



Is there a virtuous circle relationship between innovation activities and exports? A comparison of food and agricultural firms [☆]



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ABSTRACT

This study examines the existence of an interrelationship between innovation decisions and exports for food and agricultural firms as such a relationship could be the source of competitive advantages. Thus, taking as a theoretical basis the focus provided by the Resource-Based-View, the innovation and export decisions taken from 2006 to 2011 by 165 agricultural firms and 783 food companies operating in Spain (Europe) are examined here. The results of the bivariate probit and matching models used indicate a bi-directional nature of these decisions in the case of food companies and a positive though not bidirectional one in the case of the agricultural firms. Furthermore, a certain persistence is seen in the use of these decisions in both types of firms. For food companies, capital intensity and size are also determinants of innovation and exports. From the viewpoint of the decisions taken by individual firms, the bidirectional relationship could involve significant pressure in terms of the larger volume of both technological and human resources required. Agricultural and food policy decisions should incentivize these decisions given that in order to operate successfully in the global market it is necessary to acquire these competitive advantages, which also favor the growth of the agriculture and food trades.

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Introduction

The food and agricultural businesses play a fundamental role in the European production systems, representing about 14% of turnover in 2013 in the European Union (Food Drink, 2014; Hirsch et al., 2014; Eurostat, 2015). The importance of the sector becomes even greater when the contribution it makes to the rural population in disadvantaged areas of rural areas is taken into consideration (Compes and García Alvarez-Coque, 2009; Arnalte and Ortiz, 2011). It is thus of the greatest importance that agri-business firms increase their competitiveness in order to continue to make a valuable contribution to economic growth. However, the continuing globalization of the economy in general and the food market in particular constitutes a significant challenge for the various kinds of European agri-firms (Blandford and Hill, 2005; Arnalte et al., 2008). In any case, three factors are seen as crucial by Food Drink (2014) in the development of the sector: the growth of export market share, private (R&D) investment and improvements in labor productivity.

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Thus, the entry of these firms into international markets and the increase of their commercial activities in relation to countries abroad involve considerable effort but they allow them to make progress with their decisions of growth and competitiveness. Furthermore, as has already been mentioned, during this current period of global economic crisis, which has depressed domestic consumption, exports represent one of the few possibilities for growth for these firms, and even for their survival in some cases (Ebersberger and Herstad, 2013; Rama, 2014).

Along with their efforts to develop exports, these firms can use other decisions to help improve their competitiveness, among these are innovation activities and, indeed, these have become one of their main tools for this purpose (Vega-Jurado et al., 2008; Filippaios et al., 2009; Falk, 2012; Hashi and Stojcic, 2013). Thus the globalized environment and financial crisis in the context of which these firms operate forces them to think about the incorporation of technological advances in order to ensure their survival and growth (Ebersberger and Herstad, 2013). The basic idea is that innovation resources allow for the improvement of certain aspects of productivity which in turn has an effect on the firm's results, in terms of growth, profitability etc., as well as on the internationalization of the firm. And this in turn opens ways to find new markets and opportunities to increase production. Innovation and exports thus interact and can create a virtuous circle for the

firm, the sector or the country in question (Smith et al., 2002; Damijan et al., 2010).

Furthermore, both innovation and market internationalization have their places within the various theoretical focuses that have been applied over time. According to Hirsch et al. (2014) these activities are important from the viewpoint of Industrial Organization (IO), Market-Based-View (MBV) as set down by Porter as well as the more up to date Resource-Based-View (RBV) and the Evolutionary approach (López Rodríguez and García Rodríguez, 2005; Castellacci, 2008; Gallego, 2010; Hashi and Stojic, 2013; Hervas et al., 2014). All of these, to a greater or lesser extent deal with the competitive advantages which could arise resulting from the efforts made by firms toward innovation and internationalization. However, the greater complexity of the agribusiness market due to the important double influence of both the individual aspects of the firms as well as institutional factors must be taken into account (Triguero et al., 2013).

Additionally, the literature highlights the importance of innovation for the agri-food sector as one of the main elements by means of which firms can improve their positions in front of their rivals, both in local and international markets (Rama, 2008, 2014; Grunert et al., 1997; Traill and Meulenbergh, 2002; Capitanio et al., 2009). Though it is still considered a low intensity sector with regard to R&D&I (García and Burns, 1999; López Rodríguez and García Rodríguez, 2005; Capitanio et al., 2009, 2010; Triguero et al., 2013) one positive factor is the considerable growth in innovation activities in the agri-food sector in relation to the small amount of money spent on it when compared to other sectors.

This paper seeks to provide empirical knowledge regarding these matters so as to contribute to the debate on the innovation measures and policies which should be encouraged. In this context, the objective of this paper is to explore the possible bidirectional relations between innovation and exports in the agri-food sector, that is to say, to examine how the efforts made in innovation by agri-business firms contributes to their internationalization, and how at the same time this strengthens innovation. Two methodological approaches are used, with the study being contextualized within the Resources-Based-View Theory (RBV).

This study was carried out in Spain (European Union), a country where the agribusiness sector is very relevant in terms of economic position. Agriculture accounted for 2.3% of Spanish GDP in 2013 while the agri-food business accounted for 18.2% of sales and 16.5% of employment in Spanish industry (INE, 2015). In general terms and with regard to the business activities being examined here, in order to improve their competitiveness the Spanish agribusiness sector has been successfully responding to the challenges of internationalization that it faces. Thus, according to the Exports Report of the FIAB¹ (FIAB, 2012) sales outside Spain have increased by more than 60% in the last 10 years, from 19398.63 million Euro in 2001 to 31284.09 million Euro in 2011. Furthermore, the Spanish government is conscious of the importance of these processes and has taken steps to support innovation and the internationalization of these firms. The State Innovation Strategy (E2i) is the policy framework which coordinates measures to achieve higher levels of innovation. Furthermore, Spanish Institute of Foreign Trade and the Spanish Ministry of Food, Agriculture and the Environment] co-finance the internationalization programs of FIAB.

The information used was obtained from the PITEC [Innovation Technology Panel] produced by the INE (National Statistical Institute), which provides statistics on the technological activities of firms and is commonly used for analyzing innovation decisions. The bivariate probit models and the matching techniques

estimated take as dependent variables an indicator of whether or not the firm exports, jointly with variables for product or process innovation. The independent variables include different control variables and various measures of firms' innovation activities.

This paper's main contributions are a study of both food and agricultural firms, an analysis of innovation both in terms of the inputs that are used (total expenditure on innovation, internal expenditure on R&D, external expenditure on R&D) and the innovation outputs obtained (product innovation and process innovation) and, finally, the relationship between innovation and internationalization decisions.

The paper is organized as follows: section 'Innovation and exports' presents the most significant features of the study's conceptual framework, section 'Methodology' sets out the methodology used, starting from the data and moving to the econometric models estimated, and section 'Data' presents the results obtained. The section 'Conclusions' presents the most noteworthy conclusions to be drawn, the study's limitation and suggests areas for future research.

Innovation and exports

Considered from the microeconomic viewpoint used in this study, the decisions taken by firms in relation to innovation and exports can be placed in the context of strategic decisions taken with the aim of improving and increasing the firm's resources and capacities (The Theory of the Growth of the Firm, Penrose, 1959; Wernerfelt, 1984; Barney, 1991 among others) with the final aim of obtaining competitive advantages. Thus, internal and external R&D, technological cooperation with other firms and institutions etc. are innovation inputs which firms can employ in a coordinated manner with the impulse provided by other complementary assets such as human, commercial and financial resources (Christensen, 1995). This innovating effort carried out by the firm, in its different formats (internal, external, collaborations, etc.) conditions the capacity the organization will have to absorb the knowledge so generated. Various authors have referred to this as the capacity to recognize the value of the knowledge generated and incorporate it into the firm in commercial and productive terms (Cohen and Levinthal, 1990; Abecassis-Moedas and Mahmoud-Jouini, 2008). Thus this present study situates itself, as has already been indicated, within the Resource-Based-View theory, which has demonstrated the importance of the connection firms are capable of making between their resources and capacities (Hirsch et al., 2014).

Exploring this resources and capabilities perspective in various countries Wakelin (1998), Sterlacchini (1999), Basile (2001), Guan et al. (2006), Pla-Barber and Alegre (2007), Caldera (2010) and Yang and Cheng (2012) find that innovation capabilities encourage exports. López Rodríguez and García Rodríguez (2005), for their part, suggest that technological capabilities have an influence on the decision to export and also find that these capabilities are key factors in its competitiveness. Castellacci (2008) also finds more growth in these circumstances.

The model of Clerides et al. (1998) offers a rational explanation for this relationship: companies commit themselves to sunk entry costs in order to enter international markets (i.e. market research, product adaptation, etc.) so that only those that expect to make a gross profit from exports greater than these costs will decide to export. Companies that meet this condition are the most productive and in many cases the most innovative as well. Therefore, companies self-select for the internationalization process i.e. as companies innovate and increase productivity they gain in chances and incentives for access to foreign markets. Some studies differentiate between types of innovation and show that product innovations lead to more export advantages and benefits than process

¹ FIAB: Food and Drink industries Federation (Spain) www.fiab.es.

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