SCOTTISH INDEPENDENCE: HOW WOULD IT AFFECT THE COUNTRY'S FOREIGN TRADE?

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Abstract

The aim of this paper is to identify the main determinants of Scotland's foreign trade and, above all, the EU's role in the volume of the country's exports, as its EU membership is one of the key arguments in the political discourse about independence. The article highlights the results of opinion polls in the country, as well as the relationship between economic integration and political disintegration. The methodological approach adopted is the gravity model of international trade. Given the large number of zero flows present in the data sample, the Tobit model proved to be a more suitable technique for the estimation. The Random effects model estimates are also provided in order to prove the robustness of the estimates. The results of the study allow for more substantiated conclusions about the main determinants of Scotland's foreign trade, as well as they provide arguments for discussing the implications of Scottish independence.

Keywords: Scotland, independence, European Union, international trade, gravity model
JEL classification: F13, F47, F15, R15

1. Introduction

In recent years, Europe has experienced another wave of separatism. The Basques, Catalans, Scots, Flemings, Venetians, and the residents of North Italian regions all strive to promote their own interests. The strongest voices calling for independence can be heard in Catalonia and Scotland. While the former has to challenge the categorical rejection by the central government in Madrid, the Scots were allowed to organize a referendum to decide whether they would stay in the United Kingdom. Although the advocates of independence were in the minority, the subsequent development of preferences, and above all expectations associated with Brexit show that those who want to separate from the UK have definitely not been silenced. Brexit has become one of the central arguments by which the secessionists are trying to gain the right to organize another referendum, mainly because the Scots voted differently than the rest of the UK. Possible negative impacts associated with Scotland's departure from the European Union thus highlight once more the importance of the EU market for Scottish exporters. The aim of this paper is to identify the main determinants of Scotland's foreign trade and, above all, the EU's role in the volume of the country's exports, as its EU membership is one of the key arguments in the political discourse about independence.

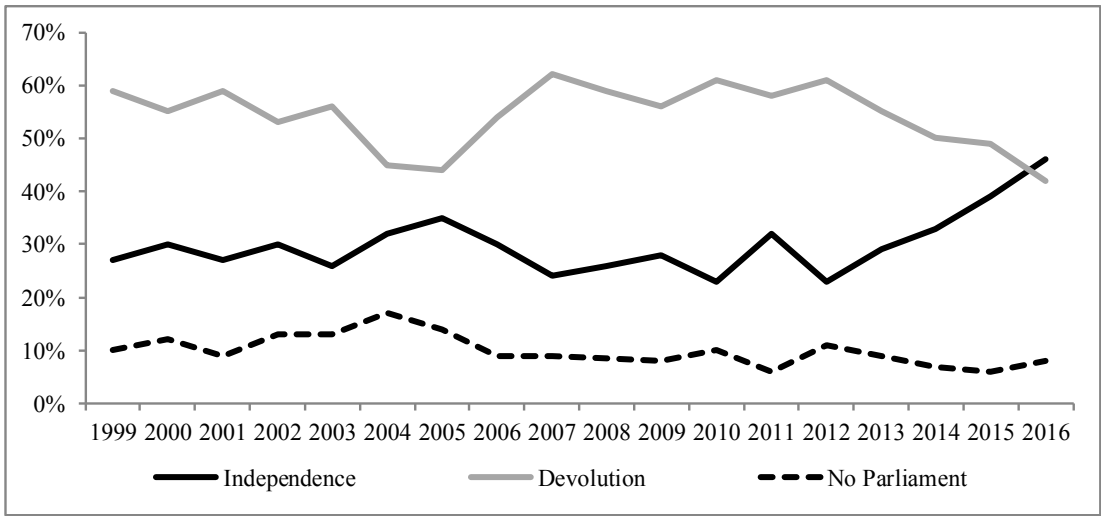
The analysis is based on an econometric approach, using the well-known gravity model of international trade. The data were provided by the Scottish Government and cover exports of the country over the 2007-2016 period. The sample contains a large number of zero flows, as the Scottish government reports the given values only when exports are worth at least £50 million. For this reason, the Tobit model is used to estimate the effects. To assess the robustness of the results, the data are also estimated using the GLS Random effects model.

The paper is organized as follows. The first part serves as introduction to the current Scottish independence movement. The following part discusses the role the European Union plays in it. Subsequently, attention is paid to a descriptive analysis of Scottish exports. This creates the ground for the following econometric analysis, which starts with a brief literature review and introduction to the methodology used, followed by the description of the data sample and the variables included in the model. Results and discussion are the content of the penultimate part and the last section concludes.

2. Support for Independence in Scotland

As well as other European separatist regions, Scotland is also characterized by evident discrepancy between central and regional preferences. In elections, the Scots have traditionally shown preferences different from those in the rest of Great Britain (Dvořáková & Ferrarová 2014). Although the modern Scottish nationalism originated only in the 20th century, its representatives achieved considerable success in talks with the central government in London. The failure of the Scottish referendum, in which Scotland received only 44.7% of the votes for the secession (BBC 2017), will not soothe the voices calling for the independence of the country, especially not after the decision of the UK to start the Brexit process. Public opinion polls show that preferences for staying in the UK are at present only slightly higher than the share of votes calling for secession. Moreover, Figure 1 shows that the support for the later continues to grow and the quantitative difference between support for staying in the UK and that for secession is currently more than modest.

Figure 1: Opinions on how Scotland should be governed.



Source: Scottish Social Attitudes (SSA 2018)

The traditional argument of the secessionists is that an independent Scotland would be one of the richest countries in Europe, with GDP per capita higher than that of France or Italy, but above all higher than that of the rest of the United Kingdom. For example, in 2014, Scottish GDP per capita (in PPP), including a geographic share of offshore oil and gas output, reached $41,239, which was the 15th highest GDP per capita of all the OECD countries. GDP per capita in the United Kingdom accounted for $40,188, two places below the figure for Scotland (Scottish Government 2016). However, in 2015, the panorama changed and Scotland, for the first time in 35 years, had a per capita income slightly lower than the rest of the UK (Gardham 2015).

Indeed, the political discourse of the Scottish National Party (SNP), headed by Alex Salmond, was primarily driven by higher oil revenues to the Scottish budget after the independence (Macnab & Barnes 2013). Their huge decline as a result of the fall in prices, led to a fall in support for independence in mid-2014, when the "Yes" answer to the question "Should Scotland be an independent country?" fell from 37% in April to 28% in August, probably reflecting the fear that an independent Scotland would be significantly more vulnerable to these fluctuations. Nevertheless, in October of the same year, the independence movement reached its maximum support with 49% of the interviewees answering "Yes" (YouGov 2015) and as Figure 1 shows, the year-on-year change in the support for independence was positive.

It seems that the 2014 Scottish referendum, rather than calming down separatism, led to far more support for secession. This was further exacerbated by the fact that Britain in the national referendum decided to leave the European Union. While at the national level, 52% of voters preferred leaving the Union, only 38% did so in the case of Scotland (The Electoral Commission 2018). Majority of the Scots therefore wanted to remain in the EU. Hence, the

Brexit process may be an important argument for convening a new referendum, nevertheless, according to SSA (2018) with uncertain result.

3. Scotland and Europe

The influence of the European Union, and the economic integration in general, on the disintegration of national states has been widely studied by scholars all over the world. It was a quarter of a century ago when Bob Davis (1994) used the term *global paradox*, pointing to the fact that, with the increasing interconnection of individual nations through the global market and technology, the call for national disintegration may increase. The author also stressed the importance of the fall of the Soviet Union, which made Europe no longer in a military threat. As a result, the separatists changed from chauvinists looking only to the domestic economy to internationalists and free trade advocates. This issue was further developed, for example, by Alesina et al. (1997), who agree with the idea that at that time the world was already safe for separatism, mainly because of the growing openness and interdependence of economies.

Given that Scotland would be one of the smallest European countries, makes the possibility to participate in the European Union's common market a crucial concern. In general, separatist regions tend to be positively inclined to create international trade agreements (e.g. Davis 1994, Dvořáková & Ferrarová 2014). In the field of political economics, Alesina et al. (1997) argued that the free market leads to secession mainly because openness reduces the costs associated with the small size of the country and thus the small domestic market. For this reason, the size of the country in the integrated world is not decisive and has no negative effect on the level of income. Instead, the heterogeneity in local preferences leads to the creation of smaller jurisdictions.

This theory was further developed by a great number of authors. Daumal (2008) focuses attention on countries with a federal arrangement. She claims that only federated regions can benefit from free market participation. Regions in a unionist state are, with some exceptions like Canada or Switzerland, inherently denied the possibility of secession by the constitution. Brancati (2014), on the other hand, considers that the relationship between European integration and electoral support for separatism is generally very weak, which contrasts considerably with Dvořáková & Ferrarová (2014), according to whom regions with pronounced separatist tendencies generally tend to be pro-European.

From my point of view, the European Union has an ambivalent impact on separatism. On the one hand, separatists may be threatened by the fact that a newly created independent state would, at least temporarily, find itself outside the Union. On the other, European integration generally facilitates foreign trade and thus also leads to a decrease in dependence on the domestic economy and at least partially offsets the costs associated with the limited size of the domestic market. Dvořáková & Ferrarová (2014) further point out that the EU disturbs the direct link between voters and local decision-makers, participating in the decision-making process. This is a consequence of the fact that the EU weakens the links between the national state and its individual regions and promotes the national identity of the regions.

In the case of Scotland, the voters' attitudes to the Union are also unclear. Muro & Vlaskamp (2016) have already empirically explored this issue. The authors carried out an electronic questionnaire survey in Scotland and Catalonia, with the aim of determining what impact the prospects for EU membership have on the support of separatism. Relying on the so-called Linz typology, they asked a question whether the respondents feel "Scots only", "Scots rather than British", "Scots and British", "Brits rather than Scots" or "British only". Subsequently, they divided the interviewees into three groups. The first one was faced with a situation where the region would remain a member of the EU after becoming independent; the second with the opposite scenario; and the third group is left as a control one. Unlike Catalonia, there were no statistically significant results in any of the above-mentioned cases in Scotland, which is, according to the authors, a consequence of the predominant Scottish Euroscepticism. However, the Scots, in contrast with the inhabitants of the region in the Iberian Peninsula, did not experience a violent negative propaganda from the center, which would in principle reject their membership in the Union in case of secession.

When evaluating responses, Muro & Vlaskamp (2016) emphasize the answer to the above-mentioned question concerning the degree of nationalism. The authors conclude that the preference of strongly nationalistic voters was not influenced by any of the scenarios in any of the regions. In a case of secession, the subsequent membership in the European Union is important especially for dual-choice voters, i.e. those belonging to the middle three groups. In the case of Scotland, the relationship of respondents to the European Union has often been misleading. A negative scenario has frequently led to the promotion of separatism, especially for Eurosceptic voters, for whom secession offers the chance to escape the EU's influence. Hence, from this point of view, Brexit should rather reduce the support for separatism, but in reality this did not happen.

Contrary to Muro and Vlaskamp, Dardanelli a Mitchell state that "[i]dentity is important, but does not explain everything" (2014, 93). They highlight that in 2011 Scottish Parliament, the SNP gained more votes that the Conservative Party among those who called themselves "British not Scottish". Indeed, the reason of the victory of the SNP in these elections seems to be its high competence in government, especially in comparison with its direct rivals, rather than purely its commitment to the independence issue.

Indeed, the SNP was in its origins not in favour of the British membership in the Union. In the 1975 referendum on whether to continue being part of the EU, the SNP opposed it. But later, following the public opinion, it emphasized its opposition to the Euroscepticism of England. Dardanelli and Mitchell (2014) even use the term 'Europhilia' when referring to the most important Scottish party. Nevertheless, despite the SNP's advocacy of an independent Scotland within Europe, nowadays, there is no consensus about the Scottish membership in the EU amongst those who are in favour of independence. Indeed, according to the SSA (2018) opinion poll from 2016, 36% of those who were in favour of independence said they had voted in favour of leaving the Union, almost the same percentage share as that of the unionists that wanted to leave it (35%). The long-term tendency of the inhabitants of the region towards the Union according to the opinion polls realized from 1999 to 2016 can be seen in Table 1.

Table 1: Answers to the question "Do you think Britain's long-term policy should be…"

	1999	2000	2003	2004	2005	2013	2014	2015	2016
Leave the EU	10	11	11	13	14	19	17	17	25
Stay in EU but reduce its powers	30	27	25	23	39	29	36	43	42
Leave things as are	16	22	20	20	19	18	23	20	21
Stay in EU and increase its powers	28	22	28	28	8	16	9	11	5
Work for single European government	10	9	8	8	6	7	8	6	3

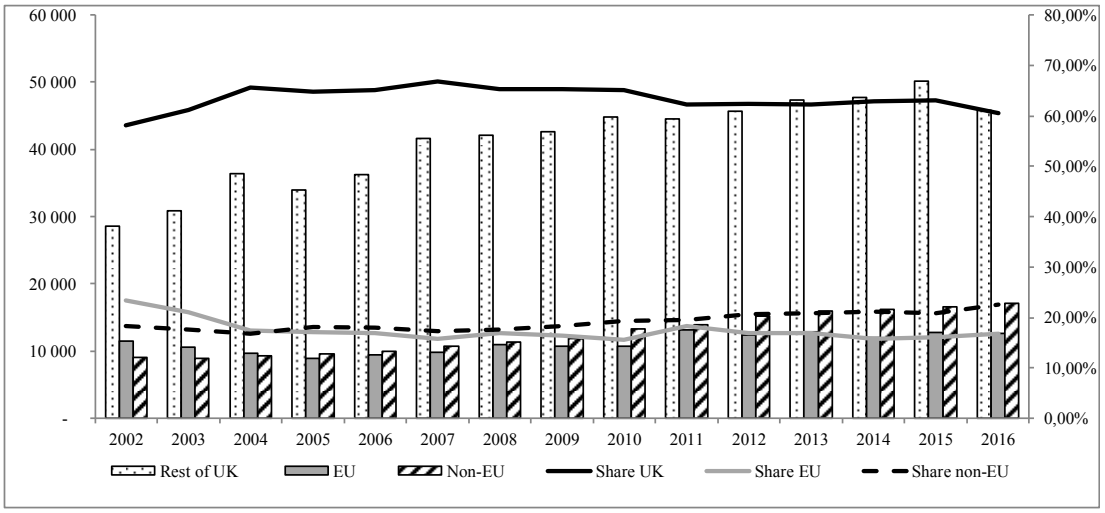
Source: SSA (2018)

Hence, at present, most Scots would either leave the European Union or severely restrict its powers. However, the outlook of Scotland outside the EU necessarily leads to concerns relating to the impact of the loss of membership on the country's foreign trade.

4. Scottish exports

Figure 2 presents the grouped destinations of Scotland's exports. It shows that two thirds of the exports (excluding oil and gas extracted from the UK Continental Shell) are absorbed by the rest of the United Kingdom. The share of exports going to EU countries is currently lower than that of those going to non-EU ones. Given the membership of Scotland in the Union, one would expect the Scottish trade to be distributed in a different way. Moreover, there can be observed a decreasing trend in the share of the EU countries in the total exports.

Figure 2: Volume of Scottish exports (£ million, left axis) and their percentage share (right axis).



Source: Scottish Government (2018b)

The most important export trading partners of Scotland are featured in Table 2. With the exception of the UK, by far the most important trading partner is the United States economy, whose importance has even increased in the period under review. The top 10 partners were, with the exception of Brazil in 2016, formed by European states. Nevertheless, Scotland exports considerable volumes also to quite remote non-European countries, which is rather surprising. Therefore, the determinants of the country's exports are worth analysing.

Table 2: Scotland's major trading partners (£ millions)

2007						2016					
1	USA	2 980	**11**	Switzerland	480	**1**	USA	4 775	**11**	Belgium	760
2	Netherlands	1 925	**12**	Singapore	475	**2**	Netherlands	2 115	**12**	Italy	715
3	France	1 385	**13**	Sweden	430	**3**	France	1 960	**13**	UAE	705
4	Germany	1 325	**14**	Japan	405	**4**	Germany	1 910	**14**	Australia	650
5	Spain	875	**15**	UAE	345	**5**	Norway	1 365	**15**	Canada	610
6	Ireland	815	**16**	Canada	345	**6**	Eire	1 025	**16**	Sweden	565
7	Belgium	685	**17**	South Korea	290	**7**	Denmark	995	**17**	China	555
8	Norway	675	**18**	China	290	**8**	Spain	855	**18**	Singapore	525
9	Italy	670	**19**	Malaysia	285	**9**	Switzerland	795	**19**	Japan	460
10	Denmark	645	**20**	India	240	**10**	Brazil	770	**20**	South Korea	435

Source: Scottish Government (2018b)

5. Econometric analysis of the main determinants of the Scottish exports

Review and methodology

It has become a common practice in the economic literature to estimate the factors influencing the volume of the exchange of goods and services of some country or region using the gravity model of international trade. It was first used by Jan Tinbergen (1962), who was followed by a great number of economists (e.g. Linneman 1966, Anderson 1979, Deardorff 1984, Bergstrand 1985 or Frankel 1997). This method became extremely popular among those who focus on the magnitude of trade among different countries, as well as migration flows or the effects of currency unions. Empirically, the model was very successful. On the theoretical level, however, there were a great number of studies aiming to address its correct specification (see, for example, the well-known paper by Anderson and Van Wincoop 2003). Notwithstanding, there is still no consensus on the inclusion of individual variables in

the model, nor on the choice of an appropriate estimation techniques. Therefore, the election of both should be based on a concrete dataset.

In this specific case, the data provided by the Scottish government include the country's exports that reached in the corresponding year at least £50 million. Subsequently, those years when the volume of exports was lower than the given value, are not reported in the dataset. For this reason, the sample includes many zero flows (almost 19%). This is a common problem related to the gravity models, regardless of whether they are a consequence of measurement errors, rounding or simply missing data (Grančay et al. 2015).

In the presence of zero flows, the OLS estimates become inconsistent. There is, however, no consensus among scholars about how to solve this problem. It has become a common practice to substitute the zero values by a small number close to zero. Nevertheless, in the absence of knowledge whether the reported zero flows are caused by no trade at all, or more probably, are a consequence of the methodology adopted by the Scottish government, this analysis cannot proceed in this way.

Among the most commonly used estimation techniques prevail the Heckman correction model (Linders & de Groot 2006, Martin & Pham 2008, Gómez-Herrera 2013), the Poisson method (Santos Silva & Tenreyro 2006, Martínez-Zarzoso et al. 2013), the Gamma Pseudo Maximum Likelihood (GPML, Martínez-Zarzoso 2013), the Feasible Generalized Least Squares (FGLS, *idem.*) and the Tobit model (Saloaga & Winters 2001, Rose 2004, Linders & de Groot 2006, Babecká Kucharčuková et al. 2012, Grančay et al. 2015). Despite the advantages of these methods, all of them also suffer from some shortcomings. The problem with the Heckit model arises when there is heterogeneity in the dataset. Another drawback may be in finding the appropriate selection equation. The Poisson method is not suitable when the number of zeros is very abundant (Martin & Pham 2008). The GPML is less prone to measurement error and last, but not least, the FGLS method requires the variance covariance matrix to be estimated first (Gómez-Herrera 2013). In consequence, I have opted for the Tobit model, which is often used for data set analysis with a substantial number of zero flows (see e.g. Linders & de Groot 2006).

In this procedure, the unobserved part of the explained variable is continuous and censored to some specific value. Hence, it is applied primarily to cases when some important rounding happens (*idem.*). In this case all the trade volumes lower than £50 million are censored to zero, regardless of whether the flows are really zero, or they only do not reach the given value. Certainly, the Tobit model does not explain the reason why there are missing trade flows (*idem.*). Nevertheless, this is not my concern and hence this procedure appears to be suitable for this estimation.

In order to check the robustness of the estimates, I also provide the estimates of the GLS Random effects model, which allows for time varying intercepts. Allow the intercept to be different in different moments reflects a fact that all the things equal, some countries may trade more, or less, in different time periods. Although some authors prefer the Fixed effects (FE) model (Soloaga & Winters 2001, Egger 2002, Baier & Bergstrand 2006), this method ignores the time-invariant variable effects and therefore the RE should be preferred if one is interested in estimating influences that do not change over time.

Neither this commonly used method (e.g. Egger 2002 or Carrére 2006) is perfect and suffers from many drawbacks. First, it assumes that there is no correlation between the individual effects and the regressors included in the gravity equation. Not meeting this assumption results in inconsistent estimates (Egger 2005). In the opposite case, the RE model is more efficient than the FE one (Gómez-Herrera 2013). Another drawback is that the estimates provided by this method usually have lower statistical significance. Nevertheless, the signs of the estimates remain the same (Grančay et al. 2015).

The standard Hausman test (p-value = 0.79319) did not reject the hypothesis of the appropriateness of the RE method, implying that this procedure may be correct.

Variables and data

Two different equations have been specified in order to find out the principal factors determining the volume of Scottish exports. The first one corresponds to the Tobit model:

$$\ln \mathrm{EXP}_i^t = \beta_0 + \beta_1 \ln GDP_i^t + \beta_2 \ln distance_i + \beta_3 sea_i + \beta_4 UK\_currency_i + \beta_5 Language_i + \beta_6 EU_i^t + \varepsilon_i^t \quad (1)$$

$$\ln EXP_i = \ln EXP_i^* \quad \text{if } \ln EXP_i^* > \ln \alpha$$
$$\ln EXP_i = \ln \alpha \quad \text{if } \ln EXP_i^* \leq \ln \alpha$$

In this case, α refers to £49.9 million, the larger number that would be even censored to 0.

The GLS RE model then looks as follows:

$$\ln \mathrm{EXP}_i^t = \beta_0 + \beta_t + \beta_1 \ln GDP_i^t + \beta_2 \ln distance_i + \beta_3 sea_i + \beta_4 UK\_currency_i + \beta_5 Language_i + \beta_6 EU_i^t + \varepsilon_i^t \quad (2)$$

The dependent variable $\ln\_EXP_i^t$ $\ln\_EXP_i^t$ reflects the volume of exports from Scotland to the i-th trading partner. This volume of exports is expected to be positively influenced by the size of the demand of the receiving country. To approximate it, I have included the $\ln\_GDP_i^t$ variable. The data was retrieved from the the World Economic Outlook Database provided by the International Monetary Fund (2018). GDP for the rest of the UK was calculated by subtracting Scotland's GDP (Scottish Government 2018a) converted to dollars (OFX 2018).

In the opposite direction should work the $\ln\_distance_i$ term, which is traditionally included in order to approximate the transaction costs. I use the great circle approach based on the distance between the capital cities of the states (Geobytes 2018). In this case it is the distance between Edinburgh and the capital city of the corresponding country, with the exception of Germany, in which case Frankfurt is traditionally used as the capital of the country's trade. The larger the distance, the greater the transaction costs may be. These costs are also expected to be influenced by the possibility of the country to access to the sea (Sea_i), which is expected to influence positively the volume of trade. Including both variables may lead to more accurate approximation of the transaction costs, which may be lower for countries with access to the sea and vice versa for the landlocked ones (Grančay et al. 2015, Glick and Rose 2015, Hanousek & Kočenda 2015).

I also include additional dummy variables that reflect other characteristics of Scotland's trading partners. The $UK\_currency_i$ variable accounts only for the UK and hence is 0 for the rest of the trading partners. The interpretation of this variable is a little bit confusing. On the one hand, it refers the to the McCallum's (1995) well-known *border effect*. McCallum introduces the term *home bias*, which expresses the fact that the volume of intra-national exchange greatly exceeds its level predicted by the gravity model. This is a kind of bias towards the domestic market. According to the author, the main culprit is the existence of the physical border that gave the name to the given phenomena. For this reason, I expect the parameter to be positive, which means that, all the things equal, Scotland should trade proportionately more with the rest of the UK than with the other countries. This may be because both trading partners pertain to the same country, share history or language. Nevertheless, some role should also be attributed to the fact that Scotland shares the currency with the rest of the Kingdom, which is also expected to influence the export volumes positively (see e.g. Glick & Rose 2015). There is no other country in the sample that uses the British pound. Therefore, it is not possible to differentiate between these two influences and the issue requires a careful interpretation.

The Scotland's export volume is also supposed to be influenced by the term $language_i$, which is 1 for those countries were the official language is English and 0 otherwise. Egger and Lassmann (2012) state that, other things equal, a common language determines positively the trade between two countries and increases it by 44%. The data concerning this information were retrieved from the CEPII database provided by Mayer and Zignago (2011).

Last, but not least, I include the dummy EU_i^t, which is supposed to have a positive effect on trade between the Union member states (Fidrmuc & Fidrmuc 2003, Egger 2004 and 2005, Baier & Bergstrand 2009, Glick & Rose 2015, or Grančay et al. 2015). The dummy takes the value of 1 if the country is part of the Union and 0 otherwise.

β_0 is an intercept and β_t is a year-specific intercept included only in the RE model, which accounts for a significant year-to-year changes in the world trade patterns. ε_i^t is the error term.

Results and discussion

As can be seen from Table 3, all the variables predicted by the Tobit model have the expected sign, with the exception of the EU_i^c and Sea_i terms, which are neither significant, nor on the lowest level of significance.

Table 3: Results of the econometric analysis.

	Tobit model (QML standard errors)		GLS RE model	
const	*2.30602*	***	*4.32606*	***
l_GDP	*0.647151*	***	*0.479724*	***
l_distance	*-0.626003*	***	*-0.612145*	***
UK_currency	*2.46713*	***	*2.87082*	***
Language	*0.798443*	***	*0.60427*	***
EU	*0.0748641*		*-0.121816*	
Sea	*-0.0692591*		*0.281289*	
	Left-censored observations: 132			
The *, ** and *** indicate significance on 10, 5 and 1% level.				

Although countless studies (see above) predict a positive effect of free trade areas on the volume of exchange, as has been mentioned before (Figure 1), in the case of Scotland, the share of the EU in the international exports of the country is very small. Leaving the Union may, therefore, not be as dramatically harmful to an independent Scottish economy as one would expect. A more important factor to be considered is the currency union with the UK. The model predicts a considerably high border effect ($e^{2.46713}$= 11.79). Nevertheless, there are no physical borders inside the European Union. This variable probably includes also the effect of the same currency. Hence, an independent Scotland should seek to maintain the monetary union with the UK.

Indeed, it seems that the secessionists are aware of the importance of the same currency. In the *Scotland's Future*, the Scottish government (2013) defended the option of retaining the pound sterling in the case of independence. The answer from the Bank of England was that this solution could be possible. However, it would limit Scottish autonomy. On the other hand, the Treasury's Permanent Secretary strongly opposed the single currency option (Dardanelli & Mitchell 2014).

As expected, Scottish exports are also positively influenced by the possibility of speaking the same language with the partner in the receiving country. This factor probably includes also cultural and historical ties with some of the partners.

The GLS RE model provides with the same results. The signs of the statistically significant variables are the same as in the previous model and the magnitudes of the effects similar. The estimates may be therefore robust.

6. Conclusion

The last referendum on independence in Scotland seems to have triggered out some kind of boom in the Scottish support for independence. This is to be added to the fact that the British have decided to leave the European Union. This situation leads to speculations about another Scottish referendum on independence. While its advocates use the EU in their discourses as an important argument for a new referendum, the position of Scottish voters towards the Union is far from clear. In fact, currently, the Scots seem to be closer to Euroscepticism than the rest of the UK.

Nevertheless, the econometric analysis provided in this paper confirms the relatively lower importance of the EU's markets for Scottish exporters than expected. In comparison with Catalonia, which exports around 40% of its production to the rest of the EU (C-intereg. CEPREDE 2017) and which is expected to be much more severely damaged if forced outside the Union, other factors seem to be of more importance in the case of Scotland. Future

arrangements with the rest of the UK, concerning some free trade area, or retaining the British pound, would be especially important for an independent Scotland.

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