Colonial Trade Spillovers

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Preliminary Version

Abstract

Did colonial trade linkages contribute to shape the geographical pattern of trade of former British and French colonies with the rest of the world? A recent literature has emphasized the relevance of international trade networks to analyze the dynamics of trade, and how these trade networks are structured by geography. Using bilateral exports data for a large number of countries, our paper provides evidence confirming that colonial trade linkages have generated colonial trade spillovers with destinations being geographically proximate, or having more trade with the former colonizer. We then explore the transmission channels by exploiting the information about bilateral exports at the product-level, and also the timing of export activity. We find empirical evidence consistent with mechanisms of learning/matching on the former colonizer's market. We also identify a complementarity between former colonizer's exports to former colonies, and the exports of similar goods by geographically proximate countries to the same destination.

JEL classification: F12, F15

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1 Introduction

Former colonies trade more with their former colonizer than with other countries, controlling for other gravity forces and multilateral resistance terms. A number of works estimating a gravity equation have indeed shown that the "colony" dummy variable is usually estimated with a positive coefficient, although this coefficient has declined over time Head *et al.* (2010).[1]

In this paper, we investigate whether colonial trade linkages contributed to shape the geographical pattern of trade of British and French former colonies with the rest of the world. In doing this, we are particularly interested in a network of countries depicted by Figure 1 below. The colonial trade linkage is already well identified in the literature. Our objective is to determine whether the existence of a colonial trade linkage can trigger exports to (and imports from) certain countries which are linked to the former colonizer, i.e. a *colonial trade spillover*. Our results show that indeed, countries being geographically proximate to the former colonizer, and having more trade with the former colonizer, tend to have also more trade (both imports and exports) with the former colonies of that country than other countries.

Figure 1: Colonial trade linkage and spillover
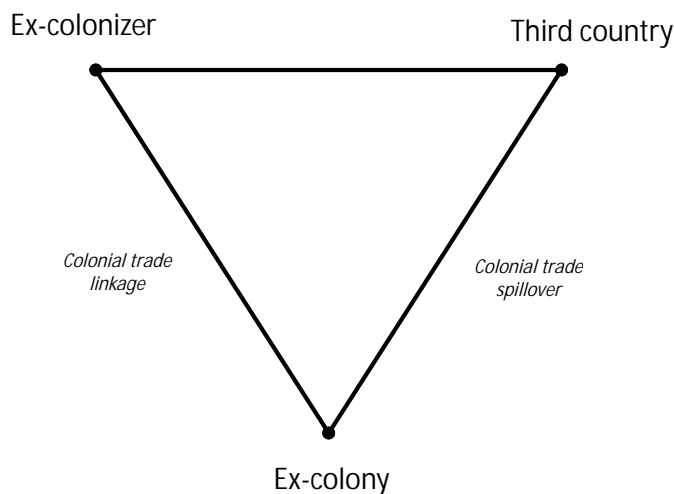
The recent literature in trade, networks, and global value chains, has provided theoretical arguments that can generate this type of spillover. First, exporting to (or importing from) the

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[1]See also the work by Mitchener and Weidenmier (2008) about trade linkages within colonial empires. de Sousa and Lochard (2012) investigate the colonial legacy in terms of export performance of developing countries. More generally, a large number of works use the colonial relationship dummy as a control in gravity equation estimations, and find a robust positive and highly significant colonial trade linkage.

former colonizer could generate business opportunities with individuals located in different countries through *learning* or *matching*. The recent literature on trade dynamics has indeed shown that exporting to a given market can trigger a geographical spread of exports, as firms learn about the profitability of their products through export (Albornoz *et al.*, 2012) or meet new contacts in a first market that generate new business opportunities in subsequent ones through "remote search" (Chaney, 2011). In Chaney (2011) in particular, a firm is more likely to expand in new markets which are geographically proximate from - or trade more with - the first market. Morales *et al.* (2011) develop a model that generates a spatial dependence in export entry and exit due to the extended gravity effects, related to the similarity between foreign countries and third markets. Evidence of a "geographical spread" of exports is also provided by Evenett and Venables (2002) using aggregate data. This channel may have helped former colonies to expand towards markets being highly connected to the former colonizer. Countries exporting to the former colonizer may also find opportunities to export to the former colonies through this channel, if this helps to meet there new contacts.

A second channel is related to the existence of input-output linkages across countries, which implies a *complementarity* between the exports of the former colonizer and third country exports to a specific destination. In particular, imports of inputs by former colonies from the former colonizer may trigger imports from different countries that enter the same value chain, and produce inputs that are complementary. For instance, there is anecdotal evidence that Renault car factories in Marocco use inputs from Renault factories, or suppliers, mainly located all over Europe.[2] The literature on networks has provided theoretical and empirical evidence of the relevance of input-output linkages for the propagation of shocks and the explanation of aggregate economic volatility (Bergin *et al.*, 2009; Acemoglu *et al.*, 2012), or business cycle co-movement across countries (di Giovanni and Levchenko, 2010; Johnson, 2012). [3] Different papers have also shown that intermediates trade is more important for geographically proximate countries due to lower trade costs (Johnson and

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[2]For instance, the new Renault factory in Tanger import inputs from Romania, Turkey and Spain, according to the director of Renault's new factory in Morocco. See the interview in "Jeune Afrique": http://www.jeuneafrique.com/Article/JA2667p064.xml0/ france-maroc-mohammed-vi-interviewtunc-basegmez-renault-tanger-a-donne-du-travail-a-la-france. html. In Spain, Renault is producing motor engines (Valladolid), gearbox and transmission (Sevilla and Cacia) that can be used as inputs for the production of cars in Morocco. See the Renault annual report 2011. Besides, Valeo, one of the suppliers of Renault cars, is mainly located in Europe.

[3]Acemoglu *et al.* (2012) show that in the presence of inter-sector connections (due for instance to the existence of input-output linkages across sectors), microeconomic shocks affecting one sector do not average out in the economy. Microeconomic volatility propagates to other sectors and tends to magnify the initial shock. Moreover, input-output linkages also tend to propagate shocks across countries. Bergin *et al.* (2009) for instance show that US manufacturing industries tend to transmit volatility in the Mexican Maquiladoras due to input-output linkages. A series of papers di Giovanni and Levchenko (2010); Johnson (2012) emphasize that vertical linkages through input-output supply relationships tends to increase business cycle co-movement across countries.

Noguera, 2012a,b).[4] Imports by former colonies from the foreign colonizer may therefore trigger imports from proximate countries that produce complementary goods.

The first objective of the paper is to provide empirical evidence of the existence of colonial trade spillovers. We explore in particular whether 15 countries that belong to the European Union (EU) before enlargement in 2004 have more trade with former British and French former colonies than other countries, controlling for multilateral resistance terms and additional variables affecting bilateral trade costs and preferences such as the geographical distance and common language. The choice of the 15 EU countries before enlargement is driven by their geographical proximity and their high degree of economic integration with former colonizers, which is predicted to foster the geographical spillovers of colonial trade linkages.

The empirical strategy relies on the estimation of a gravity equation on bilateral exports for about 200 country pairs, for the period 1995-2007 (i.e. before the crisis), using the BACI trade data.[5] The estimation controls for importer and exporter multilateral resistance terms using a new procedure to control for high-dimensional fixed effects introduced by Guimaraes and Portugal (2010), and discussed by Head and Mayer (2013). What remains to be explained is therefore country-pair characteristics that influence trade. We have mainly two variables of interest: first, a dummy variable that controls for colonial trade linkages. Second, a dummy variable that controls for colonial trade spillover with EU15 countries. This variable therefore identifies whether (or not) EU countries have a higher propensity to trade with former British and French colonies, relative to other (non-colonizer) countries.

The empirical estimation of this gravity model provides strong evidence of the existence of colonial trade spillovers. Controlling for a large variety of factors that influence bilateral trade (geography, trade and monetary policy, legal system, cultural and religious proximity, migrations etc.) and for multilateral resistance terms, the estimation confirms that EU15 countries have more trade with former British and French colonies than other countries. Our point estimates indicate that former British and French colonies trade 40% more with EU countries than with different countries.

We complete this first result with additional estimations that explore more in details how colonial trade spillovers are affecting the geography of trade of former colonies. Colonial trade spillovers are

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[4]The role of intermediates trade in business-cycle co-movement is also more likely to affect geographically proximate countries due to lower trade costs. Johnson and Noguera (2012a) and Johnson and Noguera (2012b) build a dataset of trade in value added based on a global bilateral input-output table. They show in particular that the value-added to gross exports ratio is lower among partners within geographic regions rather than across regions, suggesting that trade in intermediates is mostly locally organized.

[5]http://www.cepii.fr/CEPII/fr/bdd_modele/presentation.asp?id=1

shown to affect both exports and imports of former colonies. We show that the spillover concentrates on the extensive margin of trade (number of products traded) rather than on the intensive margin (mean exports per product). Importantly, colonial trade spillovers tend to decline over time, as it is the case for the colonial trade linkage in Head *et al.* (2010). Finally, we take a more general approach and consider trade intensity between the former colonizer and third countries, or the geographical distance between them, to identify the colonial trade spillover. We can therefore identify whether colonial trade spillovers are more important with countries that trade more with, or are more proximate from, the former colonizer. Our results indicate that countries having more trade with the United Kingdom and France in proportion of their GDP, or being less distant from them, have also more trade with British and French colonies. These results confirm that the colonial trade linkages contributed to shape the geographical trade pattern of former colonies with third countries: British and French colonies do trade more with countries being geographically proximate and trading more with the former colonizer.

In the final section of the paper, we provide evidence that both the *learning/matching* channel and the *complementarity* channel discussed above contribute to explain the existence of a colonial trade spillover. Our analysis relies on Harmonized System (HS) 4-digits product-level trade data that are used to identify the probability of exports within a country pair and for a specific product.

We firstly explore whether exporting a product to the former colonizer increases the probability of exporting the same product to third destinations: (1) to countries that are geographically proximate from the former colonizer, when the exporter is a former colony, or (2) to former colonies when the exporter is a OECD economy. Secondly, we investigate whether the probability of OECD countries exports to former colonies increases when the former colonizer is exporting a similar category of product (HS4) to the same destination.

The estimation confirms that the probability of exports from the former colony to OECD countries increases when the same product was previously exported to the former colonizer. The effect is more important for EU destinations, or countries that are less distant from the former colonizer. We then confirm that the probability of OECD exports to former colonies is increased when the exporter previously shipped the same product to the former colonizer. Finally, the probability of exports of an OECD country to a former colony is increased when the former colonizer exported previously the same category of product to the same destination. The effect is increased when the exporter is an EU country, or is a country less distant from the former colonizer.

This paper contributes to the literature that emphasizes the role of learning to explain the dynamics of trade patterns. At the firm-level, there is empirical evidence that new exporters

tend to start small and then grow fast conditional on survival into foreign markets (Eaton *et al.*, 2008; Freund and Pierola, 2010), consistent with the idea that firms have imperfect information about their profitability before they start exporting to a given market.[6] Uncertainty about future profitability in export markets is a key ingredient in recent models that explain the geographical path of exports expansion. Models presented in Albornoz *et al.* (2012) or Nguyen (2012) assume that profitability is imperfectly correlated across markets, which tends to generate a sequential entry into different destinations, conditional on survival. Using firm-level data for Argentina, Albornoz *et al.* (2012) provide empirical evidence supporting this mechanism. Defever *et al.* (2011) use the end of multi-fibre agreements to predict Chinese firms' entry into EU, US and Canadian markets. They show that after entry, Chinese firms tend to expand towards markets that were geographically and culturally proximate from previous destinations. Morales *et al.* (2011) use a moments inequalities approach to predict the path of exports expansion of firms into foreign markets. Their empirical model emphasizes the role played by *gravity* and *"extended" gravity* forces, the latter depending on the similarity between the destination, and countries where the firm exported previously.

Trade models that feature a matching process between supplier and buyer also bring important predictions regarding the formation of trade networks and the dynamics of trade. In particular, Rauch and Watson (2003) develop a model of relationship-buiding between developed countries' buyers and developing countries' suppliers, which incorporates search frictions, sunk investment in training, and uncertainty about the capacity of suppliers to respond successfully to large orders. Their model establishes conditions where buyers may want to start small or place large orders, and also conditions for switching to new suppliers. More recently, Eaton *et al.* (2010), Araujo *et al.* (2012) or Aeberhardt *et al.* (2012) have developed models that feature a matching process through which firms can learn about the appeal of their products in a market, or a risk of default from the buyer.

Although our empirical investigation does not use firm-level trade data, but rather country-pair exports data at the aggregate or product-level, our results are consistent with the existence of a learning/matching process, where exporters (located in former colonies or in third countries) learn about the appeal of their products when they export to the former colonizer's market, or meet new buyers there. It also completes the work by Carrère and Srauss-Kahn (2012) showing that previous export experience by developing countries into non-OECD markets, for a given product, raises export survival in OECD markets. We show a similar mechanism in relation to the colonial

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[6]Berthou and Vicard (2013) provide empirical evidence that part of this result is related to an aggregation bias in the first year of exports. They find that growth in foreign markets is related to export experience, only when the estimation controls for the average size of exporters.

trade linkage.

Importantly, we bring new evidence of a complementarity of exports among highly integrated countries. Indeed, our results show that part of the colonial trade spillover can be explained by a complementarity between the products exported by the former colonizer, and those exported by geographically proximate countries. This result is consistent with a locally fragmented value chain, as emphasized by Johnson and Noguera (2012b).

The paper is organized as follows. Section 2 presents the empirical methodology and the data used in our estimations. Evidence of a colonial trade spillover is presented in Section 3. In Section 4, we use the product detail of the bilateral exports data and provide evidence consistent with the learning/matching channel, and also evidence of a complementarity between the products exported by the former colonizer, and the products exported by geographically proximate countries to the former colonies.

2 Empirical Methodology

2.1 The empirical model

Previous papers quantifying the colonial trade linkage have relied on the estimation of a gravity equation, correcting for the multilateral trade resistance terms as emphasized by Anderson and van Wincoop (2003). We follow this literature and introduce additional terms that account for the potential linkages between former colonies of British and French colonial empires and EU countries. Our working hypothesis is that colonial trade spillovers should benefit more to EU countries than to other countries, given their high degree of integration and their geographical proximity with the former colonizers. We estimate Equation 1 below, which is a gravity equation that figures a variable identifying colonial trade spillovers between former colonies of colonizer Z={UK, FR} and EU15 countries.

$$lnX_{ijt} = \beta_0 + \sum_{Z=FR,UK} \beta_{1Z}Spillover(EU, ColZ)_{ij} + \sum_{Z=FR,UK} \beta_{2Z}ColLink(Z)_{ij}$$
$$+ \mathbf{C}_{ijt}\Omega' + \kappa_{it} + \kappa_{jt} + \epsilon_{ijt} \tag{1}$$

X_{ijt} is the bilateral exports of country i to country j in year t. Our main variables of interest are $Spillover(EU, colZ)_{ij}$ and $ColLink(Z)_{ij}$.

Regarding colonial trade linkages, the two dummy variables $ColLink(UK)_{ij}$ and $ColLink(FR)_{ij}$

take the value 1 for bilateral relationship between respectively the United Kingdom and its former colonies, and France and its former colonies. They take the value zero otherwise. The former colonies are those countries that have had a colonial relationship after 1945. The list of the former British and French colonies is presented in Appendix 1. Following Head $et\ al.$ (2010), we focus in the paper on the two main colonial empires, the British and French ones but we will verify as a robustness check whether the colonial trade spillovers also hold for the former colonies of the other colonial empires.

To assess the transmission of colonial trade linkages to third countries, and especially to EU countries, we construct two dummy variables. First, the variable $Spillover(EU, colUK)_{ij}$ takes the value 1 when the country-pair is constituted of an EU country, except United Kingdom, and a former British colony. Second, the variable $Spillover(EU, colFR)_{ij}$ is similarly built but for former French colonies instead of British ones. These two variables allow us to identify whether (or not) EU countries have a higher propensity to trade with former British and French colonies, relative to other (non-colonizer) countries. We consider the 15 countries that were, in 1995, members of the EU, namely Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Portugal, Spain, United Kingdom and the Netherlands. The choice of the 15 EU countries before the 2004 enlargement is driven by their geographical proximity and their high degree of economic integration with former colonizers, which is predicted to foster the geographical spillovers of colonial trade linkages.

C_{ijt} is a vector of bilateral trade costs that comprise the following bilateral-specific variables. $Distance$ measures the geographical distance between i and j, the variable GDP gap between the two countries is a proxy for the similarity of tastes and preferences and the continuous 0-1 variable $Religious\ Proximity$ captures the common religion between the two countries. The stock of migrants from country i living in country j ($Migrants\_ij$) and those migrants from j living in i ($Migrants\_ji$) are also included. [7] A set of binary variables indicating that the two countries share a land border ($Contiguity$), share common currencies ($Common\ Currency$), speak a common language ($Common\ Language$), have a common legal system ($Common\ LegalSystem$), have a regional trade agreement (RTA), have a common ex-colonizer ($Common\ Colonizer$) and have been in a colonial relationship since 1945, except the French and British colonial empire that we treat separately, ($ColLink(Other)$), are also included.

κ_{it} and κ_{jt} are time-varying exporter and importer specific effects that account for the multi-

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[7]Migrants have been found to foster international trade as they facilitate the transmission of information and diffuse their preferences (see Rauch and Trindade (2002) or Ehrhart $et\ al.$ (2012) among others).

lateral price resistance terms and the economic size of each country. To reduce the computational problem linked with an exceedingly large number of dummy variables, we rely on the reg2hdfe Stata command, developed by Guimaraes and Portugal (2010), which demeans in one dimension and use dummies only in the other dimension. This iterative method is discussed by Head and Mayer (2013) which find that it yields identical estimates to Least Square Dummy Variable estimator. ϵ_{ijt} is the error term.

2.2 Data

The regression uses annual data from 1995 to 2007 for all pairs of countries in the world. The trade data comes from BACI, a database developed by the CEPII which provides bilateral values of exports at the HS 6-digit product disaggregation since 1995. It is constructed using COMTRADE data and an original procedure that reconciles the declarations of the exporter and the importer to extend considerably the number of countries for which trade data are available (Gaulier and Zignago, 2010). To avoid the great trade collapse episode beginning in 2008, the last year of the analysis is 2007.

Data on GDP and trade costs are from the CEPII gravity dataset. We augment their regional trade agreement variable with three important agreements that shape the trade relationships between North and South countries. First, the Everything but Arms agreement, that entered into force in 2001, grants a duty-free access to imports of the EU of all products from less developed countries, except arms and ammunitions, without any quantitative restrictions. Second, the Cotonou Agreement entered into force in 2003 and is a partnership agreement between the EU countries and 79 countries from Africa, the Caribbean and the Pacific (ACP) based on trade cooperation. Last, the African Growth and Opportunity Act aims at increasing the bilateral trade between the USA and the eligible Sub-Saharan African countries.

For measures of religious proximity, common native language, common spoken language and common official language we rely on the variables constructed by Melitz and Toubal (2012). Data on the bilateral stock of migrants have been obtained from the World Bank Global Bilateral Migration Database. These data are only available every ten years, in 1990, 2000 and 2010, thus to match our annual data we made the assumption that the stock of migrants recorded in a country in a year t remains constant over the period going from $t-4$ to $t+5$.

3 Colonial trade spillovers

3.1 Colonial trade spillovers among European countries

Baseline results

In this section, we will assess the existence of colonial trade geographical spillovers to EU countries. The results of the estimation of Equation 1 are presented in Table 1. The first column shows the regression of exports on the colonial trade linkages and various gravity characteristics, without our main variable of interest measuring colonial trade spillovers. As established in the literature, we see that former colonies have a preferential trade relationship with their former colonizer. The coefficients associated with the two variables $ColLink(UK)$ and $ColLink(FR)$ are positive and significant at the 1% level. For former British colonies, for instance, the point estimates indicate that they trade about 170% more with the UK than a simple gravity model would predict, which is in line with the order of magnitude found by Head *et al.* (2010). In the second column, we introduce our variable of interest capturing the colonial trade spillovers i. e. specific trade relationships between former colonies and EU countries beyond traditional gravity factors. The estimated coefficient on the $Spillover(EU, colFR)$ and $Spillover(EU, colUK)$ dummy variables are positive and significant, which implies that EU countries have more trade with British and French colonies than the rest of the world, controlling for other gravity forces.

All of the gravity variables have the expected signs. The geographical distance and the GDP gap between two trading partners lowers international trade whereas having a regional trade agreement, sharing a common ex-colonizer, a common language (both official and ethnic), a common currency, a common legal system and a common border increase the volume of exports between two countries.

In the subsequent columns, we progressively add several variables that could explain the importance of bilateral trade between former colonies and European Union countries. First, in column 3, we use the three indicators of common official language, common spoken language, common native language developed by Melitz and Toubal (2012) who show that the impact on trade of linguistic factors all together is larger than the traditional common official language dummy. The positive sign on the coefficient of the colonial trade spillovers variables remain significant. Then, adding the religious proximity (column 4) or the stock of migrants (column 5) the coefficient capturing the transmission of colonial trade linkages to EU countries remains positive and significant at the 1% level.

Thus, after controlling for numerous determinants of bilateral trade and for both importers and

exporters multilateral trade resistance through time-varying country fixed effects, we find that the former French and British colonies still trade significantly more with countries that are close to their former colonizer, namely the European Union countries, than with other countries. Taking the exponent, the point estimate indicates that former colonies trade 40% more with EU15 countries than with other countries. It appears that the colonial trade spillovers are slightly higher for former British colonies than for former French colonies but are not significantly different.

Exports versus Imports

The trade network formed by the three groups of countries (former colonizer, former colony, and third countries) depicted in Figure 1 in introduction implies that the colonial trade spillover could involve both exports from third countries to the former colonies, or imports by these countries. We therefore complete our investigation with additional estimations indicating whether colonial trade spillovers are mainly reflected in EU countries exports to the former colonies ($Spillover - X(UE, colZ)$) or by their imports from these countries ($Spillover - M(UE, colZ)$). For British and French colonies, we therefore have a set of four dummy variables. The estimation results reported in Table 2 indicate that the colonial trade spillover can be observed for both the imports and exports of EU countries with British and French former colonies. In the Section 4 of the paper, we will test more systematically for the different mechanisms that may drive this empirical pattern. Other variables have the expected sign as in Table 1

Extensive versus intensive margin

Are colonial trade spillovers associated with a larger number of products traded by countries, or by a larger value of individual trade flows? To answer this question, we used the details of the data provided in the BACI dataset. BACI reports initially individual trade flows for HS 6-digits product categories. Using this information, the exports of country i to country j in year t (X_{ijt}) can be decomposed into an extensive margin corresponding to the number of products exported (E_{ijt}), and an intensive margin corresponding to the average value exported per product (I_{ijt}). More formally, the following identity holds: $\ln(X_{ijt}) = \ln(E_{ijt}) + \ln(I_{ijt})$. Importantly, since the total exports value between the two countries can be expressed as a linear combination of the extensive and the intensive margins, the two coefficients on the extensive and intensive margin in the estimation add-up and determine the total effect for aggregate exports.

Estimation results are provided in Table 3. These results show that most of the effect of the colonial trade spillover is related to the extensive margin. In the case of French former colonies, about

Table 1: Colonial trade spillovers to European Union countries

VARIABLES	(1) $\ln(Exports_{ijt})$	(2) $\ln(Exports_{ijt})$	(3) $\ln(Exports_{ijt})$	(4) $\ln(Exports_{ijt})$	(5) $\ln(Exports_{ijt})$
Spillover(EU,colFR)		0.374***	0.392***	0.448***	0.334***
		(0.026)	(0.026)	(0.026)	(0.029)
Spillover(EU, colUK)		0.460***	0.427***	0.500***	0.417***
		(0.020)	(0.020)	(0.020)	(0.022)
ColLink(FR)	1.399***	1.574***	1.621***	1.695***	1.409***
	(0.082)	(0.082)	(0.083)	(0.082)	(0.074)
ColLink(UK)	1.060***	1.190***	1.235***	1.226***	0.846***
	(0.065)	(0.065)	(0.065)	(0.065)	(0.061)
ColLink(Other)	2.178***	2.199***	2.007***	2.114***	1.155***
	(0.067)	(0.067)	(0.071)	(0.071)	(0.065)
Common colonizer	0.684***	0.764***	0.826***	0.782***	0.490***
	(0.018)	(0.018)	(0.018)	(0.018)	(0.024)
FTA	0.441***	0.436***	0.449***	0.475***	0.270***
	(0.015)	(0.015)	(0.016)	(0.016)	(0.017)
Distance (log)	-1.458***	-1.474***	-1.444***	-1.454***	-1.061***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.010)
Contiguity	0.675***	0.651***	0.519***	0.497***	0.158***
	(0.028)	(0.028)	(0.029)	(0.029)	(0.027)
Common legal origin	0.268***	0.260***	0.212***	0.232***	0.164***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.013)
GDP gap	-0.031***	-0.038***	-0.018***	-0.027***	0.025***
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)
Common currency	0.132***	0.211***	0.284***	0.258***	0.343***
	(0.039)	(0.039)	(0.040)	(0.040)	(0.039)
Common off. language	0.428***	0.427***		0.414***	0.293***
	(0.022)	(0.022)		(0.023)	(0.028)
Common ethn. language	0.120***	0.123***		0.069***	-0.031
	(0.021)	(0.021)		(0.022)	(0.026)
Common off. language			0.303***		
			(0.018)		
Common spoken language			0.418***		
			(0.033)		
Common native language			0.545***		
			(0.044)		
Religious proximity				0.576***	0.296***
				(0.022)	(0.026)
Migrants_ij (log)					0.122***
					(0.003)
Migrants_ji (log)					0.101***
					(0.003)
Country x year FE	yes	yes	yes	yes	yes
Observations	265,070	265,070	246,215	243,961	121,729
R-squared	0.752	0.753	0.757	0.755	0.800

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

57% (=0.255/(0.255+0.193)) of the effect channels through the number of products exported. In the case of the former British colonies, the extensive margin accounts for 86% (=0.434/(0.434+0.066))

Table 2: Distinction of the effect between imports and exports

VARIABLES	(1) $\ln(Exports_{ijt})$	(2) $\ln(Exports_{ijt})$	(3) $\ln(Exports_{ijt})$
Spillover-M(EU, colFR)	0.456***	0.501***	0.550***
	(0.037)	(0.037)	(0.037)
Spillover-X(EU, colFR)	0.295***	0.288***	0.350***
	(0.036)	(0.036)	(0.036)
Spillover-M(EU, colUK)	0.335***	0.319***	0.388***
	(0.029)	(0.029)	(0.029)
Spillover-X(EU, colUK)	0.579***	0.531***	0.608***
	(0.028)	(0.029)	(0.028)
ColLink(FR)	1.574***	1.621***	1.695***
	(0.082)	(0.083)	(0.082)
ColLink(UK)	1.191***	1.236***	1.227***
	(0.065)	(0.065)	(0.065)
ColLink(Other)	2.199***	2.007***	2.114***
	(0.067)	(0.071)	(0.071)
Common colonizer	0.764***	0.826***	0.783***
	(0.018)	(0.018)	(0.018)
FTA	0.437***	0.448***	0.475***
	(0.015)	(0.016)	(0.016)
Distance (log)	-1.474***	-1.444***	-1.454***
	(0.007)	(0.007)	(0.007)
Contiguity	0.651***	0.519***	0.498***
	(0.028)	(0.029)	(0.029)
Common legal system	0.260***	0.212***	0.231***
	(0.010)	(0.010)	(0.010)
GDP gap	-0.038***	-0.018***	-0.027***
	(0.004)	(0.004)	(0.004)
Common currency	0.211***	0.284***	0.258***
	(0.039)	(0.040)	(0.040)
Comlang off.	0.427***		0.414***
	(0.022)		(0.023)
Comlang ethn.	0.123***		0.069***
	(0.021)		(0.022)
Comlang off.		0.304***	
		(0.018)	
Comlang spoken		0.417***	
		(0.033)	
Comlang native		0.545***	
		(0.044)	
Religious proximity			0.575***
			(0.022)
Country x year FE	yes	yes	yes
Observations	265,070	246,215	243,961
R-squared	0.753	0.757	0.756

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

of the total effect. Note that the effect of the colonial trade linkage is also mostly channeled through the extensive margin, and to a lower extent through the average value of individual trade flows.

Overall, the results presented in this section are consistent with a reduction of transaction costs for EU countries, in relation to the existence of a colonial trade linkage between colonizers and former colonies.

Table 3: Trade margins

VARIABLES	(1) ln(Extensive margin)	(2) ln(Intensive margin)
Spillover(EU-colFR)	0.255***	0.193***
	(0.013)	(0.021)
Spillover(EU-colUK)	0.434***	0.066***
	(0.010)	(0.016)
ColLink(FR)	1.293***	0.402***
	(0.042)	(0.066)
ColLink(UK)	0.917***	0.310***
	(0.033)	(0.052)
ColLink(Other)	1.629***	0.485***
	(0.036)	(0.057)
Common colonizer	0.528***	0.255***
	(0.009)	(0.015)
Common off. language	0.435***	-0.021
	(0.012)	(0.019)
Common ethn. language	0.054***	0.014
	(0.011)	(0.018)
FTA	0.318***	0.157***
	(0.008)	(0.013)
Distance (log)	-0.998***	-0.456***
	(0.004)	(0.006)
Contiguity	0.346***	0.151***
	(0.015)	(0.023)
Common legal system	0.153***	0.079***
	(0.005)	(0.008)
GDP gap	0.011***	-0.039***
	(0.002)	(0.003)
Common currency	0.161***	0.097***
	(0.020)	(0.032)
Religious proximity	0.440***	0.136***
	(0.011)	(0.017)
Country x year FE	yes	yes
Observations	243,961	243,961
R-squared	0.832	0.487

Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

3.2 Colonial trade spillovers erosion

Head *et al.* (2010) document an erosion of the colonial trade linkage since independence between the former colonies and the ex-colonizer. They find that after 40 years, their bilateral trade contracted

by about 65%. It is not clear however if the colonial trade spilllover should have increased or rather declined over time. On the one hand, the erosion of the colonial trade linkage could have generated trade opportunities for third countries, if the colonial trade linkage *before* independence was associated with a trade diversion. In that case, European countries may have increased their trade with former colonies over time. European integration, through standard harmonization for instance, could have also promoted additional exports to third European countries once the product is exported successfully in France or in the UK. The euro introduction also could have generated new exports opportunities for EU countries to CFA Franc zone countries among former French colonies, due to a reduction of transaction costs (see Frankel (2008)). On the other hand, the erosion of the colonial trade linkages could have also reduced opportunities to trade with third European countries, for example if exporting to France generates opportunities to export to third European markets (we provide such evidence in Section 4).

We analyze, in Table 4, the evolution of the coefficient over three sub-periods: 1995-1999, 2000-2003 and 2004-2007. Results suggest that there is an erosion in colonial trade spillovers over the period 1995-2007. A decline over time of the coefficient on the colonial trade spillover variables can be observed when we consider aggregate exports, the extensive and the intensive margins. Importantly, since we control for importer-year and exporter-year fixed effects, our results should not be driven by the increased competition of China over time. Overall, these results suggest that there exist a form of complementarity between the colonial trade linkage and the colonial trade spillover. In section 4 of the paper, we will investigate more this issue by taking into account the dynamics of trade at the product level.

Table 4: Colonial trade spillovers erosion

VARIABLES	ln($Exports_{jit}$)			ln($ExtensiveMargin_{ijt}$)			ln($IntensiveMargin_{ijt}$)		
	1995-99 (1)	2000-03 (2)	2004-07 (3)	1995-99 (4)	2000-03 (5)	2004-07 (6)	1995-99 (7)	2000-03 (8)	2004-07 (9)
Spillover(EU, colFR)	0.573***	0.397***	0.306***	0.325***	0.217***	0.192***	0.248***	0.180***	0.114***
	(0.040)	(0.046)	(0.049)	(0.021)	(0.024)	(0.024)	(0.032)	(0.037)	(0.041)
Spillover(EU, colUK)	0.557***	0.452***	0.434***	0.485***	0.424***	0.365***	0.072***	0.028	0.069**
	(0.032)	(0.036)	(0.038)	(0.017)	(0.018)	(0.018)	(0.025)	(0.028)	(0.031)
ColLink(FR)	1.948***	1.597***	1.442***	1.510***	1.219***	1.084***	0.437***	0.378***	0.358***
	(0.126)	(0.147)	(0.158)	(0.067)	(0.076)	(0.077)	(0.099)	(0.117)	(0.131)
ColLink(UK)	1.381***	1.140***	1.093***	1.037***	0.875***	0.805***	0.344***	0.266***	0.287***
	(0.100)	(0.115)	(0.124)	(0.054)	(0.060)	(0.060)	(0.079)	(0.092)	(0.102)
ColLink(Other)	2.166***	2.100***	2.060***	1.684***	1.656***	1.532***	0.482***	0.444***	0.528***
	(0.111)	(0.124)	(0.134)	(0.059)	(0.064)	(0.065)	(0.087)	(0.098)	(0.111)
Common colonizer	0.784***	0.728***	0.824***	0.561***	0.497***	0.518***	0.223***	0.231***	0.306***
	(0.031)	(0.032)	(0.033)	(0.016)	(0.017)	(0.016)	(0.024)	(0.025)	(0.027)
Comlang off.	0.275***	0.415***	0.560***	0.339***	0.412***	0.553***	-0.064**	0.003	0.007
	(0.037)	(0.040)	(0.043)	(0.020)	(0.021)	(0.021)	(0.029)	(0.032)	(0.036)
Comlang ethn.	0.150***	0.068*	-0.019	0.090***	0.078***	-0.006	0.059**	-0.010	-0.013
	(0.036)	(0.039)	(0.042)	(0.019)	(0.020)	(0.020)	(0.028)	(0.031)	(0.035)
FTA	0.392***	0.488***	0.546***	0.278***	0.363***	0.326***	0.115***	0.125***	0.220***
	(0.030)	(0.027)	(0.025)	(0.016)	(0.014)	(0.012)	(0.023)	(0.022)	(0.021)
Distance (log)	-1.409***	-1.458***	-1.499***	-1.029***	-0.992***	-0.969***	-0.380***	-0.466***	-0.530***
	(0.012)	(0.013)	(0.013)	(0.006)	(0.007)	(0.006)	(0.009)	(0.010)	(0.011)
Contiguity	0.583***	0.478***	0.436***	0.408***	0.350***	0.267***	0.175***	0.128***	0.169***
	(0.046)	(0.051)	(0.054)	(0.025)	(0.026)	(0.026)	(0.036)	(0.041)	(0.045)
Common legal system	0.285***	0.230***	0.181***	0.201***	0.161***	0.097***	0.084***	0.069***	0.083***
	(0.017)	(0.018)	(0.019)	(0.009)	(0.009)	(0.009)	(0.013)	(0.014)	(0.015)
GDP gap	-0.019***	-0.036***	-0.030***	0.018***	0.005	0.010***	-0.037***	-0.040***	-0.040***
	(0.006)	(0.006)	(0.007)	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)	(0.006)
Common currency	0.624***	-0.047	0.227***	0.493***	-0.093***	0.124***	0.131**	0.046	0.103*
	(0.069)	(0.065)	(0.072)	(0.037)	(0.034)	(0.035)	(0.054)	(0.052)	(0.060)
Religious proximity	0.599***	0.508***	0.610***	0.490***	0.451***	0.385***	0.109***	0.056*	0.226***
	(0.035)	(0.038)	(0.039)	(0.019)	(0.020)	(0.019)	(0.028)	(0.030)	(0.033)
Country x year FE	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	84,942	77,149	81,870	84,942	77,149	81,870	84,942	77,149	81,870
R-squared	0.756	0.755	0.756	0.832	0.833	0.831	0.477	0.481	0.497

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

3.3 Robustness

In the previous tables, we analyzed the colonial trade spillovers in the case of the two larger colonial empires, the British and French ones. However this identified transmission of colonial trade linkages to third countries might also be relevant for the former colonies of the Benelux, Portugal or the Netherlands. Results are presented in the first column of Table 5. Except for the Netherlands, the same pattern of colonial trade spillovers to European Union countries appears for the ex-colonies of Benelux and of Portugal.

The subsequent estimations, in columns 2 and 3, show that results are robust to dropping from the sample two former British colonies that are important commercial partners of the European Union countries, namely India and Hong-Kong.

Given the large prevalence of zero trade flows in our dataset, which are undefined when converted into logarithms, our estimations are based on a truncated sample where all the country-pairs that do not trade are not considered. To deal with this issue of zero trade flows and the issue of heteroscedasticity, we rely on the Poisson pseudo-maximum likelihood estimator identified by Silva and Tenreyro (2006) as an efficient estimator. Results appear unchanged and are available upon request.

3.4 The role of trade intensity and geographic distance

Models of trade networks suggest that geographical distance and the intensity of trade between countries - which are both related to trade frictions - are important factors that explain the dynamics of trade and the geographical spread of exports. The strong colonial trade spillover that we identified in the previous estimations between EU countries and former colonies of British and French colonial empires could therefore well be explained by the geographical distance that separates France and the United Kingdom from other EU countries, or alternatively their trade intensity.

In this section, we analyze if colonial trade spillovers are more important for countries that trade more with or are more proximate from the former colonizer, rather than simply considering EU countries. We introduce two dummy variables, $Spillover-X(.,colZ)$ and $Spillover-M(.,colZ)$ for each colonizer $Z = \{FR, UK\}$, which identify country pairs where a third country (.) is either exporting to a former colony in the first case, or importing from a former colony in the second case. We then interact these variables with the trade intensity of the third country (.) with the former colonizer $(Trade(., Z))$, corresponding to the total value of bilateral trade with colonizer Z divided by the real GDP of the third country. We also consider the influence of geographical distance by

Table 5: Robustness

VARIABLES	(1) ln($Exports_{ijt}$)	(2) ln($Exports_{ijt}$)	(3) ln($Exports_{ijt}$) Without India and Hong Kong
Spillover(EU, colBLX)	0.347***		
	(0.084)		
Spillover(EU, colPRT)	0.147**		
	(0.059)		
Spillover(EU, colNLD)	0.050		
	(0.072)		
ColLink(BLX)	2.160***		
	(0.270)		
ColLink(PRT)	3.956***		
	(0.181)		
ColLink(NLD)	1.741***		
	(0.236)		
Spillover(EU, colFR)	0.469***	0.448***	0.459***
	(0.026)	(0.026)	(0.026)
Spillover(EU, colUK)	0.519***	0.500***	0.516***
	(0.020)	(0.020)	(0.020)
ColLink(FR)	1.719***	1.695***	1.672***
	(0.082)	(0.082)	(0.083)
ColLink(UK)	1.245***	1.226***	1.233***
	(0.065)	(0.065)	(0.066)
ColLink(Other)	1.769***	2.114***	2.063***
	(0.085)	(0.071)	(0.071)
Common colonizer	0.782***	0.782***	0.820***
	(0.018)	(0.018)	(0.019)
Comlang off.	0.406***	0.414***	0.436***
	(0.023)	(0.023)	(0.024)
Comlang ethn.	0.069***	0.069***	0.085***
	(0.022)	(0.022)	(0.023)
FTA	0.478***	0.475***	0.477***
	(0.016)	(0.016)	(0.016)
Distance (log)	-1.456***	-1.454***	-1.465***
	(0.007)	(0.007)	(0.007)
Contiguity	0.505***	0.497***	0.510***
	(0.029)	(0.029)	(0.030)
Common legal system	0.232***	0.232***	0.250***
	(0.010)	(0.010)	(0.010)
GDP gap	-0.030***	-0.027***	-0.019***
	(0.004)	(0.004)	(0.004)
Common currency	0.269***	0.258***	0.220***
	(0.040)	(0.040)	(0.040)
Religious proximity	0.573***	0.576***	0.562***
	(0.022)	(0.022)	(0.022)
Country x year FE	yes	yes	yes
Observations	243,961	243,961	235,676
R-squared	0.756	0.755	0.753

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

introducing interactions between the two dummy variables with the geographical distance between any third country (.) and the former colonizer (Z), ($ln(Dist(.,Z))$).

The results are presented in Table 6. The results confirm that as expected, the colonial trade spillover is more important for third countries having more trade with France or the UK in proportion of their GDP (column 1), or third countries being geographically more proximate from the former colonizers (column 2). Importantly, these results indicate that the trade spillover in relation with distance and trade intensity hold when we consider both exports to, or imports from the former colonies.

4 Trade Dynamics and colonial trade spillover

In this section, we test more formally for the role of the learning/matching process, and the complementarity channel, to explain the existence of a colonial trade spillover. Both channels imply a dynamic process of trade.

Through a first export experience, exporters may learn about the profitability of their products or meet new buyers, leading them to explore new markets. Through global value chains, exports from the former colonizer towards former colonies may also create business opportunities for third countries. Recent models of trade networks discussed in introduction predict that these spillovers should operate at the regional scale.

We test for these different channels by making use of the product-details offered by the trade data (BACI data detailed at the HS 4-digits product level) and the timing of exports activity. The empirical investigation focuses on the probability of exporting a specific good to a destination, which is explained by gravity and "extended gravity" forces, taking into account prior export experience or the existence of a similar export flow from the former colonizer to the former colony in the current or past period.

4.1 Exports from former colonies towards OECD countries

We start with a sample of countries where the exporters are former British and French colonies, and the destinations are OECD destinations only. This South to North framework allows to determine whether exporting to the former colonizer triggered export opportunities to third countries.

We consider the probability that a former British or French colony exports an HS4 product category in an OECD country ($\Pr(X_{ijkt} > 0)$), where i is the country of origin, j the country of destination, k is the product, and t is time. We have a total of 1241 different HS4 products exported

Table 6: Trade intensity and distance with former colonizer

VARIABLES	(1) $\ln(Exports_{ijt})$	(2) $\ln(Exports_{ijt})$
Spillover-X(., colFR) x Trade(.,FR)	4.147***	
	(1.249)	
x ln(Dist(.,FR))		-0.107***
		(0.012)
Spillover-X(.,colUK) x Trade(.,UK)	13.424***	
	(2.329)	
x ln(Dist(.,UK))		-0.149***
		(0.010)
Spillover-M(.,colFR) x Trade(.,FR)	3.705***	
	(1.138)	
x ln(Dist(.,FR))		-0.129***
		(0.012)
Spillover-M(.,colUK) x Trade(.,UK)	7.804***	
	(2.341)	
x ln(Dist(.,UK))		-0.109***
		(0.010)
ColLink(FR)	1.495***	0.591***
	(0.082)	(0.114)
ColLink(UK)	1.140***	0.039
	(0.065)	(0.092)
ColLink(Other)	2.125***	2.118***
	(0.074)	(0.071)
Common colonizer	0.650***	0.764***
	(0.019)	(0.019)
Common off. language	0.399***	0.400***
	(0.023)	(0.023)
Common ethn. language	0.064***	0.058***
	(0.023)	(0.022)
FTA	0.482***	0.489***
	(0.016)	(0.016)
Distance (log)	-1.441***	-1.461***
	(0.007)	(0.007)
Contiguity	0.523***	0.496***
	(0.029)	(0.029)
Common legal origin	0.241***	0.255***
	(0.010)	(0.010)
GDP gap	-0.016***	-0.023***
	(0.004)	(0.004)
Common currency	0.148***	0.166***
	(0.040)	(0.039)
Religious proximity	0.557***	0.525***
	(0.022)	(0.022)
Observations	241,476	243,961
R-squared	0.756	0.755

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

by French and British former colonies to OECD destinations. In each destination, we consider all the products that are potentially exported by a country, i.e. any product that enters at least once

in the export matrix of each country. We therefore have many zeros (about 93%) composing our dataset of about 30 million observations, as not all products are exported to every destination every year.

The basic framework is similar to what was previously estimated in the aggregate estimates, but we now have the product dimension and the dependent variable is a dummy variable, indicating whether we can observe a positive trade flow ($X_{ijkt} > 0$) or not. Details of the estimation are reported in Equation 2 below. The estimation controls for measures of bilateral trade costs (C_{ijt}, with a vector of coefficients Ω') and for the exporter and importer multilateral resistance terms κ_{it} and κ_{jt}. It also controls for colonial trade linkage ($ColLink(Z)_{ij}$) and colonial trade spillovers with EU countries unrelated to the dynamics of trade ($Spillover(EU, colZ)_{ij}$).

Equation 2 additionally includes two variables indicating whether the product considered has been exported to the former colonizer ($Trade(Z, .)_{ik,t/t-2}$). This variable is equal to 1 when the product was exported by the former colony to the former colonizer between year t and t-2 at least once, whatever is the OECD destination, and zero otherwise. These two variables (one for France and one for UK colonies) are then interacted with a dummy variable that indicates whether the destination is an EU country, or with the geographical distance between the former colonizer and the destination country ($Trade(Z, .)_{ik,t/t-2} \times C_{Zj}$). These interaction terms allow us to capture if the geographical distance and economic integration with the former colonizer affect the colonial trade spillover.

$$\Pr(X_{ijkt} > 0) = \beta_0 + \sum_{Z=FR,UK} \beta_{1Z} Trade(Z, .)_{ik,t/t-2} + \sum_{Z=FR,UK} \beta_{2Z} Trade(Z, .)_{ik,t/t-2} \times C_{Zj}$$

$$+ \sum_{Z=FR,UK} \beta_{3Z} Spillover(EU, colZ)_{ij} + \sum_{Z=FR,UK} \beta_{4Z} ColLink(Z)_{ij}$$

$$+ \mathbf{C}_{ijt}\Omega' + \kappa_{it} + \kappa_{jt} + \epsilon_{ijt} \tag{2}$$

Using a large number of fixed effects (we have country-year fixed effects) and observations prevents us from using a probit estimator. Moreover, using interaction terms makes it more difficult to compute marginal effects with probit or logit estimators. We therefore choose to estimate a linear probability model, which is more flexible in our context. Marginal effects from the estimation of Equation 2 are provided in Table 4.1 below. We have different specifications of the estimated equation. Column (1) and (4) report estimation results where importer and exporter GDPs are controlled for, and only year dummies are included. In columns (2) and (5), importer and exporter

fixed effects are controlled for. Finally, columns (3) and (6) correspond to our preferred specifications with country-year dummies, which implies that importer and exporter GDPs are dropped in the estimation.

The coefficient on $Trade(Z,.)_{ik,t/t-2}$ variables is positive and highly significant, which implies that exporting previously or in the current year a product towards the former colonizer increases the likelihood that the same product will be exported towards additional OECD countries. The result holds for both exports experience with France and the UK. While this effect is consistent with the existence of learning in the former colonizer's market, it does not allow to conclude on the exitence of a colonial trade spillover biased towards certain countries.

The interaction of variable $Trade(Z,.)_{ik,t/t-2}$ with the EU(j) dummy variable, or with the log of the distance between the former colonizer and the distant country j, allows to identify whether exporting towards the former colonizer tends to promote new export flows for the same category of products towards geographically proximate and integrated countries. The coefficient on the EU(j) interaction variable is always positive and significant in columns (1) to (3), and the coefficient on the distance interaction is always negative in columns (4) to (6). These results imply that exporting a product towards the former colonizer increases former colonies' probability of exporting the same product towards different OECD countries, but more so for OECD destination being geographically proximate and integrated with the former colonizer.

Note that the coefficient on the $Spillover(EU, colZ)_{ij}$ variable is always close to zero: the existence of a colonial trade spillover with EU countries is conditioned by the existence of a prior export flow towards the former colonizer. The coefficient on the $ColLink(Z)_{ij}$ is positive as expected.

Overall, these results support the prediction from models of trade networks and learning that exporting towards the former colonizer provides former colonies opportunities to export to additional destinations being geographically proximate and integrated with the former colonizer.

4.2 Exports from OECD countries towards former colonies

We now consider OECD exports towards British and French colonies. Two transmission mechanisms are explored: (1) the export experience of OECD exporters in the colonizer's market, which may trigger export opportunities for OECD countries in former colonies; (2) The export experience of the former colonizer in the former colony, which may generate opportunities for OECD countries exporting complementary products.

Experience of the exporter in colonizer's market

Table 7: Trade dynamics: exports from former colonies to OECD destinations

Dep. Variable	$\Pr(X_{ijkt} > 0)$					
Sample	Importers (j) : OECD; Exporters (i) : former British and French colonies					
	Products (k) : HS 4-digits products; Time period : 1995-2007					
	(1)	(2)	(3)	(4)	(5)	(6)
Trade(FR,.)(ik, t/t-2)	0.141***	0.152***	0.150***	0.739***	0.734***	0.728***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
× EU (j)	0.031***	0.024***	0.020***			
	(0.001)	(0.000)	(0.000)			
× ln Dist-FR (j)				-0.079***	-0.078***	-0.078***
				(0.000)	(0.000)	(0.000)
Trade(UK,.)(ik, t/t-2)	0.281***	0.231***	0.228***	0.685***	0.636***	0.635***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
× EU (j)	0.024***	0.025***	0.025***			
	(0.000)	(0.000)	(0.000)			
× ln Dist-UK (j)				-0.054***	-0.054***	-0.054***
				(0.000)	(0.000)	(0.000)
Spillover(EU, colFR) (ij)	-0.005***	-0.006***	-0.008***			
	(0.000)	(0.001)	(0.001)			
Spillover(EU, colUK) (ij)	0.006***	0.003***	0.000			
	(0.000)	(0.001)	(0.001)			
ColLink(FR) (ij)	0.090***	0.082***	0.085***	0.031***	0.016***	0.031***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
ColLink(UK) (ij)	0.066***	0.074***	0.065***	0.026***	0.013***	0.014***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
ColLink(Other) (ij)	0.109***	0.150***	0.107***	0.130***	0.167***	0.121***
	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
ln GDP(it)	0.022***	0.011***		0.023***	0.011***	
	(0.000)	(0.000)		(0.000)	(0.000)	
ln GDP(jt)	0.020***	-0.000		0.021***	0.001**	
	(0.000)	(0.000)		(0.000)	(0.000)	
Comlang official (ij)	0.025***	-0.011***	-0.011***	0.023***	-0.011***	-0.011***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Comlang ethno (ij)	0.011***	0.023***	0.024***	0.011***	0.021***	0.023***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
RTA (ijt)	0.043***	0.020***	0.022***	0.038***	0.011***	0.009***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln Dist (ij)	0.003***	-0.048***	-0.045***	0.007***	-0.045***	-0.042***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Contiguity (ij)	0.059***	-0.008***	0.008***	0.063***	-0.009***	0.007***
	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Legal origin (ij)	0.006***	0.012***	0.013***	0.007***	0.011***	0.011***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Common Currency (ijt)	0.070***	-0.022***	-0.021***	0.060***	-0.030***	-0.017***
	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Year dummies	yes	yes	no	yes	yes	no
Country FE	no	yes	no	no	yes	no
Country-year FE	no	no	yes	no	no	yes
Observations	27,913,676	27,913,676	29,743,896	27,913,676	27,913,676	29,743,896
R-squared	0.253	0.300	0.301	0.282	0.328	0.329

Note: Significance levels: *10%, **5%, ***1%. Robust standard errors in parentheses. EU countries correspond to the 15 EU countries before enlargement in 2004. The main variable of interest is Trade(i-FR, k, t/t-2) and Trade(i-UK, k, t/t-2), which indicate whether the exporter (i) exported product (k) to the former colonizer between year t and year t-2.

We start the analysis by estimating Equation 3, where the probability that an OECD country is exporting an HS4 product category k to former British and French colonies is explained by multilateral resistance terms κ_{it} and κ_{jt}, bilateral trade costs $\mathbf{C}_{ijt}$ with a vector of coefficients Ω', the colonial linkage and colonial spillover variables.

Our main variable of interest, $Trade(Z, ColZ)_{ijk,t/t-2}$, takes the value 1 if the exporter i has shipped good k towards the former colonizer Z in the recent period, with destination j being a former colony of Z, but zero otherwise. Saying it differently, this variable identifies whether export experience in France helps creating new trade relations in French former colonies; the variable is also defined for the UK.

$$\Pr(X_{ijkt} > 0) = \gamma_0 + \sum_{Z=FR,UK} \gamma_{1Z} Trade(Z, ColZ)_{ijk,t/t-2} + \sum_{Z=FR,UK} \gamma_{2Z} Spillover(EU, colZ)_{ij}$$

$$+ \sum_{Z=FR,UK} \gamma_{3Z} ColLink(Z)_{ij} + \mathbf{C}_{ijt}\Omega' + \kappa_{it} + \kappa_{jt} + \epsilon_{ijt} \tag{3}$$

Results are provided in columns (1) and (2) of Table 4.2. The first column controls for year dummies only whereas the second column controls for country-year fixed effects. In both columns, the coefficients on our main variables of interest are positive. This result confirms that indeed, recent export experience in the former colonizer's market helps to create new trade relationships in former colonies' markets. Importantly, given that countries being geographically more proximate to the former colonizer's market have a higher propensity to export (Germany is more likely to export a product to France than New Zealand), these countries will therefore benefit more from this colonial trade spillover.

The coefficients on colonial trade spillover dummies for EU countries turn to be close to zero in Column (1), and negative and significant in Column (2). This result suggest that, as in the previous estimations, the existence of a colonial trade spillover is conditionned by the past export experience in the colonizer's market. The colonial trade dummies have the positive expected sign.

Experience of the colonizer in former colony's market

The last step of our analysis consists of identifying if the exports of an HS4 product category k by the former colonizer Z to the former colony $ColZ$ increases the probability that third countries will export goods in the same HS4 category. This last test is motivated by the existence of networks of suppliers participating to global value chains that often operate in geographically proximate countries. We discussed in introduction examples where French car industry firms have located part of their production in Morocco, with some inputs being imported from Spain where different units are located.

To investigate this transmission channel, we estimate Equation 4 using the same sample of

observations and the same empirical methodology as in previous estimation. Our main variable of interest is now ColTrade(Z,ColZ)$_{jk,t/t-2}$, which takes the value 1 if the former colonizer exported HS4 product category k to its former colony between t and t-2, and zero otherwise, when the former colony is the destination country j. This variable aims at identifying whether the probability of exporting products into an HS4 category increases when the former colonizer has an export experience into this category of product.

This variable is then interacted with variable C_{Zi}, which is either an indicator variable that identifies exporting countries within the EU, or the geographical distance between the exporter and the former colonizer. The rationale for having this interaction is that export spillovers should decline with distance, given that trade networks are organized within narrowly defined geographical areas.

$$
\begin{aligned}
\Pr(X_{ijkt} > 0) = \eta_0 + & \sum_{Z=FR,UK} \eta_{1Z} ColTrade(Z,ColZ)_{jk,t/t-2} + \sum_{Z=FR,UK} \eta_{2Z} ColTrade(Z,ColZ)_{jk,t/t-2} \times C_{Zi} \\
+ & \sum_{Z=FR,UK} \eta_{3Z} Spillover(EU,colZ)_{ij} + \sum_{Z=FR,UK} \eta_{4Z} ColLink(Z)_{ij} \\
& + \mathbf{C}_{ijt}\Omega' + \kappa_{it} + \kappa_{jt} + \epsilon_{ijt}
\end{aligned}
\tag{4}
$$

Estimation results are provided in columns (3) to (6) of Table 4.2. Columns (3) and (5) control for year dummies only whereas columns (4) and (6) control for country-year dummies. The main result from this estimation is that the probability of exports to British and French colonies are increased when the former colonizer has an export experience for the same HS4 product category into the former colony's market. This result is obtained for all estimations. Moreover, the effect is more pronounced for exporting countries being members of the EU, and countries being geographically more proximate from the former colonizer.

This result confirms a complementarity between former colonizer's export flows towards former colonies, and the propensity of proximate countries to export similar products to the same countries. As discussed above, this complementarity may be explained by the organization of networks of suppliers, whose intermediates are complementary to produce final goods in destination countries. Alternatively, former colonizer's exports may act as a signal for profitable exports towards the former colony, for a certain type of goods.

Table 8: Trade dynamics: exports from OECD destinations to former colonies

Dep. Variable	Pr($X_{ijkt} > 0$)					
Sample	Importers (j) : former British and French colonies; Exporters (i) : OECD Products (k) : HS 4-digits products; Time period : 1995-2007					
	(1)	(2)	(3)	(4)	(5)	(6)
Trade(FR,ColFR)$_{ijk,t/t-2}$	0.073***	0.084***				
	(0.000)	(0.000)				
Trade(UK,ColUK)$_{ijk,t/t-2}$	0.054***	0.070***				
	(0.000)	(0.000)				
ColTrade(FR,ColFR)$_{jk,t/t-2}$			0.090***	0.090***	0.773***	0.717***
			(0.000)	(0.000)	(0.001)	(0.001)
× EU(i)			0.176***	0.174***		
			(0.000)	(0.000)		
× ln Dist-FR (i)					-0.083***	-0.075***
					(0.000)	(0.000)
ColTrade(UK,ColUK)$_{jk,t/t-2}$			0.135***	0.136***	0.723***	0.713***
			(0.000)	(0.000)	(0.000)	(0.001)
× EU (i)			0.178***	0.173***		
			(0.000)	(0.000)		
× ln Dist-UK (i)					-0.069***	-0.069***
					(0.000)	(0.000)
Spillover(EU, colFR)$_{ij}$	-0.001***	-0.075***	-0.077***	-0.029***	-0.002***	-0.026***
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
Spillover(EU, colUK)$_{ij}$	0.006***	-0.068***	-0.057***	0.000	0.015***	-0.010***
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
ColLink(FR)$_{ij}$	0.307***	0.162***	0.187***	0.221***	0.121***	-0.036***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ColLink(UK)$_{ij}$	0.248***	0.080***	0.107***	0.160***	0.088***	-0.060***
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
ColLink(Other)$_{ij}$	0.326***	0.124***	0.290***	0.263***	0.345***	0.166***
	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)
ln GDP(it)	0.052***		0.064***		0.066***	
	(0.000)		(0.000)		(0.000)	
ln GDP(jt)	0.045***		0.028***		0.029***	
	(0.000)		(0.000)		(0.000)	
Comlang official (ij)	0.004***	-0.017***	0.019***	-0.016***	0.012***	-0.019***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Comlang ethno (ij)	0.044***	0.053***	0.028***	0.050***	0.030***	0.041***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
RTA (ijt)	0.085***	0.051***	0.085***	0.038***	0.090***	0.034***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln Dist (ij)	-0.071***	-0.124***	-0.059***	-0.120***	-0.044***	-0.109***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Contiguity (ij)	0.110***	0.146***	0.143***	0.098***	0.171***	0.166***
	(0.003)	(0.001)	(0.003)	(0.002)	(0.003)	(0.001)
Legal origin (ij)	0.024***	0.033***	0.025***	0.033***	0.031***	0.031***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Common Currency (ijt)	0.133***	0.051***	0.160***	0.034***	0.155***	0.037***
	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)
Year dummies	yes	no	yes	no	yes	no
Country-year FE	no	yes	no	yes	no	yes
Observations	34,209,500	36,910,250	34,209,500	34,209,500	34,209,500	36,910,250
R-squared	0.227	0.274	0.281	0.323	0.299	0.336

Note: Significance levels: *10%, **5%, ***1%. Robust standard errors in parentheses. EU countries correspond to the 15 EU countries before enlargement in 2004.

5   Conclusion

In this paper we investigated whether the existence of a colonial trade linkage triggered trade between former colonies and third countries close to the former colonizer. The empirical estimation of a gravity model provides strong evidence of the existence of such colonial trade spillovers. Controlling for a large variety of factors that influence bilateral trade and for multilateral resistance terms, we find in particular that EU15 countries have more trade with former British and French colonies than other countries. These colonial trade spillovers affect both the imports and the exports of former colonies and are concentrated on the extensive margin of trade rather than on the intensive one. Also, similarly to the erosion over time of the colonial trade linkages identified in Head *et al.* (2010), the colonial trade spillovers tend to decline over our period of study. More generally, our results show that it is the third countries having more trade with, and being geographically close to, the former colonizer that tend to trade more with the former colonies of that country than other countries.

Finally, using product-level trade data, we provide evidence that both the *learning/matching* and the *complementarity* channels can play a role in explaining the existence of these colonial trade spillovers. Indeed, the probability of exports from the former colony to OECD countries increases when the same product was previously exported to the former colonizer and, vice-versa, the probability of OECD exports to former colonies is increased when the exporter previously shipped the same product to the former colonizer (*learning/matching*). A complementarity effect is exhibited in the result that the probability of exports of an OECD country to a former colony is increased when the former colonizer exported previously the same category of product to the same destination. For all these product-level trade results, the effects are larger when the third country is a EU country or is a country less distant from the former colonizer.

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6 Appendix

Former French colonies
Algeria, Benin, Burkina Faso, Cambodia, Cameroon, Central African Republic, Chad, Comoros, Congo, Cote d'Ivoire, Djibouti, Gabon, Guinea, Laos, Madagascar, Mali, Mauritania, Morocco, New Caledonia, Niger, French Polynesia, Senegal, Syrian Arab Republic, Togo, Tunisia, Vanuatu, Vietnam.

Former English colonies
Antigua and Barbuda, Bahamas, Bahrain, Bangladesh, Barbados, Belize, Bermuda, Brunei, Cayman Islands, Cyprus, Dominica, Eritrea, Fiji, Gambia, Ghana, Grenada, Guyana, Hong Kong, India, Israel, Jamaica, Jordan, Kenya, Kiribati, Kuwait, Malawi, Malaysia, Maldives, Malta, Mauritius, Nigeria, Pakistan, Qatar, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Seychelles, Sierra Leone, Singapore, Solomon Islands, Sri Lanka, Sudan, Tanzania, Tonga, Trinidad and Tobaggo, Tuvalu, Uganda,United Arab Emirates, Vanuatu, Yemen, Zambia, Zimbabwe.