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Export behaviour and innovation: a challenge to be met by cooperatives

Mercè Sala-Ríos
University of Lleida

Mariona Farré-Perdiguer
University of Lleida

Abstract

This study examines cooperatives' export behaviour. The aim is to determine the direct effect of cooperatives' size, innovation and experience on export intensity and whether there are any indirect effects. We use Path analysis to evaluate causal relationships. We find that innovation is a key factor to improve export intensity, whereas size displays an indirect effect only, and experience exhibits a negative relationship.

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Contact: Mercè Sala-Ríos - merce.sala@udl.cat, Mariona Farré-Perdiguer - mariona.farre@udl.cat.
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1. Introduction

The relationship between firms' characteristics and exporting has been widely analysed since Bernard & Jensen, (1995) first looked into it. The most common conclusions are that this relationship exists and that exporting firms exhibit better performance than non-exporting ones (Girma, Greenaway, and Kneller 2004). Melitz's (2003) trade model, with heterogeneous firms and a monopolistic competition framework, establishes that there is a "productivity threshold" below which firms do not generate sufficient profits from trade because they are unable to cover the sunk costs associated with export markets. Thus, there is a self-selection process that drives only the most productive ones to become involved in export activities (Andersson, Lööf, and Johansson 2008).

This paper focuses on this field of analysis. Specifically, we are interested in analysing the relationship between export intensity and some characteristics of Spanish work cooperatives in the manufacturing sector. In a previous analysis (Sala-Ríos, Torres-Solé, and Farré-Perdiguer 2021), we analysed the relationship between cooperatives' export behaviour and size. The results obtained made us suspect that some chains of cause-effect might exist between variables that were not captured by the methodology used. The aim of this work is to overcome that limitation. We use Path analysis to determine the effect of independent variables (cooperatives' size and experience) on the dependent variable (export intensity) by using an intermediate variable (innovation).

2. Working hypotheses

Among the main characteristics that scholarly research highlights as determinants of export intensity are firms' innovation processes, experience and size. However, as the link is not solely direct (Coad, Segarra, and Teruel 2016), our working hypotheses are inferred from the relationships noted below.

Many studies have found that innovation has a strong positive impact on exports (Becker and Egger 2013; Caldera 2010; Damijan, Kostevc, and Polanec 2010; Freixanet and Churakova 2018; Monreal-Pérez, Aragón-Sánchez, and Sánchez-Marín 2012). Innovation improves productivity and allows firms to transform their intention to export into the capacity to export (Ayllón and Radicic 2019; Máñez-Castillejo, Rochina-Barrachina, and Sanchis-Llopis 2009). Thus, our first working hypothesis is:

H1: *Innovation has a positive and significant effect on export intensity*

Something that is frequently deemed a stylized fact is that the larger the firm size, the greater the export intensity. However, empirical studies have yielded contradictory results, although the most widely held conclusion is that there is a positive relationship (Bandick 2020; Calof 1993, 1994; Celebic et al. 2020; Dhanaraj and Beamish 2003; Majocchi, Bacchiocchi, and Mayrhofer 2005; Moini 1995; Reis and Forte 2016). In addition, large firms tend to find it easier to obtain financing and recruit, hire and retain R&D staff, which makes them more efficient and better performing in terms of innovation (Abdu and Jibir 2018; Messeni Petruzzelli, Ardito, and Savino 2018).

The second and third hypotheses are:

H2: *Size is a determinant of export intensity*
H3: Size is a determinant of innovation

We expect experience to display a positive relationship with export intensity. If annual export profits were the same for younger and older firms, then younger firms would receive smaller returns upon entering the export market because they face higher risk of failure (Bernard and Jensen 1999; Madrid and García 2004). Likewise, we assume a positive relationship between experience and innovation. Research in this area shows the existence of learning effects that make innovation more effective in older firms (Coad, Segarra, and Teruel 2016). Capabilities, competencies, resources and knowledge increase with experience. Ultimately, firm age improves innovative outcomes. The fourth and fifth hypotheses are:

H4: *There is a significant positive relationship between experience and export intensity*
H5: *There is a significant positive relationship between experience and innovation*

3. Sample and methodology

We use a Spanish firm-level panel dataset spanning 26 years (1991–2016) focusing on Spanish work cooperatives in the manufacturing sector. The dataset comes from the Encuesta sobre Estrategias Empresariales (ESEE), which is produced annually by the Fundación SEPI under an agreement with the current Spanish Ministry of Finance.

Export intensity is measured through the export-to-total sales ratio. The indicator of size used is the cooperatives' employment (log Employment). Experience is assessed by the cooperatives' age (log Age). Innovation is measured as total expenditure on R&D plus imports of technology, over total sales (in %).

To analyse our dataset, we use Path analysis, a multivariate method that enables the verification of causal model adjustment and the identification of the direct and indirect contribution of independent variables that explain the variability of the dependent variable. Path analysis is a straightforward extension of multiple regression models. Its aim is to provide estimates of the magnitude and significance of hypothesised causal connections between sets of variables.

Previous studies on the relationship between export performance and firms' features have usually applied regression analysis. This modelling suffers from a certain simplicity in its structure when several explanatory variables are in turn explained by others, thus constituting chains of cause-effect that evidently better fit the nature of the phenomena. The advantage of applying Path analysis is that the links between variables can be considered simultaneously. This method clarifies correlation and indicates the strength of a causal hypothesis.

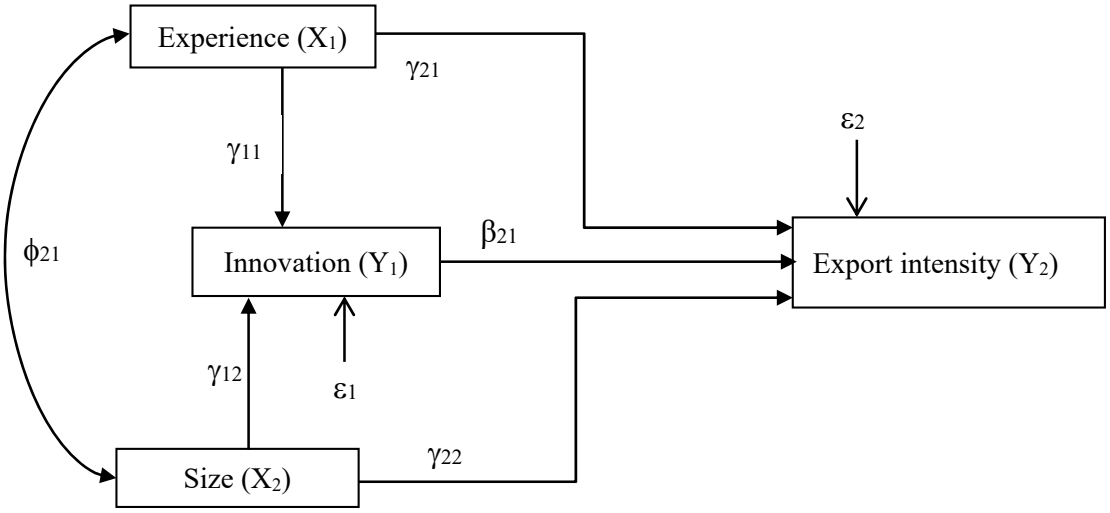
As is customary, we use a diagram to represent the hypothesized model. To adequately represent the model, some conventions must be followed:

- The relationship between variables is indicated by an arrow (represented by γ in Figure 1 and model 1).
- The covariation between exogenous variables is represented by a bidirectional arrow (represented by ϕ in Figure 1).
- Direct effects are those that one variable directly has on another.

- Indirect effects occur when the relationship between two variables is mediated by one or more variables.
- There is a spurious effect between two variables when the covariation between the two is due to a common cause.

Given these conventions and our working hypotheses, Figure 1 depicts our model.

Figure 1. Diagram of Path Analysis



The structural equation model is:

$$Y_2 = \beta_{21}Y_1 + \gamma_{21}X_1 + \gamma_{22}X_2 + \varepsilon_2$$
$$Y_1 = \gamma_{11}X_1 + \gamma_{12}X_2 + \varepsilon_1 \qquad (1)$$

4. Results

We begin this section by focusing on Hypothesis 5 because the results affect the discussion that follows. The structural equation model 1 estimation indicated a non-significant negative direct relationship between experience and innovation and a non-significant negative indirect relationship between experience and export intensity. Based on this result, two main considerations should be established. On the one hand, this direct negative relationship may be explained by the idea that firms' experience has the potential to generate obsolescence in the search for new ideas and innovation, whereas the challenge for young firms is to set up higher-level innovation capabilities (Soresen and Stuart 2000).

On the other hand, and more importantly for the development of the analysis, the lack of significance of the direct coefficient led us to reject Hypothesis 5. We eliminated the relationship between experience and innovation and found that the goodness-of-fit of the estimate improved. Thus, we decided to perform the analysis without this relationship. Figure 2 and Table 1 show the path analysis results.

The chi-square is not significant. The null hypothesis is that the model fits perfectly. The p-value (p = 0.284) is greater than 0.05, which means that the null hypothesis cannot be rejected and the model's goodness-of-fit is adequate. The root mean square error of approximation (RMSEA) value is less than the recommended 0.08 cutoff, and the p-value is above 0.05, again indicating a well-fitting model. The comparative fit index (CFI) and the Tucker–Lewis index (TLI) are close to the expected 0.95 (CFI = 1.00, TLI = 0.998), respectively. The standardized root mean square residual (SRMR = 0.011) is also good and below its 0.08 cutoff. The R2 values are 0.322 for export intensity and 0.065 for innovation. The value for export intensity is acceptable, but for innovation it is very low. Both suggest that there are more variables affecting export intensity and innovation.

Figure 2. Diagram of Path Analysis: Results

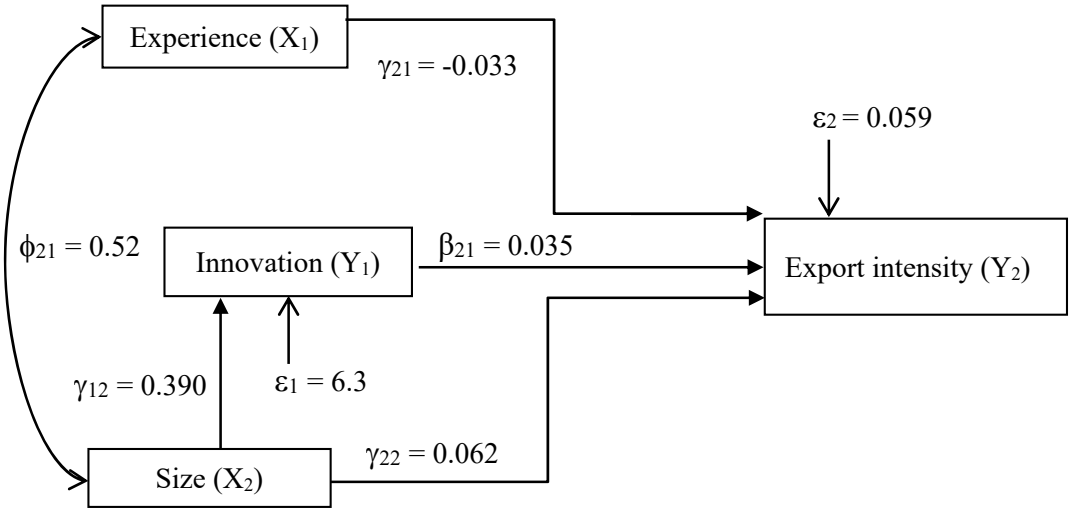


Table 1. Results model analysis

	Path Model	
Dependent variable: Export intensity (Y_2) $R^2 = 0.322$	Coefficient[1]	P>|z|
H1: Innovation (Y_1)	0.035*** (0.003)	0.000
H2: Size (X_2)	0.062 (0.006)	0.101
H4: Experience (X_1)	-0.033* (0.013)	0.011
Dependent variable: Innovation (Y_1) $R^2 = 0.065$	Coefficient	P>|z|
H3: Size (X_2)	0.390*** (0.054)	0.000
Indirect effect		
Dependent variable: Export intensity (Y_2)	Coefficient	P>|z|
Size (X_2)	0.014*** (0.002)	0.000

Fit statistics	
Likelihood ratio	
chi2_ms(1)	1.146
p > chi2	0.284
chi2_bs(5)	339.755
p > chi2	0.000
Population error	
RMSEA	0.014
90% CI, lower bound	0.000
upper bound	0.099
pclose	0.623
Baseline comparison	
CFI	1.000
TLI	0.998
Size of residuals	
SRMR	0.011
CD	0.235

1. Std. Err. In parenthesis; * p<0.05; ** p<0.01; *** p<0.001
Source: STATA

H1: *Innovation has a positive and significant effect on export intensity*

The model shows a positive and significant relationship between innovation and export intensity. This result supports Hypothesis 1 and is in line with other empirical studies focusing on capitalist firms (e.g., Falk & de Lemos, 2019; Iyer, 2010; Pla-Barber & Alegre, 2007; Reis & Forte, 2016) or on Spanish firms (e.g., Ayllón & Radicic, 2019; Caldera, 2010; Donoso & Martín, 2008; Monreal-Pérez et al., 2012).

H2: *Size is a determinant of export intensity*

The value of the coefficient is positive but is not significant. This leads us to note that cooperatives' size does not affect export intensity, so H2 is rejected. The relationship we are dealing with has been extensively analysed in the literature. The most important fact is that there is no agreement across the studies. Some confirm a positive relationship between the two variables yet others do not support this hypothesis and, in a smaller number of studies, a

negative relationship is even reported (for a literature review, see, e.g., Alshiqi, 2020; Bonaccorsi, 1992; Calof, 1994; Ha, Holmes, & Le, 2020; Hernández, 2020).

H3: Size is a determinant of innovation

The relationship between cooperatives' size and innovation is positive and significant. This provides support for hypothesis 3. In addition, the indirect effect of size on export intensity, i.e., the effect acting through innovation, is also positive and significant. Therefore, factors relating to size, such as economies of scale, resource availability and greater capacity for collecting information (Majocchi, Bacchiocchi, and Mayrhofer 2005; Verwaal and Donkers 2002; Wagner 1995, 2001) do not have a direct impact on export intensity, but have an indirect effect by having an impact on innovation.

H4: *There is a significant positive relationship between experience and export intensity*

Our results do not confirm that there is a positive relationship between cooperatives' experience and export intensity. Hypothesis 4 is not fulfilled. Studies focusing on Spanish capitalist firms such as Alonso & Donoso, (2000) and López & Serrano, (2020) are in disagreement with this because they found a positive relationship. However, we can find other works that cast doubt on the impact of experience on the growth of export intensity and instead believe that the youth of companies can be fundamental, especially within a context of market globalization (Pla-Barber and Alegre 2007). The younger the firms the more dynamic their behaviour, denoting that they adapt easier to changes in the legal and business environments (Vu et al. 2019). In addition, from the perspective of the so-called 'learning by exporting' mechanism, that is, the knowledge and learning process linked to exporting (Clerides, Lach, and Tybout 1998), a considerable number of studies have found that younger firms learn more quickly than older ones (Fariñas and Martín-Marcos 2007; Liu 2017). Better and faster learning therefore gives young companies an advantage in export markets.

5. Robustness check

As we have previously highlighted, regression suffers from a certain simplicity in its structure when there are chains of cause-effect with explanatory variables that are in turn explained by others. However, it provided a suitable methodology for assessing the robustness of our results. We decided to make two different estimates. The total effects could be obtained from the estimate of model 2. Model 3 would show the direct effect between innovation and size. To confirm the results, the total effects should go in the same direction as that obtained in the previous section. In addition, we assumed that an indirect effect would arise if the coefficient of model 3 was positive and significant.

$$\ln Export\ intensity_{it} = \alpha + \beta_1\, Innovation_{it} + \beta_2\, lnSize_{it} + \beta_3\, lnExperience_{it} + \delta_t + u_{it} \quad (2)$$

$(u_{it} = \mu_i + \varepsilon_{it})$

$$Innovation_{it} = \alpha + \beta_1\, lnSize_{it} + \delta_t + u_{it} \quad (3)$$

$(u_{it} = \mu_i + \varepsilon_{it})$

We started by estimating the total effects on export intensity (model 2). We assumed an individual-specific component (μ_i), and a time-specific component (δ_t).

The first step was to test between the fixed effects model and the random effects model. We rejected the null hypothesis that the random effects model was the most appropriate one because the probability value of the correlated random effects-Hausman test was less than 5% (0.000). We adopted the Wald test to determine the right model between the fixed effects model and the pooled OLS regression model. The null hypothesis of the pooled OLS regression model being appropriate was accepted because the value of the Wald test was greater than 5% (0.9694). Table 2 presents the main results of the regression (2). As expected, size and innovation showed positive and significant coefficients. The experience coefficient was, in contrast to the path result, positive and significant, albeit with a very low value.

Table 2. Results of Export intensity – total effects

	Pooled OLS	
Dependent variable: Export intensity	Coefficient	Prob.
Innovation	0.037*** (0.002)	(0.000)
Size	0.039*** (0.002)	(0.000)
Experience	0.001*** (0.001)	(0.000)
Firm effects	No	
Time effects	Yes	
Fit statistics		
R-squared 0.303419 Adjusted R-squared 0.302950 SE of regression 0.245245 Sum squared resid. 178.8114 Log likelihood -38.49961 Durbin-Watson stat. 1.415326	Mean dependent var. 0.223395 SD dependent var. 0.293744 Akaike info criterion 0.027890 Schwarz criterion 0.033936 Hannan-Quinn criterion 0.030065	

Note. Std. Err. In parenthesis (robust standard errors were used).
***p<1%; **p<5%; *p<10%.

We then proceeded to estimate model 3. We followed the same process as before. The value of the correlated random effects-Hausman test was 0.003; the value of the Wald test was 0.7231. Again, the most appropriate model was pooled OLS regression. Table 3 presents the main results of the regression (3). Size showed a positive and significant relationship with innovation.

Table 3. Results of Size – direct effect on innovation

	Pooled OLS	
Dependent variable: Innovation	Coefficient	Prob.
Size	0.2666*** (0.015)	(0.000)
Firm effects	No	
Time effects	Yes	
Fit statistics		
R-squared 0.057301 Adjusted R-squared 0.057301 SE of regression 2.522983 Sum squared resid. 9465.414 Log likelihood -3487.938 Durbin-Watson stat. 1.602694	Mean dependent var. 1.027419 SD dependent var. 2.598531 Akaike info criterion 4.689433 Schwarz criterion 4.692998 Hannan-Quinn criterion 4.690762	

Note. Std. Err. In parenthesis (robust standard errors were used).
***p<1%; **p<5%; *p<10%.

The total effects are largely consistent with those discussed in the previous section. The existence of the indirect effect of size through innovation can be deduced by combining the coefficient of size in model 3 and the coefficient of innovation in model 2. Although the indirect effects cannot be calculated, these results are in agreement with the main findings in our baseline estimation, giving them robustness.

6. Conclusion and discussion

The findings of this study indicate that the determinants of cooperatives' export intensity do not differ from those of capitalist firms. We have pointed out that innovation is a key factor to improve export intensity. However, size does not have a significant direct effect although it does have an indirect effect through innovation. Younger cooperatives show better export intensity results than older ones, which seems to agree with recent results supporting the positive correlation between younger Spanish cooperatives and entrepreneurship (Guzmán, Santos, and Barroso 2020). From a policymaker's viewpoint, it is necessary to point out that, besides the subsidies that currently exist in Spain to promote projects for the creation, modernization and employment of cooperatives, cross-cutting measures need to be implemented. On the one hand, such measures would help to promote and preserve the principles and values of cooperatives and, on the other, would help to improve competitiveness in international markets. This should avoid the process of degeneration that some studies link to cooperatives' internationalization processes (Bretos and Errasti 2017; Bretos, Errasti, and Marcuello 2018; Guzmán, Santos, and Barroso 2020; Leite and Duaibs 2017).

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