CATALAN HOME BIAS WITH THE REST OF SPAIN: DOES IT STILL EXIST?

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Abstract

The current high degree of support for secession in Catalonia raises questions about the viability of an independent Catalan country. Most deal with the impact secession would have on the region's foreign trade. The aim of this paper is to identify the main determinants of the region's foreign trade and compare them with previous studies that dealt with this topic. The analysis is based on the gravity model approach, using the Poisson model for the period 1995−2007. We determined that the home bias in Catalan exports presented in the previous literature was, to a great degree, a consequence of the omission of important explanatory variables in the model equation. Moreover, those estimates showed a strong tendency to decrease over time. For the last two years of the period under review, the model predicts a border effect equal to zero.

Keywords

Catalonia, Exports, Gravity Model, Home Bias

I. Introduction

In Europe, talks are currently underway on separatism, particularly in connection with the call for independent states among the Catalans, Scots, Flemish, Basque, Venetians and other Italian regions. By far, the most significant secession movement in recent years has been recorded in both Catalonia and Scotland. While in the latter an official referendum was held in 2014, the Spanish constitution does not allow independence referenda of its autonomous regions.

Even though, the exacerbation of the situation in the last years also revived debate over consequences for possible Catalan independence. In the region, as well as in other democratic countries, political discourse related to separatism is increasingly centred on the role of foreign trade. For example, the Spanish government has long been trying to discourage Catalans from secession by threatening them with vetoing membership of their potential future state in the European Union. While we neglect the much-discussed legal framework today for accession of the potential new state, it seems that trade among EU member states would be a key point for its survival.

The creation of a physical border between an independent Catalonia and the rest of the Spanish state, as well as the reintroduction of obstacles to trade linked to the abandonment of the single European market, would certainly affect the volume of trade flows for the newly created state.

The purpose of this article is certainly not to present how that disruption might take place, what might follow and how the Catalan economy may be affected, as all this would only be speculation. Our goal is to identify the main determinants of the region's foreign trade and compare them with the previous studies that dealt with this topic.

Given the ongoing internationalization of the Catalan economy, these determinants are expected to be different. Moreover, we further aim to demonstrate that these studies missed

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important factors influencing Catalan foreign trade. In consequence, their value of parameter estimates of the Catalan home bias were overrated. Our analysis is based on the gravity model of foreign trade, using the Poisson (PPML) model.

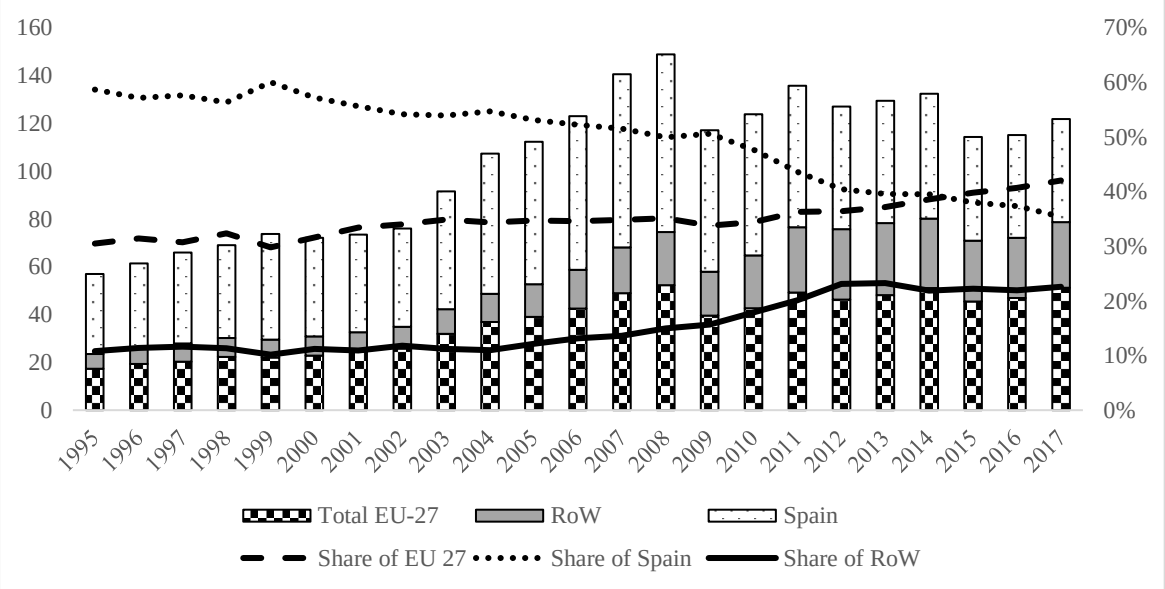
The text is structured as follows: Firstly, the paper deals with the current trade links of the region with the rest of Spain and other countries. Following that, focuses on a review of the literature that deals with the border effect and the relationship between disintegration and trade with a special emphasis on Catalonia. The third area presents data and methodology and the fourth summarises results and discussion. The last part concludes.

II. Catalonia's trading patterns

In terms of trade, Catalonia is a key region of Spain, accounting for 26 % of international Spanish exports and 28 % of total national imports. The sum of the trade flows that take place within the region, plus those which Catalans realize within the rest of the Kingdom, represent 22 % of the total flows of goods produced and realized in Spain. This is a huge number in comparison with Andalusia (13 %) and Valencia at 11 % (C-intereg. CEPREDE 2018).

Catalonia is an export-oriented region. Its share of foreign exports of goods and services to its GDP in 2011 was 33.2 %. Moreover, considering its trade with the rest of Spain as foreign, this share would increase to almost 62.9 % in that same year (Generalitat de Catalunya 2018).[3]

Figure 1 Catalan exports to Spain, EU-27 and the rest of the World (in billions of US $; left axis) and their corresponding percentage shares (right axis)



Source: C-intereg. CEPREDE (2018) and DataComex (2018)

Figure 1 shows the development of Catalan exports of goods depending on whether they travel to the rest of Spain, the EU or the rest of the world. Obviously, over time its relative share of exports to other Spanish regions has declined in comparison with the relative growth in exports

[3] We make this comparison for 2011, because recent data for trade with goods and services with the rest of Spain was not available. In 2017, the share of exports to foreign countries accounted for 39.4% of the region's GDP (Generalitat de Catalunya 2018).

to the EU and the rest of the world.[4] This supports a plausible geographical diversification of the region's exports over time.

From the point of view of individual destinations, it is certainly not surprising that Catalonia realizes a great percentage of its exports within the Spanish state. However, its principal trading partners changed considerably in recent years (see Table 1). Whereas in 1995 the three principal export destinations were other Spanish autonomous regions, in 2016[5] only Aragon was among them. The remaining two leading positions were overtaken by France and Germany. There was also a significant change on the import side, where are now a clear predominance of foreign trading partners. This resulted in 2016 in a huge trade deficit in international trade of 13 billion euros, which was compensated by a great surplus of 18 billion euros with the rest of the Spanish state (C-intereg. CEPREDE 2018).

Table 1 Principal geographical destinations of the Catalan goods.

Export				Import			
1995		**2016**		**1995**		**2016**	
Destination	Mil. €	Destination	Mil. €	Destination	Mil. €	Destination	Mil. €
Rest of Spain	31 373.43	*Rest of Spain*	38 861.26	*Catalonia*	25 004.07	*Catalonia*	31 401.75
Catalonia	25 004.07	*Catalonia*	31 401.75	*Rest of Spain*	17 006.77	*Rest of Spain*	21 313.21
Valencia	5 869.76	France	10 460.44	Germany	5 006.88	Germany	14 566.61
Madrid	4 647.30	*Aragon*	9 708.53	*Valencia*	3 798.66	China	7 445.33
Aragon	4 512.70	Germany	7 736.28	France	3 720.79	France	7 271.56
France	3 536.36	Italia	5 932.27	Italy	3 346.94	Italy	6 336.67
Andalusia	3 388.26	*Valencia*	5 009.59	*Aragon*	2 430.44	*Andalusia*	4 253.27
Germany	3 107.34	Portugal	4 366.01	*Andalusia*	2 006.00	*Aragon*	3 623.32
Basque C.	2 692.43	*Madrid*	4 050.88	*Madrid*	1 824.79	*Valencia*	3 402.97
Castile & León	2 261.23	UK	3 910.36	*Basque C.*	1 723.01	Neatherlands	3 068.99
Italy	1 875.74	*Andalusia*	3 372.17	*Castile & León*	1 581.97	US	2 665.14
Canary Isl.	1 529.96	*Castile-La M.*	2 826.40	UK	1 548.92	UK	2 489.63
Portugal	1 375.34	*Basque C.*	2 662.40	Japan	1 450.61	Belgium	2 218.82
Navarra	1 276.74	Switzerland	2 162.91	Neatherlands	1 355.56	Switzerland	1 918.44
Balearic Isl.	1 171.26	US	2 156.54	US	1 281.55	Japan	1 873.79
Galicia	1 136.05	*Castile & León*	2 040.99	Belgium	916.41	*Basque C.*	1 753.30
UK	1 075.85	*Balearic Isl.*	1 965.61	*Navarra*	691.85	Portugal	1 684.57
Murcia	751.54	Neatherlands	1 921.15	*Castile-La M.*	637.72	Morrocco	1 548.81
Castile-La M.	684.51	Belgium	1 643.70	China	593.37	Poland	1 386.77
Neatherlands	565.54	*Cantabria*	1 399.66	Switzerland	470.45	*Castile & León*	1 352.89

Source: C-intereg. CEPREDE (2018)

[4] For example, compared to Scotland, the Catalan region is relatively trading much less with the rest of the country and significantly more with the other EU countries. In 2016, a total of 61% Scottish exports (excluding oil and gas) went to the rest of the UK, 17% to the EU and 23% to the rest of the world (The Scottish Government 2018).

[5] The table offers principal partners only for the trade with goods. Detailed data which would include also trade with services are not available. For this reason, the following analysis is only based on data concerning trade with goods. Nevertheless, we are aware that the data on exports including services would certainly provide more accurate estimates.

It is therefore clear that, in the event of independence, it would be crucial for a newly created country to maintain its existing trade links with the other Spanish regions, as well as those business partners from outside Spain. On the other hand, maintaining friendly business relationships would also be vital for Spain, given the importance of Catalonia as a nexus between Spain and Europe. The region is an important gateway for European imports arriving in Spain (Ghemawat 2011; Llano-Verduras et al. 2011).

III. Trade and borders

The development of business links between two areas can be modelled by gravity equations of foreign trade. John McCallum was a pioneer of this approach in the field of economics, who explored the role of the border in trade between Canadian and US provinces. In his 1995 article, he introduced the term *home bias*, which expresses the fact that the volume of national exchange largely exceeds its level predicted by the gravity model. It is, therefore, a kind of bias towards the domestic market.

This theory puts the blame on the physical border between the two trading partners, introducing the term *border effect*. McCallum concludes that, taking into account other variables that affect the level of exchange, flows between the Canadian provinces are twenty-two times higher than the flows between an elected Canadian province and a corresponding US state. Therefore, the existence of borders plays a very important role, even if they separate two states that support the liberalization of mutual trade relations, as was the case of Canada and the USA.

It follows that the membership of Catalonia in the European Union and the associated removal of physical borders should have had a positive effect on the region's foreign trade. On the contrary, its possible independence might lead to a decline in mutual trade with the rest of Spain, as well as with the European Union if the country finds itself outside the European Single Market (ESM).

Integration, disintegration and the gravity model

After McCallum, came many other economists who used the same method and tried to estimate the influence of many other factors influencing foreign trade. The model was used inter alia to study the impact of integration and disintegration on volumes of foreign trade.

From the point of view of secessionist tendencies in some European countries, the paper *Disintegration and trade* by Fidrmuc and Fidrmuc (2003) is important, as it deals with the impact of the break-up of the Soviet Union, Yugoslavia and Czechoslovakia on the mutual trade of the successor states. In the case of Czechoslovakia, the home bias between the two newly created republics slightly decreased immediately before the division, but the intensity of the exchange stood 32 times above its normal level between the two countries.

Immediately after the breakup of the federation, in 1993−1994, it decreased eleven times and by 1998 even to the level of seven times the average intensity predicted by the model. This large trade slump took place despite enormous efforts to maintain the current level.

The authors thus point to a much greater bias towards the domestic market than McCallum and, above all, the posterior scholars' contributions (e.g. Helliwell 1995; Nitsch 2000). However, they also draw attention to the need to analyse these events in a wider context, which includes the proximity of the new republics to the European Union market, as well as to other circumstances, such as economic crises. The geographical proximity to developed European markets and ongoing accession negotiations into the EU led to a rapid reorientation of its trade towards these economies.

The drop in the trade between countries concerned was even deeper than in the case of the Baltic countries or Russia, Ukraine and Belarus.[6] An important role was certainly played by the fact that these were formerly centrally planned economies, characterized by generally very low levels of foreign trade.

On the other hand, Sousa and Lamotte (2007), in agreement with Frankel (1997), conclude that business paradigms change very slowly, and they oppose the traditional view of the sharp decline in trade between two newcomers who were part of the same political group. The authors apply a theoretical gravity model, which concerns the period from 1993 to 2001, to the same political blocks as Fidrmuc and Fidrmuc.

The conclusion of their work is that there is no compelling evidence of the negative influence of political disintegration on mutual exchanges between successor states. Established business links vary quite slowly, due to the sunk costs of entering new markets and building business infrastructure. This idea is in line with Eichengreen and Irwin, who wrote that "countries with a history of trading with one another – whether for reasons related to politics, policies and other factors – generally continue to do so" (1997: 35). Djankov and Freund (2002), who see the main cause of the decline in the volume of trade between countries in the former CCCP after the introduction of customs, also point to the fact that past trade ties limit its reorientation.

Catalonia and its home bias

There were also studies that focused on Catalonia. The aim of these works, based mostly on this very model, was to prove the strong dependence of the Catalan economy on the Spanish state or, on the contrary, to underline the strong reorientation of the region's trade towards foreign markets. Nevertheless, empirical evidence concerning this phenomenon is limited.

For example, the contribution of Gil-Pareja et al. (2005) focuses on exports of Spanish regions among themselves and on their exchange with 27 OECD countries in the period 1995−1998. The authors conclude that at that time Catalonia traded 22 times more with other regions within the Iberian Peninsula than with other countries. Their work was followed by Llano-Verduras et al. (2011), whose analysis covers the period 2000−2005 and the observed OECD sample is reduced to 25 countries. Their conclusion is that the border effect in Spain is largely the result of geographical aggregation, and such estimates are therefore significantly overestimated.

Decreasing dependence of the region on trade with Spain, as a consequence of the deepening European integration, is the most important conclusion of Ghemawat et al. (2010). The estimated value of their border effect is 4.01, which means that, according to their results, Catalonia trades 55 times more with other Spanish regions than with the other countries included in the sample. They observe a downward trend of this effect – from 80 in 1995 to 29 in 2005. Nevertheless, they work with 1995−2006 dataset covering, apart from the rest of Spain, only 22 OECD countries. As shown in Figure 1, in 2006, Catalonia still exported more than a half of its goods to Spain. At present, Spain accounts only for 35.4 % of Catalan exports of goods.

Five years later, Lanaspa Santolaria et al. found large deviations in the border effect across Spanish regions. Their estimates were the lowest for Madrid (5.17) and Catalonia (8.11), both well below the national average (10.5). The authors also emphasize the decreasing importance of this effect over time. They consider a set of 40 countries which included all the OECD

[6] The home bias in the former Soviet Union countries was, before the break-up, up to 43 times the predicted level. For the successor states, Russia, Ukraine and Belarus, it was significantly lower (only 13 times). Similarly, the breakup of Yugoslavia meant a drop in the value of this parameter in the case of the trade between Croatia and Slovenia from 24 times to twice the predicted level.

members, Russia, Brazil, China, India, Indonesia and South Africa during the period 2000−2010.

All these estimates play an important role in the current lively debate about the consequences of the Catalan independence on the region's economy. Most scholars, mainly those who oppose independence, focus on the drop in export flows of Catalonia with the rest of Spain, as well as with other EU states, and its consequent impact on the region's GDP. Generally, they emphasize the importance of the mentioned border effect and the drop in trade with Spain that is expected to occur should Catalonia become independent (among all Buesa 2009; Ghemawat 2011; Comerford and Mora 2014; or Feito 2014).

For example, Ghemawat (2011) expects a drop in trade between an independent Catalonia and Spain comparable with the drop registered between Czech Republic and Slovakia after 1993. He concludes that there would be a slump in bilateral flows to one third of their actual value that would cause a 7 % drop in GDP. Comerford and Mora (2014) expect a reduction in Spanish-Catalan exchange to the current level of Spanish exchange with Portugal with its subsequent 9 % negative impact on the GDP of the region.

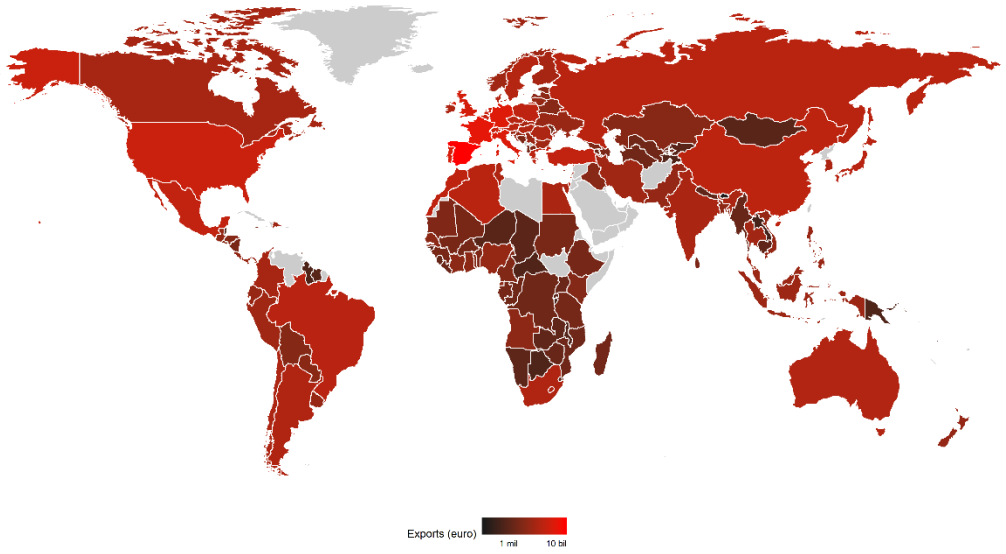
By contrast, pro-independence authors highlight the erosion of this factor over time (Antrás and Ventura 2012) or do not consider bilateral exchange of goods and services as a determinant to the wellbeing of Catalonia should the region obtain independent status (Guinjoan and Cuadras-Morató 2011).

As has been explained, in recent years, there has been strong internationalization in Catalan export flows. Consequently, updated estimates may be beneficial to the debate.

IV. Data and methodology

Our sample includes the trade volumes of Catalonia with 161 trading partners from 1995 to 2017. It is an unbalanced data set, as there are some missing trade flows. It represents the vast majority of Catalan trade in goods and, because data on trade at the regional level is generally very poorly available, provides us with a unique set of statistics. The data set was retrieved from the C-intereg CEPREDE database, which covers the interregional trade of the Spanish regions and from DataComex, statistics provided by the Spanish Ministry of commerce, industry and competitiveness. Figure 2 offers a visualization of the data.

Figure 2 Catalan export destinations. Countries are filled with respect to absolute value of Catalan export. Countries filled with grey colour were not available in the dataset



The standard tool to model trade flows is the gravity model of international trade that was first used by Tinbergen (1962). The model mimics gravitational interaction as described in Isaac Newton's law of gravity. Masses of objects (in the physical point of view) are replaced by economic masses of each country (typically the GDPs) and the distance is measured as the distance between the two economies. The basic gravity model takes the form of

$$F_{i,j} = \beta_0 \frac{Y_i^{\beta_1} Y_j^{\beta_2}}{D_{i,j}^{\beta_3}} \epsilon_{i,j} \quad (1)$$

where $F_{i,j}$ denotes trade flow between country i and j, Y_i and Y_j represent GDPs, $D_{i,j}$ is the distance between the two countries, $\epsilon_{i,j}$ is an error term with expected value equal to 1, and β_0, β_1, β_2 and β_3 are unknown parameters. The β_1, β_2 and β_3 correspond to the elasticity of trade flow to size of an economy and distance, respectively.

Since the basic form of the gravity model is not linear, both sides of the equation are transformed into logarithmic form. The *log-log* form is the following

$$\ln F_{i,j} = \ln \beta_0 + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \beta_3 \ln D_{i,j} + \ln \epsilon_{i,j} \quad (2)$$

This equation can be estimated using ordinary least squares (OLS). However, the disadvantage of this specification is that it may lead to problems of endogeneity due to the correlation between explanatory variables and error members or endogeneity due to the omission of a significant variable. In consequence, the OLS method is not appropriate (Egger 2004; Santos Silva and Tenreyro 2006; Baier and Bergstrand 2009a; Bubáková 2013).

Moreover, although the zero trade flows in our sample are relatively low (2.55 %), their presence (regardless of whether they result from measurement errors, rounding or actual absence of trade), makes the OLS estimator inconsistent. To deal with this inconvenience, we follow Santos Silva and Tenreyro (2006), who propose to use the Poisson pseudo-maximum likelihood (PPML) estimator. PPML works with a non-logarithmic form of the gravity equation and consequently is suitable for estimating datasets containing missing flows. The only demand

on the model is the proper identification of regressors. If this requirement is met, then estimates are consistent.

Another advantage is that it does not require a Poisson distribution and with correctly specified regressors it allows for regressions with continuous dependent variables. It is also a solution to the heteroscedasticity problem caused by the log-linear form of the model (UNCTAD/WTO 2012). According to existing literature, the PPML is the best estimator of gravity equation, especially when the dataset contains missing trade flows (Babecká Kucharčuková et al. 2012; UNCTAD/WTO 2012; Glick and Rose 2015; Fally 2015).

The Santos and Silva Tenreyro's (2006) multiplicative form of the basic model is as follows:

$$F_{i,j} = \exp\left[\ln \beta_0 + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \beta_3 \ln D_{i,j}\right] + \epsilon_{i,j} \quad (3)$$

We estimated two model specifications in order to determine whether any border effect in Catalan exports can be observed. This means whether, after controlling for the other effects, the region trades more with other Spanish regions than with the rest of the countries.

The dependent variable expresses the volume of exports from Catalonia to the corresponding trading partner. The basic model contains only logarithms of GDP and distance and a dummy variable accounting for the border effect. The augmented version of the gravity equation also includes additional characteristics such as contiguity, common currency, language, access to the sea, and membership in the ESM.

We expect the volume of trade to be positively influenced by the size of the demand by the trading partner. We cover this influence by including the gross domestic product variable in the equation ($\ln\_GDP_i^t$). The GDP in 2011 constant international dollars was retrieved from the World Development Indicators provided by the World Bank (2018). We opted for the purchasing power parity (PPP) values, as they better reflect the demand power of a given country than non-parity values. In order to calculate the GDP of the rest of Spain, we used data offered by the World Bank (2008) and subtracted from them the percentage share of Catalonia on the total Spanish GDP in a given year, as provided by the Spanish National Statistical Office (INE 2018).

According to the previous literature that uses gravity models of international trade, we believe that exports positively depend on the GDP of the trading partner. Despite the fact, that larger markets can generally better satisfy home demand, a larger importer's market should be able to absorb more imports. The second effect should prevail, and the GDP's parameter estimates should be positive (Bubáková 2013). Although the product of one country is a function of its net exports, we follow Frankel (1997), who states that endogeneity causes only minor changes in results and it is therefore ignored in most cases.

Another basic term included in the gravity models of trade reflects the distance between the pair of trading partners. For this reason, we include the variable $\ln\_Distance_i$, which is expected to have a negative effect on the bilateral trade of Catalonia, because the longer the distance, the higher the transportation costs. There is no consensus among existing literature about how the distance between two countries should be measured. We use the data from the geobytes.com site[7], based on a great circle approach, which approximates the distance from Barcelona to the capitals of all trading partners included.

[7] In few cases we had to use the GeoDataSource, because the geobytes.com did not contain the corresponding information.

The BE_i variable only accounts for Spain and hence is 0 for the rest of Catalonian trading partners. It refers to the mentioned border effect. We suppose the parameter to be positive, which means that Catalonia should trade proportionately more with the rest of Spain than with third countries. This may be because both trading partners belong to the same country, share a history, culture and legal system, as well as the absence of a physical border between them.

In the augmented version we also control for other geographical characteristics of the partners in order to approximate the transaction costs as accurately as possible. The first is a dummy variable Sea_i, which is 1 for countries with access to the sea and 0 otherwise. The possible use of sea transport should have a positive influence on trade, as transaction costs are lower for countries with access to the sea and vice versa for landlocked nations (e.g. Grančay et al. 2015; Glick and Rose 2015).

The last variable accounting for specific geographic attributes of the importer is $Contiguity_i$ which is 1 for countries that share a land border and 0 for those that do not. According to the existing literature (e.g. Bubáková 2013), Catalonia is expected to trade more with adjacent countries, in this case France, than with other partners.

Additional dummy variables that refer to economic and political characteristics of the region's trading partners have also been included. Following several studies (such as Fidrmuc and Fidrmuc 2003; Egger 2004, 2005; Baier and Bergstrand 2009b; Grančay et al. 2015; Glick and 2015), we introduce the dummy FTA_i^t, which is supposed to have a positive effect on trade between the ESM member states. It takes the value of 1 if the country is part of the ESM and 0 if it is not.[8]

The volume of the region's exports is also expected to be influenced by the $Currency_i^t$ variable. Glick and Rose (2015), in reviewing their well-known article from 2002, conclude that, *ceteris paribus*, a currency union increases trade volumes by 2.5 times. On the other hand, the authors also point out that the European Monetary Union (EMU) has a much smaller positive impact on trade creation than other monetary unions. The authors use a range of alternative estimates that predict different results, which significantly undermines their ability to accurately estimate the impact of paying with the same currency on trade. This leads them to conclude that it is beyond their power to arrive at a precise conclusion on the effect of the single currency on trade volumes--even though it has become a common practice to control for this influence.

The term $Language_i$ is 1 for those countries were the official language is Spanish and 0 otherwise. For this purpose, we use the CEPII database provided by Mayer and Zignago (2011). Egger and Lassmann (2012) in their meta-analysis conclude that common language has a direct and positive impact on the two countries' mutual exchange, which increases by 44 %. They also highlight the growing importance of this parameter over time. Fidrmuc and Fidrmuc (2016) show, that this effect is not restricted to official tongues. The ability to communicate in the same language considerably facilitates trade.

We have included time dummies γ_t in order to control for all events which are specific to the year t that could affect the international trade. β_0 is an intercept and ε_i^t is the error term.

V. Results and discussion

Table 2 offers the estimations of both specifications. The basic form included on the right side of the equation denotes only GDP, distance and BE variables. Parameter estimates of both GDP and Distance are highly statistically significant and close to unity in accordance with the

[8] Nevertheless, according to the World Bank (2005), the parameter estimates of FTA can also be negative. The FTA estimate depends on the design and implementation of a given free trade agreement.

available literature. This model predicts on 5% level of significance a border effect of 11.31 ($e^{2.426}$), which closely matches the results of the literature reviewed above.

In the next step, we included several explanatory variables in the model. GDP and distance also continue in line with our expectations in the augmented version of the gravity equation. GDP clearly positively affects the exports of Catalonia. The larger the GDP of the importer, the larger the demand for Catalan exports. Also the parameter estimate of the distance between Barcelona and the capital of the corresponding trading partner has the expected sign reflecting that the larger the distance between both countries, the higher the transaction costs.

Table 2: Results of the basic and augmented Poisson estimations.

Variable	Basic Model	Augmented Model
Intercept	3.522** (1.519)	4.887*** (1.406)
Distance (log)	-0.900*** (0.093)	-1.070*** (0.099)
GDP (log)	0.954*** (0.038)	0.907*** (0.030)
Border Effect	2.426** (1.002)	0.438 (1.211)
FTA		0.703* (0.361)
Currency		0.067 (0.571)
Language		1.307*** (0.214)
Access to the Sea		1.048*** (0.167)
Contiguity		-0.127 (0.859)
Time fixed effects	Yes	Yes

*Notes: Estimated in R Software Version 3.3. Standard errors are in parenthesis below parameter estimates. *, **, and *** denotes statistical significance at the level 10, 5, and 1 % respectively.*

Similarly to the majority of previous studies, the model predicts the positive effect of ESM membership, although it is only significant on a 10% level. According to these results, Catalonia trades 2.01 times more with countries that can participate in the ESM, than with third countries. The parameter estimate of currency union was not statistically significant and the same holds for the dummy that controls for contiguity.

Regarding our main variable of interest, the BE estimates resulted as statistically insignificant, which can be interpreted in such a way that in the basic specification this variable also captured other effects that were not included in the model. On the contrary, two of the additionally added variables, Language and Sea, were highly statistically significant. Our multiple variables model thus points to the fact that the BE term often captures other effects that the available literature misses

For example, Lanaspa Santolaria et al. (2015) include the coast variable, which corresponds to our sea variable, but the authors do not include language. Neither do Gil-Pareja et al. (2005) nor Ghemawat et al. (2010), who control for the island states. Llano Verduras et al. (2011) do not include any of them. Therefore, none of these studies account for the language effect.

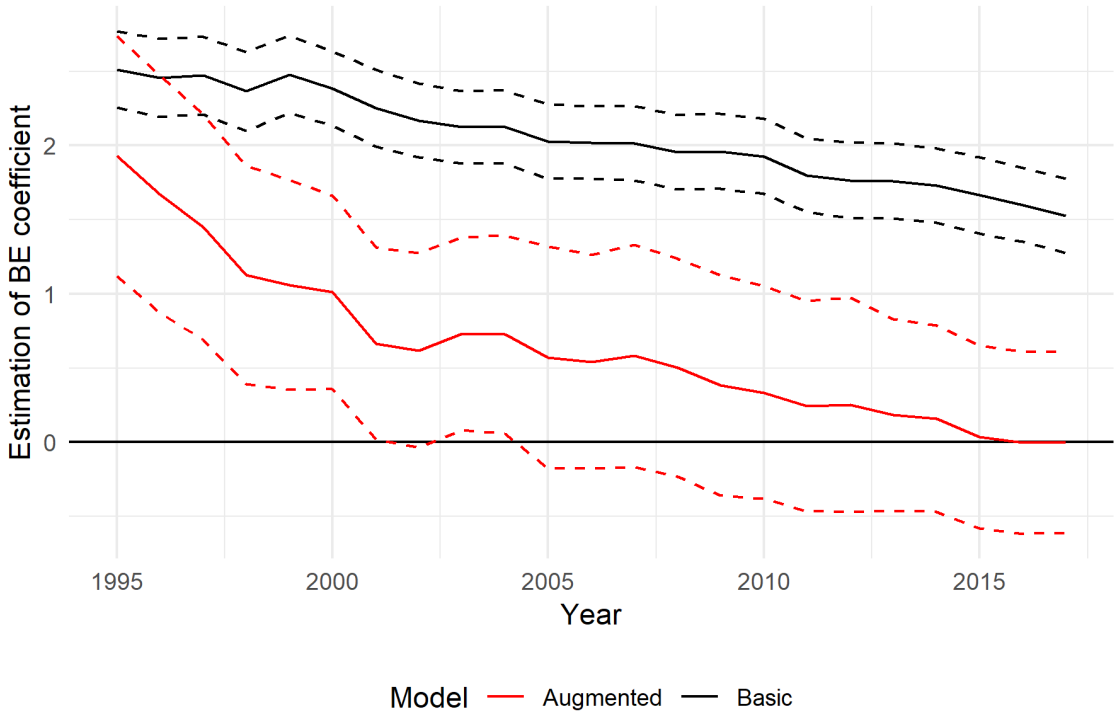
Nevertheless, our estimates show that, after controlling for the other variables, Catalonia trades significantly more with Spanish-speaking countries than with those with other official languages. The model shows that Spanish-speaking countries absorb, *ceteris paribus*, 3.7 times more Catalan exports that countries with other official tongues.

Moreover, part of the discrepancy may also be a consequence of the fact that some of the studies reviewed contain only data concerning OECD countries, including in their samples, apart from Spain, only one Spanish speaking member–Mexico. Moreover, the period studied by these authors covered either the 90's or the initial years of the 21st century. Given that the share of the rest of Spain on Catalan exports continuously diminished, the significance of the border effect also logically decreased.

Therefore, widening the dataset adds value to the analysis. The same occurs with the Sea variable. Whereas many previous studies failed to include this variable, our estimation shows that Catalan foreign exports are positively associated with the use of sea ports. Its parameter estimate is highly statistically significant reflecting the fact that using sea transport lowers the transaction costs of trade.

Figure 3 shows the difference in BE parameter estimates between the basic and the augmented model, as well as the evolution of the border effect over time. It shows that, after controlling for the other variables, the model predicted zero border effect for the final two years of the period reviewed. Therefore, it seems that nowadays there is no significant bias towards the Spanish economy.

Figure 3 The evolution of the border effect over time.



VI. Conclusion

The last unofficial referendum on independence in Catalonia expressed the will of a great part of the inhabitants of the region to secede from Spain. The reluctance of the Spanish central government to discuss any topic on the subject does not mean that the situation may calm down soon. The political discourse of both supporters and opponents for independence is very often based on the importance of Catalonia's trade links to the rest of Spain, as well as on future membership of the region in the European Union.

Previous literature on this topic highlighted the bias of Catalan trade towards Spain, confirming McCallum's border effect. Nevertheless, the econometric analysis provided in this paper shows that this effect is a result of the under-defined model specifications presented by those scholars.

In our basic model specification Catalonia exports, all things equal, on average 11.6 times more to the rest of Spain than to other countries. Notwithstanding, the augmented model predicts no significant border effect in the exports of the region. Especially important are sharing the same language and access to the sea.

Controlling for these variables, the border effect decreases significantly. Moreover, after controlling for the other variables, the model predicted zero border effect for the last two years of the period reviewed. This means that nowadays there is no significant bias towards the Spanish economy.

Therefore, we can conclude that Catalonia is less dependent on trade with the rest of Spain that is commonly believed. This finding is extremely relevant given the role of a border effect argument in the debate on secession. Preserving the Spanish language in case the region becomes independent also seems to be crucial because the official language in Catalonia is also one of the pillars of the separatist discourse in the region. Indeed, this factor appears to be definitely more important than staying in the Eurozone, as the parameter of the currency variable showed as insignificant.

Another important argument of both sides of the conflict is the future membership of Catalonia in the ESM, as that status is far from clear. The Poisson model predicts that, all things equal, Catalonia trades more with countries with free access to the ESM than with the rest of the world. Therefore, it is certainly not surprising that Catalonia, in the case of independence, should strive at least to maintain its duty-free trade status within Europe.

However, given the fact that the data offered by the Spanish Ministry of commerce, industry and competitiveness does not include flows of services, there is still space for more accurate estimates, as trade with services accounts for a considerable part of world trade.

Acknowledgements

This work was supported by the Masaryk University under Grants MUNI/A/1031/2018 and MUNI/A/0918/2019,

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