The effect of the Great Recession on exports. Evidence from Spain*

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Abstract

   This paper analyzes whether the drop in domestic demand due to the Great Recession triggered an increase in the number of exporters and export revenues among existing exporters in Spain. Our analyses show that a fall in domestic demand raised the likelihood that a firm became an exporter and increased export revenues among existing exporters. The drop in domestic demand had stronger effects on firms whose export intensity was low than on firms whose export intensity was large. We also show that the drop in domestic demand had a larger effect on export revenues generated from new markets and products than from existing export operations. The increase in the number of new exporters motivated by the crisis may lead to a permanent increase in Spanish aggregate exports in medium-long term.
   Keywords: exporters, exports, Spain, Great Recession, domestic demand.
   JEL classification: F10, F14.

Resumen

   Este trabajo analiza si la caída de la demanda doméstica debida a la Gran Recesión provocó un aumento en el número de empresas exportadoras y de los ingresos por exportación de las empresas que ya exportaban en España. Nuestros análisis muestran que la caída de la demanda doméstica aumentó la probabilidad de que empresas no exportadoras comenzasen a exportar, y provocó un crecimiento de las exportaciones entre empresas que ya exportaban. La caída de la demanda doméstica tuvo un impacto mayor en las empresas con una baja intensidad exportadora que en las empresas con una alta intensidad exportadora. Asimismo, la caída de la demanda tuvo un mayor efecto sobre las exportaciones en nuevos mercados y productos que sobre las operaciones de exportación que ya existían. El crecimiento del número de empresas exportadoras debido a

la crisis puede conducir a un aumento permanente en el valor agregado de las exportaciones españolas en el medio-largo plazo.
    Palabras clave: *exportadores, exportaciones, España, Gran Recesión, demanda interna.*
    Clasificación JEL: *F10, F14.*

1. Introduction

In a conference in San Sebastián on the 13th of February 2018, the Spanish State Secretary of Commerce, Marisa Poncela, stated that "the economic crisis had been a revulsive to Spanish exports"[1]. This statement is likely to be accepted without further discussion by the business community: if sales drop at home, foreign markets provide an alternative market for firms' products or services. In fact, international business textbooks and export promotion agencies highlight market diversification as one of the reasons to export.

However, international trade models have not contemplated, until very recently, the possibility that firms may compensate the downturns in domestic demand with exports. For example, the present workhorse model of international trade (Melitz, 2003), does not establish any link between the situation in the domestic market and firms' export status. In this model, firms will export if they obtain profits in the foreign market, and these profits are independent of the situation in the domestic market.

In contrast, alternative models, such as Blum et al. (2013), argue that firms face capacity constraints in the short-run, which lead to increasing marginal costs. When domestic demand is high, the marginal cost of producing for foreign markets will be large, making firms less competitive in foreign markets. Instead, when domestic demand drops, the marginal costs of producing for foreign markets declines, raising firms' competitiveness abroad. This model explains why firms sell only in the domestic market when domestic demand is high and become (occasional) exporters when domestic demand drops. In Blum et al. (2013), physical capital generates the capacity constraint; however, it can also arise due to a lack of financial resources or limits in management time[2].

In this paper, we use Spanish firm-level data to test whether the reduction in domestic demand is positively associated with an increase in (i) the likelihood of firms becoming exporters and (ii) existing exporters' foreign sales. We find that the drop in domestic demand is positively associated with the probability of entering foreign markets and with an increase of incumbent exporters' foreign sales. We show that the drop in domestic demand has stronger effects on low export-intensity firms

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[1] Available *at http://www.diariovasco.com/economia/empresas-exportadoras-vascas-20180213113201-nt.html.*

[2] VANNORENBERGHE (2012), SODERBERY (2014) and AHN and MCQUOID (2017) develop alternative trade models with capacity constraints. These authors, as BLUM et al. (2013), provide empirical evidence on the negative relationship between exports and domestic demand. In contrast, BERMAN et al. (2015) find a positive relationship between domestic demand and exports.

than on high export-intensity firms. We also find that the drop in domestic demand has a greater effect on export revenues generated in new markets and products than in existing export operations. Finally, some exporters that were born during the crisis have become regular and may lead to an increase in the aggregate value of Spanish exports in the medium and long term.

Our findings contribute to the literature that analyzes the relationship between exports and the economic cycle in the domestic market. There is a long tradition in the Spanish literature on the relationship between domestic demand and exports. Previous studies, such as Fernandez and Sebastián (1989), Buisán and Gordo (1994). Mauleón and Sastre (1994), Bajo and Montero (1995), Alonso (1997) and Domenech and Taguas (1997) analyzed this relationship using export functions and aggregated data[3]. Our study is a step forward in this literature since it uses firm-level data to explore the relationship between exports and domestic demand. The use of firm-level data links our paper with Banco de España (2017) and Almunia et al. (2018) who also find a positive relationship between the drop in domestic demand and the expansion of exports[4]. We contribute to this later literature providing new evidence on the association between exports and domestic demand. We explore whether the fall in domestic demand has a different effect on low export-intensity and high export-intensity firms. Furthermore, we examine whether the revenue generated in existing export operations are less sensitive to changes in domestic demand than the revenue generated in new export operations.

The paper is organized as follows. Section 2 presents the evolution of domestic demand, exports and number of exporters during the Great Recession. Section 3 introduces the firm-level datasets used in the empirical analysis. Section 4 reports the regression results on the relationship between domestic demand and the extensive and intensive margin of exports. Section 5 explores whether the rise in the number of exporters due to the crisis can become permanent and Section 6 concludes.

2. Domestic demand and exports in the Great Recession

Figure 1 presents the evolution of domestic demand, merchandise exports and the number of exporters during the 2008-2017 period. Domestic demand is calculated as GDP-Exports+Imports. We use index numbers, setting the values for the year 2008 at 100. We define as exporter a firm that exports, at least, €1500 per transaction and year.[5]

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[3] BELKE et al. (2015) also find a negative relationship between domestic demand and exports in Spain using time-series techniques.

[4] In a previous study (MAÑEZ et al., 2004) using firm-level data from the Survey of Firms' Strategies (Encuesta de Estrategias Empresariales – ESEE) do not find any relationship between the growth in domestic sales and export participation.

[5] Exporters' data are from the Customs and Excise Department of the Spanish Tax Agency. GDP, aggregate exports and imports data are from the Spanish Statistics Institute (INE). Current prices are transformed into constant prices using INE's price indexes.

The Great Recession began in Spain in the third quarter of 2008 and lasted until the third quarter of 2013 (Spanish Statistics Institute's Economic Accounts database). At the end of that year, domestic demand was 16 percentage points lower than at the beginning of the crisis. From 2014 onwards, domestic demand began to recover, although in 2017 it was still 6 percentage points lower than in 2008. The figure also shows that, after a sharp drop in 2009, Spanish exports grew during the 2010-2017 period. Although some media articles have denoted the evolution of exports as miraculous[6], the post-crisis export growth rate, measured in current prices, was similar to the one achieved before the crisis (De Lucio et al., 2018b).

FIGURE 1

EVOLUTION OF EXPORTERS, (MERCHANDISE) EXPORTS AND DOMESTIC DEMAND, 2008-2017 (CONSTANT PRICES; 2008 VALUES=100).
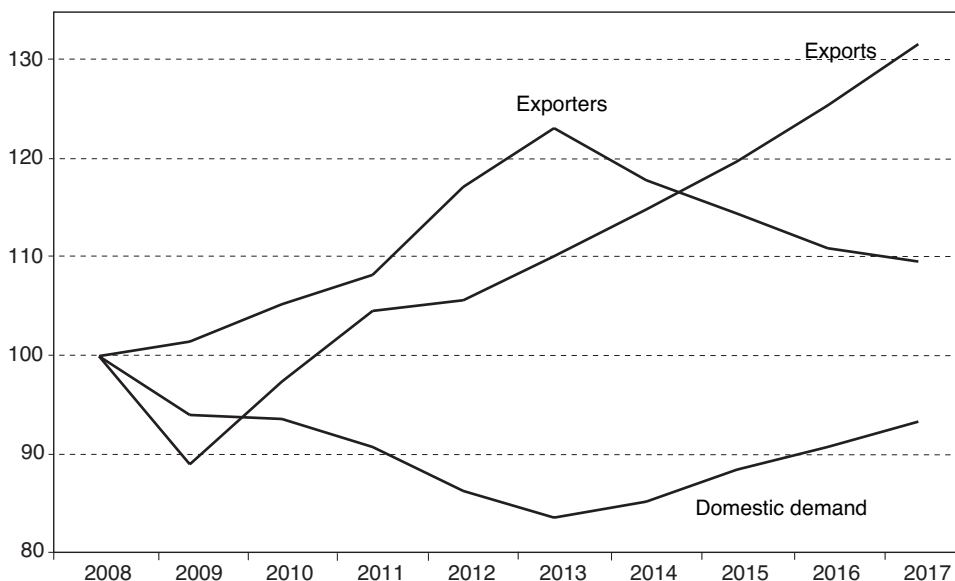
SOURCE: Authors' own calculations based on Customs and Spanish Statistics Institute.

Finally, the figure suggests an association between domestic demand and the number of exporters. When domestic demand drops, more firms enter foreign markets; however, the number of exporters drops once domestic demand begins to recover. We also observe that, except for 2009, exports rise both when domestic demand drops and when domestic demand recovers. In the regression analyses

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[6] For example, *https//www.elconfidencial.com/economia/2015-04-13/espana_vive_un_milagro_expor tador_tras_la_crisis_financiera;* and *http://www.blogscapitalbolsa.com/article/12931/el milagro de la economia espanola.html*.

we will test the association between (i) the variation in domestic demand and the likelihood of becoming an exporter, and (ii) the variation in domestic demand and changes in existing exporters' foreign sales.

3. Firm-level data

To carry out the regression analyses, we use data on firms' domestic demand, export status and export revenues. We obtain this information combining the Department of Customs and Excise of the Spanish Tax Agency and the Bureau Van Dick SABI datasets. The first provides data on export transactions for all Spanish exporters and the second reports detailed financial and accounting records of Spanish firms that deposited their accounts in the Business Register. Unfortunately, it is not possible to combine directly Customs and SABI because of the lack of a common firm identifier. This handicap is solved using the correspondence created by de Lucio et al. (2018c). We use data for the 2001-2016 period. We can match SABI and Customs data for 25,081 firms, which account for 81 per cent of Spanish merchandise exports during the period of analysis. It is important to note that our sample does not include firms that were always non-exporters during the period of analysis. We calculate firms' domestic demand as the difference between output and exports. We transform current into constant values using INE's industrial price indexes.

4. Regression results on the substitution between domestic demand and exports

In this section we use a regression analysis to test the relationship between (i) the drop in domestic demand and the likelihood that a firm becomes an exporter; and (ii) the fall in domestic demand and existing exporters' foreign sales.

To test the first relationship, we estimate the following regression equation

$$Exporter_{fkt} = \beta_1 \ln dd_{fkt} + \beta_2 \ln TFP_{fkt}$$
$$+ \beta_3 \ln wpe_{fkt} + Exporter_{fkt-1} + \gamma_{kt} + \gamma_f + \varepsilon_{fkt} \qquad [1]$$

where $Exporter_{fkt}$ is a dummy variable that takes the value of one if firm f, operating in industry k, is an exporter at year t and zero otherwise; dd_{fkt} is domestic demand, TFP_{fkt} total factor productivity, wpe_{fkt} wage per employee and $Exporter_{fkt-1}$ is a dummy variable that takes the value of 1 if firm f was exporting the previous year[7].

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[7] Wages per employee are obtained from SABI. Data to estimate TFP are also obtained from the SABI dataset. We estimate a separate production function for each 4-digit NACE rev 2 industry using all manufacturing firms in SABI with complete information about sales revenues, cost of intermediate inputs, value of physical capital and number of employees. Output is obtained after deflating sales revenues by the corresponding 4-digit NACE rev 2 industrial production price index published by the Spanish National Statistic Institute (INE) (available at *www.ine.es*). Labor is measured as the total number of employees. Physical

Equation (1) includes industry+year fixed effects (γ_{kt})[8] and firm fixed effects (γ_f); ε_{fkt} is the disturbance term. Equation (1) includes TFP and wages per employee to control for firms' marginal costs, and for export-status hysteresis, due to the potential existence of export sunk costs (Baldwin, 1988). Due to the high-dimension fixed effects in equation (1), we estimate a linear probability model.

Table 1 presents the results of the estimations. In column (1) we present the results of estimating the model with domestic demand as the only independent variable. As expected, the domestic demand coefficient is negative and statistically significant. A 10 per cent drop in domestic demand raises the probability of becoming an exporter by 0.1 per cent. In column (2), we introduce TFP and wages per employee to control for firm level variables that determine marginal costs and vary over time. As expected, the TFP coefficient is positive and statistically significant, confirming that more productive firms are more likely to become exporters (Bernard et al., 2007). However, wage per employee does not have a significant effect on the likelihood of a firm becoming an exporter. The domestic demand coefficient remains negative and statistically significant. Finally, column (3) estimates Equation (1) introducing a lagged export status. In line with previous studies (Roberts and Tybout, 1997), we find that firms are more likely to remain exporters if they exported the previous year. The coefficient for domestic demand remains negative and statistically significant.

TABLE 1
DOMESTIC DEMAND AND THE PROBABILITY OF BECOMING AN EXPORTER, 2001-2016

	(1)	(2)	(3)
Domestic demand(log)	–0.010*** (0.003)	–0.017*** (0.003)	–0.015*** (0.002)
TFP(log)		0.031*** (0.004)	0.025*** (0.003)
Wage per employee(log)		0.002 (0.007)	–0.004 (0.005)
Exported previous year			0.387*** (0.006)
Observations	140,112	140,112	140,112
R-squared	0.601	0.602	0.664

NOTE: All specifications include industry+year and firm fixed effects. Standard errors clustered by firm in parentheses. *** statistically significant at 1 per cent.

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capital is proxied by the book value of material tangible assets and transformed into constant values using the deflator of aggregated "production" capital obtained from IVIE (available at *www.ivie.es*). Materials is proxied by the consumption of intermediate inputs and deflated by the Spanish intermediate goods production price index obtained from INE. We use Stata's LEVINSOHN and PETRIN'S (2003) levpet routine to estimate the production coefficients using intermediate inputs (materials) as control for unobservable productivity shocks.

[8] We define industries at the NACE Rev. 2, 4-digit classification. Due to their special characteristics we drop tobacco and petroleum industries from the sample.

Our results are in line with Almunia et al. (2018). They combine data from the Commercial Registry and the Central Bank of Spain foreign transaction registry for the 2000-2013 period. They also find that domestic demand is negatively associated with the probability of becoming an exporter.

Next, we explore whether existing exporters increase their export revenues when domestic demand falls. To test this hypothesis, we estimate a regression equation in first-differences

$$\Delta x_{fkt} = \Delta dd_{fkt} + \Delta TFP_{fkt} + \Delta wpe_{fkt} + \gamma_{kt} + \gamma_f + \varepsilon_{fkt} \qquad [2]$$

where $\Delta x_{fkt} = \ln x_{fkt} - \ln x_{fkt-1}$ is the difference in log exports by firm f operating in industry k between year t and $t-1$. We estimate the equation with OLS.

Table 2 presents the results of the estimations. The domestic demand coefficient is negative and statistically significant in both specifications. According to the coefficient reported in column (2), a 10 per cent drop in domestic demand is associated with a 3 per cent increase in export revenues. As expected, an increase in TFP and a reduction in wages per employee are associated with a rise in export revenues. Our results concord with the estimations reported in Banco de España (2017) and Almunia et al. (2018).

If the theoretical argument that exports compensate for the decline in domestic demand was correct, we would expect a larger elasticity of exports with respect to domestic demand in firms that direct most of their sales to the domestic market than in firms that direct most of their sales to foreign markets. To test this hypothesis, we estimate Equation (3) for firms whose export intensity, measured as exports over revenue, is equal or lower than 50 per cent, and firms with an export intensity higher than 50 per cent.

TABLE 2
FIRST DIFFERENCES. DOMESTIC DEMAND
AND EXPORT REVENUES, 2001-2016

	(1)	(2)
ΔDomestic demand	−0.218*** (0.010)	−0.273*** (0.011)
ΔTFP		0.330*** (0.018)
Δ Wage per employee		−0.154*** (0.022)
Observations	92,870	92,870
R-squared	0.156	0.169

NOTE: Δ Domestic demand = ln (Domestic Demand$_t$) − ln (Domestic Demand$_{t-1}$). All specifications include industry + year and firm fixed effects. Standard errors clustered by firm in parentheses. *** Statistically significant at 1 per cent.

Table 3 shows the results of the estimations. As expected, the domestic demand coefficient has an absolute larger value for firms with an export intensity equal or below 50 per cent than for firms with an export intensity higher than 50 per cent. A 10 per cent drop in domestic demand leads to a 4 per cent increase in exports in the former and to a 1 per cent rise in the latter. For both class of firms, TFP has a positive effect on export revenue and wage per employee has a negative impact on export revenue.

We define a firm export operation as the combination of a product and a destination. Exporters can increase their revenues raising sales in their existing export operations, denoted as the intensive margin, or diversifying into new destinations and products, denoted as the extensive margin. To determine whether changes in domestic demand have a different impact on each margin, we estimate Equation (2) separately for existing operations and for diversification operations. We define an export operation as existing if it was alive the previous year. We define products at the Combined Nomenclature (CN) 8-digit classification. Since a sizable amount of CN codes are introduced, dropped or merged every year, we use the algorithm developed by Van Beveren et al. (2012) to build a product classification that traces these changes.

Table 4 presents the results of the estimations. The effect of a drop in domestic demand is larger on diversification operations than on existing operations. Whereas a 10 per cent drop in domestic demand is associated with a 1.7 per cent increase in export revenues from existing operations, the same drop leads to a 3.2 per cent increase in diversification operations. These results indicate that, in the event of a fall in domestic demand, exporters are more likely to seek new customers in new

TABLE 3
CHANGE IN EXPORTS AND DEMAND FOR DIFFERENT LEVELS OF EXPORT INTENSITY, 2001-2016

	(1) Export intensity<=50%	(2) Export intensity>50%
ΔDomestic Demand	–0.408*** (0.021)	–0.118*** (0.007)
ΔTFP	0.326*** (0.023)	0.374*** (0.029)
ΔWage per employee	–0.147*** (0.027)	–0.194*** (0.027)
Observations	73,396	17,949
R-squared	0.179	0.506

NOTE: ΔDomestic Demand = ln(Domestic Demand$_t$) – ln(Domestic Demand$_{t-1}$). All specifications include firm and industry + year fixed effects. Standard errors clustered by firm in parentheses. *** Statistically significant at 1 per cent.

TABLE 4

THE EFFECT OF DOMESTIC DEMAND ON EXISTING AND DIVERSIFICATION OPERATIONS, 2001-2016

	(1)	(2)
	Existing	**Diversification**
ΔDomestic Demand	−0.172***	−0.320***
	(0.010)	(0.025)
Δ*TFP*	0.274***	0.312***
	(0.017)	(0.030)
ΔWage per employee	−0.178***	−0.085*
	(0.023)	(0.045)
Observations	80,052	77,355
R^2	0.163	0.125

NOTE: ΔDomestic Demand $=$ ln(Domestic Demand$_t$) $-$ ln(Domestic Demand$_{t-1}$). All specifications include firm and industry+year fixed effects. Standard errors clustered by firm in parentheses. ***, **, * Statistically significant at 1 per cent, 5 per cent and 10 per cent respectively.

destinations or products. This evidence suggests that it might be easier for firms to increase sales in new destinations and products than to raise revenues in existing destinations and products.[9] The TFP coefficient for diversification is around a standard error higher than the coefficient for existing operations. Instead, the wage per employee coefficient is in absolute terms larger for existing than for diversification operations.

Our results are in line with de Lucio et al. (2018b) who show that diversification into new products and destinations accounted for a large share in the aggregate growth in Spanish exports during the 2009-2016 period.

5. Will the increase in the number of exporters become permanent?

The capacity constraint models predict that firms that entered foreign markets when domestic demand was low will cease exporting once domestic demand returns to "normal" levels. However, as shown in Figure 2, the number of regular exporters, defined as firms that export consecutively during, at least, 4 years, was larger in 2017 that at the beginning of the crisis.

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[9] Following ARKOLAKIS (2010) market penetration model, the marginal cost of reaching new customers in incumbent destinations and products seems to be larger than the cost of approaching new customers in new destination and product combinations.

FIGURE 2
THE EVOLUTION OF REGULAR EXPORTERS,
2008-2016 (2008 VALUES=100)
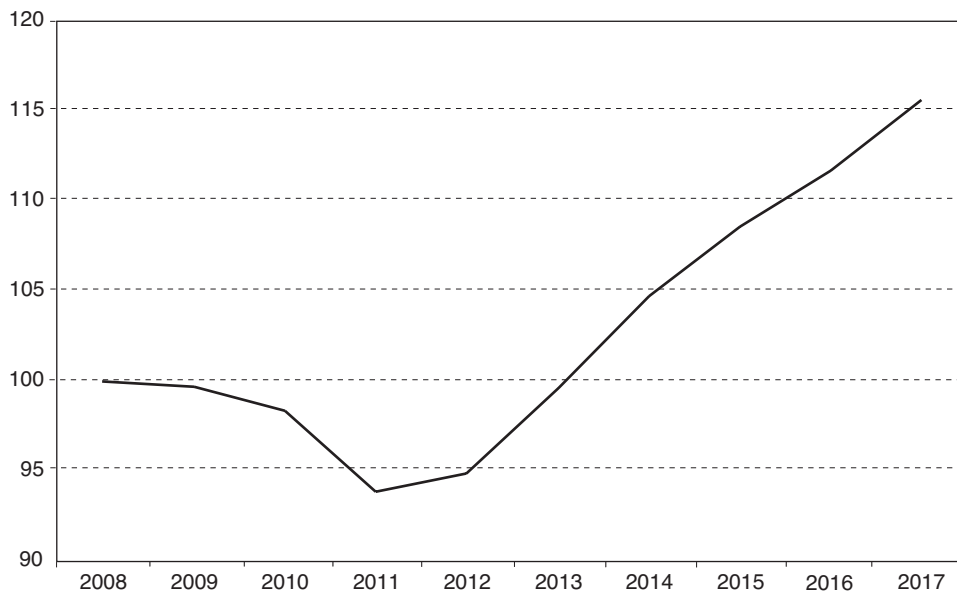
NOTE: Regular exporters are firms that export consecutively, at least, for 4 years.
SOURCE: Authors' own calculations based on Customs.

To explain this evolution, de Lucio et al. (2018a) argue that some firms that entered foreign markets during the crisis became regular exporters. In their narrative, firms have capacity constraints, so marginal costs increase with production. Firms are uncertain about the profits they can obtain in foreign markets. They also assume that firms are risk averse, so they will demand extra profits from their foreign operations to compensate for the risk premium. When domestic demand drops, the marginal cost to produce for foreign markets is reduced. If expected export revenues cover the fixed costs of exporting and the risk premium, firms will enter foreign markets. This will allow firms to learn whether they can compete successfully abroad. Some of them will realize that they can compete successfully and will remain exporters even in a situation when domestic demand returns to pre-crisis levels. In sum, the higher experimentation in foreign markets triggered by the Great Recession facilitates the discovery of new exporters that can compete successfully in foreign markets.

To test this hypothesis, de Lucio et al. (2018a) analyze whether the industries with a larger increase in the number of new exporters during the crisis had a larger

increase in the number of regular new exporters once domestic demand returned to pre-crisis levels. Using an instrumental variable approach, these authors find than the exogenous increase in the number of new exporters is positively associated with the emergence of new regular exporters. In their preferred specification, a 10 per cent increase in the number of new exporters translates into a 5 per cent increase in the number of new regular exporters.

As shown in de Lucio et al. (2011), new exporters accounted for a third of the growth in Spanish exports over the 1997-2007 period. If the crisis has enabled an increase in the number of new regular exporters, it may increase the aggregate value of Spanish export in the medium and long run.

6. Conclusion

We use firm-level data to test the effect of the Great Recession on Spanish exports. We find that a drop in domestic demand raises the probability that a firm will become an exporter and increases existing exporters' foreign sales. We also show that the drop in domestic demand has a stronger effect for exporters for which domestic demand accounts for a large share of their sales, than for exporters for which domestic demand only accounts for a small share of their sales. Our results indicate that the drop in domestic demand has a larger effect on new export operations than on regular export operations. Finally, the higher experimentation in foreign markets triggered by the Great Recession has led to an increase in the number of regular exporters in Spain. A broader range of exporters may lead, in the medium term, to a permanent increase in Spanish aggregate exports.

In terms of economic policy, specific measures to raise the likelihood of survival of the exporters that are born with the crisis may have a very positive impact on the number of regular exporters. Moreover, a larger number of firms exposed to foreign markets in a regular manner, due to learning-by-doing effects, raise the overall productivity of Spanish firms, and allows the Spanish economy to transition from a growth model based on domestic demand, and specially on the building sector, to another based on the competitiveness of its firms.

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