

## Box 1

# A Transportation Services Indicator to measure Colombian Economic Activity

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Transportation services play a critical role across all sectors of the economy by facilitating the movement of goods and services at all production levels. Although not all goods produced in a country require transportation due to inventory accumulation in industries and businesses or because certain services do not require physical transport; the dynamic of the transportation sector can provide valuable insights into economic activity trends during specific periods (e.g., Google’s mobility indicators during the COVID-19 pandemic).

Transportation services offer the advantage of providing more timely information compared to other economic indicators. Consequently, they are often integrated into nowcasting methodologies developed by central banks and economic analysts (Cote-Barón *et al.*, 2023; Galeano-Ramírez *et al.*, 2021; Vidal *et al.*, 2015). However, while these tools are valuable, there is a need for a comprehensive indicator that summarizes the overall dynamics of transportation services and closely correlates with various macroeconomic aggregates and the economic cycle.

This section outlines the methodology used to construct the Transportation Services Index for Colombia (ISTCO for its Spanish acronym). By aggregating data on domestic transportation, ISTCO enables the timely monitoring of monthly economic activity in the country with a focus on tertiary sectors like domestic trade and service consumption (e.g., tourism). The ISTCO has been calculated since January 2015 following partially the methodology of Young *et al.* (2014) for the Transportation Services Index in the United States. This methodology is characterized by its simplicity and potential regional replication.

The subsequent sections detail the components, weighting, indexing, and aggregation method of the indicator. Additionally, the relationship between this indicator and various leading economic activity indicators, such as gross domestic product (GDP) and the Economic Tracking Indicator (ISE), is explored.

### 1. Indicator components

ISTCO includes domestically operated contract transport services, which involve moving goods or passengers within the country for a fee. This excludes the use of vehicles like motorcycles and taxis by private companies and non-commercial household trips. Istco is divided into three categories according to the mode of transport used: ground and pipeline, air, and water. Table B.1.1 provides an overview of the main sources of information used for each of these service categories.

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Table B1.1  
Main sources of information used for Istco

Mode of transport	Source	Indicator	Frequency	
Ground and pipeline	National Registry of Cargo Dispatch (RNDC)	Tons mobilized by land	Monthly	
	Ground	Superintendency of Transport	Number of passengers mobilized by main transport terminals	
	Urban Passenger Transport Survey (ETUP), DANE	Number of passengers mobilized	Quarterly	
	Pipeline	Ecopetrol S. A. (financial and operating reports)	Tons mobilized (oil and gas)	Quarterly
	Railway	Superintendency of Transport, Ministry of Transport	Tons mobilized (coal)	Monthly
Air	<i>Aeronáutica Civil</i>	Tons mobilized	Monthly	
		Number of passengers mobilized (domestic and international flights)	Monthly	
Water	Superintendency of Transport, Ministry of Transport	Mobilized tons (river and cabotage)	Monthly	

Source: Own calculations.

### 1.1 Ground and Pipeline Transport

In Colombia, a significant portion of both intermediate and final goods is transported by land. To capture these transportation flows, data from the Ministry of Transportation's National Registry of Cargo Dispatch (RNDC for its Spanish acronym) is used. This registry provides detailed information at the product level, showing the total tons and gallons moved between population centers by registered logistics companies in the country. Moreover, the RNDC data is organized by tariff heading, which allows for the grouping of transported cargo into agricultural, mining, and industrial sectors based on the four-digit International Standard Industrial Classification (ISIC, rev. 4, A. C.). The weighting of each sub-sector in terms of value-added, determined by nominal figures, is also considered.

Additionally, the movement of coal by land is supplemented by the tons transported via railway, representing shipments from La Guajira and Cesar mines to the ports, as reported by the Superintendency of Transportation. For the transport of crude oil, gas, and refined products, tonnage transported through pipelines is included based on quarterly data reported by sector companies in their financial and operational reports, as well as export records from DIAN by shipment date.

Ground transportation of passengers encompasses several components. Firstly, it includes passenger movement between municipalities via services provided by authorized or approved ground terminals, which are reported by the Superintendency of Transportation. This data is further corroborated and enhanced by examining the evolution of category I and II vehicles passing through concessioned toll roads overseen by the National Infrastructure Agency (ANI for its Spanish acronym), serving as a proxy for inter-municipal passenger movement between 2015 and 2020. Moreover, the index incorporates quarterly data on inter-city transportation services within the country's twenty-three major cities<sup>1</sup>, utilizing vehicle fleet information reported in the Urban Passenger Transport Survey (ETUP for its Spanish acronym) conducted by DANE.

1 The twenty-three capital cities included in the ETUP are the metropolitan areas of Barranquilla, Bogotá, Bucaramanga, Cali, Cúcuta, Manizales, Valle de Aburrá (including Medellín), Centro de Occidente (including Pereira), Armenia, Cartagena, Florencia, Ibagué, Montería, Neiva, Pasto, Popayán, Quibdó, Santa Marta, Sincelejo, Tunja, Valledupar and Villavicencio.

## 1.2 Air Transport

The air transportation services component relies on operational statistics reported by the Civil Aeronautics Department (Aerocivil), detailing the total number of passengers and tons transported on domestic and international flights.

## 1.3 Water Transport

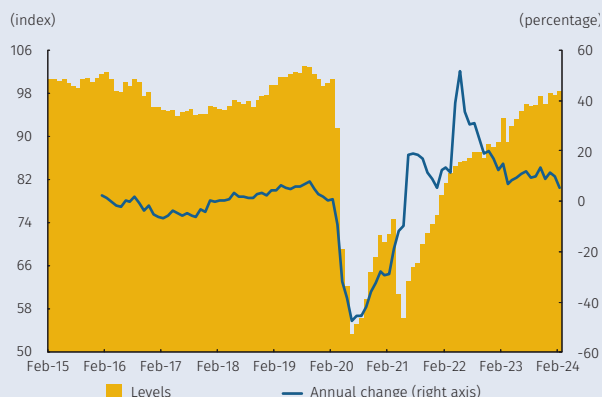
Water transport encompasses the movement of goods by vessels operated by port companies providing river and maritime cabotage services, as reflected in Colombia’s port traffic statistics. These statistics are particularly valuable for complementing the transport of mining goods such as oil and coal. However, it’s important to note that due to data limitations, this component does not cover passenger transportation.

## 2. Transportation Services Index (ISTCO)

Each component series is indexed with the average of data from 2015 as the base. For the ground and air transport indexes, the movement of goods and passengers is weighted based on their historical relationship with the nominal value added of each respective mode of transport.<sup>2</sup> The composite index for each transport service is then aggregated, considering its weighting within the total transport sector value from one year ago, based on the most recent<sup>3</sup> available publication of quarterly GDP at current prices.<sup>4</sup> The incorporation of a time-varying weighting structure enables the indicator to recognize historical shifts in the primary sources of economic growth, such as the recent expansion of the tertiary sector. Given the seasonal nature of transportation services, series are adjusted for seasonal and calendar effects (DAEC) using the X-13Arima-Seats method.<sup>5</sup> This ensures that monthly changes in ISTCO and its short-term trends are accurately captured.

Graph B1.1 illustrates the monthly trends of the indicator from January 2015 to February 2024.<sup>6</sup> Notably, ISTCO effectively captures the impacts of mobility disruptions on the movement of goods and passengers within the country. These disruptions include the civic strike in Quibdó (Chocó) and Buenaventura (Valle del Cauca) in May 2017, the 51-day Avianca airline pilots’ strike that began in September 2017, mobility restrictions imposed during the COVID-19 pandemic in 2020, and blockades occurring in various parts of the country in 2021.

Graph B1.1  
Transportation Services Index (Istco)  
for Colombia<sup>a/</sup> (monthly)  
(levels and annual change)

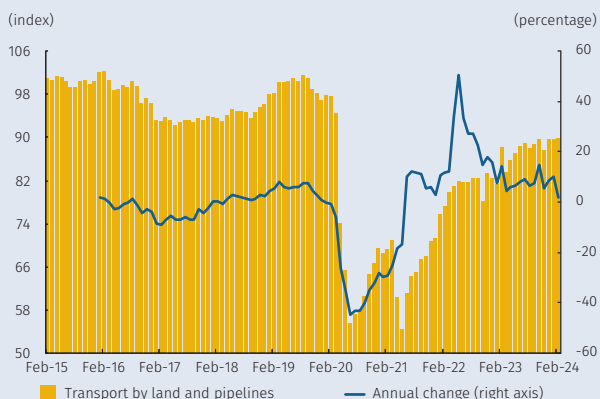


a/ Seasonally adjusted and corrected for calendar effects  
Source: Calculations by Banco de la República.

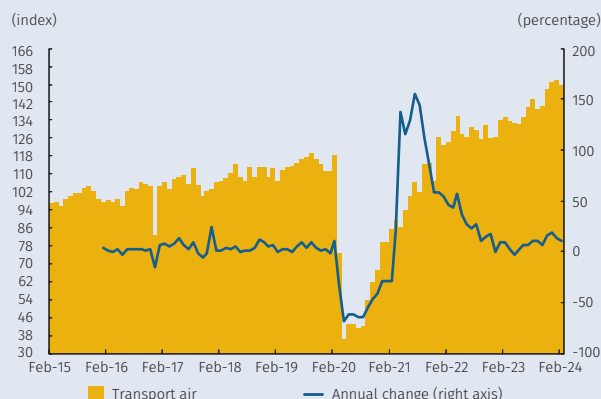
- 2 In the annual national accounts, the highest level of disaggregation available is represented by 61 groupings based on the ISIC divisions (rev. 4 A.C.). This limitation prevents us from determining the specific weighting of these activities in the value added of each mode of transport.
- 3 Activities that supplement transport, including warehousing, mail, and courier services are excluded.
- 4 As of the publication of this Box, the most recent quarterly national accounts data available is from February 2024, which includes data up to December 2023.
- 5 This methodology enables the incorporation of exogenous variables within the Arima modeling to accurately account for Colombian holidays. It also includes adjustments for Easter and New Year within its structure.
- 6 The data for the first quarter of 2024 regarding urban ground passenger transportation and waterborne freight transportation is preliminary.

**Graph B1.2**  
Istco components<sup>a/</sup> (monthly)  
(levels and annual change)

**A. Transport by land and pipelines**



**B. Air Transportation**



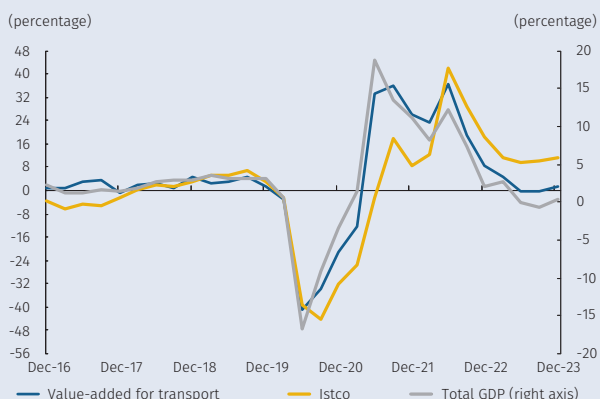
a/ Seasonally adjusted and corrected for calendar effects  
Source: Calculations by Banco de la República.

Regarding the dynamics of individual components, the significant contraction of ground and air transport services during 2020 is notable (Graph B1.2). Specifically, activities related to ground transport have shown a slower recovery compared to the overall trend and remain below pre-pandemic levels. This is primarily due to ongoing low levels in inter-urban passenger movement and the transportation of mining products like coal and oil. In contrast, air transport services have experienced a faster recovery, reaching record-high levels, driven by robust international passenger activity despite reduced domestic passenger movement.

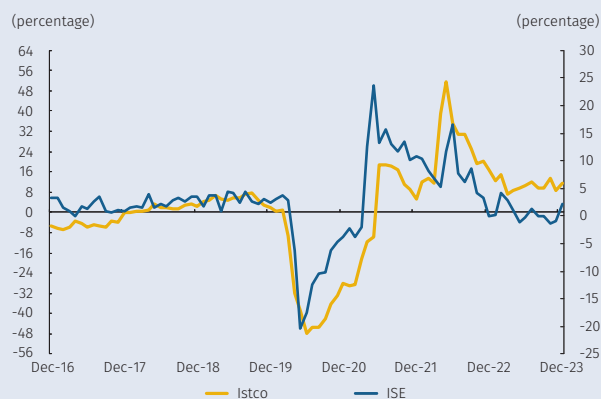
Transport services play a crucial role across both productive and consumer sectors, leading to strong annual variations closely correlated with variables like GDP (Graph B1.3, Panel A). Remarkably, this correlation with GDP is even higher than that associated with the value added of the transport sector before the pandemic (0.85 versus 0.40, respectively). Examining the period between 2020 and 2021, ISTCO demonstrates a higher sensitivity to shocks related to mobility restrictions on goods and services compared to GDP. However, its relationship with the Economic Tracking Indicator (ESI) was not as evident during the study

**Graph B1.3**  
Relationship between Istco and several economic indicators<sup>a/</sup> (monthly)  
(levels and annual change)

**A. Quarterly GDP**



**B. ISE**



a/ Seasonally adjusted and corrected for calendar effects  
Note: Value-added for transport excludes activities including storage, mail, and courier services.  
Source: DANE, Calculations by Banco de la República.

period (Graph B1.3, Panel B), although post-pandemic, the correlation between the series has strengthened to 0.83.

Table B1.2 displays the contemporaneous correlation of ISTCO with other key leading economic activity indicators, including real manufacturing production and various components of GDP from both the demand and supply sides. It is highlighted the strong correlation between transport services and tertiary activities, particularly retail trade and the consumption of durable goods and services. The dynamics of transport services also offer valuable insights into the behavior of the manufacturing industry, excluding coking and oil refining. Conversely, the lower correlation between agricultural activities and the consumption of non-durable goods may be attributed to potential underestimations in RNDC data. This

Table B1.2  
Contemporary correlation with key indicators

Indicators	2016 - 2019	2020 - 2021	2022 - 2024
(a) Main indicators			
Gross domestic product (GDP)	0.85***	0.85***	0.82**
Economic Tracking Indicator (ISE)	0.46***	0.79***	0.83***
Primary ISE	0.10	0.80***	0.28
Secondary ISE	0.12	0.57***	0.88***
Tertiary ISE	0.55***	0.84***	0.77***
Regional Economic Pulse (PER)	0.58***	0.78***	0.73***
Industry	0.43***	0.83***	0.68***
Retail	0.78***	0.85***	0.76***
Finance	0.35**	0.82***	0.51**
Housing	0.06	0.22	0.59***
Transport	0.36**	0.84***	0.82***
Agriculture	-0.24*	-0.11	0.17
Real manufacturing production	0.22	0.60***	0.81***
Real sales, excluding fuels and vehicles	0.81***	0.59***	0.75***
Energy demand (SIN)	0.58***	0.79***	0.06
(b) Demand components			
Domestic demand	0.82***	0.84***	0.72**
Total consumption	0.54**	0.86***	0.77**
Private consumption	0.63***	0.85***	0.81**
Durable goods	0.60**	0.70*	0.81**
Non-durable goods	0.08	0.74**	0.86***
Semi-durable goods	0.33	0.69*	0.76**
Services	0.72***	0.86***	0.81**
Gross fixed capital formation	0.06	0.73**	0.74**
Export	0.09	0.94***	0.73**
Imports	0.51**	0.89***	0.60
(c) Supply sectors			
Primary sectors	0.36	0.92***	0.10
Agricultural activities	-0.56**	0.72**	0.01
Mines and quarries	0.87***	0.93***	0.19
Secondary sectors	0.16	0.74**	0.90***
Industry excluding refining	0.61**	0.72**	0.84***
Coke and refining	-0.45*	0.69*	0.52
Tertiary sector	0.66***	0.87***	0.79**

Note: the correlation is calculated based on the annual change of the seasonally and calendar-adjusted series, except for the levels reported by the PER. The color of the cells corresponds to the magnitude and direction of the correlation, values in green (red) indicate a positive (negative) and high correlation. Statistical significance at \*\*\* p<0.01; \*\* p<0.05; \* p<0.1.  
Source: DANE, XM and Banco de la República; own calculations.

could be due to a significant portion of goods in these sectors being transported by vehicles or trucks not accounted for by registered logistics companies.

Lastly, the available data for the first quarter of 2024 indicates ongoing growth in transportation services on both an annual and quarterly basis, driven by increased international passenger traffic and a rise in the transportation of agricultural goods other than coffee.

### 3. Conclusions

For nowcasting exercises conducted by central banks and economic analysts, the availability of timely and frequent indicators is essential. The Transportation Services Index for Colombia (ISTCO), which consolidates diverse sources of information related to domestic transportation services, emerges as a valuable indicator for understanding certain economic dynamics, particularly those linked to the performance of non-refining industries and domestic trade of durable goods and services. Its minimal lag further enhances its suitability for integration into short-term GDP forecasting models. Future efforts to enhance ISTCO could focus on refining cargo and passenger weighting methods for ground and air transportation components, incorporating alternative data sources to better capture the movement of agricultural goods, analyzing inventory behaviors in specific sectors, and exploring ISTCO's potential in detecting economic cycle turning points.

### References

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