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1. Problem

The global financial crisis has affected nearly every country around the world, devastating their economies and decimating the financial resources of their companies and citizens (Hausman and Johnston, 2014). Under these conditions, innovative businesses have suffered from lower demand for their products and substantial uncertainties regarding the recouping of their investments in a context of increasing market turbulence. Prior studies have focused on the persistence of innovation during the crisis in various contexts but largely excluded how business innovation capabilities were affected during this period. We draw from Resource-Based theory to develop a framework to examine the innovation behavior and performance of Spanish manufacturing firms, with different R&D intensity levels, during the global financial crisis. Specifically, the paper tests if the financial crisis influenced companies to opt for innovations that requires fewer inputs, which in turn, generated technological innovations with a minor economic and technological impact.

2. Current Understanding

A recent OECD (2012) report suggests that the recession, which began with the financial crisis of 2008, has impacted business innovation and Research and Development (R&D) in nearly all OECD countries. In the fourth quarter of 2008, a decline in R&D expenditure, business spending on R&D fell a record 4.5% in 2009 across OECD countries. As a consequence, many companies have been forced to reduce their investment in innovation. Milic (2013) suggests that investments in innovations and future growth are at risk during an economic crisis, when most organizations cut their R&D budgets.

3. Research Question

The financial crisis that began in Spain in 2008 and continues today has caused various problems, many difficulties come from a drop in income, job uncertainty and growing unemployment rate and all these lead to affect customer purchase behavior mostly negatively (Kay, 2010). Consumers tend to be more careful planning their expenditure, focusing on spending efficiency, reducing consumption level differently (Mansoor and Jalel, 2011). Due to low levels of consumer demand, firms could perceive product or process innovations during the crisis as a risky task due to commercialization inherent uncertainties and these costs cannot certainly be recovered.

4. Research Design

The model has been estimated assuming a Random-effects Logit to analyses the decision of firms to innovate model and a random-effects panel to estimate the sales share from new products.

The model can equivalently be written as:

$$Y_{it}^* = X_{it} \beta + \alpha_i + \varepsilon_{it} \quad (i = 1, \dots, n; t = 1, \dots, T)$$

To observe intersectoral differences, standard one-tailed z-test is used to compare regression coefficients between the industrial R&D intensity sectors

$$Z = \frac{|b_1 - b_2|}{\sqrt{\frac{\sigma_{\varepsilon_1}^2}{n_1} + \frac{\sigma_{\varepsilon_2}^2}{n_2}}}$$

5. Findings

The economic crisis has a significant and negative impact on firms' innovative performance, the negative effect of downturn is stronger in the case of incremental innovations when compared to radical innovations. Further, the findings show that High-Tech industry is the one which has best withstood the crisis when compared to the rest of manufacturing industries.

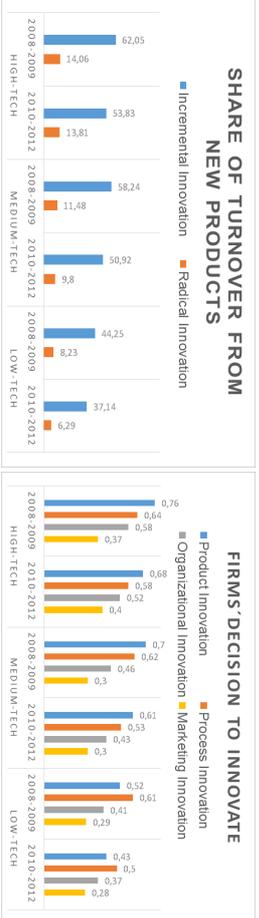


Table 1. Innovative behavior of manufacturing Spanish firms during the crisis

Innovation sources	Firms' decision to innovate				Share of turnover from new products			
	Product innovation	Process innovation	Organizational innovation	Marketing innovation	Product innovation	Process innovation	Marketing innovation	New to the market
Internal R&D	2.499(0.022)***	1.649(0.071)***	1.134(0.057)***	1.411(0.073)***	1.326(0.074)***	3.479(0.104)***	0.234(0.054)***	0.760(0.059)***
External R&D	0.368(0.025)***	0.382(0.073)***	0.428(0.081)***	0.230(0.049)***	0.234(0.054)***	0.276(0.059)***	0.234(0.054)***	0.276(0.059)***
Cooperation partners	0.388(0.027)***	0.584(0.093)***	0.468(0.085)***	0.232(0.087)***	0.155(0.079)***	0.289(0.117)***	0.155(0.079)***	0.289(0.117)***
Coop. Ind. Net.	0.648(0.066)***	0.624(0.093)***	0.315(0.085)***	0.135(0.087)***	0.553(0.080)***	0.515(0.148)***	0.135(0.087)***	0.515(0.148)***
Coop. Ind. Net. ²	0.286(0.123)*	0.271(0.124)	0.311(0.110)***	0.157(0.103)	0.205(0.158)	0.029(0.138)	0.205(0.158)	0.029(0.138)
Coop. Inst. Net. ³	0.096(0.137)	0.229(0.194)	0.046(0.165)	0.029(0.088)	0.029(0.088)	0.066(0.209)	0.029(0.088)	0.066(0.209)
Parent ⁴	0.841(0.102)***	0.308(0.092)***	0.413(0.088)***	0.755(0.087)***	0.692(0.077)***	0.266(0.116)***	0.755(0.087)***	0.266(0.116)***
Export ⁵	0.350(0.066)***	-0.019(0.056)	0.145(0.059)***	0.394(0.067)***	0.201(0.064)***	0.455(0.092)***	0.394(0.067)***	0.455(0.092)***
Firm variables	0.356(0.034)***	0.637(0.035)***	0.566(0.034)***	0.181(0.035)***	0.208(0.036)***	0.657(0.051)***	0.181(0.035)***	0.657(0.051)***
Size	0.098(0.047)**	0.181(0.047)***	0.185(0.046)***	0.073(0.049)	0.004(0.049)	0.229(0.070)***	0.073(0.049)	0.229(0.070)***
Productivity	1.020(0.168)***	-0.394(0.167)***	0.719(0.164)***	0.155(0.169)	1.188(0.167)***	1.350(0.245)***	0.155(0.169)	1.350(0.245)***
Sector variables	1.099(0.095)***	-0.179(0.094)**	0.175(0.093)**	-0.175(0.098)**	0.713(0.101)***	1.555(0.143)***	-0.175(0.098)**	1.555(0.143)***
High-tech								
Medium-tech								
Low-tech								
Dummy time	-0.778(0.046)***	-0.840(0.043)***	-0.299(0.042)***	-0.019(0.043)	-0.440(0.040)***	-0.790(0.059)***	-0.019(0.043)	-0.790(0.059)***

Notes: Standard error in parentheses. *Significance at 1%. **Significance at 5%. ***Significance at 10%.
 Wald χ^2 shows the Wald test statistic for testing the joint significance of the explanatory variables

6. Contribution:

During the recession, manufacturing companies need more than ever to position themselves appropriately in persistence in innovation in the face of sales declines, sustain and expand market positioning through innovation. Given that radical innovation performance were less damaged during an economic downturn, managers should realize more attention in the introduction of new products rather than upgrading the existing products which could help in sustaining the firm competitiveness to cope with the crisis challenges.

7. References:

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