REGIONAL EXPORT PROMOTION OFFICES AND TRADE MARGINS

Salvador Gil-Pareja*

Rafael Llorca-Vivero

José Antonio Martínez-Serrano

Francisco Requena-Silvente

University of Valencia

March 15th, 2012

Abstract

This paper investigates the channels through which Spanish regional export promotion offices (REPOs) abroad affect bilateral exports. Using transaction data per product over the period 1995-2010, we decompose the total impact of REPOs on exports value into three margins: number of products, number of firm transactions per product and average value per transaction. We find that the export-enhancing effect of REPOs takes place mainly through an increase in the first two margins. Moreover, we also find that the pro-trade effect of REPOs is larger for more differentiated products, for non-EU destinations and is increasing with the age of the offices.

Key words: Information barriers, Export promotion institutions, Extensive and intensive margins, Spanish regions, Gravity equation.

JEL Classification numbers: F14; R12.

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*Facultad de Economía, Departamento de Estructura Económica, Av. de los Naranjos s/n, C.P. 46022, Valencia, Spain. Email: Salvador.Gil-Pareja@uv.es (corresponding author); Rafael.Llorca@uv.es; Jams@uv.es; Francisco.Requena@uv.es. Tel. 34963828349. Fax 34963828354. The authors are very grateful to Christian Volpe-Martincus for helpful comments and suggestions. This study is part of a research project financed by *Ministerio de Ciencia y Tecnología* (projects 2009ECO-08181 and ECO2011-27619) and has been part-funded by the European Regional Development Fund (ERDF). We also thank financial support from the Generalitat Valenciana (GVPROMETEO2009-098). The usual disclaimer applies.

1. Introduction

Over the last two decades a growing number of Spanish regional governments have established a network of regional export promotion offices (REPOs) abroad, with the aim of providing qualified support, information and advice to regional companies wishing to trade and invest in foreign markets. Catalonia and Valencia were the first two regions that opened trade offices abroad in 1987 and in 1990, respectively, and since the mid 1990s other Spanish regions (starting by Basque Country, Region of Murcia, and Aragon) followed their footsteps to such an extent that, nowadays, REPOs have become a popular instrument to boost Spanish regional exports. The economic justification for regional public intervention in export promotion is based on the existence of market failures, such as asymmetric information or externalities.

In recent years there has been a revived interest in the study of the impact of export promotion activities on trade.[1] This renewed branch of research has shown that diplomatic representations, state visits, export credit agencies and national and local export promotion agencies have had a positive effect on bilateral trade. Documenting evidence of a positive impact of REPOs on exports is of great interest by itself, given their proliferation over the last years and the increasing amount of financial resources that Spanish regional governments spend on their foreign network. Gil *et al* (2008) studied the impact of six Spanish REPOs over the period 1995-2003 and found an overall positive impact on total exports value. This piece of evidence is both of interest for academics and useful for policy makers (particularly in a context in which the low growth rates of the Spanish economy have led to question the survival of these public-financed trade promotion institutions). However, it does not

[1] For a review of the literature, see Section 2.

allow us to know how actions taken by Spanish REPOs affect exports (through the different margins of trade) and whether or not there are differences across destinations markets, product categories and industries.

Until recently, the specialised literature made no distinction between the effect of export promotion institutions on the extensive margin (i.e., the introduction of new goods, the access to new markets or the emergence of new trading relationships) and the effect on the intensive margin (i.e., the increase of exports in existing trade relationships). The lack of bilateral trade data at the firm level has been the main difficulty in identifying effects on these two margins empirically. Since data at the firm level are usually not available, some researchers have used the total number of bilateral traded products to proxy the extensive margin of trade and the value per traded product to proxy for the intensive margin of trade (Volpe-Martincus, Carballo and Gallo, 2010 and Volpe-Martincus *et al.* 2010). While insightful, the decomposition made with this kind of data overestimates the impact on exports that takes place through the intensive margin, since it masks (inside the intensive margin) a potential important channel through which export promotion institutions may affect trade, that is, the number of firm transactions per product. Insofar promotion institutions help to the establishment of new trade relationships, it can be expected that a part of the total effect on exports takes place through an increase in the number of firm transaction per product. Such increase captures two elements that cannot be considered part of the intensive margin but of the extensive margin considering the firm-product as the unit of reference: The emergence of new exporting firms and the appearance of new trading partners of existing firms. Our proposed estimation procedure solves this problem by using transaction data per product.[2]

[2] Ideally, one would like to have bilateral trade data at the firm level. In the absence of such data, we argue that the best approach is to use transaction data at a high level of product disaggregation.

The aim of this paper is fourfold. Firstly, in addition to provide new evidence on the effect of REPOs on exports, we examine the channels through which the foreign network of REPOs affects bilateral trade. To this end, we decompose the total impact of REPOs on exports into three margins: The number of exported products, the number of firm transactions per product, and the average value of exports per firm transaction. Secondly, we investigate these impacts across destination markets and over time. Thirdly, we examine whether REPOs impact on the trade margins of exports varies based on the degree of product differentiation. Finally, we explore the effect of REPOs on the trade margins of exports by industries and regions.

To preview our results, using data over the period 1995-2010, we find that REPOs have a significant effect on aggregate exports and that this effect takes place along the three margins but mainly through the increase in both the number of products and the average number of firm transactions per product. Moreover, we find that the magnitude of the effect of REPOs on exports is larger when offices are located outside the European Economic Area and that their effects on trade increase with time. Additionally, we find that REPOs seem to favour an increase in trade margins of exports in differentiated goods, which is consistent with the ideas that REPOs help to reduce informational problems and that information-related impediments to trade are larger for differentiated goods. Finally, the results show a large heterogeneity across industries and regions. REPOs have a clear positive impact on almost all sectors but the positive effect of REPOs along the pure intensive margin takes place in less than half of them. Across regions, those with longer experience in export promotion and with a wider foreign network tend to exhibit larger effects.

The paper is structured as follows. Section 2 offers a review of the literature about the impact of export promotion institutions on trade. Section 3 presents the empirical methodology. Section 4 describes the data. Section 5 discusses the estimation results. Finally, section 6 concludes the paper.

2. Background

Exporting is a complex activity. To respond optimally to trade incentives firms require the acquisition of sufficient information about foreign markets, prices, technical characteristics of products, distribution channels and potential trading partners. In spite of the huge development in communication technologies that has taken place over the last decades, information incompleteness is still a severe obstacle for firms seeking to sell in foreign markets. Information networks help to alleviate the costs of acquisition of sufficient information on foreign markets and operations during the firm's export decision process. Recent literature on networks in international trade (Rauch, 2001) focuses on gaining insight on how information-sharing networks among internationally dispersed ethnic minorities or business groups can overcome informal trade barriers such as inadequate information about trading opportunities and weak enforcement of international contracts (Anderson and Marcouiller, 2002). Another strand of the literature focuses on the role of public institutions such as embassies and consulates (Rose, 2007), trade credit agencies (Abraham and Dewit, 2000; Egger and Url, 2006) and export promotion organizations (Volpe-Martincus, 2010). Moreover, since investments in gathering information may have positive externalities, these investments may be low from a social point of view. Hence, most governments have attempted to address these information-related problems through export promotion agencies (EPAs).

The first studies analyzing the impact of EPAs on export performance were pessimistic about the effectiveness of these organizations. The well known report conducted by the World Bank in the late 1980s (Hogan, Keesing and Singer, 1991) presents a negative picture of EPAs in developing countries. Low-quality services to exporters and import substitution policies were given as the main explanations. However, the dramatic rise of EPAs around the world over the last two decades has driven to the emergence of recent empirical literature with a more pleasing view.

Rose (2007), in a seminal cross-country analysis, examines the impact of diplomatic representations (embassies and consulates) as agents of export promotion on bilateral trade using a gravity model of trade on a sample of 22 origin countries and 200 destinations. His results show a moderate (6% to 10%) but robust effect on trade of each additional consulate abroad. Segura and Vilarrubia (2008) analyze the impact of diplomatic representations on both the export decision and the volume of exports concluding that embassies and consulates affect the probability of exporting but not the volume of exports.

A more recent study using cross-country data is that of Lederman, Olarreaga and Payton (2010). These authors construct a World survey of national EPAs covering 104 countries. Their results show that, on average, these institutions have a strong positive impact on trade suggesting that for each dollar spent on export promotion exports increase around 300 dollars for the median agency. However, there is a lot of heterogeneity in the effectiveness of EPAs depending on geography (economic regions), level of development (no impact is found for poorest countries) and types of instruments used by EPAs.

As mentioned above, the economic justification for EPAs is based on market failures, such as asymmetries of information and externalities arising from free-

riding behavior. But this argument has to be qualified for a better understanding on the channels through which EPAs influence exports. On the one hand, international trade barriers are higher when firms try to enter a new destination market (country-extensive margin) or to introduce a new product (product-extensive margin) than when firms try to sell more exports of previously exported goods or to countries that are already served (intensive margin). Additionally, more information-related problems to trade arise when trading differentiated products (in which prices do not completely perform the signaling function) than when trading homogeneous goods. Therefore, it is expected EPAs to be more effective on the extensive margin of firms and selling differentiated goods.

The above arguments are taken into account by several papers. Alvarez and Crespi (2000) analyze the effectiveness of the export promotion agency of Chile (PROCHILE) using plant level data on a sample of 365 Chilean firms over the period 1992-1996. Their results show that promotion instruments have a positive and direct impact on the number of export markets and, after a period of four years, on product diversification. Volpe-Martincus and Carballo (2008), using a Peruvian firm level data set over the period 2001-2005, find that export promotion have a positive effect on exports, especially along the country and product extensive margins.

More recently, Van Biesebroeck, Yu and Chen (2010) analyze the case of Canada. These authors evaluate the effectiveness of the Canadian Trade Commissioner Service (TCS), with 140 offices around the world. The conclusion reached is that TCS assistance has a positive and large effect on exports and that improvements are both in terms of product and market diversification. Volpe-Martincus and Carballo (2010a), using the entire population of Uruguayan exporters over the period 2000-2007, also find that trade promotion facilitate the accession of

firms to new destination countries as well as the introduction of new differentiated products. Volpe-Martincus, Carballo and Gallo (2010) also obtain that EPAs of a sample of Latin American and Caribbean countries have a larger impact on the extensive margin of exports. Additionally, these agencies stimulate the increase in the number of differentiated goods that are exported while diplomatic representations improve exports of homogeneous goods (Volpe-Martincus et al. 2010).

The impact of export promotion programs is also likely to be influenced by firm size. The reason is that heterogeneity in access to information may cause that smaller firms confront more limitations than larger ones in international trade. As a consequence, trade promotion programs are expectedly to be more effective in supporting smaller as well as inexperienced exporters. Volpe-Martincus, Carballo and García (2010) study the effectiveness of trade promotion programs depending on firm size segments for a sample of Argentinean firms over the period 2002-2006. As expected, their results show that small companies benefit more from export promotion in terms of improved export performance than larger ones. Additionally, these benefits essentially come from the country-extensive margin. Alvarez (2004), using data for Chilean firms, finds that export promotion programs (exporter committees) are effective for small and medium size companies. Finally, considering size in terms of export outcomes, Volpe-Martincus and Carballo (2010b) using the whole population of Chilean exporters over the period 2002-2006, also find that smaller firms are more favored by export promotion.

3. Empirical methodology

We empirically examine the effect of REPOs on bilateral exports from the Spanish regions using the gravity model of trade.[3] The gravity model relates bilateral trade flows to economic size, distance and other factors that affect trade barriers (such as the use of a common language or the existence of a common land border). In this framework, we estimate the impact of REPOs on exports and trade margins by adding a variable that accounts for the presence of regional foreign offices in the destination countries, once we allow for other determinants of international trade.

We estimate the gravity equation (1) using conventional Ordinary Least Squares (OLS):

$$\begin{aligned}\ln V_{ijt}^{k,z} = {} & \beta_0^{k,z} + \beta_1^{k,z} \ln(GDP_{it} * GDP_{jt}) + \beta_2^{k,z} \ln Dist_{ij} + \beta_3^{k,z} Contiguity_{ij} \\ & + \beta_4^{k,z} Language_{ij} + \beta_5^{k,z} Island_{ij} + \beta_6^{k,z} Landlocked_{ij} + \beta_7^{k,z} EUEFTA_{ijt} \\ & + \beta_8^{k,z} EmbCons_{jt} + \beta_9^{k,z} REPO_{ijt} + \delta_i + \eta_j + \mu_k + \alpha_z + \lambda_t + u_{ijt}^{k,z}\end{aligned} \quad (1)$$

where *k* indexes industries, *z* categories of goods, *i* exporter regions, *j* importer countries, and *t* time. Thus, the dependent variable (*V*) is the value of exports from Spanish region *i* to country *j* in products belonging to a broad defined industry *k* and a product category *z* (differentiated and non-differentiated) in year *t.* The explanatory variables are defined as follows: *GDP* denotes the Gross Domestic Product, *Dist* denotes the great-circle distance between each Spanish region and the destination countries[4], *Contiguity* is a binary dummy variable that takes the value of one if the

[3] The gravity model of trade has solid theoretical foundations. See, among others, Anderson (1979), Bergstrand (1985, 1989), Evenett and Keller (2002), Anderson and van Wincoop (2003, 2004) and Helpman, Melitz and Rubinstein (2008).

[4] We follow Mayer and Zignano (2011) to construct the great-circle distance variable between each Spanish region and each foreign country. We calculate a weighted average of the great circle distance (in kilometres) from the capital of each region to the five most important cities of each partner country, in which the weights are the respective populations of the latter. The great circle distance between i's and j's cities is calculated as follows. First we transform the latitude and the longitude into radians (x π /360). Second, the formula used to calculate the distance between the pair of cities is $\Delta_{ij} \equiv \lambda_j - \lambda_i, d_{ij} = \arccos\left[\sin\varphi_i \sin\varphi_j + \cos\varphi_i \cos\varphi_j \cos\Delta_{ij}\right] z$, with z= 6367 for km. Third,

trading partners are France or Portugal, *Language* is a binary dummy variable that is unity if *i* and *j* share a common language, *Island* is the number of islands in the country-region pair (0, 1 and 2), *Landlocked* is the number of country-regions in the pair that have no direct access to the sea (0, 1 and 2), *EUEFTA* is a binary dummy variable equal to one if the trade partner of the Spanish region is a member of the European Union (EU) or the European Free Trade Area (EFTA) in year t, *EmbCons* is the number of diplomatic representations (embassies and general consulates) that Spain has in the importer country *j*, and *REPO* is a binary variable that takes the value of one if the trade promotion organization of the exporter region has an office in the importer country. Equation (1) includes a full set of fixed effects, δ_i, η_j, μ_k, α_z, and λ_t to control for exporter, importer, industry, product category and year characteristics, respectively; *u* is the stochastic error term.

A novel contribution of this paper is the decomposition of total value of bilateral exports (V) into three different parts.[5] If we denote the number of products that a region exports to a country in a particular year as N and the number of firm transactions per product as T, we can implement the following decomposition: V=N*(V/N)=N*(T/N)*(V/T). In the absence of firm transaction data (T), the first part of this expression can be used to proxy the extensive margin of exports by N and the intensive margin of exports by (V/N).[6] However, this decomposition presents two limitations. First, it underestimates the impact that takes place through the extensive margin and overestimates the impact that takes place through the intensive margin. Second, it masks an important channel through which export promotion institutions may affect trade, that is, the effect that they have on the number of transactions per

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we calculate the population-weighted average distance between the capital of the region and the cities of the foreign countries using the formula $D_{i,cou} = \sum_{j \in cou} w_j d_{ij}$, $w_j = pop_j / pop_{cou}$.

[5] Subscripts (*i*, *j* and *t*) and superscripts (*k* and *z*) are suppressed for simplicity.

[6] See, for example, Volpe-Martincus, Carballo and Gallo (2010).

product. In this paper, we go beyond the existing literature by using the decomposition made in the second part of the above equality. It decomposes total exports into the number of products (N), that we call the "pure extensive" margin, the average number of transactions per product (T/N), that we call the "mixed" margin, and the average value of exports per firm transaction, that we call the "pure intensive" margin (V/T). We call "mixed" to the second margin because it combines transactions that can be considered part of either the extensive or the intensive margin. Each export transaction is invoiced by an exporting firm to a particular importer. Hence, an increase in the average number of transactions per product captures either new exporting firms or new trading partners of existing firms or higher frequency in transactions between existing trading partners. The first two elements of the "mixed" margin can be considered part of the "extensive" margin while the third is part of the "intensive" margin considering the firm-product as the unit. The lack of bilateral trade data at the firm level precludes explicitly disentangling the elements of the "mixed" margin, but if we ignore the existence of the "mixed" margin at firm-product level, then we are overestimating the magnitude of the intensive margin.

Since OLS is a linear operator, regressions of ln(N), ln(T/N) and ln(V/T) on the set of the explanatory variables used in equation (1) additively decompose their effects on the three export margins. Specifically, to investigate these effects, in addition to estimate equation (1), we estimate the corresponding three equations for the trade margins. Thus, the estimated OLS coefficient of the variable *REPO* on total

value of exports can be decomposed as the sum of the estimated OLS coefficients of the variable *REPO* for each one of the three margins.[7]

4. Data

The dependent variable (V) and its three margins (N, T/N and V/T) are taken from the ADUANAS-AEAT data set provided by the Spanish *Ministerio de Economia y Hacienda*. The sample includes annual transaction-level foreign exports flows from the 17 Spanish regions to a sample of 158 countries over the period 1995-2010. The industry classification (*k*) follows NACE 2 digits and contains 22 broad sectors. Each broad sector contains a number of subsectors (CN 8 digit classification), which are classified into two categories, differentiated and non-differentiated products, according to the Rauch (1999) classification.[8] The total number of observations ("square matrix") is 1,772,760, but the sample is reduced to those observations with non-zero trade flows (507,988) after transforming the dependent variable in logarithmic form.

The independent variables are taken from different sources. The GDPs in real terms are taken from the WDI (World Bank), for the destination countries, and from the *Regional Accounts* database (Instituto Nacional de Estadística), for the Spanish regions. Information on geographical coordinates of cities around the world (to calculate great-circle distances between regions and countries) is taken from the

[7] Notice that the additive property is only valid for linear regression models. It does not hold for non-linear estimation methods such as Pseudo Poisson, another method commonly used to estimate the gravity equation.

[8] Rauch (1999) distinguishes three product categories using the SITC rev 2 classification: differentiated, referenced-priced and homogeneous. However, since the number of observations in the category of homogeneous goods is relatively small in our sample (less than 7 per cent of the total number of observations), in this paper we group the 8-digit CN products only into two categories: differentiated goods and non-differentiated goods, including in this second category both homogeneous and reference-priced goods which jointly account for about 30 per cent of the observations in our sample. The correspondence tables between NACE and CN and between SITC rev 2 and CN are available in website Eurostat-Ramon.

webpage *http://www.world-gazetteer.com*. *For the* construction of the dummy variables for island, landlocked status and common language we use CIA's World Factbook. The data on the number of embassies and consulates come from the Spanish *Ministerio de Asuntos Exteriores*. We exclude honorary consulates and consider an embassy and a separate chancery or consulate in the same city as just one. Finally, data on the number of foreign trade agencies of the Spanish regions have been provided by the respective agencies. With regard to this variable two comments are in order. Firstly, since we know the year but do not know the month in which each particular office start to operate, we have considered that a regional office is operative since the beginning of the year after its openness. Secondly, we have not taken into account the regional offices located in Belgium (Brussels) since we assume that they have an institutional function and their operational ambit is the full European Union territory.

The Spanish REPO network has spread out gradually in the number of regions of origin and destination countries. Graph 1 shows the distribution of the REPO network by Spanish regions over the period of analysis (1995-2010). Out of 17 regions, there were six regions with REPOs in 1995, ten in 2002 and fourteen in 2010. Catalonia is the only region with a consolidated network of offices abroad since the beginning of the period, while four regions set up their network in the second half of 2000. Three regions did not open any office abroad: Balearic Islands, Navarra and Rioja. As Table 1 shows, there were 26 destination countries in 1995; the number doubled in 2010 and they are present in all the continents. China, Mexico and Poland are the three countries with the largest number of Spanish REPOs in 2010 (twelve, eleven and ten, respectively).

[INSERT TABLE 1 HERE]

[INSERT GRAPH 1 HERE]

5. Estimation results

This section begins by estimating the effect of Spanish REPOs on the total value of exports and the three trade margins using several estimation techniques. Next, we investigate these impacts across destination markets and over time. We then turn to examine whether these effects vary across group of goods (differentiated and non-differentiated). Finally, we analyse these effects across industries and regions.

Column 1 of Table 2 reports estimates of equation (1) by conventional OLS. The estimated coefficients are, on the whole, intuitive in sign and size and both economically and statistically significant. The only exception is the estimated coefficient of the variable *EmbCons* that is positive but does not reach the statistical significance at conventional levels. In particular, the results suggest that Spanish REPOs have had a positive effect on bilateral exports, which is in line with the findings of the recent literature on the impact of export promotion organizations on trade.[9] However, while very useful for policy makers, this evidence does not inform about how actions taken by Spanish REPOs affect bilateral exports.

Export promotion offices abroad provide services that try to ameliorate some of the obstacles that firms face when selling in export markets. Among the most prominent obstacles to international trade that firms face are information-related problems. Since services offered by REPOs mainly aims to alleviate information problems, it can be expected that these services have a larger impact when these

[9] Nowadays, there is an intense public debate in policy making circles in Spain about the convenience of maintaining regional offices abroad. This debate is motivated by the necessity of reducing public expenditure given the large fiscal deficit and the negative or low growth rates of the Spanish economy over de last years.

problems are more severe. Thus, we expect a larger effect on the introduction of new products (the pure extensive margin), than on the increase in the average value of exports per firm transaction (the pure intensive margin). Moreover, we also expect a positive impact of REPOs on exports through the increase in the number of transactions per product (the mixed margin) since this channel incorporates the effect that takes place through the increase of two types of transactions that are part of the extensive margin: the emergence of new exporting firms and the creation of new trading relations of existing exporters with new trading partners in a particular destination country.

Columns 2 to 4 of Table 2 provide evidence on the channels through which Spanish promotion offices abroad affect regional exports. The estimated coefficients for the three margins are positive and highly statistically significant. As expected, we find that the estimated coefficient is larger for the pure extensive margin (0.163) than for the pure intensive margin (0.111), although the difference is not statistically significant at conventional levels of significance. With regard to the mixed margin, we also find a positive coefficient (0.181) and comparing this coefficient with that of the pure intensive margin we can reject the null hypothesis of equality at the 5 per cent level of significance.[10]

The magnitude of the mixed margin states the importance of taking into account the number of transactions to decompose total exports into their extensive and intensive components and to compare empirically the relative size of both trade margins. Ignoring the mixed margin and approximating the intensive margin by V/N we would falsely conclude that about two thirds of the impact of the Spanish regional

[10] Volpe-Martincus, Carballo and Gallo (2010) find that trade offices have a larger impact on the extensive margin of exports for exports from Latin American and Caribbean countries.

offices abroad on exports operates through the intensive margin.[11] As mentioned above, this is because in T/N there are elements (such as, the emergence of new exporting firms or the appearance of new trading partners of existing exporting firms) that cannot be considered part of the intensive margin but of the extensive margin considering the firm-product as the unit.

We also report in Table 3 the results of the Pseudo Poisson estimates, a more robust gravity model compared to the log-form adopted in equation (1) (Santos-Silva and Teneyro, 2006). Unfortunately the limitation is that the sum of the REPO coefficients across margins is not equal to the overall impact on total exports. The Pseudo Poisson estimates confirm our main findings. Regional offices abroad boost exports and they operate through an increase in both the number of exported products and the average number of transactions per product. The novelty is that in this case the estimated coefficient for the pure intensive margin is not statistically significant at conventional levels of significance. Thus, there seems to be consistent evidence that REPOs boost exports mainly along both the pure extensive margin and the mixed margin and to a lesser extent along the pure intensive margin.

The strength of information barriers to international trade is likely to vary across destination markets. It is a well known fact that the European market has been traditionally the main destination of Spanish exports. Since the beginning of the openness process to international trade of the Spanish economy in the early 1960s, a large number of European countries has become important and relatively better known export markets for Spanish firms. This process was reinforced with the

[11] Remember that V/N=T/N*V/T. Hence, if we do not decompose V/N into its two components, as we propose in this paper, the estimated coefficient for the intensive margin (V/N) would be 0.292 (0.181+0.111), which nearly doubles the magnitude of the estimated coefficient for the extensive margin (0.163). However, it is worth noting that this fact do not invalidate the conclusions of Volpe-Martincus, Carballo and Gallo (2010) for exports from Latin American and Caribbean countries, since these authors find that most of the effect of offices of export promotion agencies takes place along the extensive margin (N).

accession of Spain to the EU in 1986. Moreover, since 1994 Spain shares a free trade area with members of the European Economic Area (EUEFTA in the tables), which includes in addition to the EU countries, member countries of the EFTA. Thus, barriers to international trade (including information-related obstacles) are expectedly larger for countries that not belong to the EEA than for countries that belong to that group of presumably better known destination markets. The reason is because informational obstacles associated with the export activity (e.g., firms must learn about the formal export process, shipment and marketing modalities, technical and administrative norms for products and other conditions required to access to each market, distribution channels, or their demand profile) are more easily overcome in EEA markets. Regional trade promotion actions aiming at reducing information gaps should therefore have larger effects in non-EEA countries.

Panel A of Table 4 contains the results. Four comments are in order. Firstly, as expected, the estimated coefficient for REPOs located outside the EEA is larger than that for those placed inside this area (0.498 versus 0.322), being the difference statistically significant at the 5 per cent level. Secondly, the estimated coefficients are positive and statistically significant in both cases, and therefore, REPOs boost exports not only outside the EEA but also in the EEA markets. Thirdly, REPOs located in non-EEA countries affect exports through the three trade margins whereas REPOs located in EEA only through the pure extensive margin and the mixed margin. Finally, the impact that takes place along both the pure extensive margin and the pure intensive margin is statistically larger for non-EEA destinations than for EEA markets.

Next, we explore the time pattern of the linkage between REPOs and exports. In particular, we re-estimate equations (1) to (4) adding interactive dummy variables

to obtain separate estimated coefficients of the variable of interest for the first year of operation of the regional offices abroad, the second and the third years, the fourth and the fifth, the sixth and the seventh and the eighth and subsequent years. The results, reported in Panel B of Table 4, are in line with our expectations. The magnitude of the parameter of interest in column (1) increases continuously from 1 year since the set up of REPOs to 8 or more years (almost doubling its magnitude in total), and the difference between the coefficients is statistically significant at the 10 per cent level. With regard to the trade margins, this pattern also occurs for the mixed margin and for the pure intensive margin (although in this last case the test does not reject the null hypothesis of equality of the coefficients over time). In the case of the pure extensive margin the estimated coefficient rises until 4-5 years since the start.

Information-related impediments to international trade are also likely to differ across groups of goods with varying degree of differentiation. In particular, it can be expected that information problems are larger for more differentiated goods, for which prices cannot convey all relevant information to trade given the particular characteristics of this kind of products. So, since REPOs ameliorate information problems, their effects on exports can also be expected to differ across goods according to the degree of differentiation. To examine the effect of Spanish regional offices abroad on both total exports and the three trade margins distinguishing across groups of goods, we follow the classification developed by Rauch (1999) according to the degree of severity of the information problems that firms face in trade but as noted above, we group the 8-digit CN products only into two categories: differentiated goods (which account for about 70 per cent of Spanish exports) and non-differentiated goods.

Table 5 presents the results allowing for individual coefficients for each one of the two categories of products. Panel A presents the estimated coefficients of the variable of interest. Panel B reports within-equation and across-equation tests of equality of the *REPO*'s coefficients. The results are in line with our expectations. We find that REPOs increase exports of goods which are more affected by information-related trade obstacles (differentiated goods), which is consistent with the evidence reported by Volpe-Martincus *et al* (2010) for developing countries in Latin America and the Caribbean. For non-differentiated goods we do not find evidence of a positive impact on total exports. Moreover, the analysis of the margins of trade reveals that the impact of REPOs on exports of differentiated goods operates through the three margins, but mainly through both the pure extensive and the mixed margins. In fact, the null hypotheses of equality of both estimated coefficients across equations, with respect the pure intensive margin, are rejected at conventional levels. However, for non-differentiated goods we do not find evidence of a positive impact through the pure extensive margin but we find a small positive effect along the mixed margin (being the estimated coefficient statistically significant at the 5 per cent level) and along the pure intensive margin (at the 10 per cent level)

We next investigate the effect of REPOs on exports and trade margins across the 22 industries. The results obtained from industry-by-industry estimations are reported in Table 6. According to these results, with the exceptions of *metal products* and *other manufactures*, trade promotion offices have had a positive effect on exports in 20 out of 22 industries. Turning to the analysis of the REPOs effect on the three trade margins by industries, we find that regional offices abroad seem to be effective in increasing the pure extensive margin of exports in all but three industries (*Leather and shoes*, *metal products* and *other manufactures*). A similar result is

found with regard to the impact that takes place through an increase in the average number of transactions per product (mixed margin), where we show evidence of a positive effect in all industries with the exception of *other manufactures*. In contrast, in more than half of the industries we do not find evidence of a positive effect through the pure intensive margin.

Finally, the effects of regional offices abroad on exports may differ from region to region. In order to explore whether this is the case, we re-estimate equations (1) to (4) relaxing the assumption that the estimated coefficients for REPOs are the same across regions. Spanish regions with REPOs abroad can be split into two groups. The first group includes those regions with a more extensive and consolidated network of offices in foreign markets (Catalonia, Comunidad Valenciana, Basque Country, Aragon, Region of Murcia and, to a lesser extent, Andalusia and Castilla-Leon). The second group is integrated by regions with a lesser extensive export promotion network (Canary Islands, Cantabria, Castilla-La Mancha, Extremadura, Galicia, Madrid, and Principado de Asturias).

The estimated coefficients of the variable of interest are reported in Table 7. The results show that there is a large heterogeneity across regions but in general, as expected, the largest effects appear for regions with more tradition in export promotion and with a wider network.[12] The exceptions are the Region of Murcia in the first group (whose REPOs seem not to be effective in export promotion) and the Comunidad de Madrid in the second group (whose regional offices abroad seem to have a large impact).

5. Conclusions

[12] The negative estimated coefficient for Cantabria is surprising. However, it can be explained by the fact that this region only has two offices, one of them opened in 2005 in China and the other in 2009 in Mexico.

Over the last two decades, Spanish regional governments have developed a network of regional export promotion offices abroad with the aim of boosting exports by correcting market failures such as asymmetric information or externalities. This paper explores the impact of these regional export promotion offices on total exports and, most importantly, the channels through which they affect bilateral trade. To this end, we propose a decomposition of total exports into three components: the number of products, that we call the "pure extensive" margin, the average number of transactions per product, that we call the "mixed" margin, and the average value of exports per firm transaction, that we call the "pure intensive" margin.

Our findings indicate that regional export promotion offices have had a significant effect on aggregate exports and that, as expected, this effect takes place mainly through the increase in both the number of products and the average number of firm transactions per product. Moreover, in line with our priors, we find that the effect of REPOs rises over time and that it is larger when these offices are located outside the European Economic Area (where information barriers are presumably larger).

The analysis by categories of products reveals that regional offices seem to favour an increase in trade margins of exports in differentiated goods, which is consistent with the fact that information-related impediments to trade are larger for this kind of goods. Finally, the results across regions show a large heterogeneity. In general, we find a positive effect for those regions with more tradition in export promotion activities and a broad network of offices abroad.

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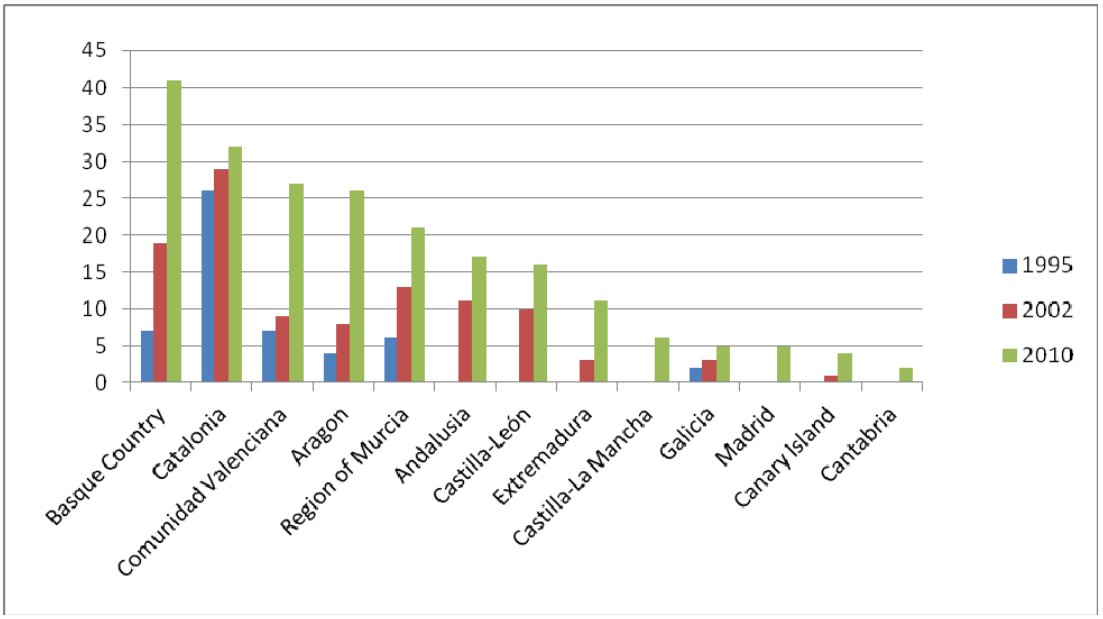
Graph 1. Distribution of REPO network by Spanish region in year 1995, 2002 and 2010



Note: Three regions did not have any REPO: Balearic Islands, Navarra and Rioja.

Table 1. Distribution of Spanish REPO network in 1995 and 2010 by destination country.

1995	ARE(1), ARG(2), AUS(1), CAN(1), CHL(3), CHN(1), CZE(2), DEU(3), DNK(1), DZA(1), FRA(1), HKG(1), HUN(2), IND(1), ITA(1), JPN(5), KOR(1), MEX(3), POL(2), PRT(1), RUS(1), SGP(1), TUR(1), URY(1), USA(2), VEN(1), ZAF(1)
2010	ARE(6), ARG(7), AUS(1), AUT(1), BGR(2), BRA(9), CAN(3), CHL(7), CHN(12), COL(1), CPV(1), CUB(1), CZE(7), DEU(7),DNK(1), DZA(4), EGY(2), EST(1), FIN(1), FRA(7), GBR(6), HKG(4), HUN(6), IND(4), IRL(1), ITA(2), JPN(7), KOR(2), MAR(7), MEX(11), MRT(1), MYS(1), NLD(1), PAN(1), PHL(1), POL(10), PRT(7), QAT(1), ROM (2), RUS(8), SGP(3), SVK(1), SVN(1), SWE(2), THA(1), TUN (1), TUR (4), UKR(1), URY(1), USA (8), VEN (2), VNM (1), ZAF (2)

Note: In brackets, number of Spanish regions with office in the country.

Table 2. The impact of regional export promotion agencies on exports - OLS estimates

	Total value exports ln (V) (1)	Pure extensive margin ln (N) (2)	Mixed margin ln (T/N) (3)	Pure intensive margin ln (V/T) (4)
GDP reg*GDP cou	0.550***	0.227***	0.0834***	0.240***
	[0.0589]	[0.0493]	[0.0310]	[0.0441]
Dist	-1.093***	-0.596***	-0.714***	0.216
	[0.259]	[0.149]	[0.104]	[0.139]
Contiguity	0.857***	0.465***	0.401***	-0.00915
	[0.0538]	[0.0953]	[0.0179]	[0.0334]
Language	1.822***	0.989***	0.257***	0.576***
	[0.0593]	[0.0479]	[0.0322]	[0.0436]
Island	0.997***	-0.0801	0.716***	0.361***
	[0.201]	[0.0898]	[0.0622]	[0.126]
Landlocked	-1.909***	-0.640***	0.102***	-1.370***
	[0.0868]	[0.0401]	[0.0270]	[0.0567]
EUEFTA	0.190***	0.108***	0.0822***	-0.00105
	[0.0569]	[0.0193]	[0.0158]	[0.0542]
EmbCons	0.00399	-0.000454	-0.00350	0.00794
	[0.0366]	[0.0122]	[0.0102]	[0.0190]
REPO	0.455***	0.163***	0.181***	0.111***
	[0.0539]	[0.0352]	[0.0190]	[0.0251]
constant	0.231	0.551	4.738***	-5.058**
	[3.200]	[2.263]	[1.492]	[1.958]
Observations	507998	507998	507998	507998
R-squared	0.395	0.540	0.307	0.201

Note. Regressions include dummies for exporter, importer, industry, category and time. The standard errors are heteroscedasticity-robust and clustered by region-country pair. ***, **, and * denote significance at the 1, 5 and 10 percent levels, respectively. Tests of equality of the REPO coefficients across equations are as follows: (2) vs (4) [$\chi^2(1)$=134. (0.25)]; (3) vs (4) [$\chi^2(1)$=5.23 (0.02]. The tests of the statistical difference of the estimated coefficients across equations are based on a seemingly unrelated regression estimation.

Table 3. The impact of regional export promotion agencies on exports – Pseudo-Poisson estimates

	Total value exports ln (V) (1)	Pure extensive margin ln (N) (2)	Mixed margin ln (T/N) (3)	Pure intensive margin ln (V/T) (4)
GDP reg*GDP cou	0.722***	0.383***	0.0986***	0.0853*
	[0.0380]	[0.00957]	[0.0300]	[0.0455]
Dist	-0.863***	-0.504***	-0.993***	0.246
	[0.164]	[0.0576]	[0.134]	[0.281]
Contiguity	0.225***	0.0729***	0.444***	-0.124***
	[0.0305]	[0.0176]	[0.0394]	[0.0462]
Language	0.188	0.428***	0.334***	-0.442**
	[0.133]	[0.0423]	[0.0779]	[0.201]
Island	-1.500***	-0.0778	0.738***	-2.075***
	[0.433]	[0.213]	[0.222]	[0.333]
Landlocked	-1.806***	-0.854***	0.0895	-0.659***
	[0.253]	[0.0806]	[0.0996]	[0.238]
EUEFTA	0.0339	0.109***	-0.332***	0.0302
	[0.0401]	[0.0123]	[0.0266]	[0.0952]
EmbCons	-0.0185	0.00543	0.00972	-0.0217
	[0.0230]	[0.00912]	[0.0214]	[0.0432]
REPO	0.0572***	0.0219***	0.106***	0.0466
	[0.0158]	[0.00546]	[0.0135]	[0.0316]
constant	-1.981	-3.406***	7.436***	-0.281
	[1.993]	[0.603]	[1.545]	[3.119]
Observations	507988	507988	507988	507988
Pseudo-Rsq	0.524	0.648	0.078	0.083

Note Regressions include dummies for exporter, importer, industry, category and time. The standard errors are heteroscedasticity-robust and clustered by region-country pair. ***, **, and * denote significance at the 1, 5 and 10 percent levels, respectively.

Table 4. The impact of regional export promotion offices on exports by location and time since set up- OLS estimates

	Total value exports ln (V) (1)	Pure extensive margin ln (N) (2)	Mixed margin ln (T/N) (3)	Pure intensive margin ln (V/T) (4)
PANEL A (Location of the REPO)				
EUEFTA countries	0.322***	0.0810**	0.222***	0.0197
	[0.0796]	[0.0362]	[0.0476]	[0.0331]
Non EUEFTA countries	0.498***	0.190***	0.168***	0.140***
	[0.0593]	[0.0451]	[0.0190]	[0.0237]
Test EUEFTA = Non-EUEFTA	3.99	4.53	1.17	10.04
[p-value]	[0.04]	[0.03]	[0.28]	[0.00]
PANEL B (Years since set up of REPO)				
1 year	0.259***	0.111***	0.076***	0.0722***
	[0.0652]	[0.0310]	[0.0239]	[0.0310]
2-3 years	0.373***	0.174***	0.116***	0.0829***
	[0.0572]	[0.0281]	[0.0209]	[0.0261]
4-5 years	0.454***	0.206***	0.155***	0.0931***
	[0.0816]	[0.0424]	[0.0269]	[0.0302]
6-7 years	0.477***	0.186***	0.168***	0.122***
	[0.0631]	[0.0387]	[0.0225]	[0.0276]
8 or more years	0.494***	0.142***	0.227***	0.125***
	[0.0679]	[0.0414]	[0.0349]	[0.0319]
Test REPO coeff. rises over time	2.11	1.64	3.90	0.67
[p-value]	[0.08]	[0.16]	[0.00]	[0.61]

Note Regressions include dummies for exporter, importer, industry, category and time. The standard errors are heteroscedasticity-robust and clustered by region-country pair. ***, **, and * denote significance at the 1, 5 and 10 percent levels, respectively.

Table 5. The impact of regional export promotion offices on exports in differentiated and non-differentiated goods- OLS estimates

PANEL A		Total value exports ln (V) (1)	Pure extensive margin ln (N) (2)	Mixed margin ln (T/N) (3)	Pure intensive margin ln (V/T) (4)
Diff	REPO	0.599***	0.238***	0.233***	0.128***
		[0.0642]	[0.0372]	[0.0233]	[0.0266]
No-Diff	REPO	0.0963	-0.0357	0.0592**	0.0728*
		[0.0672]	[0.0389]	[0.0257]	[0.0432]
	Observations	507988	507988	507988	507988
	R-squared	0.395	0.541	0.308	0.201
PANEL B					
Within equation	Diff = No-Diff test	30.51	53.61	27.22	1.52
	[p-value]	[0.00]	[0.00]	[0.00]	[0.22]
Across equations			N vs V/T		T/N vs V/T
	Diff REPO		6.90 [0.00]		10.10 [0.00]
	No-Diff REPO		1.39 [0.23]		0.01 [0.91]

Note Regressions include dummies for exporter, importer, industry, category and time. The standard errors are heteroscedasticity-robust and clustered by region-country pair. ***, **, and * denote significance at the 1, 5 and 10 percent levels, respectively. The tests of the statistical difference of the estimated coefficients across equations are based on a seemingly unrelated regression estimation.

Table 6. The impact of regional export promotion offices on trade industry by industry - OLS estimates

	Total value exports ln (V)		Pure extensive margin ln (N)		Mixed margin ln (T/N)		Pure intensive margin ln (V/T)	
	REPO coeff.	t-stat	REPO coeff.	t-stat	REPO coeff.	t-stat	REPO coeff.	t-stat
	(1)		(2)		(3)		(4)	
Agriculture & fishing	0.383***	[0.128]	0.110***	[0.0421]	0.205***	[0.0540]	0.0681	[0.0919]
Extractive products	0.430***	[0.131]	0.107***	[0.0393]	0.240***	[0.0638]	0.0829	[0.0799]
Food and beverages	0.455***	[0.0775]	0.227***	[0.0537]	0.115***	[0.0220]	0.113***	[0.0323]
Textiles	0.505***	[0.0993]	0.270***	[0.0531]	0.220***	[0.0483]	0.0154	[0.0471]
Clothes	0.609***	[0.123]	0.233***	[0.0703]	0.400***	[0.0677]	-0.0239	[0.0575]
Leather and shoes	0.313***	[0.106]	0.00151	[0.0503]	0.209***	[0.0543]	0.103**	[0.0505]
Wood products	0.372***	[0.0862]	0.123***	[0.0265]	0.0594*	[0.0303]	0.190***	[0.0603]
Paper	0.655***	[0.122]	0.236***	[0.0390]	0.180***	[0.0467]	0.239***	[0.0778]
Print & Edition	0.612***	[0.130]	0.166***	[0.0398]	0.262***	[0.0343]	0.183**	[0.0907]
Chemical products	0.458***	[0.0855]	0.289***	[0.0487]	0.146***	[0.0357]	0.0231	[0.0359]
Rubber & plastic	0.586***	[0.0846]	0.222***	[0.0384]	0.189***	[0.0356]	0.176***	[0.0406]
Non-metals	0.308**	[0.121]	0.204**	[0.0896]	0.163***	[0.0523]	-0.0589	[0.0728]
Metals	0.494***	[0.130]	0.265***	[0.0487]	0.0987**	[0.0420]	0.131*	[0.0679]
Metal products	0.0158	[0.130]	-0.0656	[0.0709]	0.0935**	[0.0435]	-0.0122	[0.0449]
Mechanical engineering	0.399***	[0.0832]	0.187***	[0.0514]	0.178***	[0.0240]	0.0335	[0.0469]
Office machinery	0.466***	[0.0954]	0.114***	[0.0332]	0.178***	[0.0562]	0.174***	[0.0594]
Electric products	0.559***	[0.117]	0.193***	[0.0521]	0.257***	[0.0363]	0.109	[0.0664]
Electronic products	0.701***	[0.128]	0.215***	[0.0500]	0.155***	[0.0492]	0.332***	[0.0763]
Precision products	0.564***	[0.0948]	0.197***	[0.0532]	0.190***	[0.0407]	0.177***	[0.0427]
Automobile	0.430***	[0.0946]	0.178***	[0.0450]	0.204***	[0.0487]	0.0483	[0.0625]
Other transport equip.	0.591***	[0.151]	0.190***	[0.0532]	0.275***	[0.0657]	0.126	[0.0924]
Other manufactures	0.117	[0.148]	0.0465	[0.0930]	0.0275	[0.0448]	0.0430	[0.0822]

Note. Regressions include dummies for exporter, importer, industry, category and time. The standard errors are heteroscedasticity-robust and clustered by region-country pair. ***, **, and * denote significance at the 1, 5 and 10 percent levels, respectively.

Table 7. The impact of regional export promotion offices on exports by region- OLS estimates

	Total value of exports ln (V) (1)	Pure extensive margin ln (N) (2)	Mixed margin ln (T/N) (3)	Pure intensive margin ln (V/T) (4)
Andalusia	0.572***	0.257***	0.160***	0.156**
	[0.148]	[0.0621]	[0.0552]	[0.0606]
Aragon	0.281***	0.0956*	0.0283	0.158***
	[0.0782]	[0.0508]	[0.0465]	[0.0446]
Basque Country	0.365***	0.131***	0.157***	0.0768**
	[0.0616]	[0.0299]	[0.0240]	[0.0303]
Canary Islands	2.139*	0.945	0.341	0.852***
	[1.249]	[0.777]	[0.399]	[0.193]
Cantabria	-0.483***	0.285***	-0.0143	-0.754***
	[0.0546]	[0.0272]	[0.0244]	[0.0326]
Catalonia	0.647***	0.197***	0.318***	0.132***
	[0.125]	[0.0705]	[0.0586]	[0.0389]
Castilla-La Mancha	0.115	0.256***	0.0693**	-0.210
	[0.0918]	[0.0973]	[0.0304]	[0.194]
Castilla-Leon	0.447***	0.209***	0.0432	0.194***
	[0.149]	[0.0779]	[0.0502]	[0.0640]
Com. De Madrid	0.871***	0.403***	0.457***	0.0112
	[0.154]	[0.0647]	[0.102]	[0.0495]
Com. Valenciana	0.550***	0.222***	0.219***	0.110***
	[0.0576]	[0.0473]	[0.0420]	[0.0374]
Extremadura	-0.164	-0.0322	-0.157**	0.0251
	[0.292]	[0.172]	[0.0760]	[0.142]
Galicia	0.369***	0.135	0.0506	0.183***
	[0.122]	[0.0921]	[0.0627]	[0.0500]
P. de Asturias	-0.142	-0.0668	-0.0613	-0.0143
	[0.183]	[0.0545]	[0.0559]	[0.143]
Region of Murcia	-0.172	-0.100**	0.00670	-0.0788
	[0.128]	[0.0432]	[0.0408]	[0.0853]
Observations	507988	507988	507988	507988
R-squared	0.396	0.541	0.309	0.201

Note. Regressions include dummies for exporter, importer, industry, category and time. The standard errors are heteroscedasticity-robust and clustered by region-country pair. ***, **, and * denote significance at the 1, 5 and 10 percent levels, respectively.