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SMALL AND MEDIUM ENTERPRISES SURVIVAL DURING COVID-19: EVIDENCE FROM BRAZIL

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Introduction

The COVID-19 has had a major impact on the economy and represents a unique context for the empirical experimentation of theories of different inspirations. In view of the wide range of research agendas, a topic of increasing relevance is the growth and survival of firms in response to extreme events (Linnenluecke 2017). Moreover, the increasing frequency of these events has triggered the debate concerning new challenges for firms due to threats related to the so-called “global society shock” (Papadopoulos, Baltas, and Balta 2020).

While the effects of the crisis are widespread and perceived by a relevant number of firms, there are specificities that need to be recognized (Bartik et al. 2020; Holcombe 2013; Fairlie 2020). Small and medium-sized enterprises (SMEs) have a particular challenge to overcome the simultaneous decrease in demand and the significant reduction in available financial credit. These companies are the backbone of economies worldwide and the pressures from weak demand and restricted credit have resulted in an unprecedented closing rate (Juergensen, Guimón, and Narula 2020).

The institutional and geographical context in which crises emerge is another specificity that requires consideration. The contexts of less developed countries are characterized by high economic volatility, with immature financial and credit systems and their firms are endowed by deficiencies in terms of human and technological capabilities. However, these SMEs account for a large share of international economic production and many of them are embedded in global value chains.

Despite recent initiatives to take advantage of the context of the current crisis to shed light on research agendas in different fields there remains a gap in investigations on the factors that affect the growth and survival of firms through an economic downturn. This article aims to fill this gap exploring the determinants for the survival of SMEs during the COVID-19 crisis. Therefore, the article contributes to the existing literature by producing

original evidence of this phenomenon from a representative group of SMEs based in Brazil.

Theoretical framework

The economic downturn caused by COVID-19 is perceived by existing literature as an unexpected event since it causes abrupt changes that surprise organizations. Accordingly, some organizations are expected to be more effective in responding to (or even surviving) unexpected, abrupt, and/or extreme events than others under similar contexts. Studies have used the term “resilience” to explain these different performances, which means inherent characteristics of those firms that are able to respond more quickly, recover faster or develop more unusual ways of doing business under duress than others (Amore 2015; Aristei, Sterlacchini, and Venturini 2017; Lee, Sameen, and Cowling 2015; OECD 2009; Sidorkin and Srholec 2014; Paunov 2012; Linnenluecke 2017)

In the case of SMEs, there are reasons to expect them to be more vulnerable when dealing with a crisis context. First, SMEs have scarcer financial resources, need to deal with greater obstacles when accessing bank financing and are more likely to pay higher interest rates (Mulhern 1996; Domac and Ferri 1999; Özar, Özertan, and Irfanoğlu 2008). Second, these firms have relative deficiencies in terms of technological, managerial and human capabilities, which can reduce their ability to deal adequately with the course of an economic crisis (Forbes 2002; Beck, Demirgüç-Kunt, and Maksimovic 2005; Butler and Sullivan 2005; Das and Pradhan 2009). Finally, the relative dependence of SMEs on a limited set of customers and suppliers and markets can result in greater obstacles to sustaining their activity during the crisis (Nugent and Yhee 2002; Butler and Sullivan 2005; Narjoko and Hill 2007).

The literature also identifies further characteristics of SMEs that can determine their performance during a recession. Small to medium sized companies are more flexible when adapting to an economic downturn since they are relatively less resistant to inertia, rigidity, and sunk costs (Tan and See 2004; Varum and Rocha 2013). SMEs are also less dependent on formal credits when compared to their larger counterparts, who tend to be more encumbered with debts (Sato 2000; Ter Wengel and Rodriguez 2006). Accordingly, despite the usual deficiencies, SMEs can be more effective in sustaining their employment levels and thus contribute to the process of economic recovery. This brief context leads us to our first conjecture:

Hypothesis 1. The weak restriction of people circulation in SMEs municipality is positively associated with the probability of survival of SMEs.

Hypothesis 2. In response to the restrictions imposed by the crisis, the higher length of existence or invoicing average of SMEs is positively associated with the probability of survival of them.

Hypothesis 3. The age and the education of the person in charge level determine the probability of survival of SMEs.

Methodology

3.1 Data and sample

We use a unique database from an online survey undertaken by the Brazilian Micro and Small Business Support Service (SEBRAE) to test the proposed hypotheses. The survey aims to investigate or impact the coronavirus pandemic in small businesses and was elaborated at the level of 6,470 firms based in Brazil. The survey was conducted between 25 and 30 June 2020 and the sampling error is approximately 1% and 95% confidence interval.

3.2 Empirical Strategy

The basic structure of the empirical model is as follows:

$$\text{Survive} = \text{Restriction} + \text{Length} + \text{Invoicing} + \text{Sector} + \text{Age} + \text{Educ} + \text{Gender} + \varepsilon$$

The dependent variable is the capacity of SMEs to survive during the COVID-19 (**Survive**). We have four possibilities: (i) firms that close operation; (ii) firms that interrupted operation; (iii) firms operating with changes; and (iv) firms operating as usual.

Regarding the explanatory variables, we have in deferments dimensions (municipality; firms and person). The first variable refers to the restriction of people circulation in SMEs municipality (**Restriction**) and we have four categories: lockdown; quarantine; reopening process; and without restriction.

Second explanatory variable denotes length of existence of SME (**Length**) and it is categorized by SME with less 1 year; SMEs between 2 and 5 years; SMEs between 5 and 10 years; and SMES with more 10 years.

The third variable is invoicing average during 6 months previous restrictions imposition (**Invoicing**) and it is categorized by: until R\$ 6 mil by month; from R\$ 7 mil to R\$ 60 mil by month; from R\$ 60 mil to R\$ 200 mil by month; more than R\$ 200 mil by month; and not informed. Fourth variable (**Sector**) is the sectors categorized by Agriculture, Manufacturing, Construction, Service and Retail. The fifth (**Reg**) is the region of localization of SMEs and it is divided by Northeast, Midwest, North, Southeast and South.

The sixth refers to the age of the person in charge (**Age**) and categorized by: more than 56 years; from 36 to 55 years; until 35 years. The seventh defines the education of the person (**Educ**) in charge and categorized by: under high school; high school; and more than graduation. The eighth defines the gender of the person (**Gender**): female or male.

We apply the generalized form of the ordered probit model. This approach allows us to estimate different coefficients for different survival categories. This is indicated in cases in which the dependent variable is categorical, and the proportional odds assumption is violated. The benefit of the generalized ordered probit model (GOPM) over a standard (OPM) is that we can use the information contained in the ordinal dependent variable without the restriction of parallel regressions for the different categories of the dependent variable. The parallel regression assumption sometimes referred to as the proportional odds assumption, of an OPM is where all the β_j 's are restricted to be equal across the different categories of the dependent variable. Relaxing this restriction is warranted because the explanatory variables may not affect all groups equally (Williams, 2016).

3.3 Descriptive and exploratory analysis

Table 1 shows the descriptive statistics of the operation of the firm at the time of the survey. The majority (59.4%) is operating with changes due to the crisis and 28.5% of firms had their operations interrupted. In the remainder, 8.18% firms operated as usual and 3.9% decided to close the firm.

Table 1. Firm's operation due to crisis.

	Freq.	Percent	Cum.
Operating as usual	529	8.2	8.2
Operating with changes	3,841	59.4	67.5
Temporarily closed	1,846	28.5	96.2
Permanently closed	254	3.9	100.0

Total	6,470	100	
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Results

Table 2 shows the results of the model. The model gives us three coefficients for each explanatory variable since we estimate generalized ordered probit and the dependent variable is divided into four categories (firms that permanently closed operation; firms that temporarily closed; firms operating with changes; and firms operating as usual). The first column (I) contrast firms that permanently close operations with other firms. The second column (II) contrasts firms that permanently and temporarily close operation with firms operating with changes and operating as usual. The third column (III) contrasts all others with firms operating as usual.

Table 2: GOPM estimates of the determinants of SME survival

Variables	Models		
	I	II	III
Lockdown ^a			
Quarantine	0.494*** (0.125)	0.862*** (0.0927)	0.239 (0.160)
Reopening process	0.526*** (0.129)	1.004*** (0.0937)	0.376** (0.160)
Without restriction	0.621** (0.251)	1.488*** (0.164)	1.115*** (0.191)
Less 1 year ^a			
From 2 to 5 years	0.131 (0.103)	0.0925 (0.0613)	0.200** (0.0927)
From 5 to 10 years	-0.0158 (0.102)	0.100 (0.0627)	0.0296 (0.0968)
More than 10 year.	0.214* (0.117)	0.284*** (0.0673)	0.191* (0.0980)

Variables	Models		
	I	II	III
Until R\$ 6 mil by month ^a			
From R\$ 7 mil to R\$ 60 mil by month	0.141* (0.0803)	0.327*** (0.0449)	-0.0522 (0.0627)
From R\$ 60 mil to R\$ 200 mil by month	0.430*** (0.150)	0.582*** (0.0715)	0.0518 (0.0847)
More than R\$ 200 mil by month	0.429* (0.240)	0.479*** (0.113)	-0.0343 (0.130)
Not informed	-0.187** (0.0924)	-0.109* (0.0588)	-0.101 (0.0922)
Service ^a			
Commerce	-0.0708 (0.0679)	0.383*** (0.0385)	0.117** (0.0542)
Construction	0.101 (0.195)	0.399*** (0.107)	0.409*** (0.124)
Manufacturing	0.115 (0.170)	0.503*** (0.0892)	0.393*** (0.0962)
Agriculture	-0.0895 (0.504)	0.362 (0.295)	0.486 (0.310)
Northeast ^a			
Midwest	0.222* (0.128)	0.115 (0.0723)	0.358*** (0.104)
North	0.176 (0.141)	0.0713 (0.0800)	-0.0450 (0.133)
Southeast	0.134 (0.0852)	0.119** (0.0509)	0.232*** (0.0807)
South.	0.146 (0.106)	0.358*** (0.0627)	0.351*** (0.0904)

Variables	Models		
	I	II	III
More than 56 years ^a			
From 36 to 55 years	-0.0504 (0.0958)	0.197*** (0.0509)	0.0773 (0.0693)
Until 35 years	0.0223 (0.114)	0.363*** (0.0627)	0.0542 (0.0861)
Under high school ^a			
High school	0.214** (0.0928)	0.0653 (0.0565)	0.208** (0.0869)
More than graduation.	0.0958 (0.0946)	0.0675 (0.0579)	0.268*** (0.0877)
Male	0.0599 (0.0672)	0.177*** (0.0376)	0.165*** (0.0525)
Constant	0.925*** (0.200)	-1.441*** (0.130)	-2.515*** (0.206)
Observations	5,575	5,575	5,575
ll_0	-5537	-5537	-5537
p	0	0	0
chi2	776.9	776.9	776.9
ll	-5148	-5148	-5148

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

^aReference group.

Estimates show that a weaker restriction of people circulation is positively associated with a higher probability of survival for SMEs, which confirms the first hypothesis of this work. The length also positively affects the survival of firms, but our results find statistical significance only for firms with more than 10 years of existence, when the reference group is composed of firms with less than a year of existence. Firms with higher invoicing average are expected to survive longer in most simulated cases. An exception is when we compare all groups with the firms operating the usual ones (Model III).

Other estimates reveal that firms in the service sector are less likely to survive when compared to other sectors. Firms established in the northeast of the country are also less likely to survive when compared to other regions. When analysing the characteristics of those responsible for the firms, the least probability of survival is concentrated in those over 56 years old (considered risk group), with less education and female gender.

Discussion and conclusion

This paper modelled the survival of SMEs during the COVID-19 outbreak. Results obtained help to understand some factors that explain the survival of SMEs in response to these types of extreme events and can guide the action of these entrepreneurs and policy makers. We find that, overall, enhances survival of SMEs is related to certain conditions, which can be summarized as follows: a) the weak restriction of people circulation is positively associated with the probability of survival; b) the higher length of existence or invoicing average of SMEs is positively associated with the probability of survival of them; and c) the age and the education of the person in charge level determine the probability of survival of SMEs. Although the results tend to confirm the available literature and our own initial intuitions, the production of evidence from latecomer economic environments remains relevant, since most of the available studies are conducted in developed countries. Accordingly, this article also highlights the risks of low survival rates for SMEs on employee job losses, further income inequality, and contributing to a prolonged recession.

References

- Amore, Mario Daniele. 2015. “Companies Learning to Innovate in Recessions.” *Research Policy* 44 (8): 1574–83. <https://doi.org/10.1016/j.respol.2015.05.006>.
- Aristei, David, Alessandro Sterlacchini, and Francesco Venturini. 2017. “Effectiveness of R&D Subsidies during the Crisis: Firm-Level Evidence across EU Countries.” *Economics of Innovation and New Technology* 26 (6): 554–73. <https://doi.org/10.1080/10438599.2016.1249543>.
- Bartik, Alexander W., Marianne Bertrand, Zoe Cullen, Edward L. Glaeser, Michael Luca, and Christopher Stanton. 2020. “The Impact of COVID-19 on Small Business Outcomes and Expectations.” *Proceedings of the National Academy of Sciences of the United States of America* 117 (30): 17656–66. <https://doi.org/10.1073/pnas.2006991117>.

- Beck, Thorsten, Asli Demirgüç-Kunt, and Vojislav Maksimovic. 2005. “Financial and Legal Constraints to Growth: Does Firm Size Matter?” *Journal of Finance* 60 (1): 137–77. <https://doi.org/10.1111/j.1540-6261.2005.00727.x>.
- Butler, John E., and Jeremiah J. Sullivan. 2005. “Crisis Response Tactics: US SMEs’ Responses to the Asian Financial Crisis.” *Journal of Business and Entrepreneurship* 17 (2).
- Das, Keshab, and Jaya Prakash Pradhan. 2009. “Externally-Oriented Small and Medium Enterprises: Predicament and Possibilities.” 15522. MPRA Paper.
- Domac, I., and G. Ferri. 1999. “Did the East Asian Crisis Disproportionately Hit Small Businesses in Korea?” *Economic Notes* 28 (3): 403–29. <https://doi.org/10.1111/1468-0300.00020>.
- Fairlie, Robert W. 2020. “The Impact of COVID-19 on Small Business Owners: Continued Losses and the Partial Rebound in May 2020.” 27462. *NBER Working Paper Series*. NBER Working Paper Series. Cambridge, MA.
- Forbes, Kristin J. 2002. “How Do Large Depreciations Affect Firm Performance?” 9095. *NBER Working Paper Series*. NBER Working Paper Series. Cambridge, MA.
- Holcombe, Randall G. 2013. “South Korea’s Economic Future: Industrial Policy, or Economic Democracy?” *Journal of Economic Behavior and Organization* 88: 3–13. <https://doi.org/10.1016/j.jebo.2011.07.021>.
- Juergensen, Jill, José Guimón, and Rajneesh Narula. 2020. “European SMEs amidst the COVID-19 Crisis: Assessing Impact and Policy Responses.” *Journal of Industrial and Business Economics* 47 (3): 499–510. <https://doi.org/10.1007/s40812-020-00169-4>.
- Lee, Neil, Hiba Sameen, and Marc Cowling. 2015. “Access to Finance for Innovative SMEs since the Financial Crisis.” *Research Policy* 44 (2): 370–80. <https://doi.org/10.1016/j.respol.2014.09.008>.
- Linnenluecke, Martina K. 2017. “Resilience in Business and Management Research: A Review of Influential Publications and a Research Agenda.” *International Journal of Management Reviews* 19 (1): 4–30. <https://doi.org/10.1111/ijmr.12076>.
- Mulhern, Alan. 1996. “Venezuelan Small Businesses and the Economic Crisis:

- Reflections from Europe.” *International Journal of Entrepreneurial Behaviour & Research* 2 (2): 69–81. <https://doi.org/10.1108/13552559610119340>.
- Narjoko, Dionisius, and Hal Hill. 2007. “Winners and Losers during a Deep Economic Crisis: Firm-Level Evidence from Indonesian Manufacturing.” *Asian Economic Journal* 21 (4): 343–68. <https://doi.org/10.1111/j.1467-8381.2007.00261.x>.
- Nugent, Jeffrey B., and Seung Jae Yhee. 2002. “Small and Medium Enterprises in Korea: Achievements, Constraints and Policy Issues.” *Small Business Economics* 18 (1–3): 85–119. <https://doi.org/10.1023/A:1015181911497>.
- OECD. 2009. “Policy Responses to the Economic Crisis: Investing in Innovation for Long-Term Growth.” Paris.
- Özar, Şemsa, Gökhan Özertan, and Zeynep Burcu Irfanoğlu. 2008. “Micro and Small Enterprise Growth in Turkey: Under the Shadow of Financial Crisis.” *Developing Economies* 46 (4): 331–62. <https://doi.org/10.1111/j.1746-1049.2008.00069.x>.
- Papadopoulos, Thanos, Konstantinos N. Baltas, and Maria Elisavet Balta. 2020. “The Use of Digital Technologies by Small and Medium Enterprises during COVID-19: Implications for Theory and Practice.” *International Journal of Information Management*, no. June: 102192. <https://doi.org/10.1016/j.ijinfomgt.2020.102192>.
- Paunov, Caroline. 2012. “The Global Crisis and Firms’ Investments in Innovation.” *Research Policy* 41 (1): 24–35. <https://doi.org/10.1016/j.respol.2011.07.007>.
- Sato, Yuri. 2000. “How Did the Crisis Affect Small and Medium-Sized Enterprises? From a Field Study of the Metal-Working Industry in Java.” *Developing Economies* 38 (4): 572–95. <https://doi.org/10.1111/j.1746-1049.2000.tb00891.x>.
- Sidorkin, O, and M Srholec. 2014. “Surviving the Times of Crisis: Does Innovation Make a Difference?” *International Journal of Technological Learning, Innovation and Development* 7 (2): 124–46. <https://doi.org/10.1504/IJTLID.2014.065881>.
- Tan, Hwee Hoon, and Hai Hui See. 2004. “Strategic Reorientation and Responses to the Asian Financial Crisis: The Case of the Manufacturing Industry in Singapore.” *Asia Pacific Journal of Management* 21 (1–2): 189–211. <https://doi.org/10.1023/b:apjm.0000024083.66366.b1>.
- Varum, Celeste Amorim, and Vera Catarina Rocha. 2013. “Employment and SMEs

during Crises.” *Small Business Economics* 40 (1): 9–25.
<https://doi.org/10.1007/s11187-011-9343-6>.

Wengel, Jan Ter, and Edgard Rodriguez. 2006. “SME Export Performance in Indonesia after the Crisis.” *Small Business Economics* 26 (1): 25–37.
<https://doi.org/10.1007/s11187-004-6491-y>.