

## **Innovation activity and firm survival during economic crisis**

Grasmik K., PhD student in Management, Ca'Foscari University of Venice, Italy; 2017;  
20.09.2020; konstantin.grasmik@unive.it

This paper is concerned with firm sustainable development. Does innovation activity stipulate higher probability that a firm will survive economic crisis? Or innovation-active companies have better performance only in good time but when economic conditions worsen dramatically they become more vulnerable than non-innovative companies? And the second part of the research problem is the role of regional economic complexity, i.e. the degree of diversification and competitiveness of regional economy. The higher degree of economic complexity could be important for several reasons: availability of resources and institutions to create and redistribute them; sometimes it means possession of monopolistic power which allows to regulate world market during crisis; ability to grow more easily because production of new kind of product requires fewer new competences than in case of less diversified economy (Hausmann and Hidalgo, 2010). So the research question is to analyze how adherence to innovation strategy and economic complexity of the region where a firm is situated influences its survival in short-term and mid-term periods. So economic crisis is a good occasion to check validity of a firm strategy (innovation/non innovation) and influence of regional economic complexity.

There are plenty of studies devoted to the impact of economic crisis (especially 2008 one) on firm development including its innovation behavior (Archibugi et al., 2013; Hausman and Johnston, 2014; Paunov, 2012). Crisis forces firms to make strategic decisions so that to fit with external environment. So there are studies which analyze how firm behavior changes during economic crisis (Banerji et al., 2009a), but results depend on firm strategic orientation. If a firm adheres to entrepreneurial strategic orientation its performance during crisis is better (Soininen et al., 2012). Economic complexity is analyzed mostly on state level (Hidalgo et al., 2007; Hausmann and Hidalgo, 2010). Initial level of economic complexity influences positively on mid-term economic growth and this dependence is negative taking into account the initial level of GDP per capita (Hausmann et al., 2013). So this study is in line with this direction of management and regional economics research.

All data on firms' indicators are obtained from the databases of enterprises and organizations FIRA-PRO and ORBIS. The observation period is 2014-2016 as current economic crisis in Russia started from the end of 2013. Firms of the sample are small and medium enterprises. They are related to several industries like engineering, chemical, production of plastic, metal and non-metal mineral products. The total sample size is 318 companies. Some companies that could be outliers are excluded from the sample. The dependent variable is binary one (1- firm goes bankrupt in a given year, 0 - not). There are two main research hypotheses.

H1. Innovation-active firm goes bankrupt during economic crisis with less probability.

H2. If a firm is situated in a region with higher economic complexity the probability of bankruptcy is lower.

To test hypotheses we use binary selection models. To characterize firm innovation activity we use dummy variable, which takes 1 if a firm possesses patents and 0 otherwise. Control variables characterize firm financial performance, presence of foreign investor, size, period of company existence, regional size.

Companies suffer equally in short-term period but in mid-term innovation-active ones are less prone to go bankrupt than non-innovative. Economic complexity doesn't have any

differences in short-term and mid-term. H2 is confirmed. Size of a company, ability to use resources efficiently and low level of debt keep being significant after crisis.

To do robustness check I conducted analysis for pre-crisis time period (2010-2013). Innovation activity is not significant but regional economic complexity keeps significant. So the question about influence of economic complexity on firm sustainability is still open.

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