

## **Are Innovation Barriers Different for Chilean Exporters and Non-Exporters?**

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Santiago, Octubre de 2023

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In this paper, we study the existence of different innovation barriers between exporters and non-exporters in Chile. We deal with endogeneity of exporting using several econometric models. Our findings are very robust. For most of the aspects analyzed, exporters perceive lower innovation obstacles compared to non-exporters. Consistent with the concept of learning by exporting, it seems that the internationalization process allows firms to access new knowledge and technologies to improving their innovation capabilities. This can have relevant implications for public policy, particularly suggesting that public support for innovation would be more important for non-exporter firms.

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\* We thank comments and suggestions from participants at 17th ISGEP Workshop of the International Study Group on Exports and Productivity and at the Universidad Diego Portales.

## 1. Introduction

The literature on innovation barriers shows that these have different impacts across firms, which is very relevant for the design and implementation of public policies addressing these barriers. Policy makers worldwide must decide where and how to allocate resources, often aiming at the highest social return. Thus, it seems reasonable that public resources should mainly go to those firms facing higher obstacles for enhancing innovation activities. However generally it is difficult to understand how different obstacles affect different firms and if these differences are explained by other confounding factors. In this paper, using information from a Chilean innovation survey, we analyze differences in innovation barriers between exporters and non-exporters. This survey provides information about several perceived innovation barriers such as financial constraints, lack of technological and market information, and scarcity of qualified workers.

Studying the differences between exporter and non-exporter firms is relevant for several reasons. First, there is abundant evidence showing that there is an exporter premium, meaning that exporters are more productive, innovative, and larger compared to non-exporters. Also, given an open economy with high export concentration, as is the case of Chile, it is relevant to know how both firm types are affected by different obstacles in order to rethink the type of policies required to improve the innovation performance depending on the firms export status.

Several papers have explored the general impact of obstacles on innovation performance (Mohnen, et al. 2008; Savignac, 2008; D' Este et al., 2012) while others have analyzed how these obstacles differ across firms' characteristics such as size (Arza

and López, 2021), adoption of environmental management practices (Pekovic and Bouziri, 2021), and sectoral affiliation and technological behavior (Santiago et al. 2017). However, only a few papers have analyzed if the importance of innovation barriers differs between exporters and non-exporters. D'Este et al. (2014) finds some differences in the perception of innovation barriers along the internationalization process. The evidence shows that higher internationalization is associated with lower innovation obstacles related to knowledge. This can be interpreted as the internationalization process promoting learning or knowledge accumulation that allows them to overcome innovation-related barriers. This would be consistent with the literature on “learning by exporting” (Clerides et al., 1998). The authors also find that internationalization increases perceptions of barriers related to market concentration and demand uncertainty, suggesting that the learning effects are limited to knowledge and regulation barriers. D'Este (2012) compares innovation barriers between Spanish exporters and non-exporters, finding higher obstacles for exporters in innovation costs and markets information. In contrast, Santiago et al. (2017) does not find significant differences between these firms in Mexico, except for services exporters. However, most of these papers do not deal with the endogeneity of exporting.

The interpretation of the correlation between innovation barriers and exporting may be misleading because barriers could be discovered once firms start to export, or innovation barriers may affect the probability of exporting. Causality may run in both directions. Also, due to the omission of relevant variables, exporting may be capturing the impact of other firm characteristics. The literature has shown that exporters and non-exporters differ in several dimensions (Melitz and Redding, 2014).

We expect to find differences between these groups considering that exporters are more exposed to higher competition, to more exigent clients, and to new technologies. Thus, they can have incentives to develop more costly innovations and can therefore face more severe financial constraints than domestic producers. In contrast, following the idea of learning by exporting, their international exposure may help them to access new information about technology and markets that is not available to non-exporters. This leads to a more complex relationship between exporting and the type of barrier, where exporters may perceive greater obstacles in financial constraints, but less in terms of technological and market information.

We estimate several econometric models to deal with the endogeneity of exporting and the findings are very robust. For most of the aspects analyzed, exporters perceive lower innovation obstacles. Consistent with learning by exporting, it seems that the internationalization process allows firm to access new knowledge and technologies that improve their innovation capabilities. This can have relevant implications for public policy. Our findings indicate that, in the case of Chile, public support for enhancing innovation would be more needed for non-exporter firms.

The paper is structured as follows. In the second section, the data and main facts are given. In the third section, we discuss our econometric approach and present the main results. In the fourth section, we present the conclusions, and discuss some policy implications.

## **2. Data**

In this paper, we use data from the National Survey of Innovation (NSI). This survey is carried out by the National Institute of Statistics of Chile since 1995, and the

questionnaire follows the guidelines of the latest version of the Oslo Manual. It is like the Community Innovation Survey (CIS) and asks about the importance of innovation barriers. There are 5691 surveyed enterprises, distributed across 4-digit industries. The sample is stratified by industry and size. Our data comes from the most recently available survey, with data from 2019.

In Table 1 we show basic information for both the propensity to export and to innovate across industries. An innovator is defined as one that introduces either a product or a process innovation. As expected, a higher percentage of exporters is found in tradable industries such as mining (57.4%) and manufacturing (21.5%). Meanwhile, the highest innovation rates are in industries such as electricity, gas, steam (44.8%) and information and communication (32.9%). In Table 2 we look at the differences in some relevant indicators between exporters and non-exporters. Considering the propensity to invest in R&D and the probability of introducing product or process innovations, the data shows that exporters are more likely to innovate and more likely to invest in R&D. Consistent with findings in the literature for several countries, there is an export premium also in terms of size and productivity.

We analyze the differences in obstacles perceived by the firms. To do that, we use data from the question: to what extent do you perceive the following obstacles or disincentives to innovation in your company? The answer for that question is given a scale from 1 (no obstacle) to 4 (severe). The obstacles are grouped into four main categories: financial, knowledge, market, and others (mostly associated with regulations).

Specifically, the groups are defined as:

- Financial: lack of funds, lack of external financing, and high cost of innovation.
- Knowledge: Lack of qualified workers, lack of information about technology, lack of information about markets, and difficulties finding partners.
- Market: Market dominated by established firms and uncertainty about demand for innovations.
- Others: it is not necessary because of previous innovations, lack of innovation demand, and regulatory complexity.

The raw differences between exporters and non-exporters and the test of mean equality are shown in Table 3. In general, exporters perceive lower obstacles than non-exporters. However, these differences are only illustrative and do not necessarily reflect true differences between the two groups. First, exporters may perceive higher obstacles because they are more interested in innovation. This issue has been illustrated in several papers looking at the impact of innovation barriers. Savignac (2008) finds that there is a positive correlation between innovation and financial obstacles to innovation in France. However, once only potential innovators as a barrier are considered, the relationship turns out to be negative<sup>1</sup>. In our case, as shown in Table 4, considering only potential innovators, the differences are even greater. There are about 10 obstacles in which the difference is statically significant, compared with 5 in the total sample.

Second, exporting is an endogenous variable and the simple difference between exporters and non-exporters may be capturing the impact of some omitted variable, for

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<sup>1</sup> The sample of potential innovators excludes companies that report they do not innovate and that they do not face any innovation obstacles.

example size or productivity. Research in several countries with firm-level data has been shown the existence exporters' superior characteristics, which has been called the export premium (Bernard and Jensen, 1999). It can be also argued that there is a problem of reverse causality. The decision to become an exporter can change the perception of innovation barriers. However, it can be also that innovation barriers are affecting exporting decisions. Therefore, it is key to deal with this endogeneity problem. In the next section, we describe the results from three alternative methodologies addressing this issue and look at the causal impact of exporting on perceived obstacles to innovation.

### 3. Econometric Analysis

To look at the differences between exporters and non-exporters we estimate the following equation:

$$OI_i = \alpha + \beta D_i^x + \gamma X_i + \varepsilon_i$$

Where  $OI$  is a measure of the magnitude of the perceived barrier,  $D^x$  is the dummy variable for exporter, and  $X$  is a vector of some control variables.

To explore the impact of exporting on innovation obstacles, we follow Savignac, (2008) by restricting the sample to "potential innovators," i.e., we exclude companies that report they do not innovate and that they do not face any innovation obstacles. It has been shown in this literature that this exclusion reduces bias that is caused by firms that are not really interested in innovation. In fact, it has been found that when only considering potential innovators, the relationship between innovation and obstacles is negative, as would be expected (Savignac, 2008).



Given the discrete nature of our interest variables and to checking our results' robustness, we estimate the impact of exporting on perceptions of innovation obstacles using three alternative procedures. We start with defining our dependent variable as a dummy equal to 1 for those firms perceiving one of the obstacles as high or medium high. First, we use impact evaluation techniques, considering exporting as a treatment. This involves a propensity score matching estimation to find a control group, i.e., non-exporters that are similar to exporters in observable variables. These variables were size, age, productivity, a dummy for firms belonging to a corporation, and a dummy variable for foreign owned firms.<sup>2</sup> Since we could not match the two last variables between treated and control firms, we control for them in the estimation. Then, we estimate equation (1) only for firms in the common support.

Second, we estimate a bi-probit model where the probability of considering an obstacle as high or medium high depends on exporting and the other covariates discussed above. We include the change in sectoral exports in the probit for the probability of exporting. However, this variable is excluded from the probit for innovation obstacles.

Third, we estimate equation (1) using 2SLS. Although the methodology is more appropriate for linear models, we use it as a robustness check. We use change in sectoral exports as an instrument for exporting. To ensure the exogeneity of the sectoral exports, we do not use Chilean exports variations as instrument, instead we use world export changes. Some Chilean industries could have some market power, which it is

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<sup>2</sup> Age is defined as years since the start of firm commercial activities, Size is log of employment, and productivity is log of sales per worker.

hard to argue given the small size of the country. The identification assumption is that some worldwide positive shocks increase the probability of exporting and they do not affect the obstacles perception through other mechanisms.

The expected sign of the parameter  $\beta$  depends on how exporting changes the perception of the different obstacles. Consistent with the hypothesis of learning by exporting, it can be argued that once firms start to export, they may have access to new technologies or information that may reduce their perception of certain obstacles, such as knowledge about markets and technologies. In such a case, the exporting parameter should be negative.

However, in some other cases, for example qualified human capital and financial restrictions, entering international markets could make exporters more aware of obstacles, and the parameter should be positive. In fact, in the case of financial obstacles, the existence of fixed entry costs and the time elapsing between exporting and payment, suggests that exporters would be more credit constrained than non-exporters (Feenstra et al., 2014). However, there is also evidence that exporting may improve financial status (Greenway et al., 2007). Thus it is an open empirical question whether exporting relaxes or increases financial innovation barriers.

#### **4. Results**

In Tables 5, 6, 7 and 8 present the results of our estimations after the matching procedure, i.e., only considering firms in the common support of the probability of exporting. We estimate a probit model, defining the dependent variable as a dummy variable equal to 1 when the firm perceives the obstacle to be medium or high. The parameter  $\beta$  is generally negative and significant. For most of the obstacles, we find

that exporting reduces the perception of them being an issue. The only exception the lack of demand for innovations, where exporting would significantly increase the perception of this barrier.

In Tables 9, 10, 11 and 12 give the bi-probit estimation. For each aspect analyzed, we show the estimations for both the innovation obstacle and the probability of exporting. First, the instrument is positive and significant with the probability of exporting. Second, when looking at the results, we can infer a similar conclusion to the propensity procedure: exporting reduces innovation obstacles. Only the case of previous innovation by the firm differs. The parameter is positive, meaning that exporting increases the perception of an obstacle, but is not significant.

The results using 2SLS are shown in Tables 12 to 15 and reinforce that exporting is associated with lower financial, knowledge, and markets obstacles. These results are consistent with hypotheses related to the learning process from firms entering international markets. Like the two previous methodologies, the IV estimation shows that for those cases where the parameter for exporting is positive (previous innovations and lack of demand for innovations), they are not significant.

## **5. Conclusions**

Policy makers around the world deal with high uncertainty about the obstacles to innovation. Where should resources be allocated? Young firms? Small firms? Exporters or non-exporters? Previous evidence has found that the perception of barriers to innovation effectively inhibits innovation and that those perceptions differ by firm type. For example, perceptions of financial barriers have been found to greatly affect small Chilean firms (Alvarez and Crespi, 2015).

In this paper we have looked at differences between exporters and non-exporters in Chile to shed light on which types of firms may benefit from public support for innovation. This topic is interesting for at least two reasons. First, it is not clear whether exporters or non-exporters face higher innovation obstacles. Second, simple differences between these groups do not necessarily indicate that there is a causal relationship between exporting and perception of innovation obstacles. We deal with this endogeneity problem using three methodologies. The results tend to be robust and do not change fundamentally. For most of the barriers analyzed, we find that exporters perceive lower innovation obstacles than non-exporters.

These findings, consistent with the concept of “learning by exporting,” suggest that the internationalization process would allow firms to access new knowledge and technologies that can improve their innovation capabilities. This has relevant implications for public policy. In the specific case of Chile, according to our evidence, public support for innovation would be more needed by non-exporter firms than exporter ones.

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Table 1: Exporters and propensity to innovate by sector

<b>Sector</b>	<b>Exporter (%)</b>	<b>Propensity to innovate (%)</b>
Agriculture, forestry, and fishing	7.0	15.7
Mining and quarrying	57.4	31.1
Manufacturing	21.5	22.2
Electricity, gas, steam	1.7	44.8
Construction	0.0	12.6
Wholesale and retail trade	3.6	15.0
Transportation and storage	2.5	13.0
Accommodation and food services	7.1	20.5
Information and communication	12.6	32.9
Finance and insurance	1.1	11.0
Real estate	0.0	10.7
Professional, scientific and technical activities	3.7	20.4
Administrative and support activities	1.9	19.7
Arts, entertainment, and recreation	0.4	23.4

Source: Author's elaboration using the National Innovation Survey 2017-2018

Table 2: Differences between exporters and non-exporters

<b>Variable</b>	<b>All</b>	<b>Exporters (t)</b>	<b>Non-exporters (t)</b>
Workers (t-1)	29.6	84.7	27.1
Age	14,7	16,7	14,6
Sales/Workers \$CLP (t-1)	93,036	480,175	74,656
Part of a corporate group (%)	6.9	23	6.2
Foreign owned (%)	2	14.3	1.4
Propensity to innovate	16.1	27.8	15.6
Invest in R&D (%)	3.7	11.1	3.4
Observations	5,189	644	4,545

Source: Author's elaboration using the National Innovation Survey 2017-2018



Table 3: Differences in obstacle perception, exporters v/s non-exporters, full sample

Obstacle	Mean difference (exporter - non exporter	Standard error	P-value
Lack of funding resources	-0.001	0.0194	0.975
Lack of external financing	-0.039*	0.0199	0.051
High cost of innovation	0.032*	0.0187	0.092
Lack of qualified workers	0.005	0.0198	0.792
Lack of technology information	-0.191	0.020	0.339
Lack of market information	-0.049**	0.020	0.015
Difficulties finding cooperation	0.007	0.020	0.744
Market dominated by established enterprises	-0.059***	0.0198	0.003
Uncertain demand for innovative goods/services	0.002	0.0196	0.909
Previous innovations by the firm	-0.011	0.0184	0.554
Uncertainty about demand	-0.040**	0.0194	0.042
Regulatory complexity	-0.021	0.0195	0.286

Source: Author's elaboration using the NSI survey (N=5,961).

Table 4: Differences in obstacle perception, exporters v/s non-exporters, potential innovators sample

Obstacle	Mean difference (exporter – non exporter)	Standard error	P-value
Lack of funding resources	-0.044**	0.0189	0.021
Lack of external financing	-0.080***	0.0201	0.000
High cost of innovation	-0.013	0.0174	0.457
Lack of qualified workers	-0.037*	0.0199	0.063
Lack of technology information	-0.060***	0.0205	0.003
Lack of market information	-0.090***	0.0207	0.000
Difficulties finding cooperation	-0.042**	0.0203	0.037
Market dominated by established enterprises	-0.102***	0.020	0.000
Uncertain demand for innovative goods/services	-0.038*	0.0193	0.051
Previous innovations by the firm	-0.032	0.0201	0.114
Uncertainty about demand	-0.067***	0.0210	0.001
Regulatory complexity	-0.048**	0.0210	0.022

Source: Author's elaboration using the NSI survey (N=5,077).

Table 5: Probit results after PS matching, average marginal effects, financial obstacles

<b>Variable</b>	<b>Lack of funding resources</b>	<b>Lack of external financing</b>	<b>High cost of innovation</b>
Exporter (t)	-0.006 (0.0093)	-0.041*** (0.0099)	-0.036*** (0.0088)
Part of a group	-0.159*** (0.0104)	-0.244*** (0.0110)	-0.099*** (0.0101)
Foreign owned	0.016 (0.0149)	0.059*** (0.0162)	0.033** (0.0143)
Observations	4,756	4,756	4,756

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 6: Probit results after PS matching, average marginal effects, knowledge obstacles

<b>Variable</b>	<b>Lack of qualified workers</b>	<b>Lack of technology information</b>	<b>Lack of market information</b>	<b>Difficulties finding cooperation</b>
Exporter (t)	-0.084*** (0.0100)	-0.085*** (0.0102)	-0.069*** (0.0103)	-0.026** (0.0102)
Part of a group	-0.077*** (0.0120)	-0.179*** (0.0119)	-0.159*** (0.0121)	-0.072*** (0.0121)
Foreign owned	-0.065*** (0.0161)	-0.009 (0.0166)	0.025 (0.0167)	-0.046*** (0.0164)
Observations	4,756	4,756	4,756	4,756

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 7: Probit results after PS matching, average marginal effects, market obstacles

Variable	Market dominated by established enterprises	Uncertain demand for innovative goods/services
Exporter (t)	-0.021** (0.0099)	0.015 (0.0095)
Part of a group	-0.154*** (0.0113)	-0.138*** (0.0108)
Foreign owned	-0.032** (0.0157)	-0.051*** (0.0149)
Observations	4,756	4,756

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 8: Probit results after PS matching, average marginal effects, other obstacles

<b>Variable</b>	<b>Previous innovations by the firm</b>	<b>Lack of demand for innovations</b>	<b>Regulatory complexity</b>
Exporter (t)	0.011 (0.0101)	0.038*** (0.0105)	0.015 (0.0106)
Part of a group	-0.032*** (0.0122)	0.005 (0.0127)	-0.059*** (0.0127)
Foreign owned	0.011 (0.0164)	0.091*** (0.0171)	0.063*** (0.0172)
Observations	4,756	4,756	4,756

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 9: Bivariate probit results, average marginal effects, financial obstacles

Variable	Lack of funds	Lack of external financing	High cost of innovation
<b>Financial Obstacle</b>			
Exporter (t)	-0.217* (0.1207)	-0.288** (0.1465)	-0.328*** (0.1124)
Size (t-1)	-0.018 (0.0128)	-0.017 (0.0137)	0.018 (0.0120)
Age (t)	-0.019 (0.0198)	-0.003 (0.0206)	0.013 (0.0192)
Productivity (t-1)	-0.017 (0.0167)	-0.020 (0.0175)	0.010 (0.0134)
Corporate group	-0.086* (0.0501)	-0.095* (0.0544)	-0.097* (0.0521)
Foreign owned	-0.061 (0.0822)	0.074 (0.0709)	0.057 (0.0566)
<b>Exporter</b>			
Export Shock	0.013*** (0.0040)	0.012*** (0.0042)	0.017*** (0.0037)
Size (t-1)	0.018*** (0.0038)	0.018*** (0.0040)	-0.002 (0.0061)
Age (t)	-0.002 (0.0063)	-0.001 (0.0061)	0.008 (0.0049)
Productivity (t-1)	0.009* (0.0053)	0.009* (0.0053)	0.013 (0.0122)
Corporate group	0.013 (0.0125)	0.012 (0.0128)	0.067*** (0.0157)
Foreign owned	0.062*** (0.0165)	0.062*** (0.0162)	0.012*** (0.0035)
Observations	5,077	5,077	5,077
Sector dummies	Yes	Yes	Yes

Standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 10: Bivariate probit results, average marginal effects, knowledge obstacles

Variable	Lack of qualified	Lack of technology	Lack of market	Difficulties finding
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	<b>workers</b>	<b>information</b>	<b>information</b>	<b>cooperation</b>
<b>Knowledge Obstacle</b>				
Exporter (t)	-0.475*** (0.1062)	-0.375** (0.1478)	-0.291* (0.1667)	-0.202 (0.1462)
Size (t-1)	0.014 (0.0133)	0.002 (0.0143)	-0.008 (0.0148)	-0.005 (0.0136)
Age (t)	0.012 (0.0207)	0.011 (0.0216)	0.008 (0.0215)	0.031 (0.0209)
Productivity (t-1)	0.002 (0.0141)	-0.010 (0.0160)	-0.015 (0.0172)	-0.004 (0.0155)
Corporate group	-0.097* (0.0547)	-0.063 (0.0567)	-0.094* (0.0556)	-0.081 (0.0572)
Foreign owned	0.197*** (0.0600)	0.045 (0.0902)	0.067 (0.0930)	-0.076 (0.1008)
<b>Exporter</b>				
Export Shock	0.013*** (0.0040)	0.012*** (0.0040)	0.012*** (0.0041)	0.013*** (0.0043)
Size (t-1)	0.017*** (0.0037)	0.017*** (0.0038)	0.017*** (0.0037)	0.017*** (0.0038)
Age (t)	0.000 (0.0056)	-0.001 (0.0059)	-0.001 (0.0060)	-0.001 (0.0061)
Productivity (t-1)	0.007 (0.0056)	0.007 (0.0056)	0.008 (0.0057)	0.008 (0.0055)
Corporate group	0.013 (0.0126)	0.015 (0.0128)	0.014 (0.0127)	0.012 (0.0122)
Foreign owned	0.068*** (0.0161)	0.062*** (0.0157)	0.063*** (0.0158)	0.063*** (0.0163)
Observations	5,077	5,077	5,077	5,077
Sector dummies	Yes	Yes	Yes	Yes

Standard errors in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1



Table 11: Bivariate probit results, average marginal effects, market obstacles

Variable	Market dominated by established enterprises	Uncertain demand for innovative goods/services
<b>Market Obstacle</b>		
Exporter (t)	-0.287* (0.1547)	-0.466*** (0.0942)
Size (t-1)	-0.011 (0.0132)	0.007 (0.0124)
Age (t)	0.031 (0.0201)	0.036* (0.0195)
Productivity (t-1)	0.002 (0.0148)	-0.001 (0.0146)
Corporate group	-0.086 (0.0544)	-0.104** (0.0512)
Foreign owned	-0.066 (0.0999)	0.151*** (0.0560)
<b>Exporter</b>		
Export Shock	0.013*** (0.0042)	0.012*** (0.0035)
Size (t-1)	0.018*** (0.0040)	0.018*** (0.0038)
Age (t)	-0.000 (0.0059)	-0.000 (0.0059)
Productivity (t-1)	0.009* (0.0052)	0.010* (0.0053)
Corporate group	0.010 (0.0126)	0.011 (0.0125)
Foreign owned	0.063*** (0.0165)	0.067*** (0.0153)
Observations	5,077	5,077
Sector dummies	Yes	Yes

Standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 12: Bivariate probit results, average marginal effects, other obstacles

Variable	Previous innovations by the firm	Lack of demand for innovations	Regulatory complexity
<b>Other Obstacles</b>			
Exporter (t)	0.259 (0.1930)	-0.026 (0.2091)	-0.329** (0.1669)
Size (t-1)	-0.015 (0.0135)	-0.001 (0.0147)	0.006 (0.0140)
Age (t)	0.010 (0.0211)	0.028 (0.0222)	0.024 (0.0220)
Productivity (t-1)	-0.019 (0.0144)	-0.007 (0.0149)	-0.006 (0.0145)
Corporate group	0.027 (0.0519)	0.045 (0.0556)	-0.072 (0.0523)
Foreign owned	-0.100 (0.0788)	-0.119 (0.0892)	0.156 (0.0983)
<b>Exporter</b>			
Export Shock	0.011*** (0.0043)	0.012*** (0.0046)	0.012*** (0.0039)
Size (t-1)	0.017*** (0.0038)	0.018*** (0.0040)	0.018*** (0.0039)
Age (t)	-0.002 (0.0063)	-0.001 (0.0064)	-0.001 (0.0057)
Productivity (t-1)	0.009* (0.0048)	0.009* (0.0052)	0.008 (0.0056)
Corporate group	0.011 (0.0116)	0.011 (0.0121)	0.010 (0.0123)
Foreign owned	0.064*** (0.0157)	0.064*** (0.0163)	0.065*** (0.0158)
Observations	5,077	5,077	5,077
Sector dummies	Yes	Yes	Yes

Standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 13: Two stage least squares results: financial obstacles.

Variable	Lack of funding resources	Lack of external financing	High cost of innovation
Exporter (t)	-0.378* (0.2065)	-0.445** (0.1794)	-0.482** (0.2025)
Size (t-1)	-0.016 (0.0150)	-0.015 (0.0150)	0.024* (0.0142)
Age	-0.020 (0.0204)	-0.002 (0.0212)	0.013 (0.0208)
Productivity (t-1)	-0.017 (0.0182)	-0.021 (0.0189)	0.013 (0.0153)
Part of a group	-0.049 (0.1113)	0.108 (0.0762)	0.089 (0.0684)
Foreign owned	-0.097 (0.0628)	-0.101 (0.0633)	-0.103 (0.0666)
Sector dummies	Yes	Yes	Yes
F test (CD)	327.9	327.9	327.9
F test (KP)	135.2	135.2	135.2
Observations	5,077	5,077	5,077

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 14: Two stage least squares results: knowledge obstacles.

Variable	Lack of qualified workers	Lack of technology information	Lack of market information	Difficulties finding cooperation
Exporter(t)	-0.568*** (0.1738)	-0.430** (0.2112)	-0.237 (0.2285)	-0.366* (0.2077)
Size(t-1)	0.017 (0.0152)	0.003 (0.0159)	-0.009 (0.0160)	-0.002 (0.0149)
Age	0.013 (0.0223)	0.011 (0.0228)	0.008 (0.0224)	0.032 (0.0221)
Productivity(t-1)	0.002 (0.0161)	-0.011 (0.0171)	-0.017 (0.0182)	-0.002 (0.0164)
Part of a group	-0.104 (0.0634)	-0.066 (0.0639)	-0.106* (0.0615)	-0.079 (0.0650)
Foreign owned	0.224*** (0.0672)	0.055 (0.1067)	0.060 (0.1080)	-0.054 (0.1218)
Sector dummies	Yes	Yes	Yes	Yes
F test (CD)	327.9	327.9	327.9	327.9
F test (KP)	135.2	135.2	135.2	135.2
Observations	5,077	5,077	5,077	5,077

Standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 15: Two stage least squares results: market obstacles.

<b>Variable</b>	<b>Market dominated by established enterprises</b>	<b>Uncertain demand for innovative goods/services</b>
Exporter (t)	-0.268 (0.2394)	-0.509*** (0.1888)
Size (t-1)	-0.012 (0.0149)	0.011 (0.0148)
Age	0.032 (0.0213)	0.039* (0.0217)
Productivity (t-1)	0.001 (0.0165)	0.000 (0.0167)
Part of a group	-0.096 (0.0621)	-0.123** (0.0625)
Foreign owned	-0.088 (0.1211)	0.165** (0.0685)
Sector dummies	Yes	Yes
F test (CD)	327.9	327.9
F test (KP)	135.2	135.2
Observations	5,077	5,077

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 16: Two stage least squares results: other obstacles.

Variable	Previous innovations by the firm	Lack of demand for innovations	Regulatory complexity
Exporter (t)	0.156 (0.2200)	0.008 (0.2217)	-0.383** (0.1707)
Size (t-1)	-0.014 (0.0146)	-0.002 (0.0150)	0.006 (0.0144)
Age	0.011 (0.0217)	0.028 (0.0224)	0.025 (0.0225)
Productivity (t-1)	-0.018 (0.0153)	-0.007 (0.0153)	-0.006 (0.0149)
Part of a group	0.033 (0.0530)	0.044 (0.0569)	-0.071 (0.0533)
Foreign owned	-0.080 (0.0824)	-0.118 (0.0849)	0.171 (0.1059)
Sector dummies	Yes	Yes	Yes
F test (CD)	327.9	327.9	327.9
F test (KP)	135.2	135.2	135.2
Observations	5,077	5,077	5,077

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1