Abstract ID: ICBMIS-2019-006

Access to finance and innovation project failures: Developing markets

Safi Ullah Khan[1], Imran Alvi[2]
[1] Universiti Teknologi Brunei,
Email: safiullah.khan@utb.edu.bn

[2] Oxford Intellect, United Kingdom
Email: ialvi224@gmail.com

Abstract

In this paper, we empirically examine whether financial constraints can have an impact on the likelihood of abandoning or suspending an innovation project. Using multi-country data drawn from the World Bank's Enterprise innovation survey data sets for 9 developing markets, we document that financial constraints significantly increases the likelihood of abandoning innovation projects at the execution stage. These results still carry through after accounting for the endogeneity concerns.

Keywords: corporate innovation, project failures, financial constraints

1 Introduction

Innovation is at the heart of the economic growth and development (Lachenmaier, 2007; Rauter et al., 2018). An extensive body of literature has explored various determinants of innovation project failures. These studies are from a diverse range of perspectives including knowledge and market conditions (García-Vega and López), industry characteristics (Acs and Audretsch, 1988), internal and external organizational capabilities (Radas and Bozic, 2012), obstacles in external R&D collaborations (Lhuillerya and Pfister, 2009), besides financing obstacles as determinants of project delays and abandonments. Recent empirical works highlight the presence of financial constraints for innovation (Alvarez & Crespi, 2015; Ayyagari et al., 2011; Cincera and Ravet, 2013). Nevertheless, the way financing obstacles may contribute to innovation project's delays or failures is one research area that has not yet fully gained traction in literature. In this respect, Mohnen et al. (2008), Garcia-Vega & Lopez (2010), and Garcia-Quevedo et al. (2017) are few exceptions. These empirical works show that financing obstacles hamper innovation projects at the initiation and execution phases. In this paper, we employ firm-level survey data in a multi-country perspective to examine whether financing constraints cause innovation project delays or suspensions during the execution phase. Furthermore, in contrast to the previous studies which has used self-reported perceived measures of financing obstacles from the manager's responses in the innovation surveys, we supplement those measures with firm's actual financing constraints. This measure is constructed from the data on the loan applications and whether firm applied or were constrained to apply for the credit, despite needing funds for business operations. We additionally examine if the funding source (e. g., debt versus equity) has differential impact on innovation failures.

2 Methodology

As described in the previous section, we aim to examine if financing constraints can affect innovation project failures. As noted by Savignoc (2008), it is imperative to control for the endogeneity of financing constraints and innovation. This endogeneity may arise due to the possibility that innovation project failures and the probability that firm experiences financing constraints may be simultaneously determined due to unobserved firm heterogeneity. This is accounted for by employing recursive bivariate probit model (García-Quevedo et al. 2017). Project failure is captured by a dichotomous variable that is equal to 1 if an establishment has indicated that it has stopped or suspended an innovation project initiated over the last three years. This variable equals 0 if the innovation project(s) are still in progress or completed recently. This information was extracted from the innovation subsection of the enterprise surveys. These firm-level surveys are conducted by World Bank Enterprise Surveys in over 138 countries. A representative sample of private sector firms from each country are selected by the World Bank Group's team through stratified random sampling techniques. Sample size for each county depends on that country's overall size of the economic sector. We select the most recent survey for 9 developing countries for which innovation follow-up surveys were also conducted by the World Bank's group.

Financing constraint indicator is a dichotomous variable constructed from questions in the finance sub-section of the core enterprise surveys. Establishment is considered financially constrained if the recent loan application was rejected, or if the firm reported any of the following reasons for not applying for loan: high interest cost, complexity of the application procedure, high collateral requirement or mismatch of the amount of loan and its duration with firm's requirement. On the other hand, financially unconstrained firm is one if it indicated as "having sufficient funds" as the main reason for not applying for credit.

3 Results/Findings

Table 1 contains results for the bivariate probit model. Several control variables, extracted from the literature, that are supposed to affect innovation project failure, were included in the bivariate probit model. The core variable of interest is the financing constraint indicator, FINCOST, and its coefficient is positive and significant. This suggests that financing constraints increases the probability of innovation project failures/suspensions during the execution stage, a result consistent with those of García-Quevedo et al. (2017).

The second part of our research objective was to assess whether a lack of access to a particular type of funding source can have differential impact on the probability of project failures/suspensions. Innovation investments are complex, risky, and plagued by high information asymmetries. These features can cause difficulty in getting access to external funding for innovation activities. Under these circumstances, internal funds (and equity) becomes crucial source of innovation investments (Leland and Pyle, 1977) and firms may be forced to follow pecking order of financing (Himmelberg and Petersen, 1994).

Innovation sub-section of the survey contains information on establishment's access to various funding sources for innovation investments. We consider bank funding as the establishment's main source of financing, as this is the most common source identified by the establishments in the survey. We also adopt the recursive bivariate probit model to account for the endogeneity of the bank financing and use the same set of instrumental variables that we use for financing constraints indicator in the selection equation of the bivariate probit model.

Results of the 2nd stage equation of the bivariate probit model are reported in Panel B of Table 1. Main variable, BANKFUND, is negative and significant. This suggests that establishment's access to bank credit decreases the probability of the innovation project failures/suspensions.

These findings generally support the existing literature. However, our contribution to the literature is twofold. First, in contrast to the previous studies that have relied on the self-reported and perceived measures of financial constraints, we use a more direct measure of financing constraints by analyzing the actual financial constraints experienced by the firms. Second, we conduct our analysis in the context of the multi-country analysis.

Table 1: financial constraints and innovation project failures/suspensions
Coefficient estimates and standard errors (in parenthesis). ***=0.01; **=0.05; ***=0.10 significance levels.

	Financial constraint	Bank funding
Firm age	0.0800***	0.0363
	(0.0114)	(0.0299)
Size	0.0410***	0.268***
	(0.0345)	(0.0286)
Business group affiliation (01/)	-0.364***	-0.189***
	(0.0812)	(0.0694)
Financial constraints (0/1)	0.903***	
	(0.207)	
Bank funding		-0.546***
		(0.315)
Marketing innovation (0/1)	-0.206***	-0.229***
	(0.0505)	(0.0401)
R&D intensity (R&D/sales)	-0.13711*	-0.00901***
	(0.00532)	(0.00218)
Exporting (0/1)	-0.0257***	-0.317***
	(0.00527)	(0.0270)
Employee-training (0/1)	-0.172***	-0.402***
	(0.0489)	(0.0179)
Government financial support (0/1)	-0.0614***	-0.0334***
	(0.0127)	(0.00556)
Patent application (01/)	-0.0716*	0.182***
	(0.0377)	(0.0100)
R&D external cooperation (0/1)	-0.151**	-0.347***
	(0.0237)	(0.00493)
N	1,699	1,699

References

Acs, Z., & Audretsch, D. (1988). Innovation in large and small firms: An empirical analysis. *American Economic Review*, 78(4): 678-690.

Ayyagari, M., Demirgûç-Kunt, A., and Maksimovic, V. (2011). Firm Innovation in Emerging Markets: The Role of Finance, Governance, and Competition. *Journal of Financial and Quantitative Analysis*, 46(6): 1545-1580.

Alvarez, R. & Crespi, G. A. (2015). Heterogeneous effects of financial constraints on innovation: evidence from Chile. *Science and Public Policy,* 1-14.

Garcia-Vega, M., & Lopez, A. (2010). Determinants of abandoning innovative activities: Evidence from Spanish firms. Cuadernos de Economía y Dirección de la Empresa 13, 69–91.

Himmelberg C., & Petersen, B. (1994). R&D and Internal Finance: A Panel Study of Small Firms in High-Tech Industries. Review of Economics and Statistics, 76: 38-51.

Lachenmaier, S. (2007). Effects of Innovation on Firm Performance. Ifo Beiträge zur Wirtschaftsforschung 28, München.

Leland, H., & Pyle, D. (1977). Informational Asymmetries, Financial Structure, and Financial Intermedia-tion. Journal of Finance, 32: 371-387.

Mohnen, P., Palm, F.C., van der Loeff, A. (2008). Tiwari. Financial Constraints and Other Obstacles: are they a Threat to Innovation Activity? De Economist, 156(2): 201-214. https://doi.org/10.1007/s10645-008-9089-y

Rauter, R., Globocnik, D., Perl-Vorbach, E., & Baumgartner, R. J. (2018). Open innovation and its effects on economic and sustainability innovation performance. Journal of Innovation & Knowledge. doi:10.1016/j.jik.2018.03.004

Radas, S., & Bozic, L. (2012). Overcoming Failure: Abandonments and Delays of Innovation Projects in SMEs. Industry and Innovation, 19(8): 649-669.

Savignac, F. (2008). Impact of financial constraints on innovation: what can be learned from a direct measure? Economics of Innovation and New Technology, 17 (6): 553–569.