

C. Ghisetti, M. Mazzanti, M. Zoli, S. Mancinelli : Do financial constraints make the environment worse off?
Understanding the effects of financial barriers on environmental innovations

The high degree of uncertainty that characterizes innovation projects, together with their complexity and specificity makes firms to be less prone in investing in innovation in the presence of lack of financial availability (Hotterott and Peters, 2012). Financial constraints are, in such a framework, a potential deterrent for firms' choice to commit resources in innovative activities and, consequently, can negatively affect firm's overall innovative activity.

Previous literature devoted a strong effort in understanding the linkages between financial barriers and innovation activities (e.g. Hall, 2002; 2008; Hottenrott and Peters, 2012, Pellegrino and Savona, 2013).

What has not been investigated yet is instead the role played by financial barriers on a peculiar typology of innovation: environmental innovations EI.

EI have recently been at the centre of the analysis of a multitude of contributions, mainly aiming at understanding the determinants of EI (e.g. Brunnermeier and Cohen, 2003; Horbach et al., 2012) and their economic implications (e.g. Cainelli et al., 2013; Hart and Ahuja, 1996). What emerges, is that EI are a special innovations, characterized by some peculiarities, such as the "double externality" issue (Rennings, 1998; 2000). Moving from their special character, and from the consideration that they require a knowledge that is far from firms' traditional knowledge base (De Marchi, 2012), we hypothesize that financial constraints might be a stronger limitation for EI than for technological innovations.

What we are willing to test in the current contribution is how and if financial barriers have a detrimental effect for EI adoption.

The analysis we perform is empirical and is aimed at discussing the issue of 'financial drivers and barriers for eco innovation adoption', with a specific interest in manufacturing SME and on country and sector heterogeneity. Secondly, we acknowledge that the strategy of investing in diverse innovations (eco innovation, process, product, marketing, organizational innovations, etc..) is a costly investment for firms that can produce returns after a certain t. Integrating different innovation strategies can thus be not feasible for certain firms (e.g. those with lower financial resources) and this can in turn hamper their competitiveness. Coherently, we claim that the financial support to innovations should recognize the intangible value of complementarity among innovation practices and we are willing to test the role of financial barriers to the multiple adoption of innovation as well.

The relevance of such an analysis for policy design is crystal clear. If the presence of under-investment in environmental-innovative activities due to financial barriers emerges in the empirical analysis, the main policy implication would be that properly mitigating imperfections in capital market and facilitating firms' access to credit could spur the adoption of EI. In other words, the scarcity of financial resources is in our view an exogenous constraint that limits firms' investment in EI. A properly designed policy can for instance reduce the perceived risks perceived by firms, or can help firms in seeing the positive economic returns of their investment, as postulated by the Porter Hypothesis (Porter and van der Linde, 1995). This will in turn help reaching the broader policy target of improving Europe's environmental performances without giving up to its competitiveness, as the Europe 2020 Strategy puts forth. Furthermore, a properly designed policy can help exploiting the complementarities among innovations and their returns.

Our empirical analysis exploits the Flash Eurobarometer survey 315 on the "Attitudes of European Entrepreneurs towards eco-innovation" for small (10-49 employees) and medium (50-249 employees) enterprises operating in the 27 Member States of the European Union in the following sectors: Agriculture, Manufacturing, Water supply and waste management, Construction and Food services.

Our results outline a positive and strongly significant correlation between the adoption of EI and the presence of financial barriers. This is at a first glance unexpected, but is consistent with the view that barriers to innovation are perceived stronger for firms who are actually innovating (Mohen and Roeller, 2005). An explanation for this positive sign can be found also in previous literature in innovation studies. Baldwin and Lin (2002) and Tourigny and Le (2004) suggest that the obstacles to innovation cannot be interpreted as preventing innovation (as a negative sign would have suggested) but rather as a measure of how firms are able in overcoming them. Coherently, D'Este et al. (2008,2012), proposed a distinction between deterring and revealed barriers, in translating innovative input into actual output. Future extension of the paper will thus be to see whether results remain unaltered if we account for the different perceptions of barriers to innovation that arise between innovative and non-innovative firms. As the latter are found to be less sensitive to obstacles to innovation just because their propensity to is lower (Mohen and Roller, 2005), we will exclude from our empirical analysis those firms who do not innovate and do not perceive any barrier to innovation.

