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Determinants of regional trade agreements: Global evidence based on gravity models

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Abstract. There has been a continuous increase in the number of regional trade agreements (RTAs) worldwide during the previous decades. However, the analysis of determinants of regional trade agreements is somehow neglected in empirical literature. This paper aims to analyse the determinants of regional trade agreements by using gravity variables on a global sample. The results suggest that colonial variables are ambiguously related to RTAs, thereby making it hard to exactly define the role of colonial relations in the formulation of RTAs. Language is found to be negatively related to RTAs, meaning that countries speaking different languages tend to create more trade. The relationship between distance and RTAs is found to be relatively straightforward with higher distance and countries without common borders suggesting less regional trade relations. Finally, geographical indication does not seem to play a major role in creating regional trade agreements. As a practical result, it was found that gravity models are applicable for analysing the determinants of RTAs. Our results might be of interest to researchers and policymakers interested in the creation of RTAs.

Keywords: regions, trade agreements, gravity model, geographical indications, world trade.

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1. INTRODUCTION

The number of regional trade agreements (RTAs) has considerably risen over the past decades. During the more than 70 years long history of the General Agreement on Tariffs and Trade (GATT) and the World Trade Organisation (WTO) many RTAs came into force. While between 1948 and 1983 altogether only 16 agreements were signed, in the second part of the examined period (1984-2018) the total number of RTAs in force increased to 302, indicating the exponential growth in the recent years (WTO, 2018a). Nowadays, negotiations go beyond simple tariffs talks (shallow agreements) and cover multiple policy areas affecting trade and investment in goods and services (deep agreements). Deep agreements have very important consequences for regional integration. If efficiently designed, they can increase investment, economic growth and social welfare through enhanced trade flows.

RTAs are currently at the centre of many policy debates around the globe, shaping trade and economic relations in the upcoming years. The TOP5 traders in 2017 (measured as the sum of exports and imports of merchandise trade) were involved in at least in a dozen of RTAs each: China (19), the United States (13), Germany (46), Japan (16) and the Netherlands (46). On the other hand, the share of trade under RTAs was quite large among the EU (64%) and the NAFTA (50%) member states (WTO, 2018b). Some of the discussions are about to renegotiate current agreements (e.g., Brexit), while others create new agreements (e.g., USMCA). Mega-regional trade agreements are also on the rise (e.g., Comprehensive and Progressive Agreement for a Trans-Pacific Partnership - CPTPP). The number of RTAs is also expected to rise in the future, given the recent developments of the USA foreign policy - see Trump's trade wars that involve multiple battles with American allies and others alike. This could encourage the rest of the world to set up new and expanded RTAs that do not include the US (Robinson & Thierfelder, 2019).

For many decades, gravity models have been the workhorse of cross-country empirical analyses of international trade flows and the effects of regional trade agreements on trade flows (Baier & Bergstrand, 2004). However, a relatively low amount of papers are using gravity models to identify the determinants of regional trade agreements. The aim of this paper is to analyse these determinants by applying the gravity model to a bilateral global dataset. Such an approach offers a number of contributions to the existing literature. First, it helps better understand why countries make RTAs globally. Second, it helps to test the classic hypotheses of gravity models to a new framework. Third, the role of geographical indications (indicating the connection between the product traded and its geographical origin) is also analysed, which, to the best of our knowledge, is missing in the current literature.

The article is structured as follows. Section 2 provides literature review on the topic, followed by the description of data and the methodology applied in Section 3. Section 4 demonstrates some recent trends in the number and nature of RTAs, while Section 5 presents the results obtained together with their discussion. The last section concludes.

2. LITERATURE REVIEW

A number of different terms are used to describe preferential relationships among trading partners. Some of the classifications are talking about preferential trade agreements (PTAs), others free trade agreements (FTAs), while there also exists various other terms such as 'closer economic relations'. The term 'regional trade agreement' is used to all kinds of such agreements in the WTO, including bilateral and multilateral agreements.

There exists a vast amount of literature dedicated to the analyses of bilateral and multilateral agreements. One part of this literature deals with the traditional and non-traditional gains from regional trade agreements. The former, for instance, was analysed by Scott L Baier and Bergstrand (2007), using a panel dataset and econometrically accounting for endogeneity for the free trade agreement variable. They found that, on average, a free trade agreement approximately doubled two members' bilateral trade after 10 years. Céline Carrere (2006) analysed effects of regional trade agreements on trade flows by using the gravity model for 130 countries with a panel dataset over the period 1962-1996. Results suggest that regional agreements have generated a significant increase in trade between members, suggesting gains at one end. As to non-traditional gains, Fernandez and Portes (1998)gave an excellent review and identified credibility, signaling, bargaining power, insurance, and coordination as the most important ones. As an interesting non-traditional gain, Baldwin and Jaimovich (2012) tested the hypothesis whether spread of regionalism was partly driven by 'defensive' FTAs, i.e. FTAs signed to reduce discrimination created by third-nation FTAs. Their main finding was that FTAs were contagious to various econometric specifications, samples, and inclusions of various economic and political controls.

A significant part of the literature is dealing with effects of RTAs on economic growth. Anderson and Yotov (2016), for instance, analysed the terms of trade and global efficiency effects of free trade agreements over 1990–2002 and found some members to gain, while other lose, though global efficiency had risen by 0.9%. (Hur & Park, 2012) assessed whether a bilateral FTA raised the growth rates of the two countries engaging in the FTA. They found that FTAs exerted insignificant effects on aggregated growth from one to ten year period after launch, though detected a significant upward trend in the gap between the growth rates of per capita GDP within a bilateral FTA. Interestingly, however, Vamvakidis (1999) analysed the growth impacts of trade and concluded that broad liberalization was more effective in promoting general economic growth than regional trade agreements. According to the results, economies grew faster and had higher investment shares after broad liberalization, in both the short and the long run, than those participating in regional trade agreements.

Another part of the literature focuses on the trade creation and diversion effects of free trade agreements. Dai, Yotov, and Zylkin (2014), for instance, analysed the trade diversion effects of free trade agreements and confirmed that FTAs diverted trade away from non-member countries. They also found trade diversion to be stronger for imports than for exports as well as internal trade diversion to be stronger than diversion from external trade. Missios, Saggi, and Yildiz (2016) goes further by analysing trade diversion effects of different types of RTAs. They found both FTAs and CUs causing external trade diversion, inducing non-members to lower their import tariffs. However, Yang and Martinez-Zarzoso (2014) investigated trade creation and trade diversion effects on the case of ASEAN–China Free Trade Area (ACFTA) by using panel data for 31 countries over the period 1995-2010. They found that ACFTA leaded to substantial and significant trade creation for both agricultural and manufactured goods.

Another significant part of the literature is dedicated to the environmental impacts of bilateral trade agreements. Antweiler, Copeland, and Taylor (2001) investigated how openness to international goods markets affects pollution concentrations and concluded that surprisingly, freer trade appeared to be good for the environment. This argument is echoed by Frankel and Rose (2005), suggesting that trade tends to reduce three measures of air pollution. The authors claim that here is little evidence that trade has a detrimental effect on the environment. McAusland and Millimet (2013) also reached the same conclusion when analysing channels through which trade impacts the environment. They found robust evidence that international trade had a statistically and economically beneficial causal effect on environmental quality, while intranational trade had a harmful impact.

Another part of the literature focuses on the role of geographical indications (GI) in international trade. In some South-European countries, the concept of linking quality of a product to its geographical origin

has a long history but the EU has its community level system since 1992. The TRIPS agreement at the end of the Uruguay Round (in 1994) was the first that brought this concept on the WTO agenda (Viju, Yeung, & Kerr, 2013). However, the approach of the European sui generis GI system (also adopted by some Asian and Latin-American countries) and the purely trademark based concept (used by the US and many extra-European Anglo-Saxon countries) often results in insoluble conflicts during the negotiation process of a trade agreement (Wattanapruttipaisan, 2009). Recently, in the Global Europe FTAs, the EU considers a GI as a must and creates a chapter for this issue (Engelhardt, 2015). In practice, parties usually agree on (unbalanced) lists of products with protected origin. In the CETA, for example, the EU has a GI list of 148 products compared to Canada neglecting this issue, meaning that Canada provided protection for certain GI products in exchange to have an improved access to the European agricultural and food markets (Moir, 2017). One of the reasons behind the stuck of TTIP negotiations was actually a lack of agreement on GIs between the US and the EU (Mancini, Arfini, Veneziani, & Thevenod-Mottet, 2017). Therefore, we can conclude that GIs play an important role in creating new trade agreements when the EU is involved.

Going further, it is also worth to look at the trade affecting effects of geographical indications. Literature here seems to be limited. Single sector analysis (European ham industry - Török and Jámbor (2016), or European cheese industry Balogh and Jámbor (2017)) showed that having a GI protection results in revealed comparative advantages for the exporter country. Leufkens (2017) estimated the EU GI regulation's effected several trade flows. Their gravity model approach using UN Comtrade data for 1996 and 2010 demonstrated that the EU GI system had a significant trade effect on both intra- and extra-EU bilateral trade. A recent study of the European Strength2Food H2020 research project highlighted that GIs affect trade flows differently depending on whether GIs are produced in the exporter or the importer country (Raimondi, Falco, Curzi, & Olper, 2018). Using bilateral trade datasets for the period of 1996-2014, the auhors found that for extra-EU trade, having GI products in the exporting European country increases export, both in terms of volume and (unit) value. Results also show that the existence of a GI system in the importing country makes GI-based trade effect lower, mainly due to higher competition.

On the whole, literature on the field seems to take different avenues, though the analysis of the determinants of regional trade agreements somehow seems to be missing from the literature – a gap to be addressed by this paper.

3. THE CHANGING NATURE OF RTAS

Regional Trade Agreements have increased rapidly in recent years. As of 1 October 2018, 288 RTAs had been notified to the WTO and were in force (Figure 1). The number of RTAs has exponentially grown after the 1990s. Compared to GATT years when 3 RTAs were notified per year on average, around 25 new RTAs are notified per year since 1995. This upward trend is likely to continue, especially considering recent developments of the Doha Round negotiations as well as trade wars initiated by President Trump.

The geographical distribution of RTAs are also about to change. Agreements today are cross-regional and occur between developed and developing countries. Furthermore, compared to the 'early ages' when the European Union and the United States were the 'engines' of such agreements, most new RTAs nowadays are concentrated in the East Asian and South American region (Figure 2). However, Europe has still remained the most active WTO member in terms of the number of RTAs negotiated (WTO, 2018a).

A number of explanations have been put forward for the continuous increase in RTAs, including the systems change in Central and Eastern European (CEE) countries as well as in the Commonwealth of Independent States (CIS); frustration among WTO members on the slow progress of WTO negotiations; the growing importance of trade in services and the emergence of global food supply chains (Acharya, 2016).

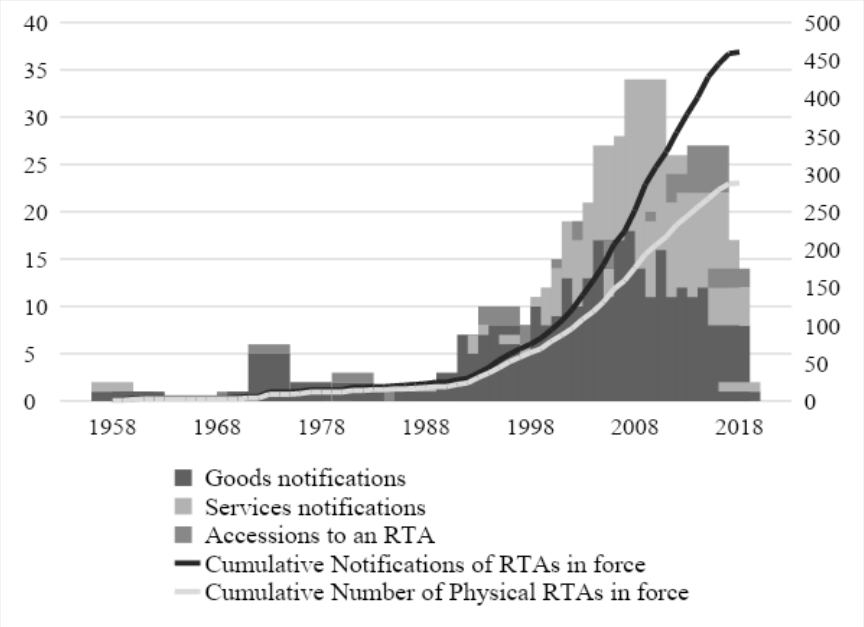

Figure 1. RTAs currently in force (by year of entry into force), 1958-2018

Note: Notifications of RTAs: goods, services & accessions to an RTA are counted separately. Physical RTAs: goods, services & accessions to an RTA are counted together. The cumulative lines show the number of notifications/physical RTAs currently in force.

Source: Own composition based on WTO (2018) data.

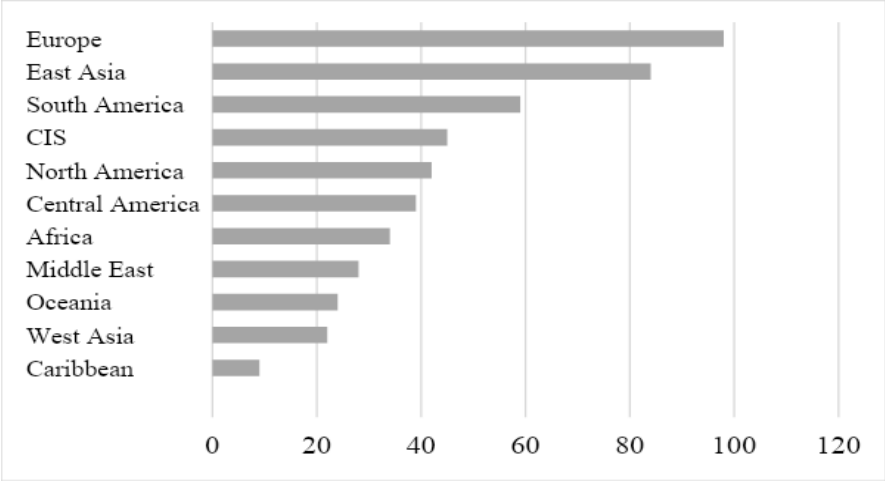

Figure 2. Physical RTAs in force, participation by region

Note: The composition of regions may be found in the RTA database User Guide. RTAs involving countries/territories in two (or more) regions are counted more than once.

Source: Own composition based on WTO (2018) data.

In addition to its growing numbers, modern RTAs have become more sophisticated both in content and coverage. They do not only include market access commitments in goods and services but, increasingly, provisions on investment, intellectual property rights, competition, labour and the environment (Acharya, 2016). Besides their complexity, newly established RTAs increasingly include issues not covered by any

WTO rules so far. There is also a tendency to cover and protect sensitive products and sectors such as agriculture, textiles and clothing. The changing rules of origin is also important in this regard.

However, it should be also born in mind that by creating new rules and standards, RTAs pose a number of new challenges to the global trade system. First, RTAs have become a centrepiece of commercial policy for many countries, implying a shift from multilateral to regional trade objectives. Second, with their increased sophisticated nature, new RTAs challenge existing regulatory regimes by 'inventing' new policy areas not covered by multilateral negotiations. Third, the emergence of RTAs change the former balance of global trade patterns together with changing the economic and political 'powers' of countries and regions, mainly in the developing world (Fiorentino, Verdeja, & Toqueboeuf, 2007).

4. METHODOLOGY

Materials and Methods

In order to test for the determinants of regional trade agreements, various regressions (logit, probit and tobit models) are run as evident from our specifications (see below). The dependent variable in our case is the existence of regional trade agreements on a bilateral basis, measuring whether there exists a regional trade agreement between a reporter (r) and partner (p) country in October 2018:

$$A_{pr} = \{1, \quad if\ there\ is\ an\ agreement\ between\ countries\ r\ and\ p\ on\ the\ 1st\ January\ 2018\ 0, otherwise\}$$

Such data is coming from the WTO RTA database, accessed in October 2018, covering 229 countries. The vast majority of these agreements are bilateral, with some exceptions, for instance, agreements having the European Union as one single entity. In these cases, data were made bilateral, assuming that each and every country of an entity has the same agreement than the entity itself. Finally, data cleaning was executed in order to eliminate possible duplications.

Based on the theoretical and empirical literature, the following hypotheses are tested.

H1: Culturally similar countries have more RTAs.

Lower trade barriers stimulate trade by reducing associated costs (Bacchetta et al., 2015). Countries sharing similar cultural values are expected to establish more RTAs as barriers to trade tend to be lower. This hypothesis is tested by using four different dummy variables. COMCOL indicates whether trading partners have had a common colonizer after 1945; COLONY shows whether trading partners have ever had a colonial link; CURCOL indicates whether partners are currently in a colonial relationship and SMCTRY shows whether trading partners were/are the same country. Data are coming from the CEPII database. A positive sign is expected for all variables vis-à-vis RTAs, as many previous gravity-based research have found positive connection (e.g.: C. Carrere & Masood, 2018).

H2: Common language fosters the establishment of RTAs.

It seems evident that a common language (in numerous gravity model, common language is also counted as a variable of cultural proximity) makes trade generally easier. This assumption is tested here by using the COMLANG dummy variable, suggesting whether the two countries share the same language or not. Data again is coming from the CEPII database and a positive relationship is expected, like for culturally similar countries (e.g.: MacDermott & Mornah, 2016).

H3: The number of RTAs will be greater the closer the countries are geographically.

The distance between trading partners is supposed to reflect transport costs with lower costs associated with lower distances between countries. The paper seeks to measure this phenomenon by two variables. First, DIST indicates the geographic distance between the reporter and the partner countries, calculated as a difference in their respective capital cities in kilometres. Second, CONTIG is a dummy variable indicating whether the two countries are contiguous (neighbours). The source of data is again the CEPII database. Previous research found that agreements have a positive impact on trade flows, however geographic distance significantly decreases their effect (e.g.: Freeman & Pienknagura, 2019). Therefore, a negative relationship is expected for DIST, while a positive for CONTIG.

H4: The more products with geographical indication a reporter country has, the higher the chance to establish an RTA.

Geographical indications have become an increasingly important issue for trade negotiations if the EU is involved. GI guarantees that an agri-food product is linked to the production area and this attribute highly contributes to the high quality level and the reputation of the product. It is assumed that the existence of a product protected by the system of the GIs fosters the establishment of RTAs, especially with the European Union. GI variable stands for the number of products with geographical indication a reporter country has in the register of the European Union that has also registered products from outside of Europe. The source of data here is the DOOR database of the European Commission, referring to its state until 30 June 2018. Following many other previous research, GI here refers only to agricultural products and foodstuffs, excluding wines and spirits, and also non-agricultural products. A positive relationship is expected not only in RTAs were the EU is involved but also for countries already in possession of an RTA with the EU. To the best of our knowledge no research before has investigated this determinant of RTAs.

Our cross-sectional dataset consists of 229 country pairs and the variables above, resulting in 50,197 observations. Data were accessed in October 2018. Table 1 provides an overview of the description of variables and related hypotheses.

Table 1

Description of independent variables

Variable	Variable description	Source	Expected sign
COMCOL	Dummy for two countries having a common colonizer after 1945	CEPII	+
COLONY	Dummy for two countries having ever had a colonial link	CEPII	+
CURCOL	Dummy for two countries currently in a colonial relationship	CEPII	+
SMCTRY	Dummy for two countries who were/are the same country	CEPII	+
COMLANG	Dummy for two countries sharing the same language	CEPII	+
CONTIG	Dummy variable indicating whether two countries are contiguous (neighbours, having common boarders)	CEPII	+
DIST	Difference between trading partners capital city measured in kilometres	CEPII	-
GI	Number of GI products the reporter country has	EC DOOR	+

Source: Own composition

Based on the literature, the following equation is estimated to our sample:

$$RTAij = \alpha + \beta 1COMCOLij + \beta 2COLONYij + \beta 3CURCOLij + \beta 4SMCTRYij + \beta 5COMLANGij + \beta 6CONTIGij + \beta 7DISTij + \beta 8\ GIi + \varepsilon ij \quad (1)$$

As the dependent variable is dummy in nature, Logit, Probit and Tobit estimations were applied to our sample.

4. EMPIRICAL RESULTS AND DISCUSSION

Our database contains all reporter and partner countries that ever had at least one regional trade agreement with each other until October 2018. Combining such data with GI and gravity variables, our database consists of 50,197 observations, out of which 4,077 country-pair observations having an RTA (Arp = 1), giving 8.12% of total observations.

Table 2 shows the summary statistics by whether or not a country-pair combination has an RTA. Gravity variables indicate that, on average, countries with RTA tend to have more colonial links; were/are the same countries; are more likely to be contiguous; have less distance and fewer numbers of GI products than those not having such agreements.

Table 2

Summary statistics: means and standard deviations

	Agreement	No agreement	Total*
Agreement Incidence	1 (0)	0 (0)	0.0841 (0.2775)
COMCOL	0.1114 (0.3146)	0.1179 (0.3225)	0.1174 (0.3219)
COLONY	0.0245 (0.1547)	0.0083 (0.0906)	0.0096 (0.0975)
CURCOL	0.0012 (0.0350)	0.0013 (0.0357)	0.0013 (0.0357)
SMCTRY	0.0343 (0.1821)	0.0057 (0.0752)	0.0080 (0.0891)
COMLANG	0.1719 (0.3774)	0.1689 (0.3746)	0.1691 (0.3749)
CONTIG	0.0552 (0.2284)	0.0086 (0.0921)	0.0124 (0.1104)
DIST	5822.4740 (4513.8350)	8714.3400 (4648.3020)	8749.4630 (4707.2870)
GI	5.7047 (31.0436)	6.3984 (31.6361)	6.3401 (31.5870)
Observations	4,077	46,120	50,197

* Refers to country-pairs with and without RTAs

Source: own composition based on WTO (2018) data.

Before running the predefined models, Pearson's correlation indices were calculated. As Table 3 suggests, correlations are generally low among the dependent variables, suggesting they well fit to our

empirical model. Variables are positively related in the majority of the cases, except for GIs, which are mainly negatively related to the variables analysed.

Table 3

Correlation among the dependent variables

	COMCOL	COLONY	CURCOL	SMCTRY	COMLANG	CONTIG	DIST	GI
COMCOL	1							
COLONY	-0.0359	1						
CURCOL	-0.0130	0.3629	1					
SMCTRY	0.1290	0.0324	0.0218	1				
COMLANG	0.3559	0.1158	0.0792	0.1008	1			
CONTIG	0.0405	0.0852	0.0061	0.2712	0.0814	1		
DIST	0.0061	-0.0422	-0.0121	-0.1365	-0.0090	-0.1756	1	
GI	-0.0714	0.1311	0.0427	-0.0105	-0.0534	0.0151	-0.0765	1

Source: own composition based on WTO (2018) data.

Estimation results are reported in Table 4. On the whole, it seems that Logit, Probit and Tobit models end up in very similar results with the same signs, though the explanatory power is probably the best for the Tobit model. All variables provide statistically significant results, mainly at 1% of significance.

Table 4

Determinants of RTAs

	Logit	Probit	Tobit
COMCOL	-0.1456** (0.0585)	-0.0826*** (0.0295)	-0.0088** (0.0040)
COLONY	0.9588*** (0.1305)	0.5409*** (0.0729)	0.1158*** (0.0134)
CURCOL	-1.1356** (0.4939)	-0.6409** (0.2548)	-0.1304*** (0.0359)
SMCTRY	0.7737*** (0.1189)	0.4828*** (0.0702)	0.1492*** (0.0141)
COMLANG	-0.1332*** (0.0488)	-0.0842*** (0.0249)	-0.0079** (0.0035)
CONTIG	0.8537*** (0.0941)	0.5363*** (0.0560)	0.1837*** (0.0114)
DIST	-0.0001*** (0.0000)	-0.0001*** (0.0000)	-0.0001*** (0.0000)
GI	-0.0027*** (0.0006)	-0.0015*** (0.0002)	-0.0002*** (0.0001)
CONSTANT	-1.4156*** (0.0335)	-0.9023*** (0.0174)	0.1535*** (0.0026)
Observations	50,197	50,197	50,197
Pseudo R^2	0.0626	0.0618	0.1673

Note: Significance levels: *10% **5% ***1%. Standard errors are clustered at the country-pair level.
Source: own composition.

Going into detail, proxies for cultural variables seem to end up in contradictory results. On the one hand, COMCOL and CURCOL are significantly and negatively related to RTAs, suggesting that countries having a common colonizer after 1945 and/or currently in a colonial relationship have less RTAs compared to those without colonial links. This is against previous expectations and seems interesting as colonial links have played a very important role in forming bilateral trade agreements in the past. Note, however, that these variables measure 'modern colonization' without previous historical linkages. This result is in line with some literature stating that colonial trade linkages erodes after independence, also suggesting depreciation of some form of trading capital (Head, Mayer, & Ries, 2010).

One the other hand, COLONY and SMCTRY are positively and significantly related to RTAs, suggesting that countries having a colonial link before 1945 or those were/are part of the same country tend to create more RTAs. Contrary to the previous colonial variables, this implies that long-term historical relationships somehow create embedded cultural structures, ending up in closer trade relations. Therefore, on the basis of colonial variables as a whole, Hypothesis 1 should be rejected.

As to the second hypothesis, COMLANG is significantly and negatively related to RTAs in all three models, implying that countries speaking different languages tend to create more RTAs than those speaking the same language. This is also against initial expectations as the role of language had been thought to ease trade barriers. A possible explanation to this phenomenon is that regional trade agreements consists of various bilateral agreements between a number of different trading partners, therefore the higher the number of these agreements, the higher the chance that we are faced with countries speaking different languages. One might think about relatively small regions geographically with a relatively large number of countries like in the case of Central and Eastern Europe. In terms of hypothesis testing, Hypothesis 2 should also be rejected.

The relationship between distance and RTAs are rather obvious, though. Distance measured by DIST is negatively and significantly related to RTAs, suggesting that the higher the distance geographically, the lower the chance is for a regional trade agreement. Distance proxied by CONTIG suggests a positive relationship, implying that if countries are contiguous, the chance is higher for creating RTAs than for countries further away from each other. All in all, these results have been expected and are in line with the majority of the trade literature. Therefore, Hypothesis 3 can not be rejected.

Last but not least, the role of geographical indications was found to be significantly negative in the formulation of regional trade agreements, suggesting that the number of GIs do not seem to count in creating a regional trade agreement. More precisely, the more GI products a country has in the European register, the less RTAs it is willing to create. This result could be interpreted from two viewpoints. First, even though Europe is the most active in creating new RTAs (see Figure 2), the issue of the GIs is important only for the EU but not for the rest of the world. Second, if a trade agreement involves only extra European parties, the matter of GIs doesn't really exist and therefore doesn't act as an obstacle during the negotiations. Altogether, Hypothesis 4 should also be rejected, the existence of EU-style GIs rather work as a barrier for creating new RTAs.

If models above are run by continent, a somewhat different picture appears (Table 5). First of all, not all variables are significant this time, reflecting that the general model has regional specificities. Moreover, the GI variable is omitted for Africa and the Pacific as they do not have any of such products in the EU register at the moment. Second, the explanatory power for Asia and Europe has largely increased, most probably due to the fact that these two regions have the most regional trade agreements globally as also evident from Figure 2.

Third, COMCOL became significantly and positively related to RTAs in Asia, suggesting that countries having a common colonizer after the WWII tend to establish more RTAs compared to those countries

without a common colonizer. The reason for this might come from post-1945 history, just like for Europe where CURCOL became positive (though not significant).

Fourth, the explanatory powers for COLONY and CURCOL has significantly increased in Africa and America, compared to the global model, implying that colonial links related to these continents were probably the greatest throughout history. This argument is also underpinned by the relatively large explanatory power of SMCTRY for Africa.

Fifth, changes compared to the global model are also reflected regarding languages. COMLANG became positive, though less significant, for Africa and the Pacific, suggesting that countries here speaking the same language, also originating from history, tend to establish more RTAs than countries speaking different languages.

Distance related variables do not show a different picture by continent except for the Pacific where CONTIG turned out to be positive (but not significant). This can be partly explained by the geographical situation of these countries (neighbours are interpreted differently in ocean-based areas).

Finally, GI became positive for America and Asia, suggesting the higher the number of products with geographical indication, the higher the chance of the establishment of an RTA. This is probably true because both regions have intensive relationships with the EU where the number of GI products are the highest all over the world. Also, in some Asian (e.g. in India) and American (e.g. in the Andean Community) countries, the concept of GIs is very similar to the EU approach, namely having a sui generis system. This could also explain why it is easier to establish an RTA including EU for the GIs.

Table 5

Determinants of RTAs by continent

Variable	Africa	America	Asia	Europe	Pacific
COMCOL	-0.0118 (0.0072)	-0.0284*** (0.0101)	0.0143** (0.0072)	-0.0079 (0.0168)	-0.0062 (0.0071)
COLONY	0.2338*** (0.0331)	0.4529*** (0.0479)	0.1130*** (0.0304)	0.0172 (0.0202)	0.1271*** (0.0293)
CURCOL	-0.4142*** (0.1364)	-0.5525*** (0.0898)	n.a.	0.0313 (0.0538)	-0.0912* (0.0539)
SMCTRY	0.2141*** (0.0279)	0.1387*** (0.0334)	0.1392*** (0.0416)	0.1197 (0.0352)	0.1332*** (0.0198)
COMLANG	0.0003 (0.0064)	-0.0225*** (0.0082)	-0.0089 (0.0079)	-0.0234* (0.0130)	0.0095* (0.0054)
CONTIG	0.1619*** (0.0199)	0.2431*** (0.0379)	0.1658*** (0.0203)	0.1761*** (0.0235)	-0.0876 (0.1749)
DIST	-0.0001*** (0.0001)	-0.0001*** (0.0001)	-0.0001*** (0.0001)	-0.0002*** (0.0001)	-0.0001*** (0.0001)
GI	n.a.	0.1270*** (0.0152)	0.0066*** (0.0015)	-0.0001*** (0.0004)	n.a.
CONSTANT	0.1380*** (0.0052)	0.1450*** (0.0074)	0.1185*** (0.0052)	0.2317*** (0.0054)	0.1207*** (0.0074)
Observations	12,544	11,201	11,219	9,632	5,601
Pseudo R^2	0.1983	0.0492	0.4287	0.4241	0.1006

Note: Significance levels: *10% **5% ***1%. Standard errors are clustered at the country-pair level. These results were obtained by the Tobit model.
Source: own composition.

On the whole, the rejection of Hypothesis 1, 2 and 4 are also valid for the Tobit model run by continent – in this regard, the overall picture does not change.

5. CONCLUSION

This paper aimed to analyse the determinants of regional trade agreements by using gravity variables on a global sample. In doing so, we have obtained a number of results. First, it turned out that the number of regional trade agreements has continuously been increasing during the past two decades with also changing the nature and content of associated agreements. Second, results suggest that colonial variables are ambiguously related to RTAs, thereby making it hard to exactly define the role of colonial relations in the formulation of RTAs. It seems, however, the relatively long historical relationships matter in this regard, while short term relationships do not seem to play a role.

Third, language was found to be negatively related to the creation of RTAs, meaning that countries speaking different languages tend to create more RTAs, which is somehow against initial expectations. Fourth, the relationship between distance and RTAs was found to be relatively straightforward: in line with previous literature, higher distance suggest less regional trade relations. Last but not least, geographical indication does not seem to play a major role in creating regional trade agreements, especially when the EU is not involved to the RTA. This also indicates that the issue of GIs has high priority only for the EU, but on the other hand, in the era of the Global Europe FTAs, it seems that there is no EU agreement without a GI arrangement. These results generally hold regionally, though specificities of different continents contributes to a better understanding of the determinants of RTAs in different parts of the world.

Our results might help to better understand the role of different gravity variables played in the formulation of regional trade agreements. Future research might focus on analysing a specific agreement by using similar variables or even an extended list of indices. One might also be interested in putting dynamics into our story by identifying changing gravity determinants by time.

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REFERENCES

Acharya, R. (2016). *Regional trade agreements and the multilateral trading system*: Cambridge University Press.

Anderson, J. E., & Yotov, Y. V. (2016). Terms of trade and global efficiency effects of free trade agreements, 1990–2002. *Journal of International Economics, 99*, 279-298.

Antweiler, W., Copeland, B. R., & Taylor, M. S. (2001). Is free trade good for the environment? *American Economic Review, 91*(4), 877-908.

Bacchetta, M., Beverelli, C., Cadot, O., Fugazza, M., Grether, J.-M., Helble, M., . . . Piermartini, R. (2015). A Practical Guide to Trade Policy Analysis. World Trade Organization, 2012, 232 p.

Baier, S. L., & Bergstrand, J. H. (2004). Economic determinants of free trade agreements. *Journal of International Economics, 64*(1), 29-63. doi:10.1016/s0022-1996(03)00079-5

Baier, S. L., & Bergstrand, J. H. (2007). Do free trade agreements actually increase members' international trade? *Journal of International Economics, 71*(1), 72-95.

Baldwin, R., & Jaimovich, D. (2012). Are Free Trade Agreements contagious? *Journal of International Economics, 88*(1), 1-16. doi:10.1016/j.jinteco.2012.03.009

Balogh, J. M., & Jámbor, A. (2017). Determinants of revealed comparative advantages: The case of cheese trade in the European Union. *Acta Alimentaria, 46*(3), 305-311.

Carrere, C. (2006). Revisiting the effects of regional trade agreements on trade flows with proper specification of the gravity model. *European Economic Review, 50*(2), 223-247.

Carrere, C., & Masood, M. (2018). Cultural proximity: A source of trade flow resilience? *World Economy, 41*(7), 1812-1832. doi:10.1111/twec.12646

Dai, M., Yotov, Y. V., & Zylkin, T. (2014). On the trade-diversion effects of free trade agreements. *Economics Letters, 122*(2), 321-325.

Engelhardt, T. (2015). Geographical Indications Under Recent EU Trade Agreements. *Iic-International Review of Intellectual Property and Competition Law, 46*(7), 781-818. doi:10.1007/s40319-015-0391-3

Fernandez, R., & Portes, J. (1998). Returns to regionalism: An analysis of nontraditional gains from regional trade agreements. *The World Bank Economic Review, 12*(2), 197-220.

Fiorentino, R. V., Verdeja, L., & Toqueboeuf, C. (2007). *The changing landscape of regional trade agreements: 2006 update*: WTO discussion paper.

Frankel, J. A., & Rose, A. K. (2005). Is trade good or bad for the environment? Sorting out the causality. *Review of economics and statistics, 87*(1), 85-91.

Freeman, R., & Pienknagura, S. (2019). Are all trade agreements equal? The role of distance in shaping the effect of economic integration agreements on trade flows. *Review of World Economics, 155*(2), 257-285. doi:10.1007/s10290-018-0327-3

Head, K., Mayer, T., & Ries, J. (2010). The erosion of colonial trade linkages after independence. *Journal of International Economics, 81*(1), 1-14.

Hur, J., & Park, C. (2012). Do free trade agreements increase economic growth of the member countries? *World development, 40*(7), 1283-1294.

Leufkens, D. (2017). EU's regulation of geographical indications and their effects on trade flows. *German Journal of Agricultural Economics, 66*(4), 223-233.

MacDermott, R. J., & Mornah, D. (2016). The Effects of Cultural Differences on Bilateral Trade Patterns. *Global Economy Journal, 16*(4), 637-668. doi:10.1515/gej-2015-0062

Mancini, M. C., Arfini, F., Veneziani, M., & Thevenod-Mottet, E. (2017). Geographical Indications and Transatlantic Trade Negotiations: Different US and EU Perspectives. *Eurochoices, 16*(2), 34-40. doi:10.1111/1746-692x.12131

McAusland, C., & Millimet, D. L. (2013). Do national borders matter? Intranational trade, international trade, and the environment. *Journal of Environmental Economics and Management, 65*(3), 411-437.

Missios, P., Saggi, K., & Yildiz, H. M. (2016). External trade diversion, exclusion incentives and the nature of preferential trade agreements. *Journal of International Economics, 99*, 105-119.

Moir, H. V. J. (2017). Understanding EU trade policy on geographical indications. *Journal of World Trade, 51*(6), 1021-1042.

Raimondi, V., Falco, C., Curzi, D., & Olper, A. (2018). *The Trade Effects of the European Union Geographical Indications Policy*. Retrieved from

Robinson, S., & Thierfelder, K. (2019). Global adjustment to US disengagement from the world trading system. *Journal of Policy Modeling, 41*(3), 522-536. doi:10.1016/j.jpolmod.2019.03.019

Török, Á., & Jámbor, A. (2016). Determinants of the revealed comparative advantages: The case of the European ham trade. *Agricultural Economics/Zemedelska Ekonomika, 62*(10).

Vamvakidis, A. (1999). Regional trade agreements or broad liberalization: which path leads to faster growth? *IMF Staff papers, 46*(1), 42-68.

Viju, C., Yeung, M. T., & Kerr, W. A. (2013). Geographical Indications, Conflicted Preferential Agreements, and Market Access. *Journal of International Economic Law, 16*(2), 409-437. doi:10.1093/jiel/jgt012

Wattanapruttipaisan, T. (2009). Trademarks and Geographical Indications: Policy Issues and Options in Trade Negotiations and Implementation. *Asian Development Review, 26*(1), 166-205.

WTO. (2018a). Retrieved from http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx

WTO. (2018b). *World Trade Statistical Review 2018*. Retrieved from https://www.wto.org/english/res_e/statis_e/wts2018_e/wts18_toc_e.htm

Yang, S., & Martinez-Zarzoso, I. (2014). A panel data analysis of trade creation and trade diversion effects: The case of ASEAN–China Free Trade Area. *China Economic Review, 29*, 138-151.