

Export markets: substitutes, complements, or independent?

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Abstract

Using a large sample of export transactions in Spain over the period 2010-2017, we explore whether firms treat export markets as substitutes, complements, or independent. We find that an exogenous change in revenue in a firm's top export destination does not change its revenue in other destinations. A firm does not have either a larger probability to increase the number of export destinations when it experiences an exogenous drop in revenue in its top export destination. These results suggest that a shock in firms' top export market does not affect their decisions in other export markets.

JEL: F10, F14

Keywords: exports, Spain, manufacturing.

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1 Introduction

Different studies conclude that firms substitute domestic sales with exports when domestic demand drops (Blum et al., 2013; de Lucio et al., 2017; Almunia et al., 2018).¹ This result, which is explained by firms' capacity constraints (Ahn and McQuoid, 2017), contrasts with the prediction of the standard heterogeneous firms' trade model (Melitz, 2003) where marginal costs are constant and, thus, the decision to export is independent from the economic cycle in the domestic market. We explore whether firms also face capacity constraints to expand their foreign sales. To test this hypothesis we investigate whether firms treat exports markets as substitutes, complements, or independent.

2 Regression equation

Following the methodology used by studies that analyzed the relationship between domestic sales (the major flow) and exports (the secondary flow), we explore the relationship between a change in revenue in the top export market (the major export flow) and a change in revenue in the rest of non-top export markets (the secondary export flow). We estimate the following regression equation:

$$\Delta \ln x_{ft}^{Non-Top} = \beta_1 \Delta \ln x_{ft}^{Top} + \beta_2 \Delta \ln dd_{ft} + \beta_3 \Delta \ln TFP_{ft} + \beta_4 \Delta \ln w_{ft} + \gamma_f + \gamma_t + \epsilon_{ft} \quad (1)$$

where $\Delta \ln x_{ft}^{Non-Top}$ is the first difference in the (log) export revenue of firm f in its non-top export destinations in year t ($\Delta \ln x_{ft}^{Non-top} = \ln x_{ft} - \ln x_{ft-1}$). x_{ft}^{Top} is firm f export revenue in its top export destination.

Equation (1) includes the (log) change in firm f domestic sales ($\Delta \ln dd_{ft}$), total factor productivity ($\Delta \ln TFP_{ft}$), and wages ($\Delta \ln w_{ft}$). It is important to control for these variables, since a drop in domestic sales and/or marginal costs may trigger an increase in export revenue in the top and the non-top destinations, creating a spurious correlation between export revenue across destinations. The regression equation also includes firm fixed effects (γ_f) to control for time trends at the firm level, a year fixed effect (γ_t), and a disturbance term (ϵ_{ft}).

In addition to the intensive margin, we also analyze the extensive margin, substituting the dependent variable in Equation (1) by the (log) change in the number of export destinations, $\Delta \ln nd_{ft}$. In the intensive and extensive margin analyses, our coefficient of interest in Equation (1) is β_1 . If $\beta_1 < 0$ export markets are substitutes; if $\beta_1 > 0$ export

¹Berman et al. (2015), who find a positive correlation between domestic sales and exports, is the exception.

markets are complements; and if $\beta_1 = 0$ export markets are independent.

A caveat in Equation (1) is that an omitted variable might still generate a spurious correlation between a change in export revenue in the firm’s top export destination and a change in revenue in its non-top export destinations. To address this concern, as in [Berman et al. \(2015\)](#), we instrument the change in revenue in the firm’s top export destination by the change in imports in that destination. To make this instrument more firm-specific, we calculate it as the sum of import changes at the product level, weighting each product by its share in firm f exports to its top export destination. Analytically,

$$\Delta \ln ix_{ft}^{Top} = \sum_p \theta_{fpt}^{Top} \Delta \ln M_{pt}^{Top} \quad (2)$$

where $\Delta \ln ix_{ft}^{Top}$ is the instrumented change in export revenue in firm f top export market, θ_{fpt}^{Top} is the share that (Harmonized System 6-digit) product p has in firm f exports to its top destination in year t , and M_{pt}^{Top} are imports by the top destination of product p in year t .

3 Data

Our sample consist on 11134 Spanish manufacturing exporters selling to more than one foreign destination over the period 2010-2017.² These firms account for half of total manufacturing exports over this period. We proxy domestic sales as the difference between total revenue and export revenue. All variables are transformed into constant values using the appropriate price indexes obtained from the Spanish Statistics Institute.

Table 1: Descriptive statistics

	Mean	Median
Number of export markets	13	8
Revenue share of the top export market(%)	59	54
Annual change in revenue of the top export market(%)	-19	-5
Annual change in revenue in other export markets(%)	-6	-1
Annual change in the number of export markets(%)	-3	0

Note: The figures are calculated using the entire period. The sample is composed by 11134 exporters.

The average firm in our sample has 13 export destinations, and the median firm 8 destinations (Table 1). The top export market represents more than half of export revenues for the average and the median firm. Revenues from the top export market

²The construction of the dataset is explained in [de Lucio et al. \(2018\)](#)

drop by 5% annually for the median firm, and 19% for the average firm; revenues from other non-top markets drop by 1% and 6%, respectively. The average firm reduces by 3% the number of export markets annually; there is no change in the number of export markets for the median firm.

Panel A of Figure 1 shows a positive correlation between changes in revenue in the top export market and changes in revenue in the non-top export markets. Panel B also shows a mild positive correlation between changes in revenue in the top export market and changes in the number of destinations. Therefore, at first sight, firms do not seem to substitute export markets.

4 Regression results

First, we analyze the intensive margin, i.e. the impact of a change in revenue in a firm's top export destination on other destinations' export revenue. Table 2 reports the results. Standard errors are clustered at the firm level. In columns (1) and (2) $x_{ft}^{Non-Top}$ is the sum of all export revenue in non-top destinations. In columns (3) and (4) $x_{ft}^{Non-Top}$ is defined as the firm revenue in its second export destination.

When the change in export revenue in the firm's top export destination is not instrumented (column (1)), the $\Delta \ln x_{ft}^{Top}$ coefficient is positive and very precisely estimated. A 10% increase in export revenue in the top destination is correlated with a 0.7% increase in export revenue in the rest of destinations. In line with previous analyses for Spain (de Lucio et al., 2017; Almunia et al., 2018), an increase in domestic sales reduces revenue in foreign markets. A raise in firms' total factor productivity and a reduction in labor costs increase firms' revenue in foreign markets.

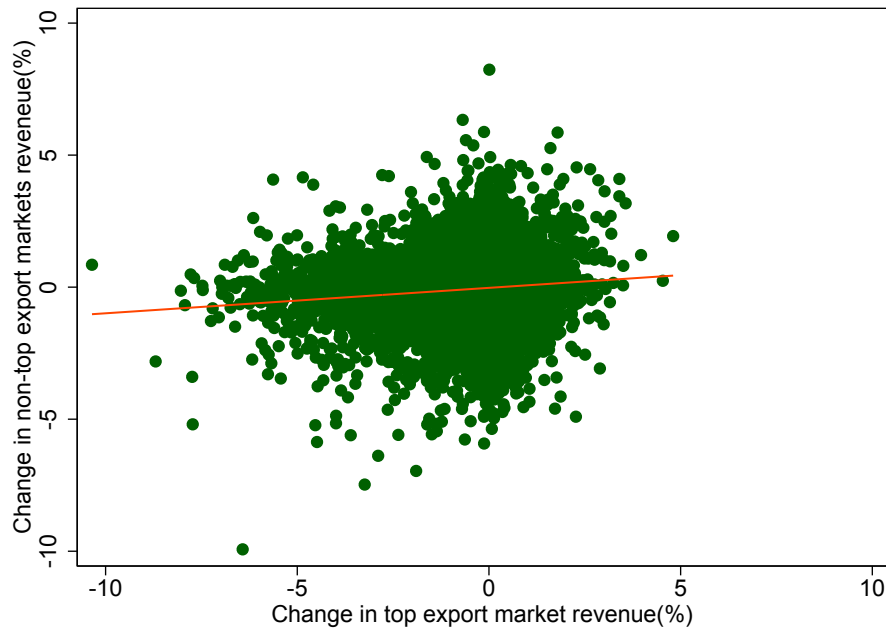
When we instrument the change in revenue in the firm's top export destination (column (2)), $\Delta \ln x_{ft}^{Top}$, although positive, is not precisely estimated.³ This result indicates that an exogenous change in demand in the top export destination does not have a statistically significant effect on export revenue in the rest of destinations. We find a positive and strong correlation between the change in revenue in the firm's top export destination and the change in revenue in its second destination (column (3)). This positive correlation remains even when we instrument the change in revenue in the top export destination (column (4)). Summing up, we do not find that firms substitute sales across export markets.

Columns (5) and (6) of Table 2 present the estimations for the extensive margin of trade. An increase in revenue in the firm's top export destination is correlated with an increase in the number of destinations (column (5)). An increase in domestic sales is

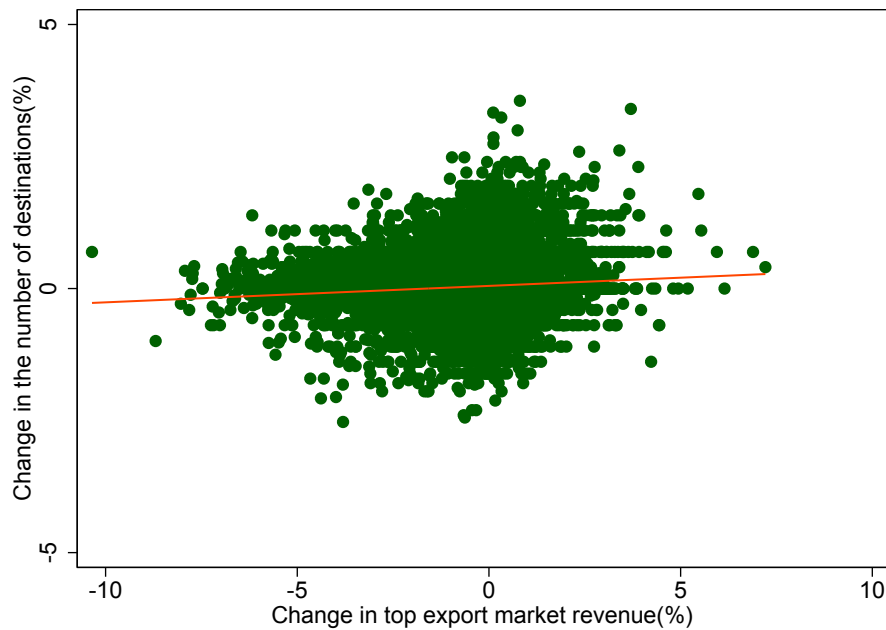
³The first-stage F-statistic of 114.89 allows us to reject the null hypothesis of weak instruments. The null hypothesis is also rejected in the rest of two-stage OLS estimations.

Figure 1: Scatter diagrams

A. Change in revenue in the non-top export market vs. Change in revenue in the top export market



B. Change in the number of destinations vs. Change in revenue in the top export market



correlated with a reduction in the number of destinations, and a higher productivity is correlated with an increase in the number of destinations. A change in the average wage has no effect on the number of destinations. A exogenous change in revenue in the top export market has a negative effect on the number of destinations (column (6)). However, this coefficient is not statistically significant. Therefore, we do not find that an exogenous

Table 2: Effect of changes in the top export destination

	Intensive				Extensive	
	Top-rest		Top-2nd		(5)	(6)
	(1)	(2)	(3)	(4)		
$\Delta \text{Ln}(\text{Top export})$	0.070 ^a (0.008)	0.054 (0.061)	0.228 ^a (0.019)	0.348 ^c (0.187)	0.024 ^a (0.003)	-0.042 (0.034)
$\Delta \text{Ln}(\text{Domestic sales})$	-0.154 ^a (0.014)	-0.158 ^a (0.019)	-0.090 ^a (0.018)	-0.073 ^b (0.031)	-0.037 ^a (0.006)	-0.053 ^a (0.010)
$\Delta \text{Ln}(\text{TFP})$	0.190 ^a (0.018)	0.195 ^a (0.025)	0.152 ^a (0.026)	0.132 ^a (0.043)	0.031 ^a (0.007)	0.050 ^a (0.012)
$\Delta \text{Ln}(\text{Average wages})$	-0.055 ^b (0.026)	-0.057 ^b (0.028)	-0.052 (0.036)	-0.044 (0.039)	-0.005 (0.012)	-0.014 (0.014)
Instrument	No	Yes	No	Yes	No	Yes
Observations	38115	38115	19435	19435	45006	45006

Note: In columns (1) to (4) the dependent variable is the (log) change in non-top export destinations' revenue; in columns (5) to (6), the (log) change in the number of destinations. The regression equations include firm and year fixed effects. Standard errors clustered at the firm level are in parentheses. a, b, c: statistically significant at 1%, 5%, and 10%, respectively.

drop in revenue in the firm's top export market leads to an increase in the number of destinations.

We analyzed whether results were robust to using longer change intervals, such as 2 or 3 years. The only main difference relative to the baseline results is that the $\Delta \ln x_{ft}^{Top}$ coefficient is no longer significant when we analyze the effect of an exogenous change in revenue in the firm's top export destination on the revenue in its second top export market.

5 Conclusion

A exogenous reduction in sales in their top export market does not lead exporters to increase sales in other export destinations, or to open new markets. The independence and, in some cases, complementarity across export markets contrasts with the evidence that firms substitute domestic sales with exports.

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