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Working Papers in Economic History

July 2016 WP 16-04

The roots of regional trade in the Americas 1870 to 1950

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Keywords: Regional trade, revealed trade preferences, the Americas, 19th and 20th Centuries.

JEL Classification: N7; F1

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Publisher:
UNIVERSIDAD CARLOS III DE MADRID • c/ Madrid 126 • 28903 Getafe (Spain)• Tel: (34) 91 624 97 97
Site: http://portal.uc3m.es/portal/page/portal/instituto_figuerola/home/publications/working_papers

Carlos III University of Madrid. Figuerola Institute of Social Sciences History
www.uc3m.es/if

Series:
Working Papers in Economic History
ISSN: 2341-2542

Electronic version of these working paper series available on:
http://hdl.handle.net/10016/16

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Abstract.
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1. Introduction

Geographical difficulties in common borders, low economic development, market size problems, and even inherited institutions from the colonial regime are some of the explicative variables discussed by the literature regarding the lack of regional trade in Latin America. Compared to other regions (such as Europe, East Asia and even North America), South America exhibited a smaller portion of regional trade during the late nineteenth century and much of the twentieth century. One would expect that a low degree of regional trade integration would be explained by high regional transaction costs. In the absence of trade barriers between regional and international markets, this would be a negative indication of regional market potential.

In the Americas the varying strategies of the metropolis during the colonial period created the historical roots of the trade networks in the North and the South of the continent. However, we know more about the relevance of intracolonial fiscal transfers than the intracolonial trade of the American Spanish Empire (see Irigoin & Grafe, 2012). We have only some partial evidence on trade price convergence in some regions of the Spanish Empire (see Gallo & Newland, 2004). Thus, it is difficult to evaluate the regional trade effects of political and monetary disintegration since the days of Independence (Irigoin, 2009).

The new Latin American Republics tried to emulate the economic and political integration of the emerging United States. Contrary to these expectations, slower growth during the post-independence period and export specialization in primary commodities towards the end of the nineteenth century led international integration to grow faster than regional integration. During the interwar years the European and North American protectionist backlash reduced Atlantic globalization in favor of a rise in the regional propensity to trade, especially during the Second World War (see Carreras-Marín, Badia-Miró & Peres Cajías, 2013; Badia-Miró, Carreras-Marín & Meissner, 2014).

Recently the more stable growth of the region since the 1990s has renewed interest in the study of regional integration and the long-term causes of its apparent historical failure. The idea that Latin America suffered from a low level of regional integration came from the very limited comparative data offered by the League of Nations (1942) for the 1920s and 1930s. Latin America's regional trade share was half of that of North America both in 1928 (11% vs. 25%) and in 1990 (14% vs. 31%). This data, as expected, show how less developed regions were not as integrated as were the industrialized regions of Europe and North America.

Nevertheless, it is not so obvious why the regional trade of other regions, such as East Asia, appears historically more integrated than the Latin American region. From the 1920s, Asian regional trade integration was similar to the European experience. Both regions had traded around half of their total trade with the region, and that propensity has persisted in Asia and increased to two thirds in Europe in the 1990s (see Anderson-Norheim, 1993. Table 2.2). Asia, similar to Latin America in terms of political fragmentation, remoteness and early low economic development, had a very different historical regional integration experience[1].

Bilateral trade patterns and their determinants usually receive little attention in the economic analysis of intraregional trade flows. Nevertheless, the estimation of international bilateral trade flows has a long tradition. Tinbergen (1962) was a pioneer in the use of gravity equations, and since then this approach has been furnished by very different theoretical and estimation techniques (see Anderson, 1979; Helpman & Krugman, 1985; Anderson and van Wincoop, 2003). Alongside the determinants of bilateral trade flows, the empirical literature has included "natural" determinants such as geography, GDPs, transportation and transaction costs or "super natural" causes such as trade agreements or commercial policy decisions (Frankel, Stein & Wei, 1995; Eichengreen & Frankel, 1995).

The formation of trade groups is dynamic, as a growing volume of natural trade itself provides incentives for investing in linkages. Thus "historical accidents" that bring economies together may well be amplified and perpetuated by the linkage investments that they induce. From the theoretical point of view, the literature is not conclusive on the causes of the formation of "natural" trade regions. On the one hand, the Ricardian and Heckscher-Ohlin-Samuelson models would predict greater trade between those countries with technological differences, while on the other hand, the Linder hypothesis would predict that countries with similar demand structures will trade more between them (Hallak, 2010).

[1] First, the imperialist policies of the Western countries established an initial network of East Asian trade after the Treaty of Nanking, which Britain concluded with China at the end of the Opium War. Later, Japanese imperialism gave an impetus for the integration of East Asia's northern economies. During the Meiji Period (1868-1912), annexed Ezo (Hokkaidô) in 1869, the Ryûkyû Islands in 1879, Taiwan in 1895, and Korea in 1905-1910. In East Asia by 1913 around 42 per cent of the region's trade was intraregional, and it increased slightly in 1938 to 46 per cent. While Asia reduced its regional trade from the end of the War until the 1970s, it partially recuperated its 1930s level in the late 1970s and during the 1980s showing a U-Shaped pattern (See Petri, 1993, p. 30-32).

The analytical basis of this paper is the concept of intraregional revealed trade preferences and the existence of trade networks. We will examine which factors determine the regional flows from 1870 to 1950 in South and North America using descriptive statistics, cluster analysis and intensity indices of regional trade preferences. We then test the main hypothesis of the paper on the existence of a historical handicap of regional trade in the Americas with an augmented gravity model, to evaluate regional trade integration throughout history according to the influence of the commodity lottery boosted by globalization and the Atlantic trade war blockades.

Our strategy is to differentiate trade into the South –S– and North –N– and to examine how the patterns of S-S and N-N trade and revealed trade preference groups can explain the conventional view of a historical handicap of regional trade in the Americas. Besides the paucity of work on South-South trade, one of the major contributions of this work is the period involved in the analysis, including, for the first time, a new data base on the bilateral trade flows of the Americas from 1870 to 1950. The paper is organized as follows. Section 2 offers some evidence and caveats on the singularity of South America versus North America in regional integration levels and trends. Section 3 displays the differences between the countries of the region, in terms of intraregional trade preferences. Section 4 contains the estimation technique and results of our gravity model. The last section concludes.

2. Historical evidence of intraregional trade in South and North America

Some caveats should be made regarding the singularity of Latin American regional integration levels and trends since independence. First, the Latin American republics were bigger and poorer than were their European counterparts. The wider geographical dimension of the American continent and the lower economic activity inside the region did not offer favorable conditions for the reconstruction of the old regional imperial trade networks. The amplitude of the continent, even if we divide the Americas between the North and the South, including geographical frontier expansion until the end of the nineteenth century, implied long distances and scarce cooperation between the new republics and this mattered insofar as it increased the scale costs of shipping goods.

Second, the new American republics, including the USA, were largely dependent on trade-taxes as the main source of fiscal revenue for the necessary process of State building after their political independence in the early 1820s. In contrast, old Europe was emerging from the Mercantilist period, reducing its trade barriers from the end of the Napoleonic Wars in a period of long trade liberalization that would only finish with a moderate return to protectionism at the end of the century (Coatsworth & Williamson, 2004; Tena-Junguito, Lampe & Tamega, 2012).

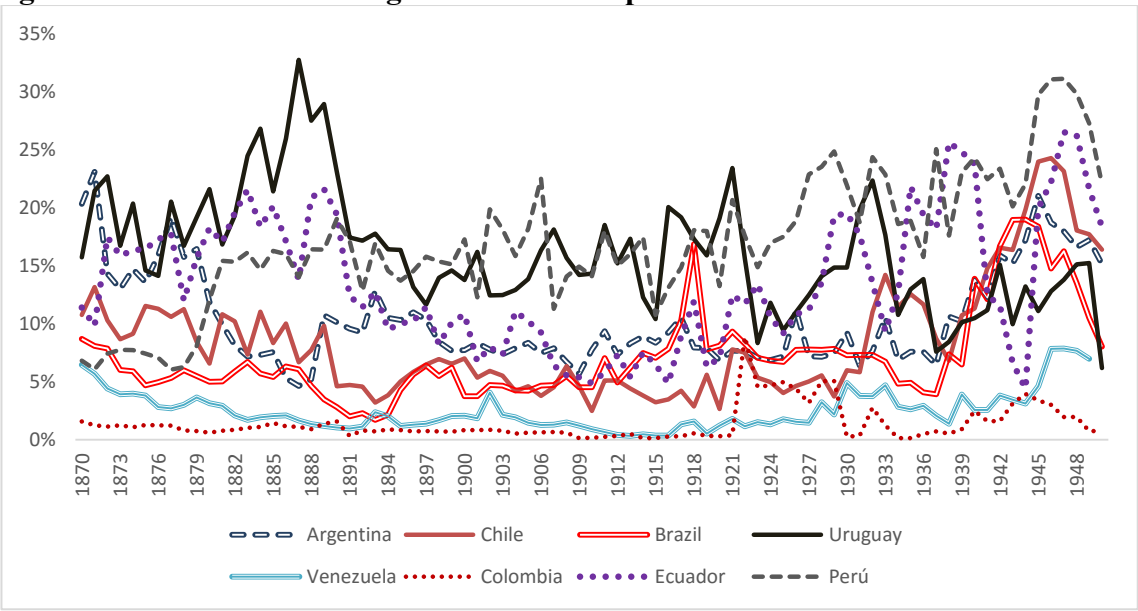
Additionally, in the late nineteenth century North and South America experienced a dynamic insertion into the world market. The spread of the Industrial Revolution in

Europe and the reduction of ocean shipping costs increased the demand for commodities and minerals produced in the Americas and this had a direct influence on regional trade (Bulmer-Thomas, 2003). Some recent studies indicate that in the South American case, intraregional trade may have increased with less restrictive trade policies or with productivity increases from the early twentieth century (Badia-Miró, Carreras-Marín & Meissner, 2014).

In the 1930s, European protectionist trade policies partially interrupted Atlantic globalization, due to the involution of Europe towards the regional trade in manufactures and the depression of the demand for commodities. Intraregional trade in the Americas was apparently higher before transport cost reductions increased globalization, but we do not have clear evidence of that except for the initial period of the commodity boom in the 1870s. During the interwar years and especially at the end of the thirties there was a growth in the share of exports to the region relative to the total (Figures 1, 2 and 3).

Thorp (1992) notes that in the 1930s South American countries implemented a number of regional trade liberalization policies. In fact, the expansion of exports played a crucial role in the recovery of the region. With the beginning of the Second World War, those countries turned again to protectionist measures as a response to the European markets' trade restriction policies (Edwards, 1994). This can be observed clearly in Figure 1, which shows an increase in the proportion of exports to the region for most South American countries and Mexico (see also Figure 2).

Figure 1. South America's regional share of exports



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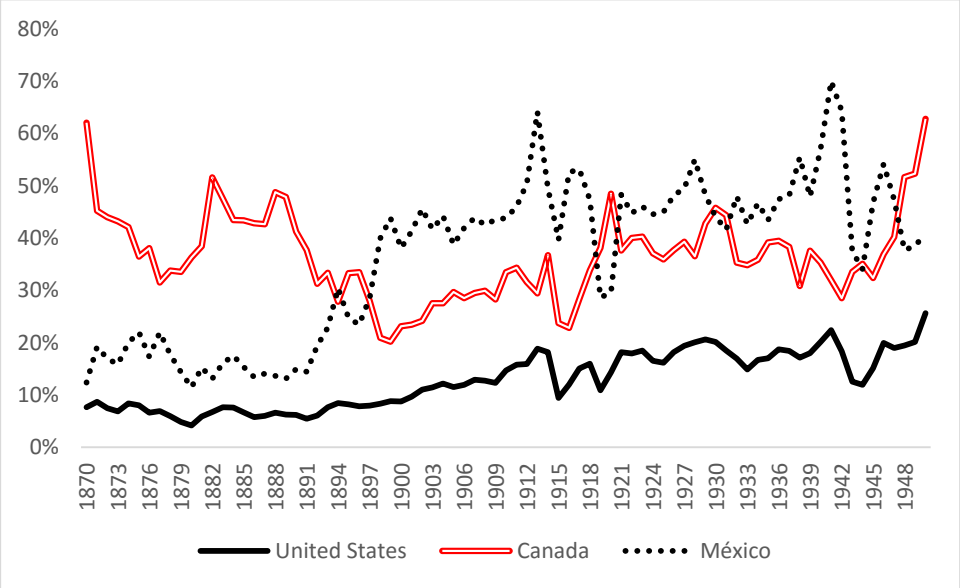
The commercial blockades that occurred during the World Wars, especially during the Second World War, apparently prompted the first significant regional trade creation in

Latin America before the ISI period (Carreras-Marín, Badia-Miró & Peres Cajías, 2013). According to Figure 1 the Second World War represented an intraregional trade boom in some of the countries in our sample, notably Peru, Chile and Brazil. Others, such as Argentina, were affected but did not alter their prewar regional integration trend in any relevant way. By the late forties and early fifties, the ISI model had spread throughout Latin America, and according to Bértola & Ocampo (2012) some countries developed a "mixed model" that, besides import substitution, included export promotion and regional integration. As commonly emphasized in the literature, this model had positive effects on manufacturing exports from these countries to the region, effectively fostering a more diversified economy.

In North America (see Figure 2), the United States has historically been an important trade partner for both Canada and Mexico. In the 1870s more than 40% and less than 20%, respectively, of their total exports were destined to the US. In the 1890s Mexico consolidated a stronger relationship with the US economy and, by the turn of the century, the Mexican regional share of exports surpassed that of Canada and peaked around half of its total trade. US importance in bilateral trade for these two countries is key to understanding the regional performance of North America in comparison to the South. In fact, Mexican and Canadian bilateral shares of exports are lower than 4% on average during the first globalization years.

Figure 2. North America's regional share of exports



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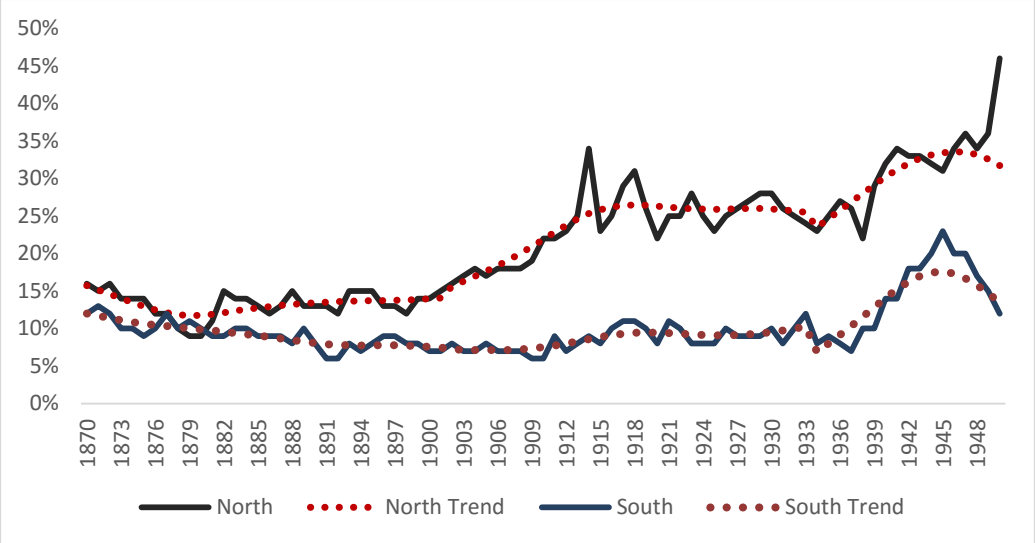
The US was from the early 19th century the biggest economy in the region and during the Belle Époque period augmented its relative economic importance through the rapid growth of exports, GDP and population. However, its participation in global trade

did not match the growth of its internal market.[2] Furthermore, in the context of the rapid Atlantic globalization of the American continent, the US increased bilateral trade with its more direct neighbors, ranging from 8% before 1890 to almost 20% in 1913. Thus, it seems reasonable to postulate that there was a "United States effect" driving greater regional trade in the North. This “US effect” may be crucial to understanding the SS-NN differences in regional integration.

Following this presumption, Figure 3 shows the shares of intraregional exports for the S-S and N-N regions with their trends extracted using the Hodrick-Prescott (1997) filter. Both regions were close before 1880 and one might consider that they evinced a similar trend until the late nineteenth century. From then until the mid-thirties there was a growing gap between the two regions, characterized by growth in the North and stagnation in the South. Although the gap persisted, between the thirties and forties there was an intraregional trade boom in both regions. In the case of South America, this regional trade was only possible due to the exogenous shock generated by the Second World War.

A possible explanation for the differences between both regions is that the "US effect" generated higher N-N regional trade. It is possible that in general the result of intraregional trade depended on the existence of commercial hubs in each region. However, this is not observable in the case of the South. According to bilateral trade flows, one might observe sub-networks that we explore through cluster analysis (Figure 4).

Figure 3. Share of intraregional exports for regions



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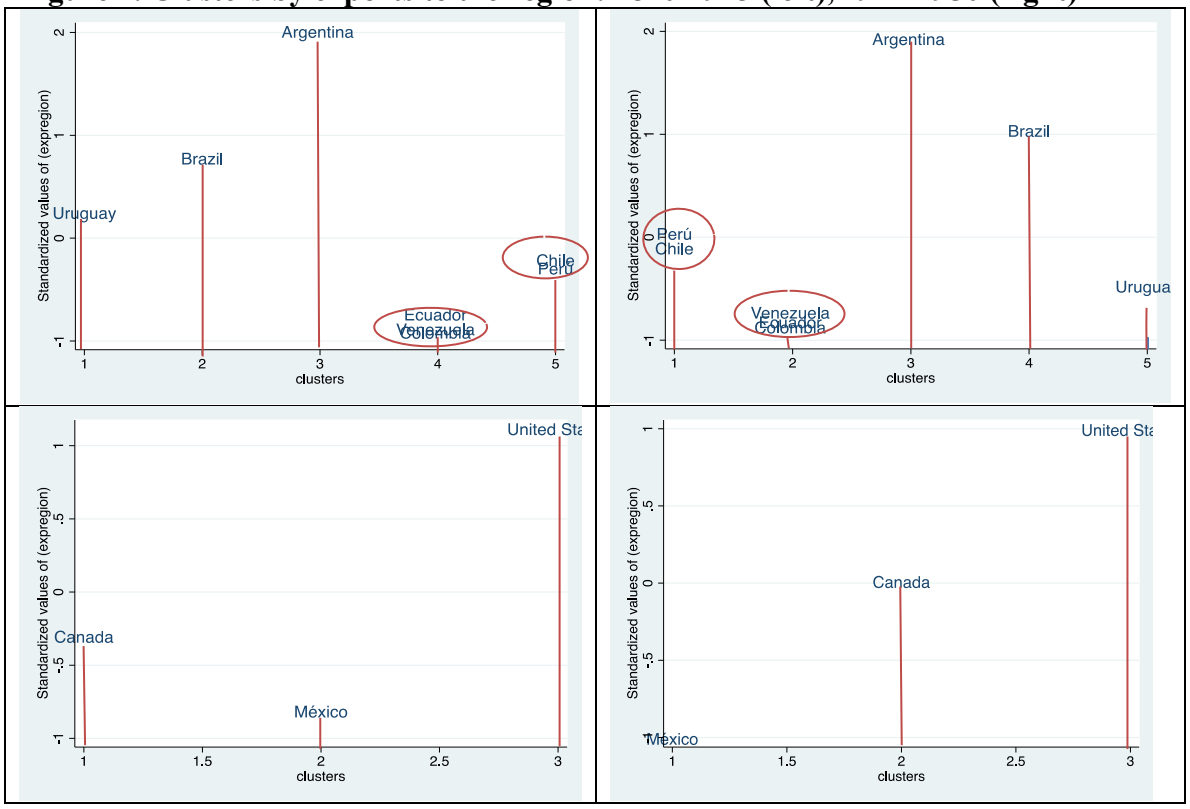
[2] The export GDP ratio at current prices of the US was around 11% and practically stagnated between 1870 and 1913 (see Federico -Tena, 2016b).

We compute the optimal k-means cluster solution for two periods: 1870-1913 and 1914-1950 (Figure 4). The idea was to observe the similarity or distance of these countries using information on standardized regional exports. In both periods, we find five groups in the South and three in North, in terms of the volume of exports to the region, meaning that on average there is a great distance between most countries of the region. The most similar countries in both periods are the clusters formed by Chile and Peru, and by Ecuador, Colombia and Venezuela. Although Argentina is the largest country in terms of trade flows to the region, it is not a commercial hub and its trade is mainly concentrated in the Southern Cone.

Figure 4. Clusters by exports to the region: 1870-1913 (left), 1914-1950 (right)



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3. Revealed intraregional preferences

In light of this descriptive evidence on the behavior of intraregional trade, we examine the role of each country in terms of its preference for exports to or imports from the region. We follow Iapadre and Tajoli (2014) who define indices for revealed trade preferences. These indices allow us to observe if a country has a greater preference for exports than for imports or vice versa. According to Iapadre and Tajoli (2014) such indices do not suffer from the problems of range variability, range asymmetry and dynamic ambiguity that may arise with other indices (Iapadre, 2006).

The problem of range variability implies that these indices are influenced by the size of the region in terms of total trade, and that they should not be used strictly to compare different regions (Iapadre & Plummer, 2011). The range asymmetry problem means that the range of the index is not symmetric around the geographic neutrality.[3] Finally, the problem of dynamic ambiguity refers to the event in which intra- and extra-regional trade intensity indices go in the same direction.[4]

In order to control for those factors, and to evaluate the propensity for intraregional trade for South and North American countries, we use the revealed import and export preference indices (Iapadre and Tajoli, 2014) which are constructed using two components: the regional trade intensity index (HI_{ir})[5] and an "extra-regional" trade intensity index (HE_{ir})[6]:

$$HI_{ir} = (T_{ir}/T_{iw})/(T_{or}/T_{ow})$$
$$HE_{ir} = \big(1 - (T_{ir}/T_{iw})\big)/\big(1 - (T_{or}/T_{ow})\big)$$

Where: T_{ir} are exports (or imports) between country i and region r. T_{iw} are exports (or imports) between country i and world w. T_{or} are exports (or imports) between the rest of the world (excluding country i) and the region. T_{ow} are exports (or imports) between the rest of the world and the world.

In order to avoid problems of range asymmetry and dynamic ambiguity, the indices of revealed import and export preferences are estimated using the ratio between the difference and the sum of HI_{ir} and HE_{ir}:

$$RMP_{ir} = (HMI_{ir} - HME_{ir})/(HMI_{ir} + HME_{ir})$$
$$RXP_{ir} = (HXI_{ir} - HXE_{ir})/(HXI_{ir} + HXE_{ir})$$

In this case, the range goes from minus one (no regional trade) to one (only regional trade) and is equal to zero when there is geographic neutrality. The difference between RMP_{ir} and RXP_{ir} shows the relative[7] importance of the region in the imports and exports of country i.

In Table 1 (a and b) we present the estimation for both the intraregional export preference index (RXP_{ir}) and the intraregional import preference index (RMP_{ir}) for 10 year benchmarks between 1870 and 1950 for the countries of South and North America. Due to the paucity of data for world totals in 1940, we calculate the indices for 1938.

[3] When the weight of regional trade is equal to the weight of world trade.
[4] See Iapadre (2006).
[5] The maximum value does not depend on the size of the partner.
[6] It measures the intensity of trade relations between country i and all other countries, except region r.
[7] It takes into account trade with the rest of the world.

Table 1(a). Intraregional export preference index

	1870	1880	1890	1900	1910	1920	1930	1938	1950
Argentina	0.46	0.49	0.61	0.19	0.16	0.67	0.36	0.35	0.44
Brazil	0.49	0.32	-0.18	-0.23	-0.12	0.32	-0.29	0.06	0.18
Uruguay	0.65	0.67	0.66	0.19	0.21	0.65	0.31	-0.11	-0.22
Chile	0.59	0.39	-0.27	-0.64	-0.64	-0.47	-0.55	0.05	0.53
Colombia	-0.99	-0.99	-0.71	-1.00	-0.99	-0.92	-0.95	-0.85	-0.83
Venezuela	-1.00	-1.00	-1.00	-1.00	-1.00	-0.72	-0.65	-0.87	-0.02
Peru	0.23	0.46	0.66	0.46	0.42	0.46	0.85	0.63	0.63
Ecuador	-0.08	0.76	0.65	0.25	-0.46	-0.16	0.46	0.7	0.41
North									
Mexico	0.05	0.25	0.66	0.46	0.57	0.44	0.46	0.25	0.75
United States	0.62	0.34	0.50	0.51	0.67	0.39	0.66	0.56	0.65
Canada	0.89	0.56	0.68	0.21	0.53	0.42	0.63	0.41	0.79

Table 1(b) Intraregional import preference index

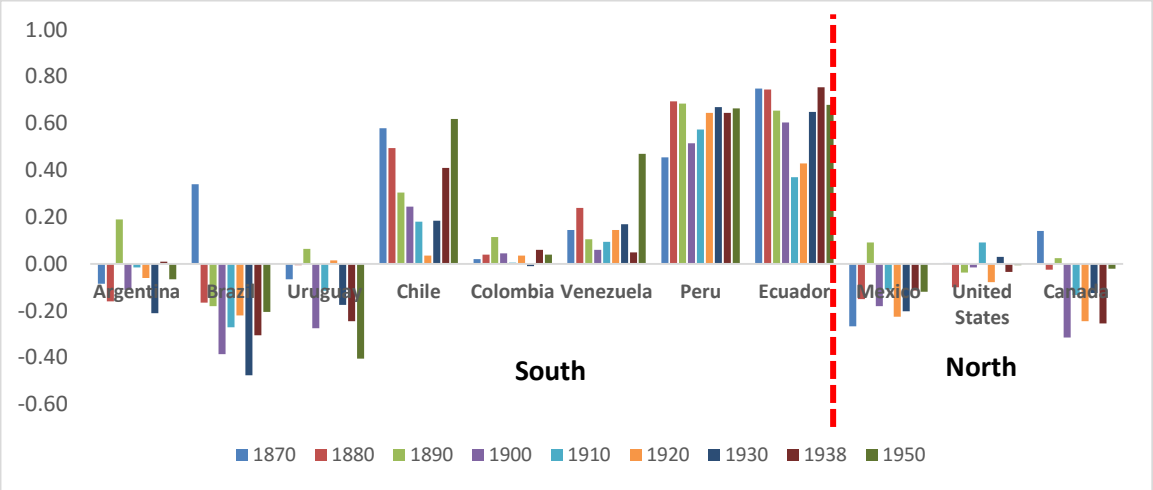
	1870	1880	1890	1900	1910	1920	1930	1938	1950
Argentina	0.69	0.84	-0.01	0.41	0.19	0.46	0.62	0.33	0.57
Brazil	-0.19	0.29	0.52	0.57	0.44	0.90	0.85	0.67	0.59
Uruguay	0.82	0.84	0.53	0.74	0.44	0.87	0.66	0.38	0.59
Chile	-0.65	-0.73	-0.88	-0.80	-0.80	-0.54	-0.81	-0.77	-0.71
Colombia	-0.98	-0.89	-0.94	-0.98	-0.99	-0.99	-0.93	-0.97	-0.91
Venezuela	-1.00	-1.00	-0.98	-0.98	-0.98	-0.98	-0.99	-0.97	-0.96
Peru	-1.00	-1.00	-0.92	-0.89	-0.93	-0.83	-0.87	-0.66	-0.70
Ecuador	-0.88	-0.81	-0.68	-0.88	-0.98	-0.94	-0.84	-0.81	-0.95
North									
Mexico	0.58	0.55	0.48	0.82	0.79	0.89	0.86	0.47	0.99
United States	0.61	0.53	0.57	0.54	0.49	0.55	0.60	0.63	0.66
Canada	0.60	0.60	0.63	0.84	0.79	0.91	0.88	0.92	0.83

In Figure 5 we summarize the results obtained by the estimation of a *revealed trade leadership* index which is calculated using the gap between the two indices ($RTL_{ir} = (RXP_{ir} - RMP_{ir})/2$). An index greater than zero implies that the country has a higher intraregional preference for exports than for imports, while a value lower than zero means that there is a higher intraregional preference for imports.

In the case of South America, on the one hand, Argentina, Brazil and Uruguay showed a higher intraregional preference for imports, which means that these countries

had an important role as destination markets for the region. And on the other hand, we observe that, Chile, Colombia, Venezuela, Peru and Ecuador had a higher intraregional preference for exports, implying that those countries were more suppliers than demanders in the South America region. Finally, in the case of North America, for most years we observe a higher intraregional preference for imports, for both Mexico and Canada, while the United States showed a split trend.

Figure 5. Revealed trade leadership index



Sources Table 1(a) and 1(b)

These results show that there are two different patterns of trade leadership in the South that remain consistent throughout the period, while the US played a key role in the North. Not only did Argentina, Brazil and Uruguay show a different tendency with respect to both the cluster and the index, they also did not demonstrate indications of being regional commercial hubs, or what we call the "US effect" in the North.

As mentioned previously, regional propensity is affected by the participation of the region in world trade. This explains how the propensity to trade within the region decreased during the years of the commodity boom, especially in the South, and why regional propensity was higher during the Second World War. These elements are considered in the following section in which we estimate a gravity model for bilateral trade flows.

4. Regional trade with Gravity

4.1 Gravity model

The gravity model postulates that trade between two countries is proportional to the product of their economic size and inversely related to the distance between them, by analogy with the formula of gravitational attraction between two masses. Because it has

worked consistently well in many empirical analyses of international trade (Anderson, 1979; Anderson & van Wincoop, 2003) many authors have proposed new theoretical and methodological foundations for the evaluation of trade patterns.

Early versions of the model used the geographical distance between two countries and their GDP to explain bilateral trade flows. However, in recent years the literature has addressed the need for an adequate formulation of the model and the variables used in order to obtain reliable results. In theoretical terms, Anderson and van Wincoop (2003) derive the following micro-founded gravity equation for bilateral trade flows between countries i and j:

$$X_{ij} = \frac{Y_i Y_j}{Y_w} \left(\frac{t_{ij}}{P_i P_j} \right)^{1-\sigma} \quad (2)$$

Where Y_i, Y_j and Y_w are the nominal incomes from the exporter, importer and world, respectively. σ is the elasticity of substitution between goods from different countries, following the common assumption that $\sigma > 1$ because consumers in country j prefer variety. P_i and P_j are country $i´s$ and country $j´s$ price indices, which Anderson and van Wincoop (2003) call the multilateral resistance terms -MRT-. t_{ij} is the gross trade cost associated with exports from i to j and have to be measured against P_i and P_j.

Anderson & van Wincoop (2003) show that a well-specified gravity model should control for relative trade costs, i.e., the inclusion of the MRT takes into account not only the bilateral trade costs but also those costs relative to the rest of the world. According to Baier & Bergstrand (2009), the MRTs are fundamental for understanding the impact of border barriers on bilateral trade.

The main issue is that P_i and P_j are not observed and should be estimated. Anderson and van Wincoop (2003), considering symmetric trade costs, use 41 market equilibrium conditions and some observed variables like distances, borders and income shares to obtain the MRT terms. The drawback with their method is that it requires a lot of information and therefore is not easily replicated (Gómez-Herrera, 2013).

Three alternatives are commonly used in the literature to estimate the MRT terms. In the first place some authors include a remoteness variable, which includes the bilateral distance, and the share of each country's GDP in world GDP.[8] However, this is not the most popular alternative because it lacks theoretical foundation. On the other hand, some authors include specific effects. For instance, Feenstra (2002) suggested including exporter and importer fixed effects; Baltagi, Egger and Pfaffermayr (2003) include country-pair, exporter-time and importer-time effects and, Egger and Pfaffermayr (2013) include fixed-pair and fixed-time effects. Finally, Baier & Bergstrand (2009) propose an approximation of P_i and P_j through a first-order Taylor series expansion.

[8] $Rm_i = \sum_j \frac{d_{ij}}{(Y_j/Y_{ROW})}$

In terms of the estimation method, there is a large literature on the most proper econometric specification of the gravity model. Some aspects that should be considered when the model is estimated are: data structure (cross-sectional or panel data), the possible heteroscedasticity in the error term, the presence of zeros in trade data and the problem of missing data. Additionally, there is no consensus on whether the model should be estimated in levels or in log-linearized form.

The implementation of the log-linearized equation is supported by the fact that the theoretical construction of the model is a CES multiplicative expenditure function. This specification allows the coefficients to be interpreted as elasticities but omits the pairs of countries for which trade is zero. As has been discussed by some authors, this is undesirable to the extent that the missing observations contain information on why low levels of trade are observed (Eichengreen & Irwin, 1998) or missing data can occur due to lack of information. Silva & Tenreyro (2006) propose an approach to deal with the presence of zeros in the dependent variable and heteroscedasticity in the error term, using a pseudo-maximum-likelihood (PPML) technique.

As there is no consensus on the best method of estimating the gravity model, the choice has to be made by considering each particular dataset (Martínez-Zarzoso, 2013). In our paper, in order to evaluate the patterns of S-S and N-N trade, an expanded version of the gravity model in log-linearized form is estimated. In addition to the variables usually included in the gravity model, we incorporate a variable to test if the similarity in terms of demand structure reduces or increases bilateral trade.

Following the Linder Hypothesis, we then add a variable to capture Differences in Demand Structure (DDS). As we had no systematic information on demand, we use as a proxy the absolute value of the difference between the logarithms of per capita GDPs. A positive estimate of the DDS validates the hypothesis that different income levels have positive effects on trade. Conversely, a negative result of the DDS variable would validate the Linder hypothesis, which states that most trade occurs when countries have almost the same income category.

Econometric tests of the hypothesis usually proxy the demand structure in a country by its per capita income. According to Linder (1961, p. 17): "To the extent that per capita income determines the demand structure, trade between countries will be more intensive the more equal per capita incomes are". This measure has been used to gauge differences in DDS by Helpman (1987), Gao (2003) and Baltagi, Egger & Pfaffermay (2003). Our augmented gravity model thus takes the following form:

$$LnX_{ijt} = \beta_1 LnGDP_{it} + \beta_2 LnGDP_{jt} + \beta_3 Lndist_{ij} + \beta_4 DDS + \sum_{k=1}^{n} \beta_k Z_k + \gamma_{ij} + \delta_t + \varepsilon_{ijt} \quad (3)$$

Where i and j represents the exporter and importer countries, respectively, and t represents time. LnX_{it}, $LnGDP_{it}$, $LnGDP_{jt}$ and $Lndist_{ij}$ are the natural logarithms of: the exports[9], the GDP's[10] of the exporter and the importer countries and, the distance between i and j. $\sum_{k=1}^{n} Z_k$ represents the set of dummy variables: Common border, common language, if both countries are from South America (S-S) or North America (N-N). Finally, γ_{ij} are country-pair specific effects and δ_t are specific time effects.

4.2 Data and results

The literature has widely documented the problem of the availability and accuracy of trade data for some countries for the late nineteenth century and part of the twentieth century. To our knowledge, this work constitutes the first attempt to evaluate South-South trade from 1870 onwards based on a new historical data base of bilateral trade. In this case much of the data of bilateral trade flows was obtained from the official statistics of each country or their business partners and, when these were not available, from secondary sources (see Appendix).

Due to the fact that the gravity model is an expenditure function, it is inappropriate to use the real GDP (Baldwin & Taglioni, 2006), so we take GDP from *Maddison data* and convert it to current prices using the GDP deflator of the United States. As inadequate deflation can generate biases, two types of controls are taken into account: first, a contrast of validity is performed with the nominal series obtained from Federico-Tena (2016b)[11] and, on the other hand, dummies for country-time effects are included.

The most obvious candidate for explaining the differential intensity of bilateral linkages is transportation costs. To find differences in shipping costs between goods traded with Europe and those traded regionally would not be a surprise. As mentioned in the introduction, we know that the level of international transactions costs is determined by past investments in physical infrastructure, information, financial and trade networks and trade economies of scale. Unfortunately, for the period under analysis there exists only fragmentary information on regional shipping costs in South America that is inappropriate for use in an econometric model.[12] We thus use the traditional proxy of distance, measured in nautical miles between the major ports, taking into account the distance before and after the opening of the Panama Canal.[13]

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[9] The gravitational theory suggests considering uni-directional trade, rather than averaging trade flows (Baldwin & Taglioni, 2006). Therefore, we have the exports in each direction for every country-pair.

[10] GDP_j and GDP_i are proxies for demand and production. Note that the theoretical gravity model uses aggregate GDP, not per capita GDP.

[11] These data were available in local currency, so exchange rates were used to convert them into current dollars.

[12] A recent effort to offer some dispersed information on intra-South American freight rates can be found in Badia-Miró, Carreras-Marín & Meissner, (2014) p. 16-20.

[13] The information was taken from: http://www.portworld.com/.

We analyze the patterns of bilateral trade for South America (Argentina, Brazil, Uruguay, Colombia, Ecuador, Peru, Venezuela and Chile), and North America (Mexico, United States and Canada), considering the largest number of trading partners of those countries for which information on bilateral trade is available. Bolivia and Paraguay are excluded from the sample because no GDP information is available for much of the period analyzed. Also, due to this reason as well as the scarcity of bilateral trade information before the 1950s, Central America was not included in this study.

Given that we are interested in measuring the effects of time-invariant variables and that with the Fixed Effects model it is impossible to estimate such effects, we estimate Equation (3) using Feasible Generalized Least Squares (FGLS), following the formulation proposed by Mundlak (1978).[14] This formulation includes within and between effects and has been used recently by other authors (Egger and Url, 2006; Martínez-Zarzoso *et al*, 2014). Such a methodology allows for the control of unobserved heterogeneity and in turn the estimation of time-invariant causes of the dependent variable.

We perform the estimation for two periods (1870–1913 and 1914–1950) with standardized data, and then compare coefficients across the periods (Table 2). In both cases, the signs for GDP and distance are as expected, but the impact of the three variables on exports is higher in the first period.

Table 2. Gravity estimation

Dependent variable: Exports (log)	**(1)** 1870-1913	**(2)** 1914-1950
Exporter's GDP (log)	.6346***	.5320***
	(.0300)	(.0210)
Partner's GDP (log)	.7181***	.3061***
	(.0289)	(.0204)
Distance (log)	-1.317***	-.9418***
	(.1067)	(.1018)
Common border	.3771	-.5240***
	(.2376)	(.1360)
Common language	.0118	-.2696**
	(.0995)	(.1291)
DDS	-.1448***	-.0682***
	(.0176)	(.0144)

[14] This approach allows for the correction for selection bias emerging from the correlation of the disturbances (Wooldridge, 1995).

S-S	-1.041***	.3786***
	(.1983)	(.1455)
N-N	-3.022***	-1.059***
	(.2484)	(.1812)
S-S* (WWI)	-	.0382
		(.0307)
N-N* (WWI)	-	-.0429
		(.0335)
S-S* (WWII)	-	.2257***
		(.0245)
N-N* (WWII)	-	.1307***
		(.0312)
S-S* (Great Depression)	-	-.1343***
		(.0219)
N-N* (Great Depression)	-	-.1686***
		(.0264)
Number of observations	6767	9347

Robust standard errors in parentheses.
*Significant at 10%; **significant at 5%; ***significant at 1%

Contrary to expectation, Table 2 shows that sharing border and language did not increase the propensity to trade. Both variables are part of the natural reduction of transaction costs expected between neighbors with similar institutions. According to Bethell (1991, p. 587-88) geographical and topographic reasons determined the bad land transport infrastructure between border countries and are probably involved in this counter-intuitive result that is independent of the maritime distance captured by the model (see Limão and Venables, 2001).[15]

On the other hand, a negative propensity of regional trade in the Americas is confirmed for both the North and the South in the first period. The commodity boom in Latin America and North America negatively influenced regional trade and this is consistent with the trend observed in Figure 3 for the first part of the period. Although the coefficient of North America in the period 1870-1913 is reduced in the second period, it is still negative. This means that Regional N-N trade grew less than it should have according to the assumptions of the gravity model. That is, commodity boom exports in the North increased Atlantic trade faster than in the South in relation with their respective partners of demand.

[15] For the influence of cultural proximity by language on bilateral trade see Felbermayr and Toubal (2010).

Additionally, the South (because the North has a negative coefficient for the whole interwar period) decreased its regional propensity to trade during the Great Depression, while both regions show a positive propensity during the Second World War. In the first case, the period of the Great Depression showed a similar regional propensity in both regions, as shown in Figure 3, while in the second case the propensity to increase regionalization was higher in the South than in the North due to the lower involvement of the South in the European War.

The results displayed in Table 2 also confirm our second hypothesis on the relevance of the Difference on Demand Structure (DDS) determinants on the regional propensity to trade. As mentioned previously, this variable shows that more regional trade occurs when countries have a convergent regional demand structure, captured by income differentials. This result would validate the Linder hypothesis, confirming that demand structure is one of the relevant explicative variables of the waves in trade regionalization in South and North America.

Finally, in order to give more robustness to this demand structure hypothesis, we examined the types of products exchanged by Argentina and Brazil, which showed a positive propensity to trade within the region and between them. The information for selected years for Argentina and Brazil is summarized in Table A.1. The selection of these countries allows for a long-term comparison, both due to their size but also to the stability of their bilateral trade relations.

In spite of the historical problems with some sources, we use the most disaggregated information at our disposal. It is important to note that, in some early years, we were confronted by a low level of disaggregation, which can be observed in Table A.1, where, for example, in a specific year there were no manufactured products. However, this does not affect our analysis because we want to assess the trend of the respective products that these countries were trading.

As shown in Table A.1, until almost the third quarter of the twentieth century Argentina and Brazil mostly traded in a small group of commodities. On one hand, Argentina experienced important changes in the type of commodities exported to Brazil during the last quarter of the nineteenth century, from mostly meat and meat preparations in the 1870s and 1880s to largely cereals and cereal preparations before the First World War. On the other hand, in the same period, Brazil showed a steady export trend towards Argentina, first in sugar and tobacco and later in coffee and other products such as yerba mate, vegetables and fruit, cork and wood.

With the exception of Brazil in 1948, exports (as reported in Table A.1) were constituted mainly by primary products. The reciprocal demand structure of one of the most intensive bilateral trade relations in South America was characterized until the mid-twentieth century by similar demand import structures with labor-intensive products, reinforcing the finding obtained by the inclusion of the DDS variable in the model. Clearly, this exercise does not allow us to include land transport costs or evaluate other

hypotheses on the failure of regional trade that go beyond the structure of demand and that are related to additional geographical and institutional factors.

Conclusions

Compared to other regions like Europe or East Asia, South America possessed a smaller share of regional trade during the late nineteenth century and much of the twentieth century. Our results confirm the conventional view of the existence of a historical handicap of regional trade in the Americas, especially during the commodity boom of the Atlantic globalization. Intraregional trade, both in the North and in the South, showed a similar bias during the first globalization (negative) and the Second World War (positive).

Cultural proximity did not contribute meaningfully to overcoming other negative variables discussed by the literature such as potential geographical difficulties in common borders, high regional shipping cost, and weak financial and trade networks. In addition, our analysis supports the hypothesis that the failure of regional trade is not due to similar demand structures but precisely the opposite. Contrary to expectation, regional trade in the North was lower than in the South according to gravity standards. This is consistent with the Linder hypothesis that maintains that, independently of the volume of demand, regional trade was bigger when the income gap between countries was narrower.

In the case of South America, and unlike the "US" effect in the North, we identified the absence of a commercial hub that could have affected the overall performance of the region. We propose in this paper that the fragmented trade found for the whole region could be viewed differently if we consider the differences between the countries of the region, in terms of the size of the volume of trade and intraregional trade preferences.

Following this strategy, we found, using a cluster analysis, five different groups in terms of the volume of exports to the region, with Argentina and Brazil on the top and Colombia, Ecuador and Venezuela on the bottom, and two types of sub-regions in terms of revealed intraregional trade leadership. In this case, Argentina, Brazil and Uruguay exhibited a destination market role while Chile, Peru, Colombia, Ecuador and Venezuela were mainly origin markets.

Clearly, this initial exercise does not allow us to include regional land and shipping transport costs or evaluate other hypotheses on the failure of regional trade that go beyond the structure of demand and that are related to additional geographical and institutional factors that require, without any doubt, further investigation.

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Appendix

I. Table A.1. Bilateral trade between Argentina and Brazil.
II. Bilateral trade data appendix

I. Table A.1. Bilateral trade between Argentina and Brazil (exports)

Group	Argentina to Brazil		Brazil To Argentina	
	1870			
	%	**Main Products**	**%**	**Main Products**
Primary	98,6	01 - Meat and meat preparations: 85% 04 - Cereals and cereal preparations: 6,6% 00 - Live animals: 2,5%	96,5	06 - Sugars, sugar preparations and honey: 59%
Manufactured	1,2		--	12 - Tobacco and tobacco manufactures: 17,5%
Other and unclassified	0,2		3,5	07 - Coffee, tea, cocoa, spices, and manufactures thereof: 9%
	1885			
	%	**Main Products**	**%**	**Main Products**
Primary	93,1	01 - Meat and meat preparations: 59,3% 04 - Cereals and cereal preparations: 23,2% 08 - Feeding stuff for animals (not including unmilled cereals): 9,2%	97,1	07 - Coffee, tea, cocoa, spices, and manufactures thereof: 65,4%
Manufactured	3,6		2,5	12 - Tobacco and tobacco manufactures: 20,6%
Other and unclassified	3,3		0,38	06 - Sugars, sugar preparations and honey: 4,5%
Group	**Argentina to Brazil**		**Brazil To Argentina**	
	1892			
	%	**Main Products**	**%**	**Main Products**

Primary	97,6	04 - Cereals and cereal preparations: 68% 01 - Meat and meat preparations: 19,6% 08 - Feeding stuff for animals (not including unmilled cereals): 3%	97,1	07 - Coffee, tea, cocoa, spices, and manufactures thereof: 83,4%
Manufactured	0,9		--	12 - Tobacco and tobacco manufactures: 4,1%
Other and unclassified	1,5		2,9	04 - Cereals and cereal preparations: 3,2%
	1901			
	%	**Main Products**	**%**	**Main Products**
Primary	95,7	04 - Cereals and cereal preparations: 61% 01 - Meat and meat preparations: 24,4% 00 - Live animals other than animals of division 03: 6,8%	99,7	07 - Coffee, tea, cocoa, spices, and manufactures thereof: 92,3%
Manufactured	3,7		0	05 - Vegetables and fruit: 2,5%
Other and unclassified	0,6		0,3	12 - Tobacco and tobacco manufactures: 2,1%
	1912			
	%	**Main Products**	**%**	**Main Products**
Primary	88,8	04 - Cereals and cereal preparations: 86,8% 01 - Meat and meat preparations: 1,3% 21 - Hides, skins and furskins, raw: 0,7%	93,8	07 - Coffee, tea, cocoa, spices, and manufactures thereof: 83,5%
Manufactured	--		--	12 - Tobacco and tobacco manufactures: 9,8%
Other and unclassified	11,2		6,2	24 - Cork and wood: 0,5%

Group	**Argentina to Brazil**		**Brazil To Argentina**	
	1924			
	%	**Main Products**	**%**	**Main Products**

Primary	94,6	04 - Cereals and cereal preparations: 86,8%	98,8	07 - Coffee, tea, cocoa, spices, and manufactures thereof: 70,3%
Manufactured	5,3	05 - Vegetables and fruit: 3,8%	0,7	05 - Vegetables and fruit: 9,9%
Other and unclassified	0,2	61 - Leather, leather manufactures, n.e.s., and dressed furskins: 2,3%	0,5	24 - Cork and wood: 9,1%
	1936			
	%	**Main Products**	**%**	**Main Products**
Primary	91,2	04 - Cereals and cereal preparations: 91,2%	82	07 - Coffee, tea, cocoa, spices, and manufactures thereof: 42,7%
Manufactured	0,4	79 - Other transport equipment: 0,4%	0,2	05 - Vegetables and fruit: 17,4%
Other and unclassified	8,4	33 - Petroleum, petroleum products and related materials: 8,4%	17,8	12 - Tobacco and tobacco manufactures: 5,5%
	1948			
	%	**Main Products**	**%**	**Main Products**
Primary	97,9	04 - Cereals and cereal preparations: 81,5%	69,4	24 - Cork and wood: 34,5%
Manufactured	1,9	05 - Vegetables and fruit: 10,6%	30,0	07 - Coffee, tea, cocoa, spices, and manufactures thereof: 19,6%
Other and unclassified	0,2	29 - Crude animal and vegetable materials, n.e.s.: 1,6%	0,6	65 - Textile yarn, fabrics, made-up articles, n.e.s., and related products: 15,5%

In order to standardize the information, we draw upon the SITC Rev.3 in order to classify the products they traded: we have used two-digit codes to classify products into primary (00-29), and manufactured goods (32-89) and other or unclassified (91-97).

II. Bilateral trade data appendix

We use, as far as possible, primary sources, i.e., we gave preponderance to the data obtained from the foreign trade statistics of our eleven countries. Because inaccuracies may arise from the use of this information, it is contrasted with data from trading partners, when available. Additionally, the information of trading partner's records was used in the case where we did not have the series of our primary sources.

The information from trading partners and secondary sources is used also when the primary source in a given year was not available. With these sources we calculated growth rates to impute the data of a year or a few years from a previous data point of the actual series. However, it is impossible to obtain a dataset without missing values.

We also know that our database does not contain information of other countries with which these countries could trade, nevertheless it is not only an important historic effort but also we have information of bilateral trade that represents a high percentage of the total trade of our countries.

Countries included in the gravity model (trade partners)

Argentina	Brazil, Canada, Chile, Colombia, Denmark, Ecuador, France, Germany, Italy, Japan, Mexico, Netherlands, Norway, Peru, Portugal, Spain, Sweden, UK, Uruguay, US, Venezuela.
Brazil	Argentina, Canada, Chile, Colombia, Denmark, Ecuador, Finland, France, Germany, Italy, Mexico, Netherlands, Norway, Peru Portugal, South Africa, Spain, Sweden, UK, Uruguay, US, Venezuela.
Canada	Argentina, Australia, Brazil, Chile, China, Colombia, Ecuador, France, Germany, Greece, Italy, Japan, Mexico, Netherlands, New Zealand, Norway, Peru, South Africa, Spain, UK, Uruguay, US, Venezuela.
Chile	Argentina, Australia, Brazil, Canada, Colombia, Ecuador, France, Germany, Italy, Japan, Mexico, Netherlands, Peru, Spain, UK, Uruguay, US, Venezuela.
Colombia	Argentina, Brazil, Canada, Chile, Ecuador, France, Germany, Italy, Mexico, Netherlands, Peru, Spain, UK, Uruguay, US, Venezuela.
Ecuador	Argentina, Brazil, Canada, Chile, Colombia, France, Germany, Italy, Mexico, Netherlands, Peru, Spain, UK, Uruguay, US, Venezuela.
Mexico	Argentina, Brazil, Canada, Chile, Colombia, Ecuador, France, Germany, Italy, Netherlands, Peru, Spain, UK, Uruguay, US, Venezuela.
Peru	Argentina, Australia, Brazil, Canada, Chile, China, Colombia, Ecuador, France, Germany, Italy, Japan, Mexico, Netherlands, Spain, UK, Uruguay,

	US, Venezuela.
United States	Argentina, Australia, Brazil, Canada, Chile, China, Colombia, Denmark, Ecuador, Finland, France, Germany, Greece, Italy, Japan, Mexico, Netherlands, New Zealand, Norway, Peru, Portugal, South Africa, Spain, Sweden, Thailand, UK, Uruguay, Venezuela.
Uruguay	Argentina, Brazil, Canada, Chile, Colombia, Ecuador, France, Germany, Italy, Mexico, Peru, Portugal, Spain, UK, US, Venezuela.
Venezuela	Argentina, Brazil, Canada, Chile, Colombia, Ecuador, France, Germany, Italy, Mexico, Netherlands, Peru, Spain, UK, Uruguay, US.

Sources: Bilateral Trade Records.

- Bilateral exports from Brazil, Argentina and Uruguay between 1870 and 1939 were re-evaluated, i.e., adjusted by a coefficient which reflects the difference between the estimated and official exports. Official data were taken from: IPEA for Brazil, Ferreres (2005) for Argentina and Statistical Yearbook of the Republic of Uruguay. The estimated are obtained from: Absell-Tena (2015) for Brazil, Tena & Willebald (2013) for Argentina and Bonino-Willebald-Tena (2015) for Uruguay.

- All data are expressed in millions of current dollars. The dataset for exchange rates came from Federico-Tena (2016 a) and some adjustment has been done using information from: GRECO (2002) for Colombia, Nahum (2009) for Uruguay, Braun-Llona *et al*. (1998) for Chile, Moll and Barreto (1942) and Thorp & Bertram (1985) for Peru, and Cortés Conde *et al.* (1985) for Argentina. and Global Financial Data and MOXLAD as last resource.

Bilateral Trade records

As mention most of the information was obtained with the own *American trade records*, but for some years and countries we have complemented with *Trading partner's records* and the following comparative international sources which we omitted from that list: mainly Board of Trade (several years) *Statistical Tables Relating Foreign Countries*. Compiled chiefly from the official returns of the respective countries. British Parliamentary Papers. London and Pan American Union (1952). Other sources used: Barbieri & Keshk (2012).

A. American bilateral trade records

Argentina

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