Residual exports and domestic demand: an empirical analysis

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Abstract: This paper analyzes and quantifies the impact on domestic sales of being an exporter. It is widely assumed that exporters sell in domestic market more than non-exporters, among other important features. We refer to this increase in domestic sales as residual export. The empirical analysis uses Spanish microdata provided by the *Encuesta Sobre Estrategias Empresariales* (ESEE) for the period 1990-2011 in a difference-in-difference model. The results indicate that participate in export activities increases domestic sales significantly, although the amount of this result varies when we distinguish between different types of firms according to their persistence as exporter.

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1. Introduction

The increase in the number of Spanish firms which trade in international markets is a great mark of the rising internationalization process experimented by Spain in the last decades. As expected, this quick increase of the international trade flows has promoted the competition in the domestic and export markets. In this sense, the relationship between the domestic demand growth and the incentives to enter and stay in export markets has been a widely discussed topic for a long time. In general, it is assumed that entry in the export market is affected by two main determinants: internal and external factors. On the one hand, internal factors include those related with firms' behavior/characteristics. In particular, empirical evidence shows that exporters are bigger, more productive, more intensive in R&D, and pay higher wages (Mayer and Ottaviano, 2008; Rodríguez, 2008). In this sense, Martín Machuca *et al.* (2009) also suggest that domestic experience affect positively on export probability. Therefore, it seems evident that previous characteristics to the entry may affect significantly on the subsequent entry. This approach is based on a self-selection hypothesis, where only the "better firms" (those that are bigger, more productive, more intensive in technology and capital, etc.) are able to face the sunk cost associated to the entry. On the other hand, external factors include characteristics related with the international economic environment, the demand situation in domestic and export market, or the exchange rates fluctuations. Thus, for example, changes in the domestic demand (produced by expansion/recession periods) may incentive the entry in the export.

The strategy of considering exports as a strategy to place "residual" sales has been present in some specific sectors as the steel industry. Blonigen and Wilson (2010) analyze the U.S. steel industry for the period 1979-2002, concluding that combinations of foreign subsidization, excess capacity and trade barriers have led to its long-run demise. In particular, foreign government subsidies produce excess capacities, which, together with the high protective trade barriers, allow the foreign producers to sell at high price in their domestic markets and then dump the excess on the US. In this sense, authors distinguish between cyclical and structural excess capacity. On the one hand, cyclical is the excess capacity that can be placed competitively in domestic and export markets. In this case, costs (production and fixed) are lower that export price in the long-run, but higher in the short-run. Thus, excess capacity and random demand shocks may condition domestic and export sales. On the other hand, structural excess capacity is related with government subsidies to invest in higher capacity

levels. Therefore, an increase in subsidies drives to structural excess of capacity and it also emphasizes the cyclical excess.

The latter strategy in the U.S. steel industry has happened historically in some agricultural products, where foreign markets were the solution for domestic production surplus. The economic crisis starting in 2008 offers a recent example to revisit this topic (Tiana, 2012; Lee *et al.*, 2009). In general, it is assumed that economic crisis reduces significantly domestic demand, promoting export activities to sell that surplus in the foreign markets. Therefore, it seems clear that access to export markets is often a necessary part of a firm's strategy to gain strategic competitiveness and long-term success, especially in time-crisis periods. This assumption is also applied to Spanish firms in the recent crisis, which endeavored to improve foreign sales, in spite of the severe decline in 2009, as a mechanism to balance the shrinking domestic sales in the years after the beginning of the crisis. The result of this effort was highly satisfying and expansive. In particular, Spanish manufacturing exports (in nominal terms) increased 8.5% from 2007 to 2012, while exports from Germany, France and Italy increased 10.5%, 6.5% and 4%, respectively.

We use a stratified representative sample of Spanish manufacturing firms between 1990 and 2011 to implement our analysis. The basic approach applied to realize the econometric analysis is the Difference-in-Difference methodology. This technique analyzes results pre- and post-treatment of individuals/firms exposed and non-exposed to the treatment. In our study, treatment is defined as participation in export activities. Therefore, we compare national sales of exporters and non-exporters before and after exporting, allowing evaluating and quantifying in euros the effect on domestic sales of being an exporter. In this sense, we distinguish between different types of firms according to their behavior in export activities, comparing their national sales with those obtained by non-exporters. To analyze the relationship between domestic and export sales, a fixed and random effect model is also applied. Thus, we can observe the influence of exporting on domestic sales.

The remainder of the paper is organized as follows. Section 2 reviews the recent literature related to the relationship between the domestic and export sales. In Section 3, data and some descriptive results are presented. The econometric analysis and the main results using different estimation techniques are contained in Section 4. Finally, Section 5 summarizes the main conclusions of the study.

2. Theoretical framework

The recent literature in International Trade has tried to analyze why exporting occurs, what are the directions of the trade flows or what are the main determinants in the export performance. The explanation of the previous questions has changed along the decades, going from macro-level (comparative advantage, factor endowments or gains from trade) to micro-level perspectives. The latter approach analyzes firms' characteristics to obtain the determinants related with entry and behavior in export markets. In this sense, there is a huge literature that addresses these topics in spite of the lack of available microdata. However, there are not many papers that analyze the impact on domestic market of being an exporter. This is the main goal of our paper, evaluate and quantify the effect before and after carrying out export activities on national sales.

A complementary perspective, closer to the perspective of this paper, addresses the interrelationship between export and domestic sales. Salomon and Shaver (2005) analyze this interrelationship and its main determinants for Spanish manufacturing firms between the years 1990 and 1997. The study has three main conclusions. First, they obtain that export and domestic sales are simultaneously determined by firms. Second, authors suggest that this interdependent relationship depends on the owned structure of firms. On the one hand, they find that domestic and export sales are complements for Spanish-owned firms. On the other hand, both types of sales are substitutive for foreign-owned firms. Finally, paper analyzes the effects of different factors/variables on domestic and international sales. As expected, it suggests that foreign economic growth makes easier exports, while national growth increases domestic sales. They also indicate that domestic and export sales are positively influenced by expenditure advertising. However, the evidence is not clear about the effects of the R&D investment and the exchange rates fluctuations on both kinds of sales. Liu (2012) also follows this line of research, focusing on the dynamics of domestic and export sales. In particular, author suggests that exporters face trade-off between domestic and export sales in the short run in response to external demand shocks. She develops a dynamic model of firms' sales dynamics with capacity constraint and endogenous investment. The results also suggest the substitution behavior between domestic and export sales. More specifically, she points out that expansion in export market is caused by positive foreign demand shocks, which generates a rise in output price and investment, and induces welfare losses for domestic consumers. Therefore, this result remarks the importance of the fixed capital adjustment cost (capacity

restrictions) when firms have to adjust their investment levels due to external shocks that generate demand shifts (domestic and foreign).

The latter papers are closed to Blum *et al.* (2013) and Ahn and McQuoid (2012) which also study the relationship between domestic and export markets, focusing on variation of marginal costs and capacity constraint. Blum *et al.* (2013) argue that export is a response to stochastic demand shocks and the existence of increasing marginal cost. The underlying intuition indicates that when a firm is affected by a negative domestic demand shock, it is able to use more fixed capital to sell in foreign markets. Similarly, they suggest that firm leaves aside foreign sales (or reduce its number of destinations) and it focuses on national market when domestic demand is relatively high. Therefore, they emphasize the importance of fixed capital investment as a mechanism to explain the participation in both markets. Authors develop a heterogeneous firm model, based in Melitz (2003), where each firm knows its productivity parameter before entering to export market. This parameter indicates the profitability (or not) of the export, due to it determines if firm may face to sunk cost or fixed capital investment associated to entry. Thus, model distinguishes two kinds of exporters depending on the level of fixed capital investment: occasional and perennial. On the one hand, occasional exporters use to be small and slightly efficient firms, and they base their export decisions according to the state of demand. These firms sell to foreign markets when domestic demand is relatively low and the fixed capital is "under-utilized". On the other hand, perennial exporters use to be large firms with high efficient levels which invest enough capital to sell in domestic and foreign markets, regardless of demand. As in the previous papers, the main conclusion of this paper confirms the substitution relationship between domestic and foreign sales. Ahn and McQuoid (2012) analyze the same relationship with Indonesian and Chilean data, focusing on the existence of increasing marginal costs. They suggest that this assumption is the key to analyze the trade-off between domestic and foreign sales. In this sense, authors point out that those firms with constant marginal costs may no reduce their domestic sales in response to positive external shocks since increasing production has no effect on the level of marginal costs. However, the same positive foreign shocks, under the assumption of increasing marginal costs, would increase export sales and would reduce domestic sales due to increase in the production level also increase the level of marginal costs. Therefore, they suggest that the existence of financial and physical constraint leads to increasing marginal costs. Their results also indicate a strong negative correlation between domestic and foreign sales related with financial and physical capacity restrictions. In

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particular, firms with capacity constrained present a higher substitution relationship between both sales than those that are not constrained.

As mentioned in previous section, the recent economic crisis has stimulated researches related with the relationship between the effects on the crisis in domestic and foreign markets. In this sense, Tiana (2012) analyzes the main factors to explain the behavior of the Spanish manufacturing industries during the crisis period, focusing on the evolution of domestic demand and the characteristics of the exports. On the one hand, he suggests that national demand has diminished due to the impact of the crisis in the construction industry, which causes direct and indirect spillovers.[1] In this sense, he points out the important decrease of the private consume and the investment in equipment due to the greater weakness of the Spanish economy compared with the rest of the EU countries. On the other hand, author indicates that exports have helped to absorb the crisis impact on industrial production and domestic demand. The progressive opening suffered by Spanish firms has reoriented the production to external markets, causing improvements the price-competitiveness. In particular, paper shows that Real Effective Exchange Rates increased 12% during the crisis from 2007 to 2012, while manufacturing exports, as stated above, augmented 8.5% in the same period. The effects of the economic crisis on the strategic choice between domestic and export sales have also been addressed in Lee *et al.* (2009). In this paper, authors analyze export intensity of Korean firms to changes derived from the Asian economic crisis in 1997. In this sense, they also observe a huge drop in domestic demand in the crisis period, distinguishing between two different types of firms according to their adaptation to those external economic changes and their domestic market position. On the one hand, they denote those firms with investment in flexible capabilities which may reorient their production to export market. On the other hand, authors identify those firms that are locked in with inflexible resources and tend to fail (exit of the domestic market). The main finding of the paper indicates that domestic leaders have a greater incentive to increase their export sales, due to they lost an important part of their domestic sales as a result to the national demand shrinking. Moreover, authors also obtain that this positive relationship between domestic position and export intensity is stronger in the post-crisis than in the pre-crisis period.

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[1] Direct spillovers are related with all goods required in construction industry. By contrast, indirect spillovers have impact on the rest of goods.

Other line of research related with the relationship between domestic and export sales is based on the estimation of export (and import) functions. These equations explain trade flows as from income/demand and relative prices, although recent papers extend this demand functions with variables related with supply factors (i.e. capital stock or capacity) or with different measures of competitiveness (i.e. product quality measures by R&D investment). Under this approach, Gordo *et al.* (2008) review previous results for the estimation of the income and price elasticity for Spain and re-estimate export and import function using a dynamic model of error correction. On the one hand, the results show that demand-elasticity for the exports is equal to 1.1 and price-elasticity is close to -1.3. As expected, these results are similar to obtained in previous works, although the estimation for both elasticities is usually higher (with values ranging between 1.6 and 1.8 for demand and between -0.4 and -1 for price).[2] On the other hand, results for imports are 2.2 for demand-elasticity and -0.6 for price. Again, these estimations are similar to other papers. In this paper, authors also analyze the dynamic of trade flows when conditions change. In particular, they obtain that reaction of exports to change in international demand is high and fast. Furthermore, they also suggest that reaction of imports to demand changes is much faster and instant than former reaction.

3. Data

The approach of this study exploits firm-level data (microdata). The database that has been used is the *Encuesta Sobre Estrategias Empresariales* (ESEE). This panel survey is carried out by the Fundación SEPI and the Spanish Ministry of Industry, and it analyzes the main strategic variables of manufacturing firms located in Spain. This database uses firm size and industry sector to two-digits NACE as the main stratification criteria. The sample period covers the years 1990-2011 and it is used an unbalanced panel from the available data. The final sample has 5,040 firms.

This database provides important information related with firms' characteristics: domestic and export sales volumes, number of employees, NACE codes, financial information, or owned structure. Moreover, it also facilitates information about export participation and R&D activities. On the one hand, export volumes can be observed in the data over the sample. In this sense, we can identify four different firms: (i) those that never export, (ii) those that always export, (iii) those that exit of the exporting and never re-export, and (iv) those new

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[2] See papers of Buisán and Gordo (1994), Mauleón and Sastre (1994), García and Gordo (1998) and Ortega *et al.* (2007) for more details.

exporters that enter into the export markets once (persistent entrants) or multiples times (switchers) throughout the sample.[3] On the other hand, database also provides information about R&D investment volumes and participation in process and product innovation activities. Table 1 presents some descriptive results related with domestic sales and R&D expenditure, according to firms' behavior in export markets.

Table1: Descriptive results of the data according to exporting participation

	# Employees	Domestic sales (million euros)	Growth rate domestic sales (median value)	R&D expenditure (average)	# Firms	%
Non-exporters	38.07 (19)	3.28 (0.85)	-0.16 %	9,061	1,744	34.61
Switchers	195.4 (35)	25.81 (2.55)	1.33 %	782,936	669	13.27
Non-exporting	*91.8 (24)*	*13.62 (1.67)*	*2.00%*	*63,980*		
Exporting	*275.32 (55)*	*36.98 (4.34)*	*0.67%*	*1,436,504*		
Persistent entrants	181.3 (40)	29.73 (3.23)	2.97 %	977,137	265	5.26
Before entry	*124.9 (28)*	*13.92 (1.95)*	*4.51%*	*200,644*		
After entry	*207.71 (50)*	*37.22 (4.27)*	*2.60%*	*1,346,713*		
Exiting-firms	136.2 (26)	27.51 (1.46)	-1.16 %	275,100	167	3.31
Always-exporters	429.6 (202)	51.29 (11.37)	0.85 %	1,363,310	2,195	43.55
Total firms	252.8 (48)	31.39 (3.29)	0.78 %	832,785	5,040	100

Note: Columns that collect the number of employees and domestic sales indicate average values; median values of these variables are presented between brackets.

As expected, firms that participate (or participated) in export activities are bigger in size and present greater domestic sales than those that do not export ever. Moreover, we also observe differences between the different types of exporters. First, always-exporters are the biggest, the most innovative and those which have the highest domestic sales. Second, firms that exit of exporting have lower number of employees, domestic sales (in median value) and R&D expenditure than those firms that continue exporting. Moreover, growth rate of domestic sales for exiting-firms is negative and the lowest. Finally, results between switchers and persistent entrants are very similar, although the latter usually present more employees (in median), more domestic sales, more growth rate of domestic sales and more R&D expenditure than switchers. Therefore, it seems clear that export generates spillovers that affect on firms positively. Moreover, the more persistent is the firm in the export markets, the larger is the effect.

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[3] In this sense, we have to remark that persistent entrants designate to those firms that enter in exporting in a particular year and continue to export until the last year of the sample consecutively.

Another interesting result is related with the variation of the latter variables for switchers and persistent entrants when they are participating in export activities and when they are not participating. In this sense, Table 1 show that both types of firms have more number of employees, more domestic sales and more R&D expenditure when they are exporting. It is particularly significant the increase in the R&D investment as a result of entry in exporting. In this sense, the R&D expenditure multiplied by 22 and 7 (in mean) for switchers and persistent entrants, respectively. However, both kinds of firms tend to reduce their growth rates of domestic sales rates when they are exporting. It may indicate that firms decide to focus and strengthen their foreign position, leaving aside domestic markets, when they incorporate foreign destinations in their portfolio. Therefore, it seems clear that exporting generates important increases in domestic sales, although this national growth (measured by its growth rate) is lower when firm is exporting than when is not exporting.

Related with the effect of the economic crisis (starting in 2008) on the national demand, Figure 1 shows the evolution of the average growth rates of domestic sales for the different types of firms according to their exporting participation in the period 2002-2011.

Figure 1: Average growth rates of domestic sales for firms (2002-2011)
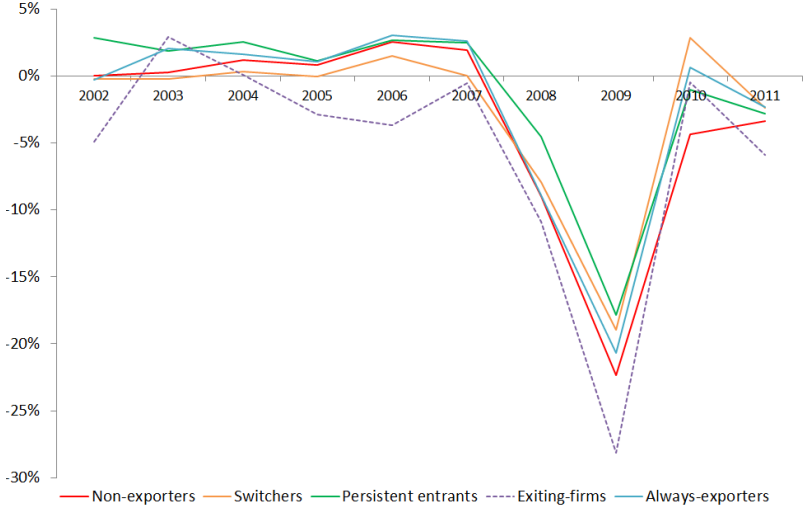
As can be seen in Figure 1, firms presented positive growth rates in the previous years of the beginning of the crisis (with the exception of the exiting-firms). In general, always-exporter and persistent entrants have more growth in their national sales than the other types of firms. The main change in the trend begins in 2008, with the significant drop in the national demand

(the growth rates for all types of firms are clearly negative). This important shrinking continues and accentuates in 2009, even to negative rates of over 20%.[4] This decline is in consonance with the observed in world trade flows. According to exporting participation, Figure 1 also shows that non-exporters and exiting-firms were the firms with greater reduction in their domestic sales. Therefore, it seems clear that firms involved in export activities suffer lower shrinking in their national sales than those not involved or those leaving the export. In the subsequent years, growth rates have been recovering slightly in order to recover positive rates, although they again show negative rates in the last year of the sample.

In the next section, we analyze the difference in term of their domestic sales between being and not being an exporter. To do that, different estimation techniques are applied.

4. Econometric approach

Before performing the econometric analysis of the data, we show some results related with the single-difference approach of the domestic growth rates. Thus, we obtain firms' behavior in domestic market before, during and after the first entry into the export market, and it may analyze the existence of a complementary or substitutability relationship between domestic and foreign markets when they decide entry into export activities. Table 2 shows the average growth rate (measured by mean and median values) for domestic sales before, during and after the first entry. To do that, entering firms may be classified as persistent entrants and switchers. On the one hand, we define persistent entrants as those firms that enter into the export markets and they continue exporting in consecutive years from that moment. On the other hand, switchers are those firms that enter and exit from exporting multiple times along the sample. Related with the obtained results, we have to remark that we only consider those firms with non-missing values before and after the entry in exporting in their domestic sales.

As can be seen in Table 2, switchers and persistent entrants decrease their growth rates of domestic sales as a result of entry into export markets. In particular, this rate diminishes for switchers in one-eighth compared with the pre-entry period, going from 4.78% to 0.58%. This reduction in median is also observed in persistent entrants, although the effect is more reduced than switchers. Therefore, it seems clear that, as expected, entry into export market

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[4] In this sense, we have to remark that we do not observe any case of persistent entries during the crisis period, i.e., there are not firms that enter in exporting in 2007 (or after that year) and continue exporting until the end of the sample period.

responds to a substitution between domestic and foreign sales. Firms that decide enter in foreign markets focus on these sales, reducing or neglecting domestic market.[5] Nevertheless, results are different when post-entry period is analyzed. As can be observed, switchers increase their domestic sales growth rates after entry, suggesting the export transient situation. Therefore, switchers may use foreign markets as a mechanism to sell their surplus and then recover their normal rates of the domestic sales after the entry. By contrast, persistent entrants continue reducing their national sales growth rates in post-entry period. It may suggest that once they decide enter in exporting they prefer strengthen their position in the foreign markets rather than focus on national markets.[6] Additionally, these domestic sales growth rates (before, during and after entry) are amply higher than those obtained by non-exporters and always-exporters. In particular, average growth rate of domestic sales for firms that never export is −0.16%, while rate for those firms that export throughout the period is 0.85%. It may suggest that exporting also promotes sales in domestic markets.

Table 2: Average growth rate for domestic sales in real terms (%)

	Switchers		Persistent entrants	
	Mean	Median	Mean	Median
Before the entry (*t-1*)	19.36	4.78	16.01	4.86
In the entry period (*t*)	5.03	0.58	23.34	3.92
After the entry (*t+1*)	11.09	3.56	7.21	2.80
# Total of firms	277		150	

Related with the link between domestic sales and export participation, we have indicated that exporters usually have more domestic sales than non-exporters. We refer to these increases as residual exports due to spillovers that are generated in export market participation are the main determinants of them. Therefore, it seems clear that being an exporter have a residual impact on domestic sales. An important point to consider is connected with the relationship between previous behavior of firms and their export likelihood. In particular, we want to analyze if previous domestic conduct (measured by rate of change of domestic sales) affects

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[5] Results remain unchanged if percentiles 1 and 99 of the distribution of firms are not considered.

[6] The trend of the results is also remained when we analyze growth rates of domestic sales two periods after the entry. In *t+2*, the growth rates continued diminishing for switchers to 2.28%, while the rates for persistent entrants decrease slightly to 2.62 %.

on export probability. Thus, it may study the possible existence of a "saturation point" in domestic market that may drive to exporting. Table 3 shows the relationship between the lagged growth rates of the domestic sales and the current probability of being an exporter using a Probit model, for switchers, persistent entrants and the whole set of firms. As can be seen, we also include other variables related with R&D investment, with ownership structure of capital and with firm size. First, *R&D* is a dummy variable which takes value one when firm realizes investment in R&D, and zero otherwise. Second, variable *OS* is another dummy that is equal to one when firm is owned by foreign capital, and zero when firm is owned by Spanish capital. Finally, firms' size is measured by the number of employees. In this sense, we distinguish six different dummy variables related with the following employees stretches: between 1 and 20 employees (*Size1*), more than 20 and less than 50 (*Size2*), between 51 and 100 (*Size3*), more than 100 and less 200 (*Size4*), between that amount and 500 (*Size5*), and more than 500 (*Size6*). In particular, the estimated equation is:

$$\Pr(X_{it} = 1) = \beta_0 + \beta_1 Gdom_{it-1} + \beta_2 R\&D_{it} + \beta_3 OS_{it} + \beta_4 Size2_{it} + \beta_5 Size3_{it}$$
$$+ \beta_6 Size4_{it} + \beta_7 Size5_{it} + \beta_8 Size6_{it} + \varepsilon_{it}$$

Table 3: Results of Probit model

	Switchers	Persistent	All firms
$Gdom_{t-1}$	0.002	0.020	0.001
	(0.002)	(0.040)	(0.001)
R&D	0.406***	0.316***	0.715***
	(0.040)	(0.069)	(0.022)
OS	0.170***	0.166*	0.524***
	(0.053)	(0.093)	(0.029)
Size2	0.348***	0.085	0.463***
	(0.040)	(0.071)	(0.021)
Size3	0.517***	0.716***	0.952***
	(0.058)	(0.119)	(0.031)
Size4	0.475***	0.311***	1.074***
	(0.061)	(0.107)	(0.032)
Size5	0.666***	0.547***	1.404***
	(0.057)	(0.111)	(0.031)
Size6	0.636***	0.403***	1.461***
	(0.079)	(0.121)	(0.042)
Pseudo R2	0.062	0.050	0.267
# Observations	6,658	2,655	30,247

Note: z-statistic between brackets. ***, ** and * indicates significant at 1%, 5% and 10%, respectively. The last column includes switchers, persistent, non-exporters, always-exporters and firms that leave of exporting.

As can be seen, previous growth rate of domestic sales has no any impact on export probability. This result is observed when we consider switchers, persistent and the whole set of firms. Therefore, it seems clear that firms do not take into account their previous domestic results as a mechanism to export, since those variables are independent. Related with the R&D investment, as expected, innovative firms are more prone to participate in export activities than non-innovative. Another interest result is referred to the owned structure. As can be observed, foreign capital firms are more likely to export than firms dominated by national capital. Finally, as expected again, firm size affects positively on export probability.

However, our main goal is not captured in the latter relationship. We have suggested that firm tends to reduce their domestic sales when they decide to enter in exporting for the first time, but we also want to analyze the effect on domestic sales of being an exporter along the time (not considering only the first export entry). In this sense, we compare (i) domestic sales when firms export and do not export and (ii) differences in national sales between different groups of firms according to their exporter behavior (i.e., exporters and non-exporters). There are several approaches to estimate this residual export, although in this study we use three of them. First, we can estimate a fixed effect model which captures this impact. In this sense, we can estimate what is the difference in domestic sales (measured in million euros) of participating in export activities by controlling unobservable heterogeneity. In particular, this methodology supposes that firm-effects are constant along time and time-effects are independent for each firm. Second, a random effect model is also considered. The underlying idea of this technique is based in the assumption that firm-effect is a random variable. Finally, we also estimate a difference-in-difference model. Specification and methodology of this technique will be explained later. Table 4 shows estimation of fixed and random effect models of domestic sales and export participation (*premia* on national market of being an exporter). This table also includes the impact on domestic sales of being an innovator and be mainly controlled by foreign capital, because both variables are related to export activities (as we show previously).

As can be observed in Table 4, participation in export activities increases domestic sales. This result is obtained in fixed and random effect models. However, results differ between each model. On the one hand, fixed effect model predicts that export increases domestic sales in 2.87 million euros (column (i)). It suggests that exporting may generate spillovers that exceed the effect on foreign sales, also affecting to domestic market. Moreover, results remain

unchanged when the other variables are included. In particular, exporting increases domestic sales by 2.59 million euros on average. Column (ii) also suggests that innovative firms have higher domestic sales (6 million euros on average) than non-innovative. Related with owned structure, results indicate that this variable does not influence on national sales. On the other hand, random effect model also predicts domestic sales increases as consequence of exporting, although this impact is much greater than obtained in fixed effect model. In particular, domestic sales are increased in 9.92 million euros due to exporting when random model is considered. However, effect reduces to 7.45 million euros when other variables are included. As in the fixed effect model, innovative sells domestically more than non-innovative firms. By contrast, using random effect model we obtain that owned structure does influence on domestic sale levels. In particular, firms controlled by foreign capitals sell domestically (on average) 18.34 million euros more than those firms managed by national capitals. Additionally, to test the adequacy of both models we implement a Hausman test. As can be seen, results suggest that fixed effect model is an adequate specification.

Table 4: Fixed and random effect model on domestic sales

	Fixed Effects		Random Effects	
	(i)	(ii)	(iii)	(iv)
Constant	29.65***	27.28***	18.34***	12.69***
	(0.91)	(1.07)	(1.45)	(1.45)
Export	2.87**	2.59*	9.92***	7.45***
	(1.41)	(1.42)	(1.26)	(1.27)
R&D		6.00***		11.71***
		(1.23)		(1.15)
OS		-0.10		18.34***
		(2.07)		(1.79)
# Observations	40,482	40,166	40,482	40,166
R2	0.026	0.045	0.023	0.080
Hausman Test	(i) vs. (iii)			125.25*** [1]
	(ii) vs. (iv)			398.70*** [3]

Note: ***, ** and * indicate significant at 1%, 5% and 10%, respectively. Standard errors in parentheses, and degrees of freedom between square brackets. All firms are considered and all figures are in 2011 euros.

The latter connection related with the *premia* exporter on domestic sales is an expected result when all firms are considered. However, results change significantly when we differentiate between the different types of firms depending on persistence level in export markets. In this sense, we distinguish between persistent entrants and switchers. As defined above, persistent entrants are those firms that enter in a particular year and they continue exporting throughout

the sample period, while switchers are defined as firms that enter and exit from exporting multiple times along the years. Table 5 shows results of these estimates.

Table 5: Fixed and random effects on domestic sales for persistent entrants and switchers

	Persistent entrants		Switchers	
	Fixed Effects	Random Effects	Fixed Effects	Random Effects
	(i)	(ii)	(iii)	(iv)
Constant	16.32***	10.49***	24.12***	22.05***
	(1.98)	(3.78)	(0.85)	(3.62)
Export	15.29***	15.32***	0.82	1.11
	(2.01)	(2.00)	(1.04)	(1.04)
R&D	5.24*	9.68***	7.97***	9.18***
	(2.83)	(2.73)	(1.48)	(1.47)
OS	5.70	19.33***	-9.40***	-3.84
	(6.22)	(5.31)	(2.64)	(2.58)
# Observations	3,224	3,224	8,104	8,104
R2	0.074	0.1295	0.001	0.014
Hausman Test	(i) vs. (ii)			50.27*** [3]
	(iii) vs. (iv)			124.22*** [3]

Note: ***, ** and * indicate significant at 1%, 5% and 10%, respectively. Standard errors in parentheses, and degrees of freedom between square brackets. All figures are in 2011 euros.

As can be seen, results for persistent entrants are similar to previous results when the whole set of firms are considered. On the one hand, Hausman test suggests that fixed effect model is more adequate than random effect model. On the other hand, results indicate that persistent entrants sell more in domestic markets when they are exporters, when they participate in R&D activities and when they are controlled by foreign capital. In particular, they sell 15.29 million euros more in domestic markets when they export. This result may suggest a complementary relationship between domestic and foreign sales when firms are persistent entrants. However, results change substantially when switchers are considered. Using this sub-sample of firms, Hausman test also indicates that fixed effect specification is more consistent than random effect model. Related with the effect of being an exporter, Table 5 indicates that it does not influence on domestic sales. It may suggest that processes of entry and exit into export markets are the main determinants to explain exporter behavior of these firms. Switchers do not vary their domestic sales significantly (regardless of their exporter status), and they use the exporting as a mechanism to sell possible national surplus. Thus, they would return to sell only in domestic market when surplus has been placed in foreign markets. Therefore, it seems clear that exporter behavior and the duration of these spells (permanents

or transients) affects significantly on domestic sales. Related with innovation activities, as expected, results also suggest that innovative switchers have greater national sales than non-innovative. However, owned structure influences differently for switchers. In particular, results indicate that switchers controlled mainly by foreign capitals have lower domestic sales than those in national hands.

As mentioned above, this study also applies a difference-in-difference model. This technique has become very widespread in the last few decades since the work of Ashenfelter and Card (1985). The underlying idea of this methodology compares pre-treatment and post-treatment outcome for two groups of individuals and for two time periods. The idea that underlying is based on a simple idea: one of the groups is exposed to the treatment in the second time period, but not in the first; while the second group is not exposed to the treatment in either period. To remove biases in second period comparisons between both groups, the average gain in the second group (control) is subtracted from the average gain in the first group (treatment). For example, paper of Ashenfelter and Card (1995) analyzes the effect of training programs on unemployment earnings and low-income workers. Using this methodology, they can measure, evaluate and quantify the effectiveness of these programs on wages. [7]

The next step is to apply the difference-in-difference approach in our study. As we said previously, we want to analyze the effect of export activities on domestic sales. First, we must identify treatment and control group. In this sense, treatment is referred to the participation in export activities. It indicates that a firm "suffers" the treatment when it sells in foreign markets in period 2, but not in period 1. By contrast, control group includes all firms that do not export along the two periods. Using this methodology, we may compare and measure the change in domestic sales in euros for the treatment group (exporters) and the control group (non-exporters) under the presumption that difference is due to export participation. We can write the latter expression as:

$$DID = [(Dom_{t+1} \mid X = 1) - (Dom_t \mid X = 1)] - [(Dom_{t+1} \mid X = 0) - (Dom_t \mid X = 0)] \quad (1)$$

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[7] This research measured the impact of the 1976 "*Comprehensive Employment and Training Act*" (CETA) programs, implemented by U.S. congress. In particular, they estimate that the effect of this programs on unemployed workers ranged from $200 to $2000, concluding that trials are needed to evaluate the accuracy of these programs.

where *Dom* indicates domestic sales before and after the exporting (*t* and *t+1*, respectively), and *X* is a dummy variable related with the participation in export activities which capture the two types of sample groups. This variable takes value one when firm is exporting, and zero otherwise.

As it was mentioned previously, the simplest form of this methodology is one with pre- and post-treatment observation (export or not export) on a group, where the domestic sales by firm are the outcome variable.

$$Dom_{it} = \beta_1 + \beta_2 T_t + \beta_3 X_i + \beta_4 T_t \times X_i + \varepsilon_{it}, \quad t = 1, 2 \tag{2}$$

In the latter expression, *i* indexes the two different groups with *i=1* for the treatment group (exporters) and *i=0* for the control groups (non-exporters), T_t is a dummy variable which takes value zero in the pre-treatment period (*t=1*) and one after the treatment (*t=2*), and X_i is another dummy that is equal to one for those firms that export and zero otherwise. The change in the growth rate of the domestic sales, before and after the treatment, for those exporting firms (treated) is:

$$E(Dom_{i2} \mid X_i = 1) - E(Dom_{i1} \mid X_i = 1) = (\beta_1 + \beta_2 + \beta_3 + \beta_4) - (\beta_1 + \beta_3) = \beta_2 + \beta_4 \tag{3}$$

Similarly, the change for non-exporting firms (controls) is:

$$E(Dom_{i2} \mid X_i = 0) - E(Dom_{i1} \mid X_i = 0) = (\beta_1 + \beta_2) - \beta_1 = \beta_2 \tag{4}$$

Therefore, the difference in difference is obtained by subtracting expressions (3) and (4). Specifically,

$$[E(Dom_{i2} \mid X_i = 1) - E(Dom_{i1} \mid X_i = 1)] - [E(Dom_{i2} \mid X_i = 0) - E(Dom_{i1} \mid X_i = 0)] = \beta_4 \tag{5}$$

The methodology described above requires a restriction of the initial sample. On the one hand, we do not consider those firms that have always exported in all sample years. These firms are already being "treated" in the first year of the sample period and they continue being

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"treated" along the entire period. Therefore, they cannot be exposed again to the treatment. On the other hand, we also exclude those firms that exits of the exporting. These firms are suffering the treatment and they leave it, not being exposed to the treatment anymore (those firms that undergo the treatment again are included in switchers). The inclusion of this "exiting-firms" in the sample may imply some kind of bias, and are therefore not considered. Under these assumptions, the total number of firms is reduced to 2,678. Moreover, we also include in our analysis other independent variables to measure the difference-in-difference effect. In particular, we also consider a dummy variable related with R&D investment, with owned structure, and with firm size. All of these variables are defined similarly to those of Table 3.

Table 6 summarizes our estimated exporting effects considering the whole set of firms (switchers, persistent entrants and non-exporters). As we noted previously, switchers and persistent entrants are treatment variables, while non-exporters is defined as control variable. These estimates are based on equation (5). As expected, the general result is similar to obtained using the other methodologies. The estimated exporting effect on domestic sales for exporters is, on average, 30 million euros greater than that of non-exporters when other variables are not considered, while this effect reduces to 10 million euros when other variables related with innovation, capital owned structure and size are included. Therefore, it seems clear that firms submitted to treatment (exporting in our analysis) have more domestic sales than those firms non-exposed to the same treatment (non-exporting firms). An interesting result is related with the non-significance of the difference-in-difference effect when variable is expressed in growth rates. Perhaps the greater dispersion of this variable may reflect the lack of significance of this effect.

Table 6: Summary of estimated exporting effect

	Domestic sales (2011 million euros)	Growth rate domestic sales (%)
1. Exporting effect, no considering other variables	30.4*** (1.62)	5.97 (6.40)
Observations	21,797	19,312
2. Exporting effect, allowing other variables	10.1 *** (2.15)	5.96 (4.09)
Observations	21,679	19,208

Note: Standard errors in parenthesis. ***, ** and * indicate significant at 1%, 5% and 10%, respectively. All figures are in 2011 euros.

A final check of this effect is presented in Table 7, which show the same analysis of previous table but distinguishing the exporting effect between switchers and persistent entrants. As before, we compare the effect of being an exporter (distinguishing between the two set of firms considered) with that effect of those firms that never export (control variable). Unlike Table 6, we only consider as analysis variable the domestic sales in absolute values.

Table 7: Summary of estimated exporting effect for switchers and persistent entrants
(domestic sales in million euros)

	Persistent entrants	Switchers
1. Exporting effect, no considering other variables	33.0*** (1.95)	30.9*** (2.03)
Observations	13,632	18,541
2. Exporting effect, allowing other variables	14.1*** (1.34)	9.09*** (2.30)
Observations	13,563	18,455

Note: Standard errors in parenthesis. ***, ** and * indicate significant at 1%, 5% and 10%, respectively. All figures are in 2011 euros.

As can be seen, being an exporter increases domestic sales for persistent entrants and switchers. On the one hand, persistent entrants sell 37.3 million dollars more than non-exporters on average in national markets. However, this value reduces, on average, to 15.3 million euros when we include variables related with size, R&D investment and owned structure. On the other hand, switchers also sell more in domestic markets compared with non-exporters firms. In particular, switchers sell in domestic market more than 36 million euros (when other variables are not considered) than those firms that do not export ever. When we allow other variables in the analysis, this difference in national sales between switchers and non-exporting firms is equal to 8.98 million euros. As can be observed, these increases are slightly lower for switchers than for persistent entrants. It may suggests that entry and exit dynamic experienced by switchers reduce the effect of being an exporter on domestic sales. Therefore, it seems clear that exporting generate a kind of spillovers that also stimulates domestic sales (residual exports), confirming and quantifying in monetary terms results of other researches.

5. Conclusions

Participation in export activities generates large spillovers that make firms be bigger, more productive and more innovative, and pay higher wage than those that do not export. Other important characteristic from exporters is related with their domestic sales. In general, it assumed that domestic sales increase due to exporting. We refer to these increases as residual export. In this paper we evaluate and quantify this effect using the different-in-different econometric methodology. This approach compares the domestic sales pre- and post-export between two groups of firms. On the one hand, it is defined a "treatment variable" that include those firms that did not export in t and start exporting in $t+1$. On the other hand, those firms that never export are included as a "control variable".

The results point out that exporters sell, on average, more than 10.4 million euros than non-exporters in domestic markets. It may suggest that part of export "are sold" inside the country borders, i.e., export surplus generates a residual export that is also use to supply national markets. Moreover, results also suggest that this residual export changes substantially according to firm's persistence in export markets. In particular, we obtain that this effect is greater for persistent entrants than for switchers (always comparing both effects with that of non-exporters). It may indicate that continuous dynamics of entry and exit from exporting reduce the spillovers effects on domestic market.

We also apply a fixed and random effects model to obtain the difference between being an exporter and sell only in domestic market. As expected, results indicate that firms have more domestic sales when they participate in export activities than when they do not. Again, results differ when we distinguish between switchers and persistent entrants. In this sense, results point out that those firms that enter in exporting and continue to export consecutively until the end of the sample sell 19 million euros on average more of domestic sales when they export than when they do not. However, this result is not observed when switchers are considered, i.e., switchers do not increase their domestic sales as consequence of export activities.

The latter conclusions suggest that export promotion policies focused on persistent entries would have benefits that go beyond of the fact of start exporting, insofar it also would increase national sales substantially.

References

Ahn, J. and McQuoid, A.F. (2012): "Capacity Constrained Exporters: Micro Evidence and Macro Implications", *mimeo*.

Ashenfelter, O. and Card, D. (1985): "Using the Longitudinal Structure of Earnings to Estimate the Effect of Training Programs", *Review of Economics and Statistics*, 67, p. 648-660.

Blonigen, B.A. and Wilson, W.W. (2010): "Foreign subsidization and excess capacity", *Journal of International Economics,* 80, p. 200-211.

Blum, B.S., Claro, S. and Horstmann, I.J. (2013): "Occasional and perennial exporters", *Journal of International Economics,* 90, p. 64-75.

Buisán, A. and Gordo, E. (1994): "Funciones de importación y exportación de la economía española", *Investigaciones Económicas*, Vol. XVIII (1), p. 165-192.

García, C. and Gordo, E. (1998): "Funciones trimestrales de exportación e importación para la economía española", Documentos de Trabajo nº 9822, Banco de España.

Gordo, E., García, C. and Martínez-Martín, J. (2008): "Una actualización de las funciones de exportación e importación de la economía española", *Boletín Económico del Banco de España*, diciembre.

Lee, S., Beamish, P.W., Lee, H. and Park, J. (2009): "Strategic choice during economic crisis: Domestic market position, organizational capabilities and export flexibility", *Journal of World Business*, 44, p. 1-15.

Liu, Y. (2012): "Capital Adjustment Costs: Implications for Domestic and Export Sales Dynamics", *mimeo*.

Martín Machuca. C., Rodríguez Caloca, A. and Tello Casas, P. (2009): "Determinantes principales de la decisión de exportar de las empresas españolas", *Boletín económico del Banco de España*, diciembre.

Mauleón, I. and Sastre, L. (1994): "El saldo comercial de 1993: un análisis econométrico", *Información Comercial Española*, 735, p. 167-172.

Mayer T. and Ottaviano G.I.P. (2008): "The Happy Few: New Facts on the Internationalization of European Firms", *Intereconomics: Review of European Economic Policy*, 43(3), p.135-148.

Melitz, M.J. (2003): "The impact of trade on intra-industry reallocations and aggregate industry productivity", *Econometrica* 71, p. 1695-1725.

Ortega, E., Burriel, P., Fernández, J.L., Ferraz, E. and Hurtado, S. (2007): "Actualización del Modelo Trimestral del Banco de España", Documentos de Trabajo nº 0717, Banco de España.

Rodríguez, D. (2008): "Heterogeneidad y competitividad exterior de las empresas industriales", *Papeles de Economía Española*, 116, p. 140-151.

Salomon, R. and Shaver, M. (2005): "Export and domestic sales: Their interrrelationships and determinants", *Strategic Management Journal*, 26, p. 855-871.