Factors behind South-American trade integration failure, 1913-50[1]

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Abstract

Except in the case of NAFTA, Latin American trade integration today is still modest. Regional exports or imports are around 20% of total trade. Even more, it is quite impressive to note that present trade integration levels are similar or even smaller than those reached during the Second World War. By 1945, 25.6% of all Latin American imports were regional; while regional exports levels reached 16.6%.

Given this fact and considering a five South American countries sample (Argentina, Chile, Peru, Bolivia and Brazil) we have explored this issue looking at 1913-1950 (Peres Cajías et al., 2012). This period represents an extraordinary opportunity to analyse regional trade integration. This is because of the existence of three external shocks -two World Wars and the Great Depression- that disrupted trade relationships between Latin American countries and US and Europe –its main trade partners. The main findings of the work proved that any of these external shocks caused sustainable changes in regional trade. It was shown that *a)* with the exception of world war years, regional trade has been low since 1913 till today; *b)* with the exception of Brazilian exports during the 1940's, regional trade repeated the global trade specialization: a high product concentration and a high concentration in low value added products.

The present paper looks to identify the determinants behind this poor trade relationship. It does still looking at the 1913-1950 period and the same five countries sample. It does using a gravity model. We explore the relative importance of the classical variables used in gravity equations – economic size and distance. However, we also test the incidence of several variables which seems to be critical to Latin American trade relationships -bilateral barter terms of trade (BTTs), factor endowments and specialization in natural resources.

Key words: Gravity models, bilateral trade, Latin America

JEL codes: F14, C43, N76

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1. Introduction

In 2010, regional trade within Mercosur (Common Southern Market) was 15,7% of its total exports. Although 43% of Bolivian exports went to Mercosur, it was only 25% in the case of Argentina, 11% in the Brazilian case, 8% for Chile and 3% for Peru[2]. With the exception of Bolivia, trade integration in the region seems to be still very modest. In this situation, it is quite impressive to note that present trade integration levels are the same or even smaller than those reached during the Second World War for most of the South American countries. By 1945, 16.6% of all Latin American exports were regional[3]. As an average for the period 1946-51, Peru exported 33% of its exports to Latin American countries, Chile 15%, Argentina 13%, Brazil 11%, and Bolivia 2,5%[4]. We focus in this paper the reasons why trade integration in South America reaches levels lower than might be expected from the complementary nature of the economies concerned.

Considering a five South American countries sample, we have previously explored this issue looking at the 1913-1950 period (Peres Cajias, Badia-Miro, & Carreras-Marin, 2012). It represents an extraordinary opportunity to analyse regional trade. This is because of the existence of three external shocks -two World Wars and the Great Depression- that disrupted trade relationships between Latin American countries and US and Europe –its main trade partners. The main findings of the work proved that any of these external shocks caused sustainable changes in regional trade. It was shown that *a)* with the exception of world war years, regional trade has been low since 1913 till today; *b)* with the exception of Brazilian exports during the 1940's, regional trade repeated the global trade specialization: a high product concentration and a high concentration in low value added products.

The present paper looks to identify the determinants behind this poor trade relationship. It does using a gravity equation, which introduces some classical variables in this literature – economic size and distance- but also some other variables critical to Latin American trade relationships -bilateral Barter Terms of Trade, factor endowments and primary exports specialization. The mains results confirm the positive effect of economic development –measured by GDP- and the negative effects of distance. But it also points out the negative effects of natural resources concentration.

This last result stress one more time the need to understand why regional flows repeated the global trade specialization in low valued added products. Why, despite a not negligible industrial growth, South American countries were not able to overcome a trade relationship based in raw natural resources? This question arose as several works shows that some Latin American countries caught-up the more developed in terms of industrial production all along the 1913-50 years. For example, this has been done looking at the industrial growth in the "industrial periphery" in relation to that of Germany, the United States and the United Kingdom (Williamson, 2011). While these new data

[2] CEPAL-BADECEL (http://websie.eclac.cl/badecel/)
[3] (Bulmer-Thomas, 1997).
[4] (ECLAC, 1957, p. 19).

shows an industrial capacity divergence in Chile since the end of the nineteenth century and a relative stagnation in Peru during the 1913-1950 period, it confirms a strong industrial development in Argentina and Brazil. So, at least in some South American countries, intra-industry trade was an economic possibility throughout the 1913-1950 periods.

It could be argue that, despite its growth, South American industrial capacity was still modest. Then, given this absolute low industrial capacity, it would be hard to expect an intra-industry trade increase among South American countries. However, it must be recall that all along the 20th Century second half, when industrial capacity was modest but dynamic, intra-industry trade grew considerably in East Asia. More striking, all along the 1960-1980 period, it also happened in Central America. Then, the question that here arises is why this was possible in East Asia and in Central America and why not in South America.

The present paper is organized as follows. Section 1 presents some stylized facts on South American regional trade. Section 2 discusses the gravity model and the variables used on it. Section 3 presents the main results. Finally, some preliminary conclusions are offered.

2. Regional trade in South-America, 1913-1950

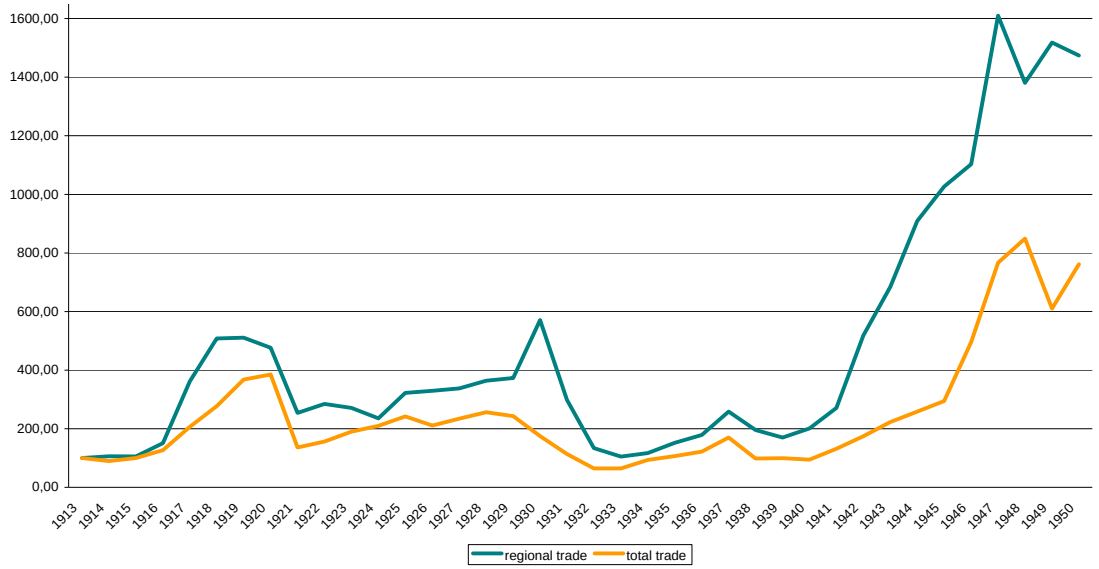
During the 1913-1950 period, the evolution of total trade – total exports of the five countries- shows the impact of three external shocks: the First World War, the Great Depression and the Second World War (see Figure 1). The external shocks generated two clear patterns. On one hand, world wars increased trade everywhere. Beyond the similarities, total trade during WWII was higher than in WWI. On the other hand, the Great Depression had a negative effect on total trade. Because of its long term effects, Latin American Economic history has focused closely on this last effect.[5] Had regional trade also followed the same path as global trade did? Figure 1 highlights how the three external shocks identified above – the World Wars and the Great Depression – had also an impact on regional trade, but the main difference was that it had developed better during the whole period.

Figure 2 shows the pattern of regional trade expressed as share over total exports of these five countries. In this case, the regional share increases with the three external shocks. It is true that these increases are not strictly similar. While during the two world wars, regional trade increased in absolute values, as long as total trade was also increasing at this time; it is clear that this explanation does not apply to the Great Depression. During this period, total trade decreased in absolute terms, while regional also decreased but at a lower rate. Consequently, regional trade (exports) reached 15% during the Great Depression, due to the trade collapse of the world markets. In contrast, regional trade increased in relative and absolute terms during both World Wars. During the First World War, regional trade (exports) achieved a maximum of 9%. During the Second World War, the expansion was greater and regional trade (exports) reached 17% of total trade.

[5] (Thorp, 1984).

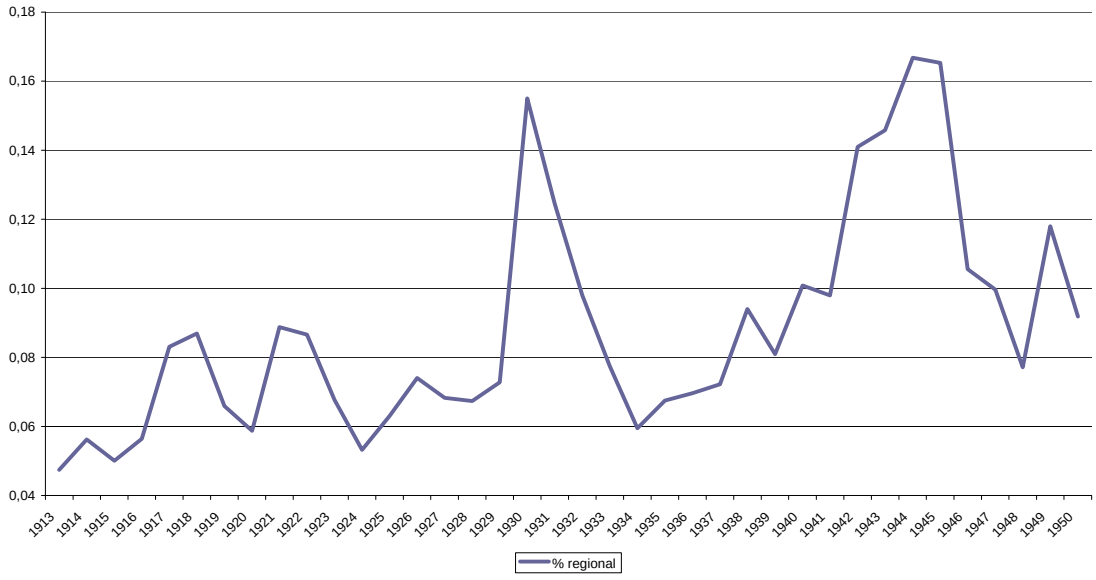
Figure 1. Total trade and regional trade of Argentina, Chile, Peru, Bolivia and Brazil (exports in millions of USA dollars, constant prices from 1926).

Values in index numbers 1913= 100



Sources: MOXLAD corrected by the prices of Hanes, C. (2006)[6]

Figure 2. Share of regional trade (exports) over total exports of Argentina, Chile, Peru, Bolivia and Brazil (millions of USA dollars, constant prices from 1926)



Sources: calculations based on Latin American official statistics and MOXLAD total trade data

Regional imports were clearly greater than regional exports, due to the fact that the main exports of South America went to USA and Europe.[7] Bolivia had the highest levels in terms of regional

[6] (Hanes, 2006; MOXLAD, 2011).
[7] Peres Cajías, Badia-Miró & Carreras-Marín, 2012.

imports, but it was more modest in the export side. Bolivian regional exports did not change appreciably throughout the period. We can only clearly see a positive effect of the First World War on exports in the case of Brazil and Chile. Peru was the country with higher shares of regional trade over its exports, but this is close connected to its high dependency on sugar and petroleum exports. The Great Depression led to a considerable decrease in Peruvian regional exports. This is a critical fact, given that Peru had a higher weight of regional exports during the First World War period. Peruvian regional exports continued increasing during the 1920s, but decreased in 1935. It was not until the beginning of Second World War that the pre-Great Depression levels were recovered. In relation to Argentina, Brazil and Chile, a significant increase in regional trade exports was identifiable in the case of the Second World War.

The pattern identified in our sample can probably be extended to all of Latin America. As stated by Bulmer-Thomas,[8] Latin American regional trade represented 16.6% of total exports and 25.6% of total imports in 1945. When the Second World War ended, those percentages were considerably reduced. They remained low throughout the 1950s. In the 1960s, regional trade represented 8% of exports and 9.9% of imports. Trying to explain these low levels of trade integration in South America we focus on bilateral export data, avoiding the cif prices used in the import values.

3. Main drivers of regional trade

The basic gravity model provides a feasible framework to understand the main drivers of the regional trade in Latin America. (Anderson, 1979; Anderson & van Wincoop, 2003; Bergstrand, 1985, 1989; Deardorff, 1998; Helpman & Krugman, 1987) provides theoretical foundations for it. In that sense, trade between two countries depends on their economic size (GDP, population…), on transaction costs (time distance, transport cost, trade barriers…) and a set of control variables as country area and population as a proxy for economy dimension, export per capita, barter terms of trade, common border, common language or remoteness (Eichengreen & Irwin, 1998). In our sample, common language and common border are not useful due to the fact that those are country dummies.[9]

$$Ln(X_{ij}) = \alpha_1 + \alpha_2 \cdot Ln(PIB_i) + \alpha_3 \cdot Ln(PIB_j) + \alpha_4 \cdot Ln(dst_{ij}) + \alpha_5 \cdot \sum_{k=1}^{p} [\mathrm{Ln}(X_{ik}) + \mathrm{Ln}(X_{jk})] + \varepsilon_{ij}$$

The dependent variable is bilateral trade data and comes from (Peres Cajias et al., 2012), considering exports from country *i* to country *j*. We have used only trade data from the Chilean official statistics, although we plan to enlarge soon our sample with data from the other South American countries. Chilean trade data are the most reliable among the other sample countries regarding to the accuracy of the official sources, and at the same time they present the advantage of

[8] (Bulmer-Thomas, 1997, pp. 231).

[9] Brazil is the only one with a different language, Portuguese, and the pair Chile – Brazil is the only one with no common border.

having exports as well as imports in fob values. As a consequence, we have included eight bilateral trade flows: exports from Chile to Argentina, to Peru, to Bolivia and to Brazil; and exports to Chile from Peru, from Argentina, from Bolivia and from Brazil. Each one of this bilateral exchange has been collected for 5 years: 1915, 1925, 1935, 1944 and 1949. Data availability with some of the exogenous variables has been the main reason to limit our time points.

Figure 3 - Total exports of the South American countries, 1915 – 1949 (milions US $ constant)

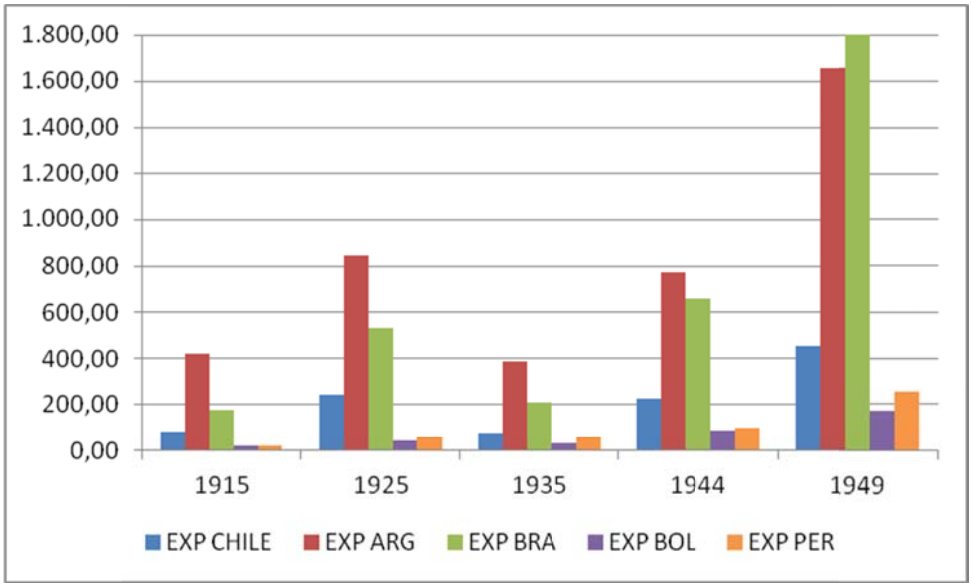


Figure 3 shows the evolution of total exports of all these countries. We observe here the big impact of the Great Depression, meanwhile during the Second World War a recovery and a huge increase occurred. Another interesting feature is the fact that Argentina was the main exporter until the thirties, but during the Second World War it was surpassed by Brazil. Bolivia was slightly above Peru in 1915, but thereafter Peru achieved a higher position.

Figure 4 - Bilateral regional exports for Chile and its trade partners, 1915 – 1949

(milions US $ constant)

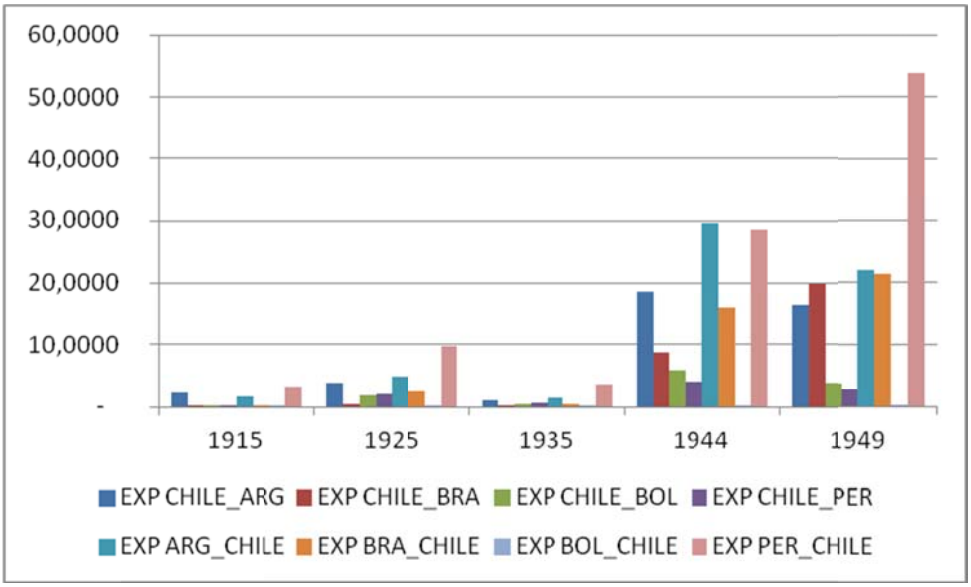
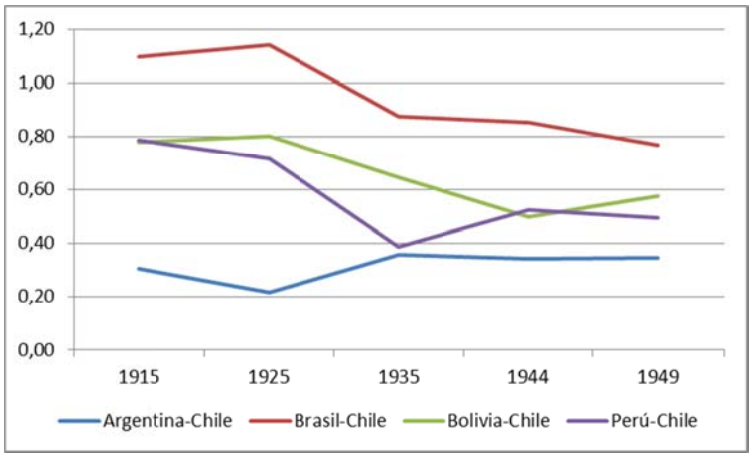


Figure 4 shows the dependent data. It was during the forties when regional trade achieved the maximum values for Chile and its trade partners. Regional trade was particularly big for the exports from Peru to Chile and from Argentina to Chile. Exports of Chile to its neighbors were almost negligible until the forties (representing only 3% of the Chilean exports). In 1944, they grew to 16%, but in 1949 this share went back to 9%. We will try to explain such a poor development of regional trade through economic size and distances.

GDP comes from (Maddison, 2010), and GDPpc considers population from (Yáñez, Rivero, Badia-Miró, & Carreras-Marín, 2012). We expect a positive sign of GDP on regional trade, that is, economic dimension favoured regional trade. $GDP_{i\_and\_j}$ is the sum between GDP_i and GDP_j, which is a proxy for economic dimension of both trade partners. We have also considered $GDPpc_{i\_j}$ as the difference among $GDPpc_i$ and $GDPpc_j$ as a proxy of a similarity of levels of development among countries, a variable usually used as differences in factor endowments. The sign of this variable can also indicate if the nature of the bilateral trade is interindustrial (a positive sign of differences in GDP per capita) or intra-industrial (a negative sign of such differences). In the case of regional trade, differences in GDP per capita are supposed to be small and the sign of this variable is supposed to be negative, as intra-industrial trade is more likely to appear among similar countries. We could observe, in Figure 5, some convergence among differences in levels of GDPpc in South American countries, accentuated 1925 onwards. The expected negative sign of differences in GDP between trade partners seem quite feasible as convergence occurs around the forties, when regional trade was higher.

Figure 5 - Differences in GDPpc among countries in South America, 1915 - 1949



DIST is sea distance as a proxy for transport costs, with a negative expected sign over trade. Maritime transport was a vital factor in regional trade within South America, except in the Bolivian case. ECLA (1957) points out that about 92% of the trade between the republics of South America in 1950-52 used the sea route. As it can be seen in Table 1, the differences among the data are important[10].

Table 1 – Distances among the countries of the sample

	Linear distance	Sea Distance		Sea Distance
Argentina - Bolívia	3.008,0	7.379,6	EUA - Bolivia	8790,872
Argentina - Brasil	2.640,0	2.115,0	EUA - Chile	8743,06
Argentina - Chile	1.408,0	5.316,9	EUA - Argentina	10824,94
Argentina - Perú	4.521,0	7.535,7	EUA - Perú	6241,152
Bolívia - Brasil	3.729,0	8.940,9	EUA - Brasil	8784,036
Bolívia - Chile	3.154,0	2.364,2	GB - Bolivia	13954,25
Bolívia - Perú	1.518,0	1.518,0	GB - Chile	13906,44
Brasil - Chile	3.679,0	6.878,1	GB - Argentina	11667,6
Brasil - Perú	5.240,0	9.096,9	GB - Perú	11404,53
Chile - Perú	3.379,0	2.616,6	GB - Brasil	9634,104

Source: http://maps.google.com/ and http://sea-distances.com/

An additional variable used in the gravity equation has been bilateral barter terms. They have been obtained considering the main products traded for each pair of countries and their international

[10] For Brazil, Argentina, USA and Great Britain we consider the main city next to the sea (Rio de Janeiro, Buenos Aires, New York and London). For the rest, we also consider the distance from the capital of the country to the nearest harbour (San Antonio – Santiago in Chile, Callao – Lima in Perú and Antofagasta – La Paz for Bolivia). For the pair Peru – Bolivia we consider the road distance from La Paz to Lima.

prices. Unitary prices for exports and imports were obtained considering (Pfaffenzeller, Newbold, & Rayner, 2007). Price for saltpeter comes from (Díaz, Lüders, & Wagner, 1998) and for oil comes from Statistical Review of World Energy 2011.[11]. These figures are the same for each bilateral trade but, when imports of Chile have been taken into account, we have used the inverse of the Chilean exports BTT.

Figure 6 – Bilateral barter terms of trade for Chile and their partners (1915 - 1949)

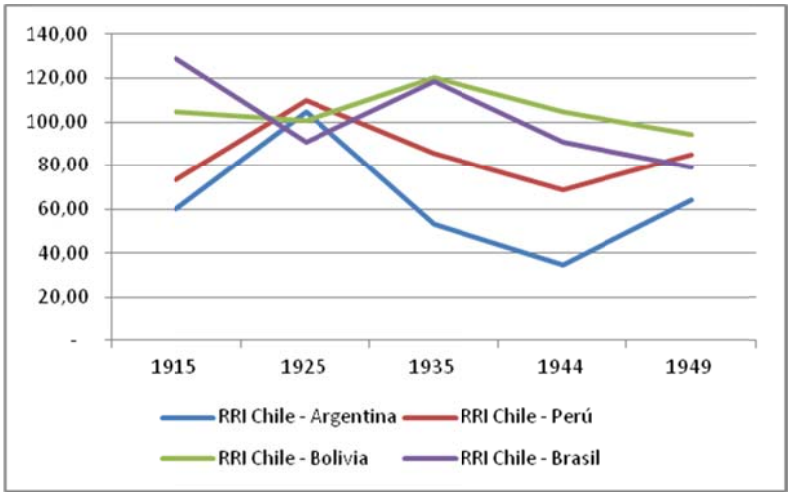


Figure 6 doesn't show a clear pattern for Chile with its trade partners. BTT among Chile-Argentina and Chile-Peru evolve similar, increasing during the 1920s and decreasing until 1944. Chile–Bolivia and Chile-Brazil went almost in the opposite direction: increasing in the thirties but decreasing during the two world wars. The product composition of this bilateral trade explains such differences.

[11] BTT for Chile and Argentina considers for Chilean exports: wool, some agricultural food commodities as nuts, some non-food agricultural commodities as wood, some metals as coal, iron and gold, cooper and saltpetre (covering around a half of total exports). For the Argentinian exports we consider lamb, beef, wheat and some agricultural food commodities (covering more than 60% of total exports except in 1935, 50%, and 1944, 35%). BTT for Chile and Peru considers, for Chilean exports: Saltpetre, wheat, rice and some agricultural food commodities (as grapes and potatoes), covering more than 60% (except in 1935, 30%). For Peruvian exports we consider sugar, oil, beef, rice, coffee and cotton (around 70% of total exports). BTT for Chile and Bolivia considers, for Chilean exports: wheat, rice and some metals, some semi-manufactured articles, some non-food agricultural commodities and some agricultural food commodities sub-index, covering, at least, 50% of total exports. For Bolivian exports we consider cotton, silver, tin, lead, coffee, wool, some metals, some agricultural food commodities and some manufactured articles (covering around 70% of total exports). BTT for Chile and Brazil considers, for Chilean exports, saltpetre, wheat, copper, some metals, some agricultural food commodities (as nuts) and some non-food agricultural commodities (covering more than 70% of total exports). For Brazilian exports we consider coffee, rice, cotton, sugar, cocoa, some agricultural food commodities and some semi-manufactured articles, covering around 90% of total exports.

PERNNRR is the percentage of natural resources over total trade for each pair of countries.[12] This variable has also been constructed in bilateral terms, taking into consideration the product composition of each bilateral export. The level of concentration on natural resources is high in most of the pairs, except for Peru – Chile and Chile – Bolivia, as a sign that the structure of bilateral trade was not as different among South American countries as it was among these countries and their trade partners in Europe and the USA. The expected sign of this variable is negative, meaning that countries with less dependency on a few exports of natural resources will tend to have higher regional exports. Table 9 shows the importance of natural resources over each bilateral trade throughout the period. The smaller shares of Peruvian exports are due to the fact that sugar has not been considered as a natural resource, as long as it is included in the food industry. The smaller share of Chilean natural resources in its exports to Bolivia in 1935, are due to the Chilean flour exports. With the only exception of Bolivia-Chile, the high dependency on natural resources, decreased from 1915 to 1949.

Table 2 – Percentage of Natural Resources over bilateral trade, 1915 - 1949

	1915	1925	1935	1944	1949
Argentina - Chile	91,9%	58,9%	66,6%	63,3%	59,3%
Perú - Chile	98,5%	9,1%	28,7%	39,8%	29,4%
Bolivia - Chile	61,4%	62,9%	55,2%	88,3%	88,8%
Brasil - Chile	99,9%	97,3%	99,1%	22,4%	60,8%
Chile - Argentina	97,7%	87,1%	90,7%	31,5%	69,1%
Chile - Perú	95,4%	86,1%	56,0%	67,3%	44,2%
Chile - Bolivia	79,6%	11,8%	45,6%	52,9%	45,8%
Chile - Brasil	100,0%	99,8%	95,9%	68,0%	82,8%

PERMAN is the percentage of the manufacturing sector of each country. This could be considered in a double sense.[13] Countries with a more developed manufactured sector tended to reduce regional trade as a response to a manufactured substitution process. At the same time, countries with a more developed industrial sector could improve their export capacity in this range of products, and improve their exports to their neighbors.

[12] We consider strictly non manufactured products as animal and mining products.

[13] Manufactured sector for Chile is obtained from (Braun et al., 2000). For Peru we consider (Seminario & Beltrán, 1998). For Argentina and Brazil we consider (MOXLAD, 2011) and for Bolivia (Peres Cajías & Herranz-Loncán, 2011).

Table 2 – Percentage of manufactured sector in South American countries (1915 – 1949)

	Chile	Argentina	Bolivia	Brazil	Peru
1915	10,02%	15,13%	7,00%	13,30%	16,03%
1925	11,39%	19,95%	6,73%	13,30%	17,82%
1935	12,30%	21,29%	13,02%	13,22%	15,79%
1944	18,57%	24,69%	13,65%	16,58%	19,02%
1949	21,30%	23,80%	14,97%	20,03%	19,74%

Manufacturing sector tend to increase their share in all the countries since 1915. The percentage at the end of the period was around 20%, except in Bolivia, although their initial levels were very different (Argentina and Peru around 15%, Brazil around 13% and Chile 10%). We have also test if differences among the development of a manufactured sector in each country, could also have some impact on regional trade ($PERMAN_{i\_j}$). Figure 7 shows this variable. At the end of the period, all countries seem to converge in their manufactured levels, except Bolivia.

Figure 7 - Differences in the manufacturing sector in South American countries (1915 - 1949)

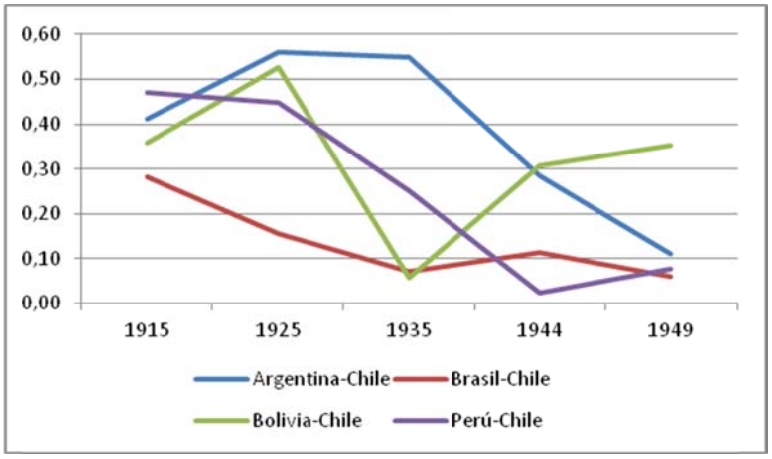


Table 3 – Determinants of bilateral trade flows among Chile and their South American partners

	OLS			OLS			OLS			OLS			FE			FE		
const	-29,062	-1,359		-36,535	-6,763	***	-28,891	-1,332		-36,699	-6,603	***	-28,034	-0,905		-28,034	-0,905	
L_PIBi	1,786	1,714	*	2,123	6,227	***							-1,558	-0,991		-1,558	-0,991	
L_PIBj	1,129	1,136		1,426	4,438	***							3,319	2,257	**	3,319	2,257	**
L_PIBi_and_j							1,313	1,313		1,745	6,387	***						
L_PIBpci_j	-0,312	-0,231					-0,415	-0,303										
L_DIST	-2,154	-0,972		-2,681	-3,306	***	-1,787	-0,800		-2,554	-3,073	***						
L_RRI	0,073	0,102					0,546	0,857					0,476	0,538		0,476	0,538	
L_PERRRNN	-1,061	-2,155	**	-0,957	-2,212	**	-1,228	-2,537	**	-1,106	-2,533	**	-0,395	-0,862		-0,395	-0,862	
L_PERMANi	-0,096	-0,050					0,097	0,050					3,219	1,568		3,219	1,568	
L_PERMANj	0,925	0,694					1,048	0,777					-1,782	-1,346		-1,782	-1,346	
R-adj	0,605			0,640			0,593			0,619			0,763			0,763		
N	40			40			40			40			40			40		

As a result of the regression, GDP is significant and with the expected sign. This means that higher economic size favoured trade. The sum of both GDP is also positive and significant as a robustness test for the previous results. In contrast, L_GDPpci_j is not significant, although the sign is negative as expected in regional trade. This means that differences in the level of development in these countries didn't affect trade among them. This is an interesting result if we consider that as an indicator of the failure of establishing intra-industrial trade. The high dependency on natural resources could also be related to this finding, as long as primary production doesn't promote intra-industrial trade between countries.

DIST is also significant and with the expected sign, reflecting that our sea measures are a good proxy for transports cost, when we are explaining the drivers of trade among South American countries. As distance is the main obstacle to regional trade, transport costs among the region seem to be a crucial question. In that point appears an interesting question: transport costs were higher among this sample of countries than with USA/UK? ECLA (1957) remarks that one of the main problems to the increase of regional trade, was the high impact of regional transport costs. Regarding to this source, the incidence of maritime freight on the fob values of imports in 1952 was 25,3% from Latin America but only 10,5% from the rest of the world. This is partly related to the fact that as the unit value of the goods was very low, the cost of its transport was proportionally high. For instance, Argentina, Brazil and Uruguay, which imported large quantities of coal from other regions, had a higher incidence of maritime freight on the imports from the rest of the world than from Latin America, in dry cargo. Another explanations for higher regional transports cost were also trans-shipments, frequently occasioned by the lack or irregularity of direct maritime services between these countries; the high relative cost of transport of frozen meat purchased from Argentina; or the inadequate utilization of hold-space in vessels.

BTT is positive but not significant. Anyway, the sign is the same in all the regression. This allows us to affirm that an improvement in barter terms of trade favoured exports as we expected. L_PERNNRRi could be considered as dependency on natural resources. The coefficient is significant and negative. It means that the two main obstacles to regional trade were transport costs from the region and the excessive content on natural resources in the trade composition of all trade partners.

Lastly, L_PERMANi and L_PERMANj, the variables which capture the impact of manufacturing importance in a country on exports were no significant and the sign varies. This non-consistent result does not allow us to reach a conclusive output.

4. Conclusions

The main goal of this paper has been to explain the low levels of regional trade in South America between the two World Wars. A previous study has led to the identification of the levels of this regional trade as long as it has pointed out its main nature. As a result we have found in previous

work that regional trade was at least so important or even higher during this period of what would be later. But nevertheless its scope was really low and when looking at the composition of this trade we found the same essential trade structure: with a high dependency on natural resources or manufactures with a high content of primary goods. We have tried here to go one step forward and explaining it through a gravity model. So far we have only used a small country sample, including Chile and all its trade partners. We plan to expand it in the near future. These first preliminary results suggest that the main drivers of regional trade was the economic size of the countries, meanwhile the main obstacles to it were transport costs and the high content of natural resources. Although these results appear to be quite reasonable, we have to test its robustness with the larger sample. Furthermore, we also plan to include more control variables, such as trade policy in our model.

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