www.cepal.org/transporte

Issue No. 343 - Number 7 / 2015

BULLETIN FAL

FACILITATION OF TRANSPORT AND TRADE IN LATIN AMERICA AND THE CARIBBEAN

The Evolution of Modal Split in Freight Transport in South America, 2000-2013

This *FAL Bulletin* analyzes data on commodities traded and the modes of transport used between nine South American countries, during 2000, 2006, 2010 and 2013. The aim is to identify the current modal split in intraregional freight transport in South America, and to ascertain the level and evolution of trade flows, imbalances and the burden of transport and insurance costs. The authors conclude with some policy recommendations.

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The views expressed in this document are those of the authors and do not necessarily reflect the views of the Organization. For more information, please contact gordon.wilmsmeier@cepal.org

Introduction

This *FAL Bulletin* updates *FAL Bulletin* No. 325 and describes the evolution of modal split in international freight transport in South America, covering Argentina, the Plurinational State of Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay and the Bolivarian Republic of Venezuela, for the period 2000 to 2013. Modal participation analysis is directly related to recently adopted Sustainable Development Goals 8 ("Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all"); 9 ("Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation."); 12 ("Ensure sustainable consumption and production patterns"); and 13 ("Take urgent action to combat climate change and its impacts") (see diagram 1).

The use and combination of different modes of transport can contribute to the aforementioned Goals in various ways. For example, a shift from road to short sea shipping is one way to reduce emissions from freight transport (Goal 13) and to encourage the building of more resilient infrastructure (Goal 9) (Brooks, Wilmsmeier and Sánchez, 2015). The use of efficient and more environmentally-friendly modes of transport in logistics chains would also promote more sustainable consumption and production patterns (Goal 12) and economic growth (Goal 8).

This Bulletin also establishes a baseline to measure developments in the international transport modal split in South America, so that policymakers might make informed decisions and that progress towards the aforementioned Goals might be monitored.

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Natural Resources and Infrastructure Division, UNECLAC

Diagram 1

Source: Authors based on United Nations (2015), "Draft outcome document of the United Nations Summit for the adoption of the post- 2015 development Agenda", August.

This Bulletin includes data available from CEPALSTAT and the International Transport Database (BTI), maintained by the Economic Commission for Latin America and the Caribbean (ECLAC). BTI was created by the Transport Unit of ECLAC in 1999 and uses statistics from the Foreign Trade Data Bank for Latin America and the Caribbean (BADECEL). Data is currently available for the period 2000 to 2013. ECLAC has published international trade and transport profiles of Latin American countries for 2000,[1] 2006, 2010 and 2012. BTI contains the following information:

- The mode of transport by which the merchandise leaves from or arrives in a country
- The product, classified according to (a) the Harmonized System, and (b) the Standard International Trade Classification (SITC), Rev 3
- The country of origin and final departure (in the case of imports) and country of destination (in the case of exports)
- The volume of the shipment in metric tons
- The cost, insurance and freight (CIF) value of imports and the free on board (FOB) value of imports and exports in current US dollars [2]
- The burden of international transport and insurance costs.

This *FAL Bulletin* compares the data for 2000, 2006, 2008, 2010 and 2013. The international transport data analyzed herein excludes all shipments of commodities classified under SITC rev. 3, codes 3 and 9, because data for trade in these commodities is less reliable and complete than the data for other products, and energy commodities are unrelated to other trade flows (Hoffmann, Pérez and Wilmsmeier, 2002).

The Bulletin is divided into five sections. Section I examines the importance of regional trade compared to overall global trade and describes the relationship between gross domestic product (GDP) and transport growth. Section II discusses modal participation in intra-South American trade, for the period 2000-2013. Section III analyses the regional imbalances in international transport flows. Section IV outlines the burden of international transport costs and, lastly, section V sets out the authors' conclusions.

I. Developments in intraregional transport

The freight transport changes are largely the result of the evolution in South American economies and their production systems, in response to the changing demand from other regions, such as the emerging Asian economies, particularly China, and to new consumption pattern within Latin America. Latin American economies still primarily

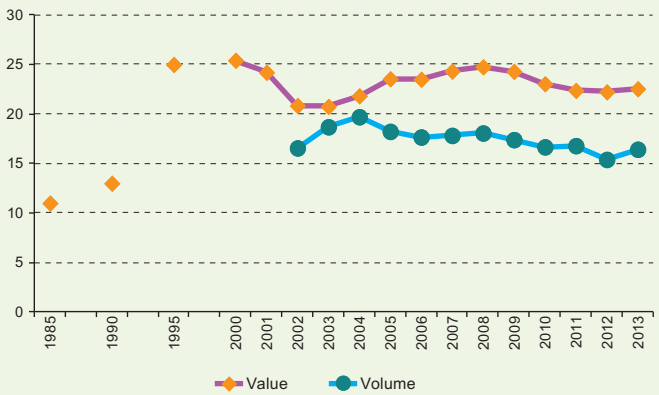
[1] http://www.cepal.org/en/publications/5581-international-trade-and-transport-profiles-latin-american-countries-year-2000.

[2] See http://www.iccwbo.org/products-and-services/trade-facilitation/incoterms-2010/ for a description of the Incoterms® rules.

export basic materials, partly driven by the high demand and commodity prices during the 2000s. However, the recent drop in demand for raw materials is also reflected in the trade data from South American countries.

Before taking a closer look at the modal participation in the region, this FAL will examine the importance of intraregional trade to South American countries. Intraregional trade has always been less important to South America than other regions, such as the European Union, despite the fact that intraregional trade more than doubled in the 1990s. However, since 2000, intraregional trade has been almost stagnant in terms of value and volume; intraregional trade accounted for 26% of trade flows among ten South American countries in 2000 (Wilmsmeier, 2002), but that had dropped to 23% by 2013 (see figure 1).

Figure 1
COMPARISON OF INTRAREGIONAL TRADE
(Percentages)



Source: International Transport Database (BTI), various years.

At the same time, the importance of intraregional trade also varies across the countries in the region (see table 1). In 2013, the percentage share of intraregional trade of total trade in terms of value ranged from 13% in Chile, to over 87% in Bolivia. Brazil, Chile, Colombia and Peru exported more than 80% of their commodities, in terms of value, to markets outside the region. This is especially remarkable, as these countries are geographically remote from these markets. Conversely, about 43% of Argentine exports stayed within the region, and Bolivia, Paraguay and Uruguay were even more dependent on regional trade partners, exporting more than 45% of their commodities to countries within the region.

With regard to imports, less than 20% of imports to Brazil, Chile and Colombia came from countries in the region. Brazil and Colombia had the lowest share of intraregional imports, while Argentina, Bolivia, Paraguay and Uruguay imported between 40% and 50% from countries in the region. Bolivia and Paraguay had the highest dependency on intraregional imports (more than 50 %), probably due to the fact that they are the only landlocked countries in the region.

Table 1
SHARES IN INTRAREGIONAL TRADE, IMPORTS AND EXPORTS, 2013

	By value *(Percentages)*		By volume *(Percentages)*	
	Exports	Imports	Exports	Imports
Argentina	43	34	25	48
Bolivia (Plurinational State of)	72	87	91	95
Brazil	20	14	5	18
Chile	13	17	12	22
Colombia	16	15	13	29
Ecuador	29	21	27	20
Paraguay	65	52	66	73
Peru	20	24	17	38
Uruguay	45	39	21	45
Venezuela (Bolivarian Republic of)	26	25	12	31

Source: International Transport Database (BTI), 2013.

Intraregional trade is dominated by the Southern Common Market (MERCOSUR) countries. In terms of value, the exports and imports of this trading bloc accounted for 75% (2013) and 57% (2013) of intraregional trade respectively.

The total value of intraregional trade[3] amounted to US$ 102 billion in 2013, which is 3.4 times higher than it was in 2000. The volume of trade in the region increased from 60 million tons in 2000, reaching 64 million tons in 2010 before dropping to 62 million tons by 2013.[4]

In 2013, Argentina and Brazil generated 43% of all intraregional transport flows in terms of volumes, and 46% in terms of value. The distribution of freight movements reveals that the highest concentration of trade flows is in the southern part of the South American cone. Vegetable products accounted for the highest volume of commodities transported intraregionally, 34%, in 2013, while mineral commodities made up more than 17% of intraregional trade, in terms of volume, in 2010, its share decreased to a mere 8% in 2013. Over the same period, the share of commodities classified as "chemicals and related products" rose from 12% to 18%, due to an increase in absolute terms.

[3] Excluding commodities classified under SITC Rev.3, codes 3 and 9.
[4] Based on the international transport database (BTI) of the Transport Unit of ECLAC.

Over the same period, international transport flows not only increased, but their structure also changed. For example, mineral commodities represented 46% of the total traded volume of all transport flows to and from the region in 2010, compared to 16% in 2000.

Sudden changes in the volume of traded commodities pose a particular challenge for the development of infrastructure, as investments tend to be discrete (Sánchez and Wilmsmeier, 2010). As commodities are shipped in a specific manner (for example, vegetable products are shipped in refrigerated containers, while mineral commodities are sent as bulk cargo), such changes also have a substantial impact on future infrastructure projects. Trade fluctuations therefore allow governments to see where adjustments need to be made to investment in transport modes, in order to reduce the potential for bottlenecks in the future (see Perrotti and Sánchez, 2011).

This raises questions about how these commodities are transported and the effects of trade development over the last decade. The following section discusses the evolution of modal participation in the region.

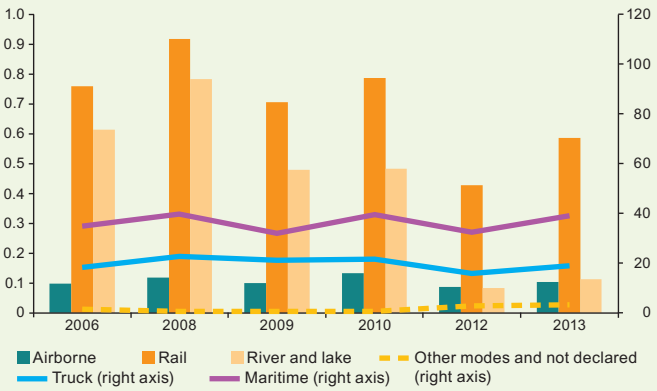
II. Modal split

The volume of intraregional transport increased by less than 7% between 2000 and 2010, in strong contrast to South American countries' trade outside the region, which increased by more than a factor of five during the same period. In fact, between 2010 and 2013, the volume of intraregional trade decreased by 3.5%. However, trade value increased by about 19% over the same period.

Analysis of developments in the region reveals that maritime transport is still the dominant mode, carrying more than 39 million tons of cargo in both 2010 and 2013. Road transport remains the second most important mode of transport in terms of volume, while the actual volume transported by air has decreased over the period under consideration (see Figure 2).

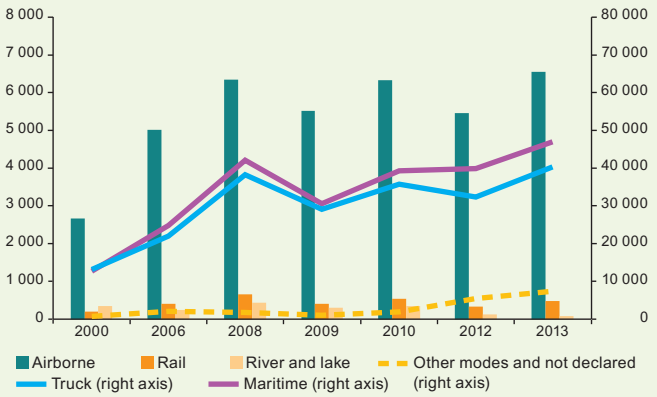
The analysis of the modal split in the value of transported cargoes (see figure 3) produces a different result to that of the volume analysis. The value of intraregional air transport flows almost doubled between 2000 and 2006, to almost US$ 5 billion, and reached US$ 6.6 billion in 2008. The value of goods transported by maritime modes more than tripled between 2000 and 2013, reaching US$ 47 billion. Road transport flows follow a similar pattern to that of air and maritime transport, amounting to US$ 40.3 billion in 2013.

Figure 2
TOTAL VOLUME OF TRANSPORT WITHIN SOUTH AMERICAN COUNTRIES
(Millions of tons)



Source: International Transport Database (BTI), various years.
N.B.: Other modes include not declared, postal and pipeline.

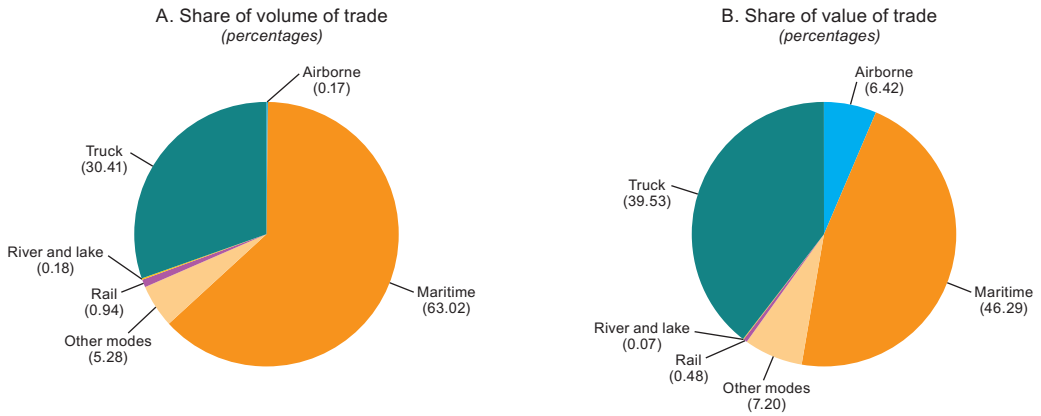
Figure 3
TOTAL VALUE OF TRANSPORT WITHIN SOUTH AMERICAN COUNTRIES
(FOB value in millions of US dollars)



Source: International Transport Database (BTI), various years.
N.B.: Other modes include not declared, postal and pipeline.

Maritime transport remained the most important mode in intraregional trade in 2013, accounting for 63% of total volume and 46.3% of total value, followed by road transport, with 30.4% and 39.5% respectively. Air transport accounted for just 6.4% of all intraregional trade in terms of value (see Figure 4).

Figure 4
MODAL SPLIT IN INTRAREGIONAL TRADE BY VOLUME AND VALUE, 2013



Source: International Transport Database (BTI), 2013.
N.B.: Other modes include not declared, postal and pipeline.

Analysis of the average value per ton of the intraregional cargo carried by the different transport modes (see Table 2) reveals, as expected, that cargo with the highest average unit value is transported by air. The unit value of goods sent by road reached US$ 2,126 per on in 2013, almost double the unit value carried by maritime transport. Rail and inland shipping moved cargo with the lowest unit value. These trends remained the same between 2000 and 2013.

Table 2
CARGO VALUE FOR SOUTH AMERICAN COUNTRIES
(US dollars per ton)

Mode	2000	2006	2008	2010	2013
Airborne	18 844	50 493	55 869	46 783	63 008
Maritime	389	722	1 118	992	1 201
Rail	291	696	812	737	832
River and lake	296	658	704	797	678
Truck	686	1 390	1 912	1 837	2 126

Source: International Transport Database (BTI), various years.

Some cargo has to be transported by specific modes. For example, airborne transport is used for high-value cargo, such as some chemicals and related products, machinery, pharmeceutical products, and some perishable goods. While these commodities have a high unit value, the overall volume shipped is low.

Tables 3 and 4 illustrate the national evolution of the modal split in imports and exports, as well as by value and volume. Waterborne transport flows between 2000 and 2006 for both imports and exports remained stable for all countries, with the exception of Chile, which saw a large increase in the volume of imports (cereals and animal fats) and exports (mineral products, including copper).

Interestingly, air transport lost a little of its share of the total value of imports between 2000 and 2013, although it still accounted for a high share of intraregional trade in the cases of Colombia, Ecuador and the Bolivarian Republic of Venezuela, thanks to pharmaceutical products, which have the highest share of the total value of commodities transported by air in all of these three countries.

Table 3:
MODAL SPLIT IN THE TRANSPORT OF INTRAREGIONAL IMPORTS, 2000, 2006, 2010 AND 2013
(Percentages)

	To	Share of total value of imports					Share of total volume of imports				
		Airborne	Waterborne	Truck	Rail	Other modes	Airborne	Waterborne	Truck	Rail	Other modes
2000	All	9.11	44.74	43.04	0.68	2.43	0.84	56.80	32.14	1.14	9.07
	Argentina	10.17	34.47	53.26	1.32	0.78	2.55	64.21	31.46	1.76	0.02
	Brazil	7.16	51.32	40.50	1.01	0.01	0.10	71.07	26.71	2.12	0.01
	Chile	11.56	33.52	54.79	0.12	n/a	0.21	28.42	71.25	0.12	n/a
	Colombia	9.89	56.23	32.01	0.01	1.86	0.43	64.44	34.74	0.02	0.37
	Ecuador	12.38	58.76	28.84	n/a	0.02	0.94	76.47	22.59	n/a	0.01
	Peru	9.76	81.76	8.36	0.01	0.11	0.22	91.08	8.46	n/a	0.23
	Uruguay	6.37	8.83	84.63	0.12	0.04	0.19	28.76	69.69	1.34	0.01
	Venezuela (Bolivarian Republic of)	11.13	56.93	31.92	n/a	0.02	0.56	77.99	21.44	n/a	0.01

Table 3 (concluded)

	To	Share of total value of imports					Share of total volume of imports				
		Airborne	Waterborne	Truck	Rail	Other modes	Airborne	Waterborne	Truck	Rail	Other modes
2006	All	9.43	47.40	38.72	0.68	3.77	0.18	65.06	31.09	1.02	2.65
	Argentina	7.17	37.90	39.71	1.57	13.65	0.07	65.90	23.68	1.37	8.98
	Brazil	7.38	45.99	45.29	1.32	0.03	0.11	56.47	40.83	2.59	0.01
	Chile	7.72	37.00	55.07	0.03	0.19	0.20	49.17	49.19	0.05	1.39
	Colombia	12.80	59.02	25.72	0.04	2.42	0.38	77.44	21.48	0.02	0.68
	Ecuador	12.18	60.40	27.41	n/a	0.01	0.35	77.42	22.22	n/a	0.01
	Peru	8.70	77.05	14.24	n/a	n/a	0.18	90.76	9.07	n/a	n/a
	Uruguay	5.70	14.61	78.99	0.06	0.65	0.11	33.20	66.06	0.36	0.27
	Venezuela (Bolivarian Republic of)	16.18	53.74	30.08	n/a	n/a	0.47	72.77	26.75	n/a	n/a
2010	All	7.63	48.30	41.45	0.63	1.99	0.22	64.73	33.24	1.17	0.64
	Argentina	3.89	38.86	48.97	0.87	7.42	0.10	65.46	31.92	1.30	1.22
	Brazil	7.17	49.23	42.58	0.66	0.36	0.20	56.52	41.21	2.06	0.01
	Chile	7.60	38.39	54.01	n/a	> 0.01	0.14	56.07	41.20	0.02	2.57
	Colombia	12.08	73.13	14.56	n/a	0.23	0.30	87.89	11.75	n/a	0.06
	Ecuador	11.49	54.93	33.49	n/a	0.09	0.36	75.27	24.35	n/a	0.03
	Peru	7.09	77.01	15.90	n/a	n/a	0.24	86.23	13.53	n/a	> 0.01
	Uruguay	4.05	12.47	81.49	0.01	1.99	0.13	24.49	75.12	0.02	0.24
	Venezuela (Bolivarian Republic of)	16.39	67.01	16.60	n/a	n/a	0.67	85.45	13.88	n/a	n/a
2013	All	7.01	51.79	37.77	0.23	3.19	0.18	70.18	28.61	0.50	0.53
	Argentina	2.19	35.14	49.47	0.60	12.60	0.07	70.13	26.65	1.03	2.12
	Brazil	6.16	54.03	39.13	0.31	0.37	0.10	66.17	32.61	1.08	0.03
	Chile	10.44	43.79	45.76	n/a	> 0.01	0.18	53.06	46.74	> 0.01	0.02
	Colombia	11.46	73.01	15.52	n/a	> 0.01	0.26	87.56	12.18	> 0.01	> 0.01
	Ecuador	11.51	53.50	33.64	n/a	1.34	0.40	68.98	29.61	n/a	1.01
	Peru	6.34	76.62	16.77	n/a	0.27	0.20	85.03	14.77	n/a	> 0.01
	Uruguay	2.94	8.88	85.97	> 0.01	2.21	0.09	15.72	83.93	> 0.01	0.25
	Venezuela (Bolivarian Republic of)	12.04	66.18	21.79	n/a	> 0.01	0.46	84.06	15.48	n/a	> 0.01

Source: International Transport Database (BTI), various years.
Notes: Other modes include not declared, postal and pipeline.

Table 4
MODAL SPLIT IN THE TRANSPORT OF INTRAREGIONAL EXPORTS, 2000, 2006, 2010 AND 2013
(Percentages)

	From	Share of total value of exports					Share of total volume of exports				
		Airborne	Waterborne	Truck	Rail	Other modes	Airborne	Waterborne	Truck	Rail	Other modes
2000	All	5.40	42.86	40.32	0.31	11.11	0.11	67.29	20.99	0.77	10.84
	Argentina	5.75	45.93	48.22	0.08	0.02	0.10	76.46	23.33	0.10	0.01
	Peru	11.43	73.46	14.98	n/a	0.12	0.37	86.47	12.86	n/a	0.29
	Uruguay	6.08	37.68	53.56	2.67	n/a	0.29	57.86	32.81	9.04	n/a
	Venezuela (Bolivarian Republic of)	0.15	2.65	6.58	0.16	90.46	0.01	1.94	9.86	0.01	88.17
2006	All	8.33	50.41	39.07	0.98	1.21	0.19	68.73	28.40	1.96	0.72
	Argentina	4.23	43.44	50.11	0.74	1.47	0.11	67.38	31.40	0.97	0.15
	Brazil	12.32	49.26	35.94	1.46	1.02	0.20	72.74	23.42	3.17	0.46
	Chile	4.66	66.63	28.08	0.12	0.52	0.15	81.14	18.21	0.50	n/a
	Colombia	6.25	34.97	58.78	n/a	n/a	0.65	48.11	51.23	n/a	n/a
	Ecuador	6.64	50.22	43.13	n/a	0.01	0.40	52.65	46.95	n/a	n/a
	Peru	8.30	78.52	13.02	n/a	0.16	0.45	80.58	18.55	n/a	0.42
	Uruguay	5.43	33.89	54.47	6.14	0.07	0.20	31.23	54.94	13.62	0.01
	Venezuela (Bolivarian Republic of)	2.11	63.82	16.61	n/a	17.46	0.08	73.08	10.52	n/a	16.32

Table 4 (concluded)

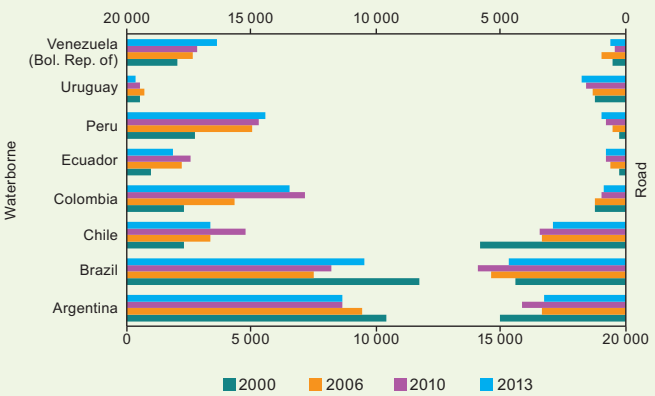
	From	Share of total value of exports					Share of total volume of exports				
		Airborne	Waterborne	Truck	Rail	Other modes	Airborne	Waterborne	Truck	Rail	Other modes
2010	All	6.30	49.45	41.77	0.69	1.78	0.40	68.35	29.62	1.34	0.29
	Argentina	3.22	46.03	48.94	0.42	1.39	0.10	63.29	35.37	1.03	0.20
	Brazil	8.24	47.44	41.34	1.04	1.93	0.82	74.49	21.97	2.22	0.51
	Chile	2.76	63.29	28.67	0.23	5.05	0.17	82.43	17.25	0.15	0.01
	Colombia	8.70	47.02	44.27	n/a	n/a	0.75	62.61	36.64	n/a	n/a
	Ecuador	13.53	52.97	33.45	n/a	0.05	0.46	63.12	36.40	n/a	0.02
	Peru	10.90	72.06	16.67	n/a	0.37	0.37	81.09	18.02	n/a	0.52
	Uruguay	2.69	38.80	57.07	0.83	0.60	0.04	50.67	47.64	1.59	0.06
	Venezuela (Bolivarian Republic of)	8.47	42.32	49.20	n/a	n/a	0.19	55.07	44.74	n/a	n/a
2013	All	4.86	51.59	41.73	0.48	1.34	0.23	69.59	28.76	1.03	0.39
	Argentina	3.21	43.60	50.60	0.28	2.30	0.12	57.50	41.39	0.91	0.09
	Brazil	5.24	49.29	43.02	0.88	1.56	0.31	73.90	23.14	1.79	0.86
	Chile	2.82	70.19	26.98	>0.01	n/a	0.10	82.98	16.87	0.05	n/a
	Colombia	7.46	53.83	38.71	n/a	n/a	0.62	62.61	36.77	n/a	n/a
	Ecuador	3.55	71.28	24.58	n/a	0.59	0.41	65.58	33.22	n/a	0.80
	Peru	12.38	70.77	16.84	n/a	0.01	0.24	82.42	17.34	n/a	0.01
	Uruguay	2.80	37.85	58.68	0.59	0.08	0.08	45.44	53.01	1.44	0.02
	Venezuela (Bolivarian Republic of)	0.98	70.99	28.02	n/a	n/a	0.01	87.65	12.34	n/a	n/a

Source: International Transport Database (BTI), various years.
N.B.: Other modes include not declared, postal and pipeline.

Argentina and Brazil move the largest volumes by waterborne and road transport, although Argentina saw the volume of its intraregional waterborne trade decline (see Figure 5). This was partly offset by an increase in road transport; thus there appears to have been a modal shift from sea to road. This development was in marked contrast to the countries in the west and north of South America, which saw an increase in the volumes of intraregional transport flows carried by both modes.

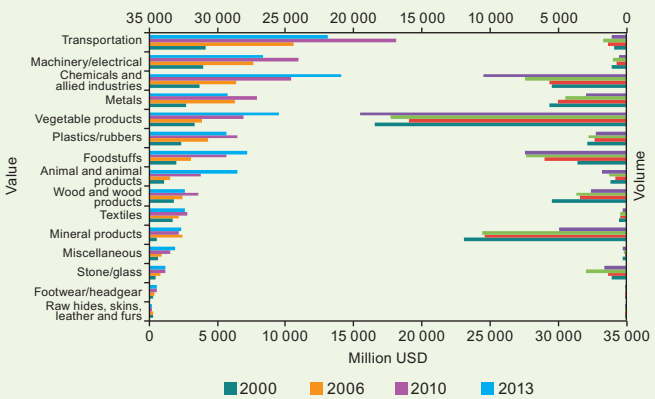
To better understand the structure of cargo movements, figure 6 sets out the commodity groups traded between South American countries.[5] Between 2000 and 2010, the majority of the commodities traded within the region, in terms of value, were classified as machinery and electrical goods, transport equipment and vegetable products. Between 2010 and 2013, the trade in transport equipment and machinery and electrical goods dropped significantly. Reasons for this may vary, but it could be linked to stagnating global demand for raw metals.

Figure 5
EVOLUTION OF WATERBORNE AND ROAD TRANSPORT VOLUMES, 2000-2013
(Metric tons)



Source: International Transport Database, various years.

Figure 6
MAJOR COMMODITIES TRADED WITHIN SOUTH AMERICAN COUNTRIES
(Metric tons)



Source: International Transport Database (BTI), various years.

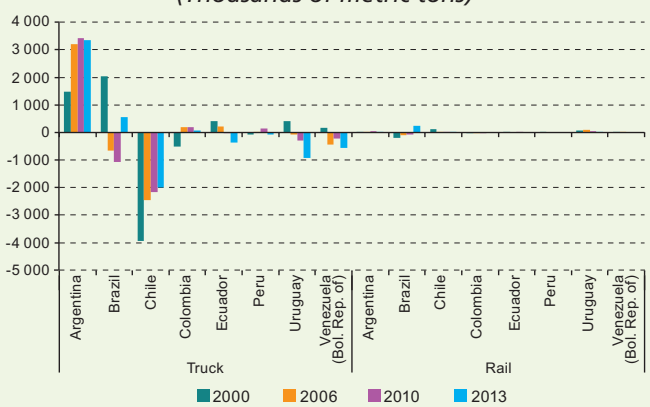
[5] Excluding "services".

The significant growth in waterborne and road transport within the region indicates the importance of developing adequate port facilities and road infrastructure, and incentivizing a modal shift towards more environmentally friendly modes of transport (Wilmsmeier and Sanchez, 2009; Perrotti and Sánchez, 2011; Sánchez and Wilmsmeier, 2005). The infrastructure gap is a major challenge in this regard, as the existing infrastructure can barely support shifts in transport and economic growth in the region. Perrotti and Sánchez note that annual investment in infrastructure for the period 1995-2008 was 1.6% of GDP, yet demand for infrastructure investment was much higher, at 6.5% of GDP (Perrotti and Sanchez, 2011). In addition to investing a signficant share of GDP in national infrastructure, the areas in which these investments are made is also important. Given the structure of trade flows, investment in rail and inland shipping infrastructure would help to meet demand along certain corridors. Moreover, the actual shift from sea to road, as seen in the intraregional trade of Argentina andBrazil , should be mitigated (see also Brooks, Wilmsmeier and Sánchez, 2013).

III. Trade imbalances

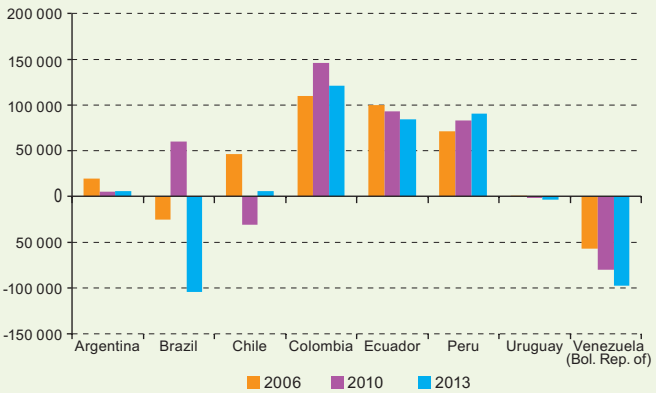
This section analyses the trade surplus or deficit, and trade imbalances, of nine South American countries over the period 2000-2013 (see figure 7). A trade surplus, when exports are higher than imports, means that trucks or trains leave full of cargo and return empty. Countries therefore face the challenge of repositioning empty equipment, trucks, rail waggons or containers depending on the mode of transport.

Figure 7
TRADE IMBALANCES IN VOLUME OF FREIGHT TRANSPORTED BY TRUCK AND RAIL, 2000, 2006, 2010 AND 2013
(Thousands of metric tons)



Source: International Transport Database (BTI), various years.

Figure 8
TRADE IMBALANCES IN VOLUME OF FREIGHT TRANSPORTED BY AIR, 2000, 2006, 2010 AND 2013
(Thousands of metric tons)



Source: International Transport Database (BTI), various years.

Argentina and Chile have large trade imbalances. In 2010, Argentina exported 604,398 tons of freight to the Plurinational State of Bolivia via truck and 25,637 tons by rail. Conversely, the Plurinational State of Bolivia exported 263,807 tons to Argentina via truck and 6,938 via rail. Trade imbalances in the volume of freight carried by waterborne transport depend to a large extent on the commodity being shipped. However, as increasing volumes are being carried by the maritime sector to capitalize on the economies of scale, further investment strategies in port infrastructure will be required in the near future in order to accommodate these larger vessels.

Assuming that imported and exported commodities have approximately the same volume to weight ratio, it can be said that the closer the imbalance is to zero, fewer empty containers will have to be repositioned. For example, if a ship calls at a port and discharges 2,000 full containers and, during the same port stay, loads another with 2,000 full export containers, then the trade balance is zero and there is neither a surplus of empty containers stacked at the port (as happens when imports exceed exports) nor a demand for more containers (as happens when exports exceed imports). Stacking empty containers at ports takes up space and causes bottlenecks for the flow of trucks and incoming containers moved through the terminals.

Most countries have a trade imbalance. Brazil, for example, has a positive balance of trade with Uruguay, particularly with regards to goods carried by maritime transport. Freight carriers thus have to reposition empty containers, resulting in higher demand for trucks and containers at ports, and pushing up the cost of returning those empty containers to Brazil. Conversely, freight brokers might

arrange for a full truck load (FTL) to leave Brazil with goods for $8,500/FTL and return for only $6,000/FTL, as demand for imports in Brazil is much lower.

The opposite situtation exists for Colombia, Ecuador, Peru and Venezuela; more goods are imported by maritime transport than exported. This results in ships entering ports with full containers which are then moved within the countries to their final destination. The containers then arrive back at the ports empty, where they either remain stacked in the ports (thus taking up space and causing bottlenecks for the flow of trucks and incoming containers moved throughout the terminals) or are loaded empty on to ships (therby not capitalizing on potential gains in freight costs). Countries where imports exceed exports should examine what volume of export cargo is transported using modes other than maritime and consider shifting exports to maritime transport, if possible, in order to balance the export to import ratio and prevent the aforementioned negative consequences. It should be noted that a shift towards using more maritime freight would increase the use of ports, terminals, port equipment and resources which, in turn, would require maintenance and investment in order to continue operating in an efficient manner.

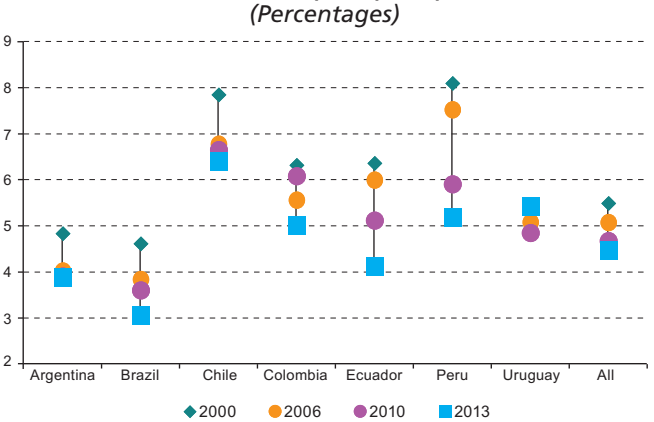
IV. International transport costs

The impact of international transport costs on trade is equivalent to that of customs tariffs or the exchange rate: a reduction in freight rates boosts exports and imports, just as depreciation in the exchange rate makes exports more competitive, and lower national customs tariffs cuts the cost of imports. In recent years, a number of studies have focused on the burden of international transport costs and its influence on a country's competitiveness. These studies cover various issues, including the lack of investment in infrastructure and the performance of infrastructure services (e.g. Micco and Perez, 2001; Limão and Venables, 2001; Martínez-Zarzoso and Wilmsmeier, 2010; Wilmsmeier and Martínez-Zarzoso, 2010; Márquez Ramos and others, 2011), and market structures and connectivity (Martínez-Zarzoso, Pérez and Wilmsmeier, 2011; Wilmsmeier and Sánchez, 2009; Wilmsmeier and Hoffmann, 2008).

If international transport costs rise, imports become more expensive, pushing up inflation, which, in the case of intermediate and capital goods, increases local production costs. The resulting hike in export costs produces a drop in earnings for the exporting country or even the loss of a market, depending on the elasticity of demand and the availability of substitutes.

The burden of international transport and insurance costs can be estimated by comparing the CIF and FOB values of one product or product group. In the period under consideration, the overall burden of transport and insurance costs was below 4.5% for all intraregional trade transport modes and products. Nevertheless, the burden differs from country to country in the region (Figure 9). For example, Chile bears the highest burden of transport and insurance costs in intraregional trade, while imports from the region to Brazil carry the lowest burden of transport and insurance costs in relation to average product value. The reasons for this are manifold and are not analyzed in detail here, but factors may include the structure and unit value of the freight trade in the region, geography, the market structure, and the imbalance of trade flows (for details see Wilmsmeier, 2014).

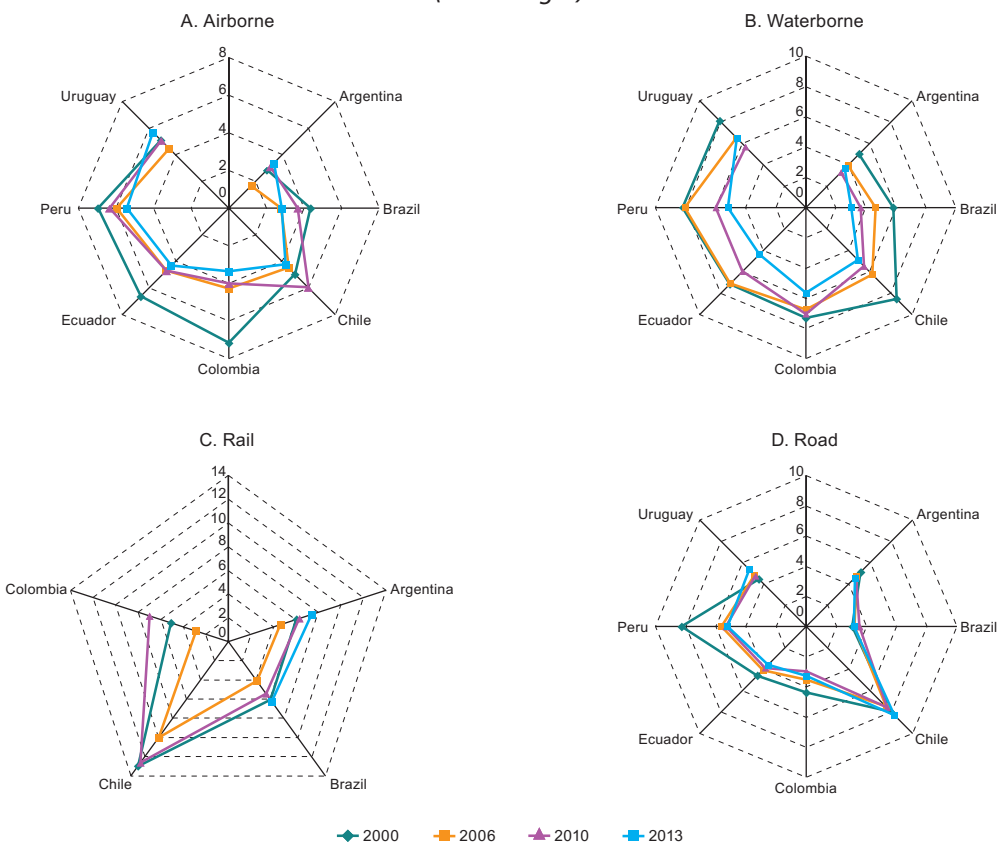
Figure 9
BURDEN OF TRANSPORT AND INSURANCE COSTS FOR INTRAREGIONAL IMPORTS, 2000, 2006, 2010 AND 2013
(Percentages)



Source: Prepared by the authors, on the basis of the International Transport Database (BTI), various years.
N.B.: No data available for Bolivia (Plurinational State of), Paraguay and Venezuela (Bolivarian Republic of).

Significant differences in the burden of transport and insurance costs can be observed when comparing different modes of transport (see figure 10). In general, all modes have seen a drop in the burden of international transport and insurance costs. However, the burden of transport and insurance costs for waterborne and airborne imports to Uruguay increased between 2010 and 2013. On a more general note, the burden on maritime transport for imports to all countries decreased between 2000 and 2013.

Figure 10
BURDEN OF TRANSPORT AND INSURANCE COSTS ON INTRAREGIONAL IMPORTS, BY MODE OF TRANSPORT, 2000, 2006, 2010 AND 2013
(Percentages)



Source: International Transport Database (BTI), various years.
N.B.: No data available for Venezuela (Bolivarian Republic of). Rail data for 2013 was only available for Argentina and Brazil.

Empirical studies have also concluded that higher transport costs can lead to less foreign investment, a lower savings ratio, a drop in the export of services, limited access to technology and knowledge, and a decline in employment rates. It is estimated that doubling transport costs knocks half a percentage point off the rate of economic growth (Radelet and Sachs, 1998). This may appear insignificant, but lower growth over the long term has a sizeable impact on per capita income.

V. Conclusions

This *FAL Bulletin* updates the analysis of the data presented in previous Bulletins concerning the commodities traded and transportation used between South American countries, in order to identify the current modal split in intraregional freight transport in South America, and to ascertain the level and evolution of trade flows, imbalances and the burden of transport and insurance costs.

Analysis of data from 2000, 2006, 2010 and 2013 reveals the trade imbalances among these countries, with clear imbalances in the value and volume of trade in Argentina, Chile and Colombia.

Analysis of country- and region-specific modal splits for imports and exports shows that, generally, a much larger share of total freight volume is carried by waterborne and land/other transport than by air. However, airborne transportation has a greater cargo value per ton. The most frequently used modes of transport, by volume (in tons) and by value (in FOB value in US dollars), are the maritime and road modes, with the maritime sector generally being used to export goods, while the trucking sector tends to carry more imports across all the countries in this data set. The evolution of trade in these countries between 2000 and 2013 suggests that the share of each mode has remained stable and that the potential of modes other than road and maritime transport could be exploited better.

All South American countries must address the issues of competitive efficiency, geographical accessibility and environmentally sustainable development. To give South America a competitive edge, networks must be able to operate efficiently in the segmented South American economy.

In line with general ECLAC recommendations regarding mobility and logistics policies, different transport modes should not be considered in isolation, but as part of an integrated transport policy. The lack of financial resources to construct and operate transport infrastructure, and the pressure to use resources sustainably and to develop feasible projects undermines transport systems in the region. Structured development concepts must be formulated that contemplate all aspects of transport modes, including legal, organizational, technological, regulatory, and infrastructural elements. Policies should not only seek to expand services, but also to use existing capacity efficiently. More efficient, sustainable and environmentally-friendly transport policies would improve delivery times for freight transport, particularly with regard to coordination between different modes of transport.

Linkages between conventional transport modes in the region, namely roads, railways, air transport, waterways and pipelines, should be developed in such a manner that the relative weight of the different modes is strengthened in their captive markets, a so-called "co-modality approach", with a high degree of intermodal operations and choices. The modes should act as counterweights to each other and be used in a complementary manner. Thus, capacity/investment in road construction could be transferred to routes and connections where accessibility and capacity is low. In future, intermodal connections and the reliability of transportation networks and infrastructure will have a profound effect on the region's economy. As intermodal transport gains importance, transport and logistics systems must be developed, with the necessary technological capabilities and economic resources.

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