

Extended Abstract

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Paper/Poster Title	Agribusinesses under siege: Firm-level innovation and productivity in adverse economic environments
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Abstract prepared for presentation at the 96th Annual Conference of the Agricultural Economics Society, K U Leuven, Belgium

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Abstract	200 words max
<p>The role of agribusinesses can be crucial in improving a country's economic growth, diversification of revenue sources and contributing to its overall development goals. Previous research has focused on innovation in the first step of the agricultural value chain. Despite that, the off-farm segments may have equal weight in the performance of the entire chain; the food and beverage branch alone represents around 40-70% of the value-added cost. The aim of this paper is to analyse whether firm-level innovation improves agribusinesses' economic performance. Our analysis contributes to the current academic debate providing evidence of the agribusiness sector within a hostile business environment, a recurrent issue in several developing countries. We use the World Bank Enterprise Survey (2010, 2016) of El Salvador and follow a sequential Crépon-Duguet-Mairesse (CDM) approach, one of the most influential empirical frameworks in the recent literature on innovation and productivity at the firm level. Our results suggest that investment in innovation activities and the potential innovation outcomes are determined by both specific firm characteristics and the surrounding hostile environment. The agribusiness sector has not expanded its overall production frontier, and the expenditures on insecurity mitigation outweigh the economic gains from innovation outputs.</p>	
Keywords	Firm-level, Innovation, Agribusiness, CDM, TFP, El Salvador, Crime, Corruption, Insecurity
JEL Code	Innovation and Invention: Processes and Incentives O31, Agricultural Markets and Marketing; Cooperatives; Agribusiness Q13 see: www.aeaweb.org/jel/guide/jel.php?class=Q)
Introduction	100 – 250 words
<p>Agribusinesses are crucial for food security and the generation of employment opportunities in developing countries. Additionally, firm-level innovation is a necessary condition for the transformation and growth of the economic structures within any country. However, little is known about how innovation operates within the off-farm component of the food system (i.e. agribusiness sector) and how it matters for economic productivity. Previous research has mostly focused on innovation and productivity in the first step of the agricultural value chain, even though the off-farm segments (i.e. processing, logistics and wholesale of both inputs and outputs) may also have a significant weight in the performance of the chain as a whole. For example, considering the food and beverage subsector only, the off-farm activities represent</p>	

between 40% to 70% of the value-added cost in Asia and Africa (Reardon et al., 2014 & 2019).

This paper aims to determine the relationship between innovation and economic performance among agribusinesses in a developing country context. Consequently, we follow the CDM framework, one of the most influential efforts in recent literature on the determinants of innovation and productivity at the firm level (Lööf et al., 2016). Our analysis contributes to the current academic debate in two broad ways, thematically and methodologically. Firstly, we provide evidence from a scenario under a hostile business environment, a recurrent issue in several Latin American countries. Secondly, we use pooled cross-sectional to account for underlying time effects, test for potential endogeneity problems, and measure the effects of innovation outputs on firm performance through Total Factor Productivity (TFP).

Methodology

100 – 250 words

We use the two most recent waves from the World Bank's Enterprise Surveys in El Salvador to create a pooled cross-sectional database. We chose this scenario as representative of the region due to the importance of the informal sector, sluggish economic growth rates, endemic poverty (OIT, 2020; World Bank, 2021a), and its crime rates being above the regional average (UNODC, 2019).

We constructed a subsample based on the ISIC definition based on our focus on the agribusiness sector. In total, 244 establishments were considered for the analysis. We divided our variables into four categories: innovation inputs and outputs, production function, firm characteristics, and business environment. We built upon the CDM framework proposed by Crepon et al. (1998) that links innovation and productivity in a sequential process. The main advantages of this approach are addressing potential issues of endogeneity and selection bias and making a clear distinction between innovation inputs and innovation outputs (Griffith et al., 2006).

The stages of our analysis are three:

1. We examine the factors that explain a company's innovation effort (R&D) using a Tobit model.
2. We determine whether investments in innovation are transformed into new products or processes through a Probit model with a control function approach.
3. We determine whether innovation outputs improve the economic performance of firms under an IV regression with an endogenous dummy variable to estimate the effects of innovation outcome on total firm output proxied by total sales.

Results

100 – 250 words

Our results suggest that the level of investment in innovation activities, such as R&D expenditures, is determined by specific firm characteristics and barriers from the business environment. For example, firm size and a higher percentage of direct exports positively affected the amount spent on innovation inputs. In contrast, a larger proportion of foreign ownership and wholesale and storage enterprises were linked to lower investments. Moreover, business environment factors such as financing obstacles and higher perceptions of insecurity lead enterprises to reduce their innovation efforts.

Regarding the generation of innovation, outputs show that -as expected- more expenditures on inputs increase the probability of generating innovation outputs. Similarly, increments in size and age had positive effects (albeit with diminishing returns). However, a surprising finding was that perceptions of insecurity and corruption are associated with an increased likelihood of innovating. We reason that this result reflects the dynamics of adaptability among Salvadoran agribusinesses. Arguably, firms have countered their hostile economic environment via new products and processes, probably to avoid exiting the market entirely. Also, firms in the wholesale and storage branches are less likely to innovate than those in the processing sector.

Furthermore, having introduced an innovation did not significantly affect the level of sales of the agribusinesses. We found no evidence of technological change in TFP growth between 2010 and 2016. Moreover, the expenditures made towards protection against crime significantly affect firms' output levels. Establishments that did not incur security costs had -on average- 36% lower sales than those that did.

Discussion and Conclusion	100 – 250 words
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The main findings of our research indicate that insecurity plays a decisive role in all the aspects of the firms under study. Higher perceptions of insecurity reduce the efforts towards innovating (e.g. R&D expenditures) while, at the same time, positively influencing the generation of new products and processes; an effect that, we argue, is a mechanism for local enterprises to cope with their challenging business climate. Moreover, firms in the agro-processing sector are more likely to generate products with relatively more value-added; thus, policies should support them according to their strategic importance in the economy.

Moreover, we found no evidence of technological change in TFP growth between 2010 and 2016. Finally, the introduction of new products or processes did not lead to significant increases in total sales, which would suggest a lack of relevance of innovation outputs in the sector. However, these results should be contrasted with the fact that establishments that did not incur security costs had lower sales than those that did, even after we controlled for other firm characteristics.

Our analysis does not come without certain limitations, mainly regarding data availability and quality. The relatively high percentages of reported innovations should be contrasted with additional questions in the surveys about the quality of the innovations (e.g. detailed description of what was introduced). Similarly, alternative measures of innovation efforts beyond R&D expenditures should be included in the questionnaire, for example, the number of hours and the expenditures dedicated to human capital training, organisational changes, or marketing strategies.