



BULLETIN

FACILITATION OF TRANSPORT AND TRADE IN LATIN AMERICA AND THE CARIBBEAN

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

## 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.

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.

This issue was written by Gordon Wilmsmeier and Thomas Spengler, both of the Infrastructure Services Unit of the Economic Commission for Latin America and the Caribbean (ECLAC).

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](mailto:gordon.wilmsmeier@cepal.org)



Introduction



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II. Modal split



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Bibliography



UNITED NATIONS

ECLAC

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,<sup>1</sup> 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<sup>2</sup>
- 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

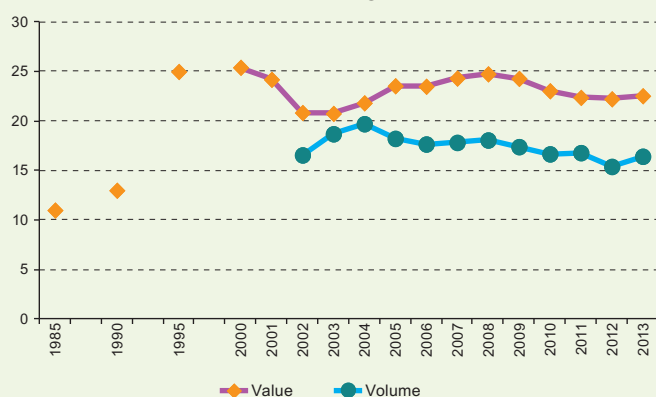
<sup>1</sup> <http://www.cepal.org/en/publications/5581-international-trade-and-transport-profiles-latin-american-countries-year-2000>.

<sup>2</sup> 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<sup>3</sup> 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.<sup>4</sup>

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.

<sup>3</sup> Excluding commodities classified under SITC Rev.3, codes 3 and 9.

<sup>4</sup> 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

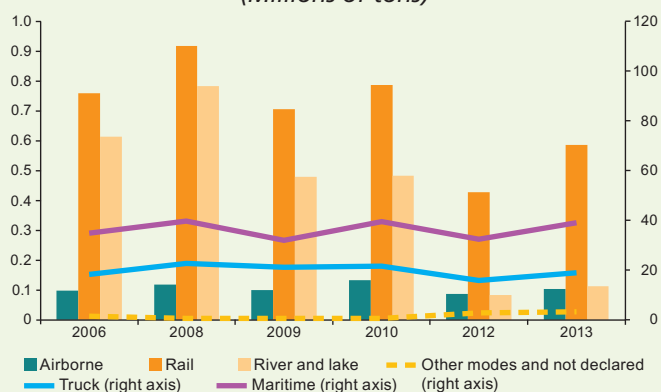
The volume of intraregional transport increased by less than 7% between 2000 and 2010, in strong contrast to South American countries' trade outside the region, which increased by more than a factor of five during the same period. In fact, between 2010 and 2013, the volume of intraregional trade decreased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

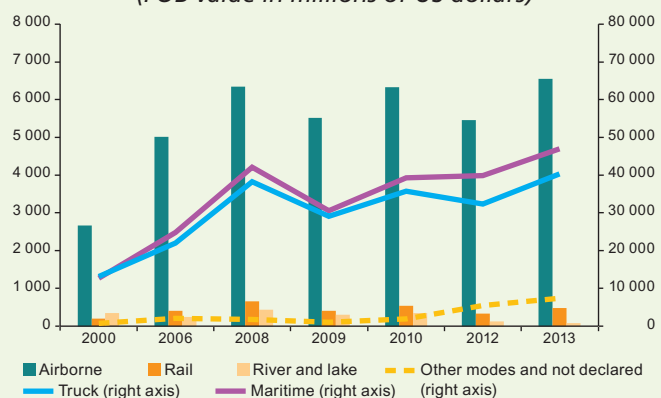
the volume analysis. The value of intraregional air transport flows almost doubled between 2000 and 2006, to almost US\$ 5 billion, and reached US\$ 6.6 billion in 2008. The value of goods transported by maritime modes more than tripled between 2000 and 2013, reaching US\$ 47 billion. Road transport 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)

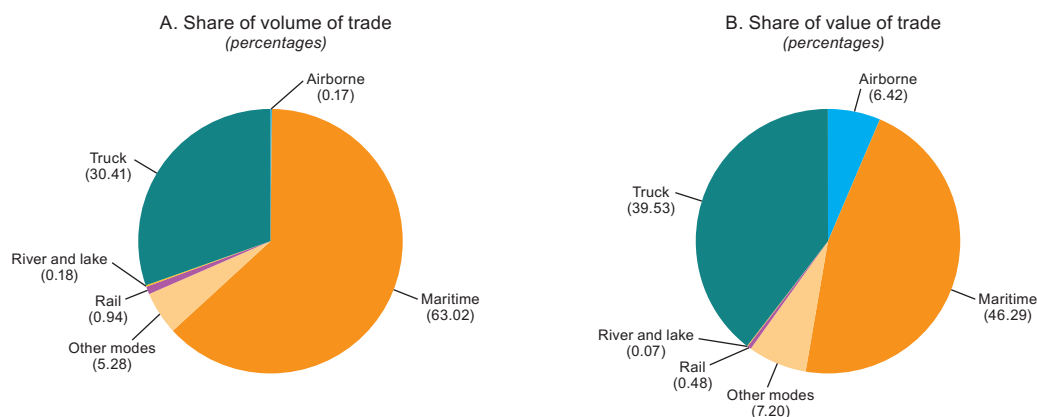


Source: International Transport Database (BTI), various years.  
N.B.: Other modes include not declared, postal and pipeline.

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 ton 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, pharmaceutical 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.

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

To better understand the structure of cargo movements, figure 6 sets out the commodity groups traded between South American countries.<sup>5</sup> 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 6**  
**MAJOR COMMODITIES TRADED WITHIN SOUTH AMERICAN COUNTRIES**  
*(Metric tons)*

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