs, Government of India
Ease of doing business	*Score calculated from ease of doing business index*	RBI
Financial Development	*Credit /GDP*	RBI
Patents	*No.of patent applications filed*	Ministry of Commerce & Industry, Government of India
Population Density	*Toatl Population/ Area in km^2*	RBI
Log GDP per capita	*Log (GDP/ Total Population)*	RBI

One of few studies of firm survival conducted on the Indian Economy by Rajeswari Sengupta and Manish Singh (Indira Gandhi Institute of Development Research) has found out that 45% out of the total new firms, survive and they remain in business for over 20 years. But the global scenario is quite different where new firms survive for not more than 5 years. This clearly calls for further exploration of firm survival in India. One of the many vital notions in the literature of firm survival is that of agglomeration externalities of clustering which helps amplify productivity of firms, thus leading to their survival and growth (Dumais, 2002; Rosenthal & Strange, 2005). We explore this vital notion in context of India and to begin with surviving rate of firms (%) within a state was calculated, the number of active firms during the time period were divided by total number of registered firms in that state. The survival rate of each region was calculated for three categories i.e. for manufacturing sector, for services sector and for combination of both (overall).

Each firm is classified by its CIN number, date of registration, status (Active /Struck off /Amalgamated /Converted into LLP/ Liquidated), principal business activity code, paid up capital and registered state. After classifying the firms into various sub categories the firms that are existing and the ones that have exited are identified state wise over the years undertaken for the study. After identifying the surviving firms, the data was classified based on the codes as per the classification followed by MCA to classify firms in two categories: firms in the manufacturing sector and service sector. To begin with the analysis it was important to have an overview of the firm survival rate by way of choropleth maps. These maps are the first step towards exploration of pattern (if any) in our dataset of the dependent variable across the various regions of India. Fig. 1,2,3 show that all the states are not evenly influenced with firm survival rate. States exhibiting highest rates common for overall map and services map are some northern states like Rajasthan, Haryama, Uttaranchal, Uttar Pradesh and others include Chhattisgarh, Jharkhand. At the same time for manufacturing sector Rajasthan, Haryana, Uttaranchal, Chhattisgarh, Jharkhand still remain amongst the states experiencing highest survival rates. In addition Gujarat

and Maharashtra have joined them (Rajeswari Sengupta and Manish Singh, Indira Gandhi Institute of Development Research). All three maps hint towards a geographical pattern of regional/state clusters with similar firm survival rates thus supporting our first hypothesis.

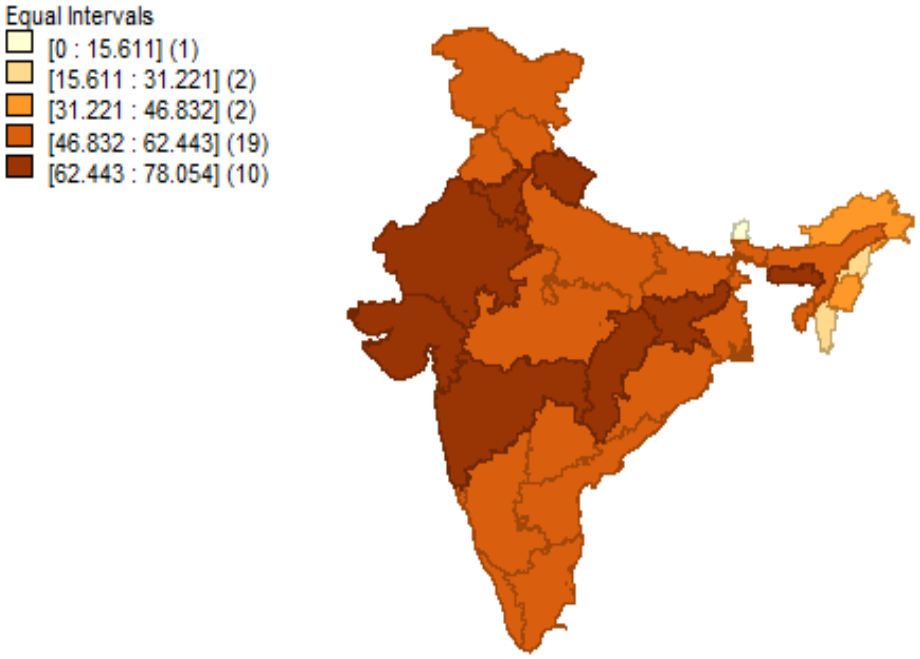

Figure 1: Firm Survival Rate in India: Manufacturing sector

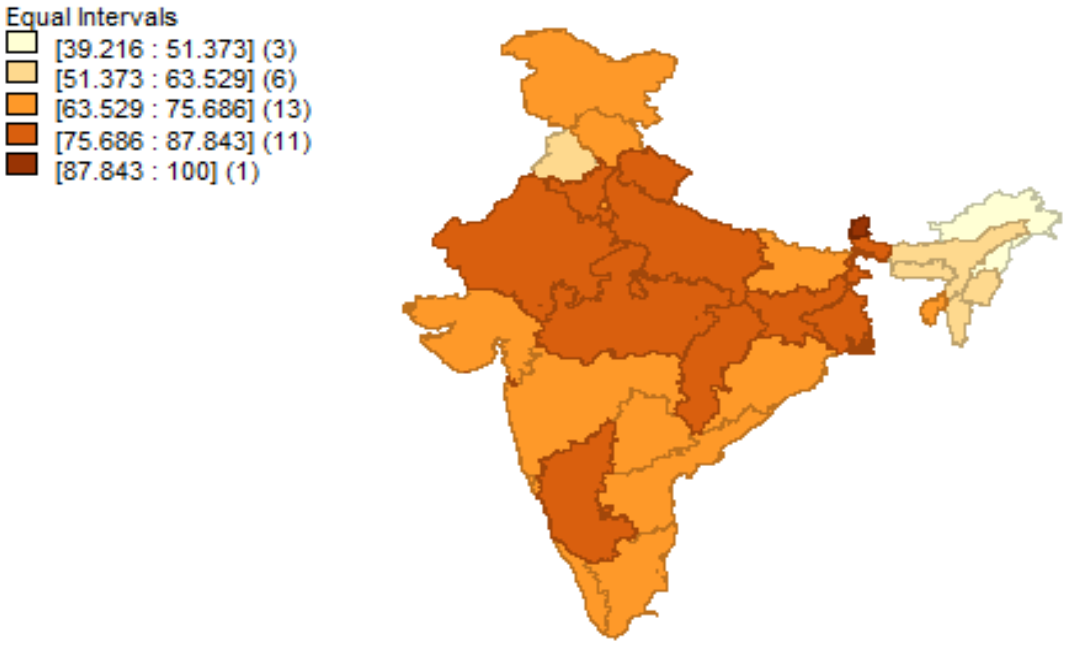

Figure 2: Firm Survival Rate in India: Services sector

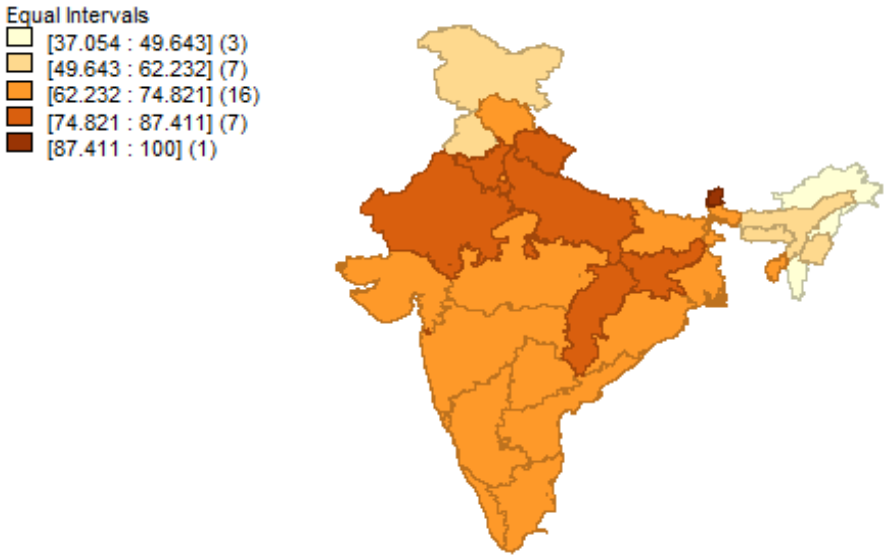

Fig.3, Firm Survival Rate in India: Overall

Table 2 presents the key descriptive statistics of variables used in this study.

Table2. Descriptive Statistics

Variable	Mean	SD	Min	Max
Y (Firm Survival) (overall)	66.73	12.47	37.05	100
Y (Firm survival in Manufacturing Sector)	55.87	15.67	0.00	78.05
Y (Firm survival in Services Sector)	69.78	12.47	39.22	100
Financial Development	0.5293	0.49	0.1183	2.1716
Ease of doing business	51.794	42.52	0.300	98.780
Patents	379.4	752.12	0.0	3654.0
Population Density	1693.0	3795.19	1.0	18456.9
Log GDP per capita	10.16	2.96	1.00	12.42

Table3. Moran's I Statistic

Type of firms	Moran's I	Mean	SD	Standardised Value	P value
Firm survival in Manufacturing Sector	0.2040	-0.0352	0.1161	2.0609	0.0290
Firm survival in Services Sector	0.4575	-0.0314	0.1217	4.0197	0.0010
Firm survival (overall)	0.461	-0.0329	0.1228	4.0232	0.0010

To look into the spatial pattern of firm survival we check for global spatial autocorrelation by the way of Moran's I statistic, which is also suggested by Cliff and Ord (1981) as a usual practise. In Table 3. Moran's I statistic (using rook weight matrix based on contiguity) for firm survival in each sector i.e. manufacturing and services and for overall firm survival is displayed. Also for each Moran's I their corresponding statistics are given. Quite not so intuitively, the expected value of I under the null hypothesis of no autocorrelation is not equal to zero but given

by I0 = −1/(n − 1). The expected variance of I0 is also known, and so we can make a test of the null hypothesis. If the observed value of I (denoted ˆI) is significantly greater than I0, then values of x are positively autocorrelated, whereas if ˆI < I0, this will indicate negative autocorrelation.

Moran's I for firm survival in services sector and for overall firm survival is positive and very high (supported by highly significant statistics i.e. at 1%). For manufacturing it isn't very high but slightly high with statistics significant at 5%. Hence, we can infer that the firm survival in all three categories does exhibit spatial dependence across states leading to global tendency of geographical clustering i.e. the states with similar firm survival rates are located close to each other.

Since these results clearly indicate spillover effect, it becomes important to investigate the various avenues that lead to the firm survival in a region being correlated to the firm survival in neighboring regions.

Spatial Regression Models

The starting point is a linear regression model, where each of the observation *i,* where *i* =1,2,3,…..*n* , the following relationship holds:

$$Y_i = \sum_{q=1}^{Q} X_{iq}\beta_q + \varepsilon_i$$

Where Y_i is the observation on the dependent variable, X_{iq} is an observation on an explanatory variable, with q = 1,…..Q , β_q is the regression coefficient and ε_i is the error term.

In matrix notation, the regression equation can be written as :

$$y = X\beta + \varepsilon$$

In the classical regression specification, the error term has mean zero, that is, $E(\varepsilon_i)=0$ for all *i* and they are identically and independently distributed. Hence, their variance is also constant for all values of *i* and are uncorrelated. The assumption of independence of observations is very unlikely to be appropriate in the context spatial data because of the possibility of having spatial dependence between the error terms. Spatial dependence occurs when the values observed in a particular area are dependent on the values of the nearby neighboring observations. This spatial dependence can be introduced in two ways : one is spatial lag dependence and the other is spatial error dependence (Anselin,1998). Spatial lag pertains to spatial correlation (dependence) in the dependent variable i.e. neighborhood effects or the spatial externalities that might show up in the dependent variable while spatial error refers to the error term which may arise because of some unobserved latent variables that are spatially correlated. Table4. explains the spatial regression models briefly by naming different independent variables for each models.

Table4. Spatial Regression Models- briefly explained.

Models	Dependent variable	Independent variables
SAR (Spatial Lag model/ Spatial Autoregressive Model)	Firm survival	Neighboring Regions'- Firm survival Region's own - EODB, Financial Development, Patents, Population density, GDP
SEM (Spatial Error model)	Firm survival	Neighboring Regions'- Residual values Region's own - EODB, Financial Development, Patents, Population density, GDP
SAC	Firm survival	Neighboring Regions' Region's own
SLX (Spatially Lagged X)	Firm survival	Neighboring Regions'- EODB, Financial Development, Patents, Population density, GDP Region's own - EODB, Financial Development, Patents, Population density, GDP

4. Econometric strategy and empirical results

This section refers to the estimation results of various Spatial Regression models by way of which data is modeled in different ways. They help analyse various avenues affecting the spillover of firm survival in different possible ways. The foundation tool of spatial econometrics is the spatial weight matrix which assigns neighborhood structure to spatial dataset. The weight matrix used here is rook weight matrix based on contiguity. It is important to check and confirm that which spatial regression model should be chosen through the results of Lagrange Multiplier (specification) tests. These tests help us take into consideration the two vital spatial dependencies- one of the dependent variables and second of the residuals. Model for spatial dependency amongst the dependent variable is known as lag model or SAR and model for spatial dependency among residual is known as error model or SEM. The two-null hypothesis for each of these models is tested by LM test respectively i.e. H0 – (1) no spatial autocorrelation amongst spatial lag (ρ=0) and (2) no spatial autocorrelation amongst error term (λ=0). Table 5 and 6 show the results for Lagrange Multiplier tests for overall firm survival and for firm survival in services sector respectively. These tables also include the results of LM robust version i.e. filtration of the false positives (which means lag model can be false positive for error model and vice-versa). The results of robust version for the models of both the tables directs towards rejection of null hypothesis, proposing that spatial lag term (ρ) and error term (λ) are significantly not equal to 0. This further suggests us referring to a more complex model, SAC, which considers both the error term and spatial lag term influencing the dependent variable. Another term which needs to be considered is spatially lagged Xs. This spatial dependency is accounted for in SLX model. Firm survival for manufacturing sector did not show significant results for LM tests. Hence in that case we accepted the null hypothesis- there is no spatial dependence. Therefore, we havent shown the results for the same.

Table 5 Spatial dependence Tests for Firm Survival (overall)

Lagrange multiplier SEM	0.6599 (0.4166)
Robust Lagrange multiplier SEM	9.4986(0.0020)
Lagrange multiplier SAR	4.2026 (0.0403)
Robust Lagrange multiplier SAR	13.041 (0.0003)

P values in parantheses

Table 6 Spatial dependence Tests for Firm Survival in services sector

Lagrange multiplier SEM	0.5636 (0.4528)
Robust Lagrange multiplier SEM	9.8069 (0.0017)
Lagrange multiplier SAR	4.0282 (0.04475)
Robust Lagrange multiplier SAR	13.271(0.0002)

P values in parantheses

In Table 7 and 8 (for overall and for services sector respectively) the results for SAR and SEM models are presented where both consider one spatial dependency each(specified earlier). Whereas, the results of SAC model (also presented in Table 6) consider two spatial dependencies collectively. But the results show only one spatial dependency of spatially lagged term to be significant with coefficient ρ and the other term of error with coefficient λ is insignificant. This indicates towards adoption of or referring back to the simpler model, SAR which only takes into consideration this significantly spatially lagged term ρ. Looking into the results it can be said that there is a spatial spillover of the firm survival rate and that the survival of the firms in a state influence or helps the firms in neighboring states to survive. This spillover effect can be explained by some factors like starting a business, dealing with the construction permits, getting electricity, registration of property, access to credit, protection of minority interests, payment of taxes, trade across cross borders, enforcing the contracts and resolving insolvency-(sub parts of ease of doing business).

Table7. Empirical Results (dependent variable is overall firm survival)

	SAR	SEM	SAC	SLX
ρWFirm Survival (overall)	0.5368 (0.1501)***		0.68721 (0.1768)***	
Financial Development	-8.8955 (28.8436)	-7.8241 (11.8281)	-4.86230586 (8.1001)	-40.6597 (25.2644)*
Ease of doing business	0.1521 (0.1377)	0.0012 (0.0545)	0.07739330 (0.0385)	0.3055 (0.0701)***
Patents	0.0024 (0.0094)	0.0024 (0.0035)	0.00154126 (0.0029)	0.0108 (0.0076)
Population Density	0.0005 (0.0033)	0.0002 (0.0013)	0.00041703 (0.0009)	0.0073 (0.0036)**
Log GDP per capita	-1.0757 (1.9806)	-0.5419 (0.7090)	-0.33535089 (0.6358)	-3.7783 (2.9236)
λ		0.6833 (0.1204) ***	-0.48479 (0.3437)	

Standard error in parantheses

Table 8 Empirical Results (dependent variable is firm survival in service sector)

	SAR	SEM	SAC	SLX
ρWFirm Survival (services)	0.5430 (0.1488)***		0.6811 (0.1788)***	
Financial Development	-5.9358 (33.7468)	-5.1413 (11.5559)	-4.34229597 (7.9195)	-41.4819 (24.4774)*
Ease of doing business	0.1526 (0.1827)	-0.0023 (0.0533)	0.08144770 (0.0389)	0.3271 (0.0679) ***
Patents	0.0006(0.0096)	0.0017 (0.0034)	0.00077139 (0.0028)	0.0096 (0.0073)
Population Density	0.0003(0.0037)	0.0000(0.0012)	0.00040389 (0.0009)	0.0068 (0.0035)**
Log GDP per capita	-2.1305(2.6170)	-0.9846 (0.6912)	-0.75172575 (0.6246)	-3.5828 (2.8325)
λ		0.6977 (0.1165)***	-0.49931 (0.3417)	

Standard error in parantheses

The key motive of this paper is to check for 'Ease of doing business' factor to be the influencer on the firm survival. The model called SLX helps us analyze the effect of spatially lagged independent variables. The results for this model are also shown in Table 6 and 7 for overall firm survival and firm survival in services sector respectively. The ease of doing business variable is positive and statistically significant at 1% (in both the tables).Hence it suggests that higher score of ease of doing business in a state helps sustain the firms not just within that particular state but also in the neighboring states. This finding of firm survival in service sector is confirmed by the same finding in the overall firm survival and vice versa.

5. Conclusion

The survival of firms is of significant importance for the economic growth. One notion of firm survival in the literature is its spatial nature, as the survival / exit of a firm may not be limited to a certain region, they can spill over to other regions as well which is in accordance with positive spatial autocorrelation. It becomes important to examine that if this positive spatial autocorrelation of firm survival amongst different states of India is a result of efficient business environment measured by Ease of Doing Business. So, the objective of the research is, to study the effect of ease of doing business on spatial pattern of firm survival. This objective was attained by performing a spatial analysis of firm survival in India on manufacturing and service sector (both collectively and individually) firms spanning over the 1900 to 2024 period. Therefore, we have contributed in better understanding of spatial pattern of firm survival in India and further widening its scope to spillover effect of ease of doing business. Our results are in line with earlier findings that firm survival has not evenly influenced the different regions of India. There is spatial dependence across states leading to global tendency of geographical clustering i.e. the states with similar firm survival rates are located close to each other. Our results also indicate that higher score of ease of doing business in a state helps sustain the firms not just within that particular state but also in the neighboring states, which is supported by theories of agglomeration externalities. Our study does have a limitation due to constraints of availability of data, which in future (if available) can be refined. The study was carried out year-wise as the data on exiting time of firms was not available. Hence, we conducted the study on the firms forming over the years and their status at the end of the period was noted. To overcome this limitation, we carried out analysis on the whole population of registered firms and not on the representative sample.

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