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Measuring the impact of regional export promotion: The Spanish case*

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Abstract. This article estimates the effect of Spanish regional trade agencies abroad on exports using the gravity model. The results indicate that regional agencies increase trade. The estimated impact seems to be larger than that of Spanish embassies and consulates. Moreover, a disaggregated analysis shows that this effect is not evenly distributed across Spanish regions.

JEL classification: F14, R12

Key words: Export, foreign trade agencies, gravity equation, Spanish regions

1 Introduction

Several Spanish regional governments have established a network of offices abroad with the aim of providing support for companies wishing to trade and invest in foreign markets. In particular, six out of seventeen regional governments (Andalusia, Aragon, Basque Country, Catalonia, Murcia and Valencia) have developed an extensive network of offices around the world over the last decade.

Market failures, such as asymmetric information or externalities, provide the economic justification for government involvement in export promotion. Spanish embassies, consulates and other national agencies are important sources of information and help to overcome market failures and enhance trade activities. However, regional governments consider that these Spanish institutions are not the best organisations to promote regional businesses abroad, mainly for small and medium size companies. This has led to the creation of alternative bodies that inform quickly and cheaply, and very often free of charge, about trade opportunities in foreign countries in order to promote exports. For instance, according to the Valencian agency (IVEX) these services include: "economic, legal and taxation information, finding and managing third party funds, searching for suitable partners and locations, assistance with administrative procedures,

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identification and initial selection of staff in the target area, and search for premises and available industrial land". So, their objectives are much more ambitious in promoting the internationalisation of the firms than those of embassies and consulates. In fact, diplomatic corps are engaged in more general bilateral affairs (political, military, cultural, etc.) while regional bodies focus exclusively on trade and investment.

The creation of export promotion agencies is considered a crucial instrument to boost the exports of small and medium-sized firms. However, until the past decade the bulk of empirical literature has failed to find a positive impact of these agencies on exports (Hogan et al. 1991, Gencturk and Kotabe 2001). Import substitution policies in developing countries and some of their management weaknesses have been noted as the main explanatory causes for this result. In the 1990s, as the strong anti-trade policy bias vanished, new empirical evidence suggested that the impact could be positive.[1] More recently, Lederman et al. (2006) find that national export promotion agencies have on average a strong and statistically significant impact on exports. Rose (2007) in a seminal cross-country study linking foreign missions (embassies and consulates) to exports concludes that the presence of a foreign mission is associated with slightly higher exports.

In spite of the increasing amount of financial resources that regional governments spend on their 'foreign missions', there is no empirical evidence about the effect of these institutions on regional exports. The aim of this article is to analyse the effectiveness of Spanish regional foreign trade agencies by measuring their impact on regional exports.

2 Methodology

In this article, we estimate the effect of regional foreign trade agencies on exports using bilateral data on exports from each one of the 17 Spanish regions to a sample of 188 international markets. The natural framework to address this issue is the gravity model of bilateral trade.[2] There are three main reasons that justify the use of this methodology in our research. Firstly, the gravity model has been extremely successful in explaining international trade flows. Secondly, the improved theoretical foundations of the gravity model make it consistent with a variety of leading theories on international trade.[3] Finally, the fact that it allows us to consider geographical, cultural and political variables, in addition to economic variables, in the explanation of export flows. In its simplest formulation, the gravity equation states that bilateral trade flows depend positively on the economic size of both countries (regions), usually measured in terms of GDP, and negatively on the distance between them, in analogy to the Newtonian gravity equation. The idea is that GDP represents the productive capacity of the exporter and the absorptive capacity of the importer, while distance represents a proxy for transportation costs.

Gravity equations used in the international trade literature generally include, in addition to the aforementioned basic variables, dummies that aim to capture other factors influencing transaction costs. For example, either a common language, a common border, sharing member-

[1] See Lederman et al. (2006) for a review of the literature.

[2] The early application of the gravity model to international trade was carried out by Tinbergen (1962); Pöyhönen (1963); and Linnemann (1966). Specialists in other fields had used the gravity model before international economists did. In particular, regional and urban economists used it as far back as 1946 (Zipf 1946).

[3] Despite its use in many early studies on international trade, the gravity model initially lacked theoretical foundations. However, nowadays it is backed up by sound theory. Anderson (1979) derives the gravity equation from a model with product differentiation. Bergstrand (1985, 1989) associates gravity equations to models of monopolistic competition. Helpman and Krugman (1985) justify the gravity equation in the framework of a model of trade with increasing returns to scale and product differentiation. Deardoff (1995) and Evenett and Keller (2002) show that gravity equations are consistent with most theoretical models of international trade. A recent structural specification of the gravity equation is provided by Anderson and Van Wincoop (2003).

ship in an integration agreement, or the existence of colonial links reduces transaction costs, whereas the insularity or the landlocked status of a country or region increases them.

We estimate the following general equation:

$$\begin{aligned} Ln\left(X_{ijt}\right) = {} & \beta_0 + \beta_1 Ln\left(GDP_{it}\right) + \beta_2 Ln\left(GDP_{jt}\right) + \beta_3 Ln\left(DIST_{ij}\right) \\ & + \beta_4 EUEFTA_{ij} + \beta_5 Lang_{ij} + \beta_6 Border_{ij} + \beta_7 Island_{ij} \\ & + \beta_8 landlocked_{ij} + \beta_9 EmbCon_{jt} + \beta_{10} RegAgen_{ijt} + \lambda_t + u_{ijt} \end{aligned} \tag{1}$$

where i denotes the exporter, j denotes the importer, t denotes time, and the variables are defined as:

X_{ijt} represents exports from region i to importer country j,
GDP_{it} and GDP_{jt} refer to real GDP,
$Dist_{ij}$ denotes the distance between i and j,
$EUEFTA_{ij}$ is a binary dummy variable that takes the value of one if the trade partner is a member of the European Union or the European Free Trade Agreement,
$Lang_{ij}$ is a binary dummy variable which is unity if i and j have a common language,
$Border_{ij}$ is a binary dummy variable that takes the value of one when the trading partners share a border,
$Island_{ij}$ is the number of islands in the pair (0, 1, or 2),
$Landlocked_{ij}$ is the number of landlocked country-regions in the pair (0, 1, or 2),
$EmbCon_{jt}$ is the number of embassies and general consulates that Spain has in j,
$RegAgen_{ijt}$ is the number of foreign trade agencies of region i in country j,
λ_t are time dummies and
u_{ijt} represents the omitted other influences on regional exports, assumed to be well behaved.

The main parameter of interest is β_{10}, which shows the marginal effect of an additional regional foreign mission on exports.

3 Data

We use data on exports in euros taken from all 17 Spanish regions to a sample of 188 trading entities (see Table A1) over the period 1995–2003. These series are taken from the 'Dirección General de Aduanas'. International trade flows have been deflated using the GDP deflators of the Spanish regions taken from the 'Regional Accounts database' (Instituto Nacional de Estadística). The independent variables are taken from different sources. The real GDP of Spanish regions come from the 'Regional Accounts database' (Instituto Nacional de Estadística). GDP in constant US dollars of the destinations are taken from the WDI (World Bank). GDP series are converted to euros using 1999 exchange rates. The distances (great-circle distances) as well as the instrumental variables are taken from Andrew Rose's website (http://faculty.haas.berkeley.edu/arose).[4] 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. Data on the number of Spanish regional foreign trade agencies have been provided by the respective agencies.

[4] We are sincerely grateful to Andrew Rose for making his data public.

4 Empirical results

We begin by estimating equation (1) excluding the variable of interest by OLS. This allows us to check whether the gravity equation works well and how it is affected by the inclusion of the number of foreign trade agencies. The results are presented in column 1 of Table 1. The equation fits the data well, explaining almost three quarters of the variation in bilateral trade flows. Moreover, the gravity coefficients are economically and statistically significant with sensible interpretations: trade increases with the size of the economies and it decreases with distance. All the remaining estimated coefficients have the expected sign and are statistically significant at the 1 per cent level. In particular, the results indicate that, all else equal, exports drop by 55% [(exp(−0.808)−1)*100] if there are islands in the trading pair and by 66% in the case of landlocked areas. On the contrary, regions export 153% [(exp(0.927)−1)*100] more with EUEFTA countries. Similarly, sharing a common language or common border increases exports by 458% and 33%, respectively. Finally, in line with Rose's results, embassies and consulates have a positive and significant but relatively small effect on exports (11%).

Column 2 reports the results when the number of foreign agencies is added to the gravity equation. This variable is highly significant and displays a coefficient with the expected sign. In particular, the results indicate that, all else equal, having an export promotion agency increases regional exports by 74%. This estimate seems large compared to the impact of embassies and consulates, but it is economically plausible. It is, for instance, much smaller than the effects of a regional trade agreement and a common language. In this estimation the coefficient of embassies is slightly reduced.

Table 1. Estimation results of the gravity equation (1). Dependent variable: log of regional exports

	(1)	(2)	(3)	(4)	(5)
$RegAgencies_j$		0.554	0.383	0.381	0.431
		(11.21)	(5.96)	(5.96)	(11.78)
$EmbCon_j$	0.101	0.088	0.243	0.396	0.198
	(12.76)	(11.08)	(5.43)	(5.62)	(7.11)
Ln GDP_i	1.422	1.405	1.382	1.384	1.380
	(107.57)	(104.74)	(110.66)	(111.39)	(116.51)
Ln GDP_j	0.915	0.908	0.862	1.122	0.844
	(128.82)	(127.19)	(24.03)	(9.41)	(35.95)
Ln $Distance_{ij}$	−1.052	−1.061	−0.518		−0.507
	(−44.23)	(−44.57)	(−4.45)		(−6.56)
$EUEFTA_{ij}$	0.927	0.950	1.428		1.769
	(20.82)	(21.37)	(4.73)		(12.14)
$Language_{ij}$	1.720	1.714	1.272		1.390
	(44.58)	(44.41)	(5.24)		(11.04)
$Border_{ij}$	0.286	0.113	0.243	0.245	0.223
	(2.32)	(0.78)	(1.02)	(1.03)	(1.77)
$Island_{ij}$	−0.808	−0.807	−2.131	−2.198	−1.910
	(−25.03)	(−25.05)	(−62.45)	(−63.93)	(−44.91)
$Landlocked_{ij}$	−1.075	−1.077	−0.146	0.031	−0.512
	(−45.89)	(−45.95)	(−3.23)	(0.66)	(−11.34)
Time dummies	Yes	Yes	Yes	Yes	No
Adj-R^2	0.72	0.72	0.67	0.44	0.80
No of observ.	26,078	26,078	26,078	26,078	26,078
Estimation method	OLS	OLS	PANEL (R.E.)	PANEL (F.E.)	CYFE
Sample period	1995–2003	1995–2003	1995–2003	1995–2003	1995–2003

Note: t-statistics in parentheses are robust to heteroscedasticity and autocorrelation.

Columns 3 and 4 report panel estimations with importer individual effects (random and fixed effects). The Hausman test suggests the use of the fixed effect estimator. Nonetheless, the results for the parameter of interest are very similar for fixed-effect and random-effect estimations (0.38). It is worth noting that the fixed effect estimation leads to a reduction in the impact of regional agencies and a notable rise in the effect of embassies.

Anderson and Van Wincoop (2003) provide a theoretical foundation for the gravity model in which they point out that one must consider not only the trade resistance between any two countries (which are a function of distance, language, etc.), but also that different countries have a different general resistance to trade. In practice, this involves including country fixed effects when estimating the gravity model as a solution to the presence of such 'multilateral resistance' (column 4). More recently, Anderson and Van Wincoop (2004) note that separate country fixed effects should be included for each year in a panel framework as the multilateral resistance may change over time. Therefore, as a robustness check, we have also estimated the gravity equation including separate country fixed effects for each year (CYFE in the tables). The estimated coefficient for our variable of interest (column 5) is in line with those reported in column 3 and 4.

Since heavy exports to a country may induce Spanish regions to set up a foreign agency, there may be reverse causality from exports to trade agencies. Therefore, it is advisable to use instrumental variables.[5] Unfortunately, we have not been able to find appropriate instruments with time variation.[6] For this reason, we have considered a sub-sample covering the period 2002–2003, for which valid instruments exist. The results for this sample are reported in Table 2. As was expected, the results using OLS (column 1) are quite similar to those found for the full sample period. The second column reports IV estimates using four variables as instruments for the number of foreign trade agencies that seek to measure the desirability of living in a destination country: the number of Condé-Nast destinations, the number of four-season hotels, the number of luxury hotels, and the number of Lonely Planet guides.[7] Column 3 and 4 also report the results using an instrumental variable technique but in this case we account for the panel nature of the data set. Instrumental variables deliver a coefficient for the variable of interest that ranges from 0.63 to 0.79 and in all cases it is statistically significant at the 1 per cent level. Thus, the impact of foreign trade agencies on exports seems to be robust to the potential endogeneity problem.

In order to check whether the impact of the foreign trade agencies is widespread among the Spanish regions or, on the contrary, our results are driven by the experience of just some of them, we have estimated region-specific coefficients. Table 3 takes into account this issue for both samples. Focusing attention on the parameter of interest, the estimations without instrumental variables reveal that there are at least four regions with a positive and statistically significant coefficient at the 1 per cent level (Catalonia, Murcia, Basque Country, and Valencia). When we use country-year fixed effects this also happens for Aragon, although for this region the estimated coefficient is statistically significant at the 10 per cent level (column 3).

[5] In any case, it is worth noting that according to members of the Valencian Agency (IVEX) staff the decision to open a foreign trade office is not based on past exports. It is based mainly on the existence of market opportunities combined with barriers to entry in these markets because they are more unfamiliar than others (for instance, Japan and China are less familiar markets for Valencian exporters than those of the EU countries). If this is the case, there is not an endogeneity problem.

[6] We have used three series as potential instrumental variables: international tourist arrivals, military expenditure and ICRG composite risk ratio taken from the WDI. Other a priori potential instruments were not considered due to data availability problems.

[7] We have made proofs using the list of instruments suggested by Rose (2007) which are available in his web page. The selected instruments are the combination of the maximum number of instruments that are valid according to the Sargan test of overidentifying restrictions. It is worth noting that the variable 'embassies and consulates' has not been instrumented because, in contrast to Rose (2007) study, in a regional study of exports this variable should not be endogenous.

Table 2. Estimation results of the gravity equation (1). Dependent variable: log of regional exports

	(1)	(2)	(3)	(4)
$RegAgencies_j$	0.444	0.795	0.654	0.631
	(4.60)	(2.67)	(2.72)	(2.66)
$EmbCon_j$	0.078	0.067	0.130	
	(4.49)	(2.70)	(1.76)	
Ln GDP_i	1.350	1.343	1.324	1.331
	(46.62)	(40.59)	(49.64)	(50.66)
Ln GDP_j	0.900	0.895	0.867	2.428
	(61.07)	(53.54)	(17.26)	(1.83)
Ln $Distance_{ij}$	−1.053	−1.059	−0.676	
	(−19.57)	(−21.53)	(−4.54)	
$EUEFTA_{ij}$	0.852	0.869	1.324	
	(8.76)	(7.21)	(3.50)	
$Language_{ij}$	1.518	1.517	1.228	
	(19.15)	(15.78)	(4.04)	
$Border_{ij}$	0.258	0.119	0.148	0.131
	(0.83)	(0.21)	(0.30)	(0.27)
$Island_{ij}$	−0.917	−0.914	−2.078	−2.239
	(−12.88)	(−14.71)	(−30.02)	(−31.76)
$Landlocked_{ij}$	−1.152	−1.153	−0.331	0.120
	(−22.02)	(−24.33)	(−3.92)	(1.24)
Time dummies	Yes	Yes	Yes	Yes
Adj-R^2	0.71	0.73	0.67	0.46
No of observ.	5,593	5,593	5,593	5,593
Estimation method	OLS	IV	PANEL-IV R.E.	PANEL-IV F.E.
Sargan test (D.F.)		7.14 (3)		4.00 (3)
Sample period	2002–2003	2002–2003	2002–2003	2002–2003

Note: t-statistics in parentheses are robust to heteroscedasticity and autocorrelation. In the estimations with Instrumental Variables (IV), the number of Condé-Nast destinations, the number of four-season hotels, the number of luxury hotels, and the number of Lonely Planet guides are used as an instrument for the number of agencies.

However, using instrumental variables we obtain a clear reduction in the significance levels, the coefficient for Catalonia not being statistically significant at conventional levels in any case, although it is near the 10 per cent level. Taking all the results together, we find that the Basque Country and Murcia show the greatest impact of their respective trade agencies on exports. At the opposite end of the spectrum, Andalusia does not show a statistically significant positive effect.

5 Conclusion

In this short article we have estimated the effect of Spanish regional trade agencies on exports. Using the gravity equation of bilateral trade we have found that regional agencies boost exports even after controlling for potential endogeneity problems. The magnitude of this effect is larger than the impact of national embassies and consulates. This result is not surprising. Diplomatic corps are engaged in bilateral affairs at a national level (Spain in our case) whereas regional bodies focus exclusively on promoting trade for firms located in its specific territory. Finally, the region-by-region analysis shows that the effect is neither widespread nor uniform across regions.

Table 3. Estimation results of the gravity equation (1) by regions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
AgenciesAndalusia	−0.203	−0.531	−0.553	−0.123	−0.998	−1.132	−1.165
	(−1.10)	(−2.00)	(−5.08)	(−0.58)	(−1.00)	(−1.40)	(−1.46)
AgenciesArargon	−0.112	0.055	0.171	−0.692	1.454	1.103	1.042
	(−0.59)	(0.25)	(1.89)	(−1.37)	(1.33)	(1.25)	(1.20)
AgenciesCatalonia	0.634	0.364	0.414	0.608	0.492	0.414	0.398
	(7.96)	(4.04)	(7.86)	(3.75)	(1.56)	(1.64)	(1.60)
AgenciesMurcia	0.837	0.552	0.624	0.694	1.022	0.896	0.891
	(6.12)	(3.38)	(5.86)	(3.48)	(1.75)	(1.92)	(1.93)
AgenciesBasqueCountry	0.842	0.831	0.867	0.838	1.325	1.107	1.087
	(9.32)	(4.56)	(14.23)	(4.75)	(2.08)	(2.16)	(2.16)
AgenciesValencia	0.442	0.384	0.411	0.345	0.651	0.620	0.612
	(6.48)	(2.90)	(8.16)	(2.55)	(1.45)	(1.70)	(1.70)
$EmbCon_j$	0.089	0.394	0.198	0.078	0.068	0.132	
	(11.15)	(5.58)	(7.15)	(4.53)	(2.72)	(1.71)	
Ln GDP_i	1.405	1.386	1.382	1.355	1.365	1.343	1.349
	(103.3)	(110.63)	(115.04)	(45.72)	(40.55)	(49.61)	(50.50)
Ln GDP_j	0.908	1.120	0.844	0.901	0.900	0.872	2.439
	(127.09)	(9.39)	(35.94)	(60.93)	(53.72)	(16.72)	(1.83)
Ln $Distance_{ij}$	−1.060		−0.507	−1.052	−1.059	−0.671	
	(−44.55)		(−6.57)	(−19.57)	(−21.51)	(−4.34)	
$EUEFTA_{ij}$	0.944		1.768	0.838	0.853	1.314	
	(21.21)		(12.13)	(8.59)	(6.99)	(3.35)	
$Language_{ij}$	1.721		1.388	1.531	1.511	1.221	
	(44.43)		(11.03)	(19.26)	(15.59)	(3.88)	
$Border_{ij}$	0.095	0.239	0.215	0.300	0.069	0.123	0.110
	(0.63)	(1.00)	(1.69)	(0.91)	(0.12)	(0.24)	(0.22)
$Island_{ij}$	−0.808	−2.197	−1.909	−0.918	−0.910	−2.089	−2.239
	(−25.07)	(−63.92)	(−44.87)	(−12.89)	(−14.60)	(−30.12)	(−31.72)
$Landlooked_{ij}$	−1.077	0.031	−0.512	−1.152	−1.149	−0.309	0.115
	(−45.94)	(0.65)	(−11.34)	(−22.01)	(−24.19)	(−3.63)	(1.18)
Time dummies	Yes	Yes	No	Yes	Yes	Yes	Yes
Adj-R^2	0.72	0.44	0.80	0.72	0.71	0.67	0.46
Sargan test (D.F.)					14.07 (18)		14.07 (18)
No of observations	24,666	24,666	24,666	5,593	5,593	5,593	5,593
Estimation method	OLS	PANEL (F.E.)	CYFE	OLS	IV	PANEL IV (R.E.)	PANEL IV (F.E.)
Sample period	1995–03	1995–03	1995–03	2002–03	2002–03	2002–03	2002–03

Note: t-statistics in parentheses are robust to heteroscedasticity and autocorrelation.

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Table A1. Export destinations

Afghanistan	Albania	Algeria	American Samoa
Angola	Antigua and Barbuda	Argentina	Armenia
Aruba	Australia	Austria	Azerbaijan
Bahamas	Bangladesh	Barbados	Bahrain
Belize	Benin	Bhutan	Bosnia-Herzegovina
Belarus	Belgium-Luxembourg	Bermudas	Bolivia
Botswana	Brazil	Bulgaria	Burkina Faso
Burundi	Cambodia	Cameroon	Canada
Cape Verde	Central African Rep.	Chad	Chile
China	Comoros	Congo Dem. Rep.	Costa Rica
Colombia	Côte D'Ivoire	Croatia	Cuba
Cyprus	Czech Republic	Denmark	Djibouti
Dominica	Dominican Republic	Ecuador	Equatorial Guinea
Egypt	El Salvador	Eritrea	Estonia
Ethiopia	Faroe Island	Fiji	Finland
France	French Polynesia	Gabon	Gambia
Georgia	Germany	Ghana	Greece
Greenland	Grenada	Guam	Guatemala
Guinea	Guinea-Bissau	Guyana	Haiti
Honduras	Hong Kong	Hungary	Iceland
India	Indonesia	Iran	Iraq
Ireland	Israel	Italy	Jamaica
Japan	Jordan	Kazakhstan	Kenya
Kiribati	Korea	Kuwait	Kyrgyz Republic
Laos	Latvia	Lebanon	Lesotho
Liberia	Libya	Lithuania	Macao
Macedonia	Madagascar	Malaysia	Maldives
Mali	Malawi	Malta	Mauritania
Mauritius	Mexico	Moldova	Mongolia
Morocco	Mozambique	Myanmar	Namibia
Netherlands	Netherlands Antilles	New Caledonia	New Zealand
Nicaragua	Niger	Nigeria	North Korea
Norway	Oman	Pakistan	Panama
Papua New Guinea	Paraguay	Peru	Philippines
Poland	Portugal	Qatar	Romania
Russia	Rwanda	Samoa	Sao Tome and Principe
Saudi Arabia	Senegal	Serbia-Montenegro	Seychelles
Sierra Leone	Singapore	Slovakia	Slovenia
Solomon Islands	Somalia	South Africa	Sri Lanka
Suriname	St. Lucia	St. Vincent	Sudan
Swaziland	Sweden	Switzerland	Syria
Tajikistan	Tanzania	Togo	Trinidad and Tobago
Tunisia	Turkmenistan	Tuvalu	Thailand
Tonga	Turkey	Uganda	Ukraine
United Arab Emirates	United Kingdom	USA	Uruguay
Uzbekistan	Vanuatu	Vietnam	Venezuela
Yemen	Zambia	Zimbabwe	

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Medición del impacto de la promoción de exportaciones regionales: el caso de España

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Abstract. Este artículo estima el efecto de las delegaciones comerciales regionales en el extranjero sobre las exportaciones utilizando el modelo de gravedad. Los resultados indican que las delegaciones regionales fomentan el comercio exterior. El impacto estimado parece ser mayor que el de las embajadas y consulados españoles. Por otro lado, un análisis desagregado muestra que este efecto no se distribuye uniformemente entre las regiones españolas.

JEL classification: F14, R12

Palabras clave: Exportación, delegaciones comerciales regionales en el extranjero, ecuación de gravedad, regiones españolas

要旨： 本論では、重力モデルを使って、外国に設置されたスペインの地方貿易振興局が輸出に及ぼす影響力を評価する。結果は、地方貿易振興局が貿易を増大させることを示している。その推定効果は、スペイン大使館及び領事館が貿易に及ぼす効果より大きいことを示す。さらに、非集計分析はこの影響力がスペインの地方全体に均等に配分されているわけではないことを示す。