



# Surface Transportation Board

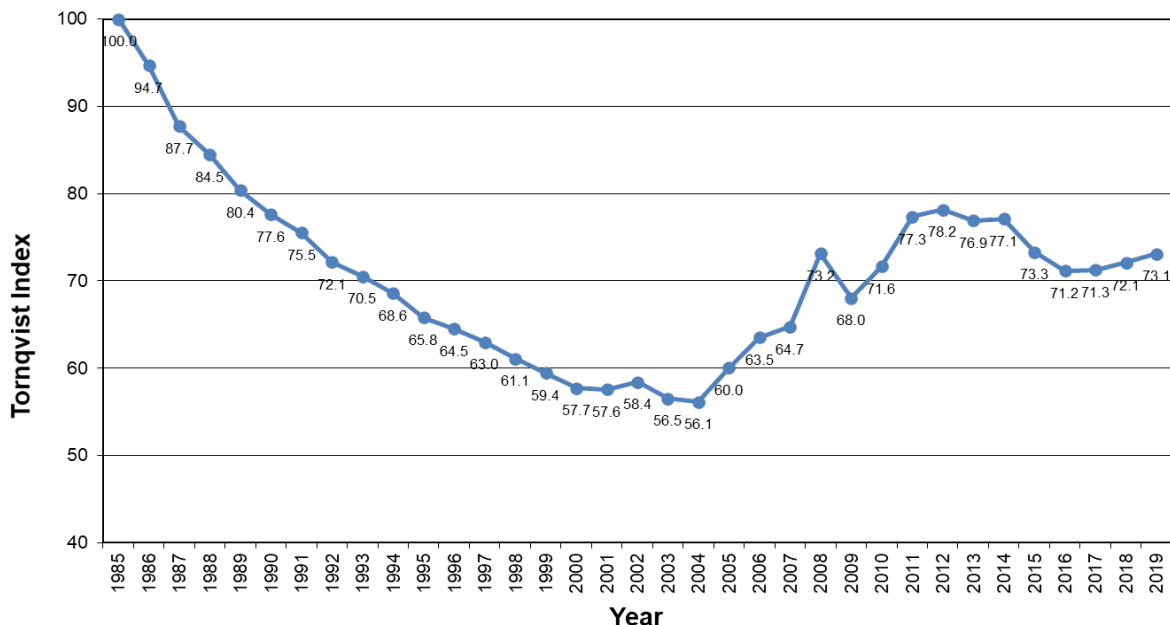
Office of Economics

December 2, 2021

## Annual Rail Rate Index Study: 1985-2019

The Surface Transportation Board (STB) monitors freight railroad rates in the United States. Periodically, the STB's Office of Economics (OE) distills its data and analysis of freight rail rates into formal reports that are shared with the Board and the public. This updated report summarizes trends in freight railroad rates and brings our measurement of the Rail Rate Index up through 2019.<sup>1</sup> The Rail Rate Index Study uses the STB's Confidential Carload Waybill Sample (Waybill Sample) data for all traffic to calculate a Tornqvist index to show how rates are changing over time across the entire rail industry, while controlling for shifts among different traffic characteristics from year to year. Figure 1 shows the real, inflation-adjusted Rail Rate Index over time.

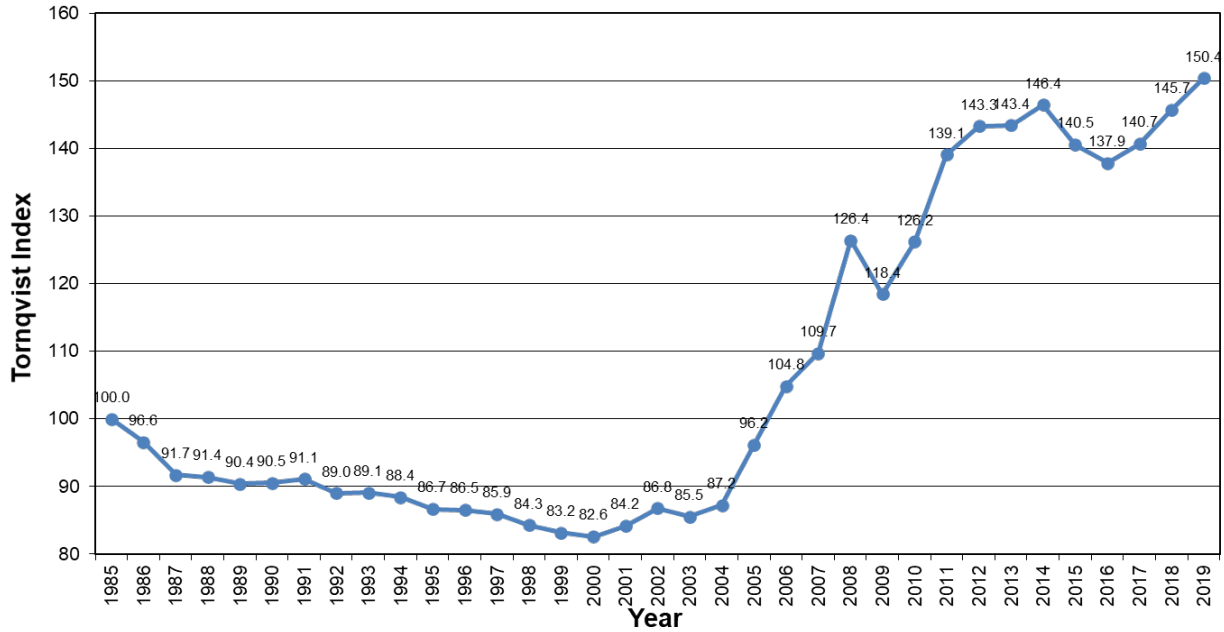
**Figure 1. Rail Rate Index Based on Real Revenue Per Ton-Mile, 1985=100**



<sup>1</sup> Our previous reports can be found at <https://prod.stb.gov/reports-data/reports-studies/>.

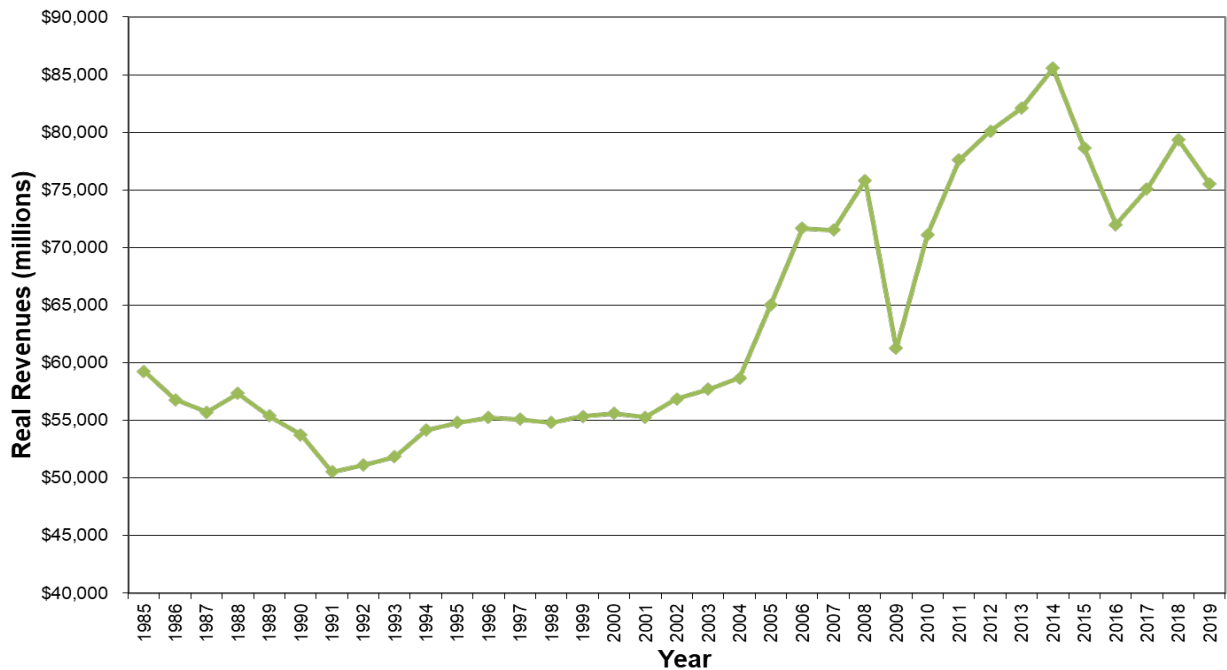
Figure 2 shows nominal rates over the same period.

**Figure 2. Rail Rate Index Based on Nominal Revenue Per Ton-Mile, 1985=100**



The railroads' real, inflation-adjusted revenue for 1985 to 2019 can be seen in Figure 3.

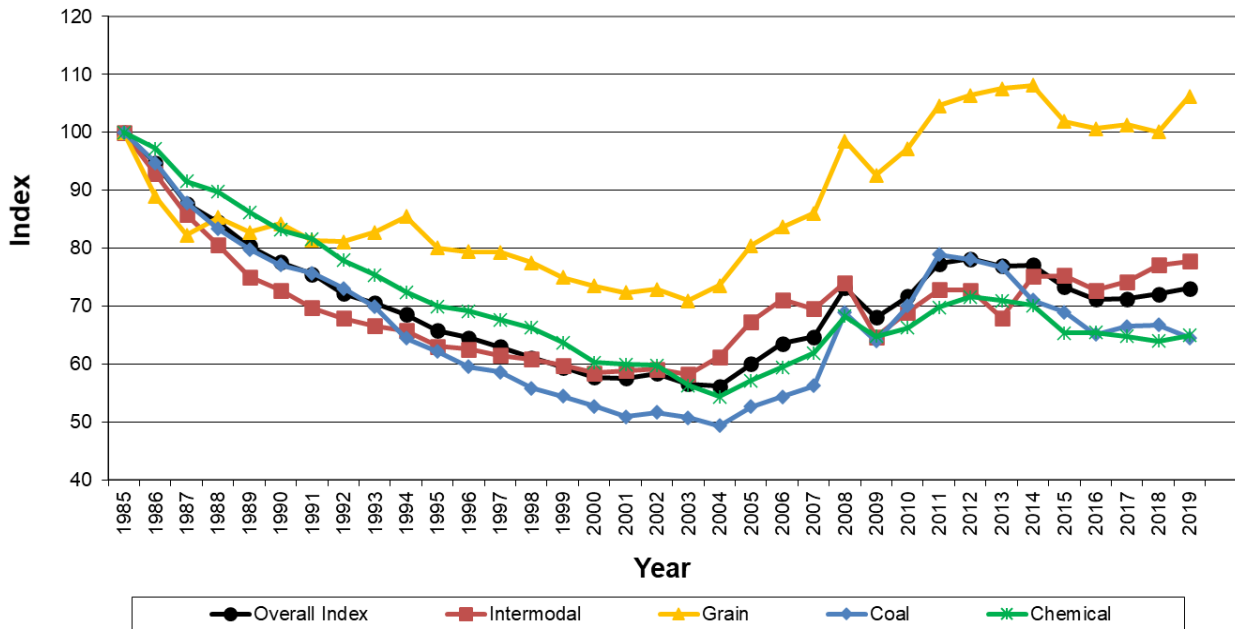
**Figure 3. Real Revenue**



## Commodity Rail Rate Indices

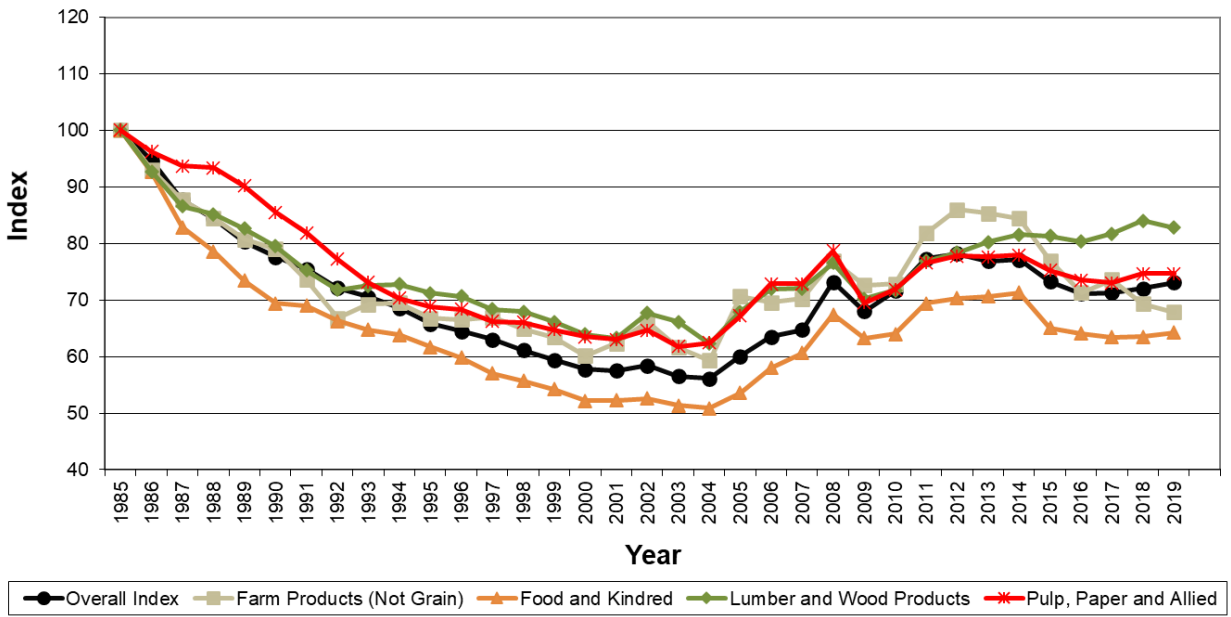
Figures 4.1-4.5 show the Rail Rate Index for selected individual commodities superimposed over that of the overall Rail Rate Index from Figure 1.<sup>2</sup>

**Figure 4.1 Rail Rate Indices for Commodity Groups**  
(Note: 1985=100)

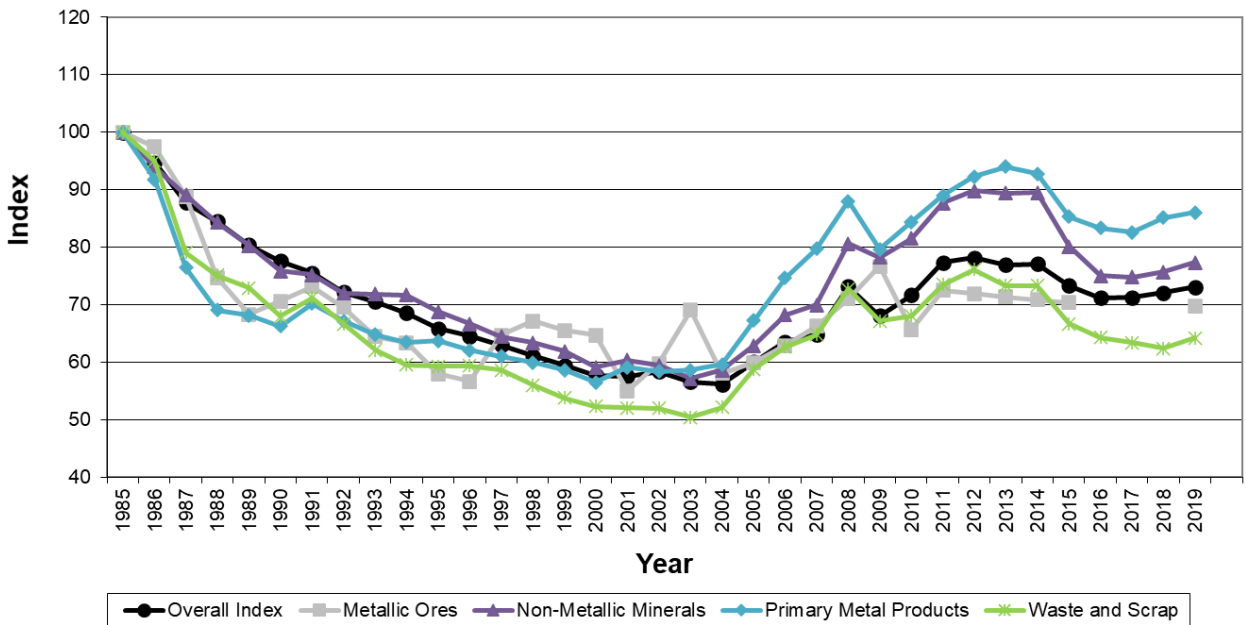


<sup>2</sup> Note that the metallic ore in Figure 4.3 is not shown from 2016 to 2018 as those years are impacted by an issue with the Waybill data which has been corrected beginning with 2019. For Figure 4.5, because crude oil traffic was not included in the study until 2007, both the overall index and crude oil index are calculated with a base year of 2007.

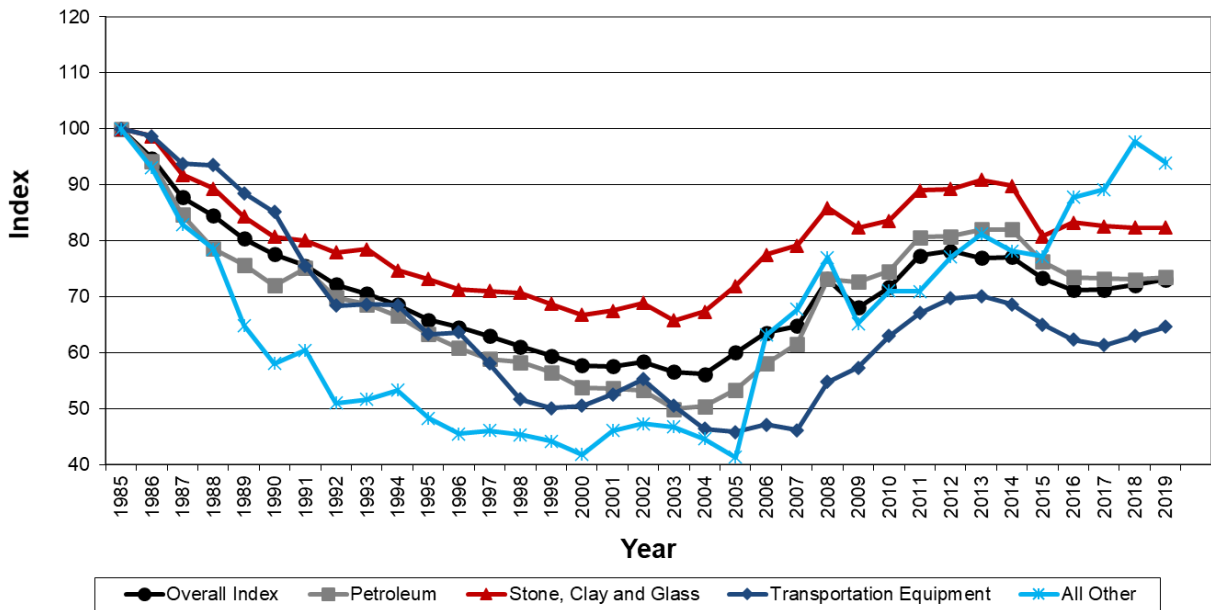
**Figure 4.2 Rail Rate Indices for Commodity Groups**  
 (Note: 1985=100)



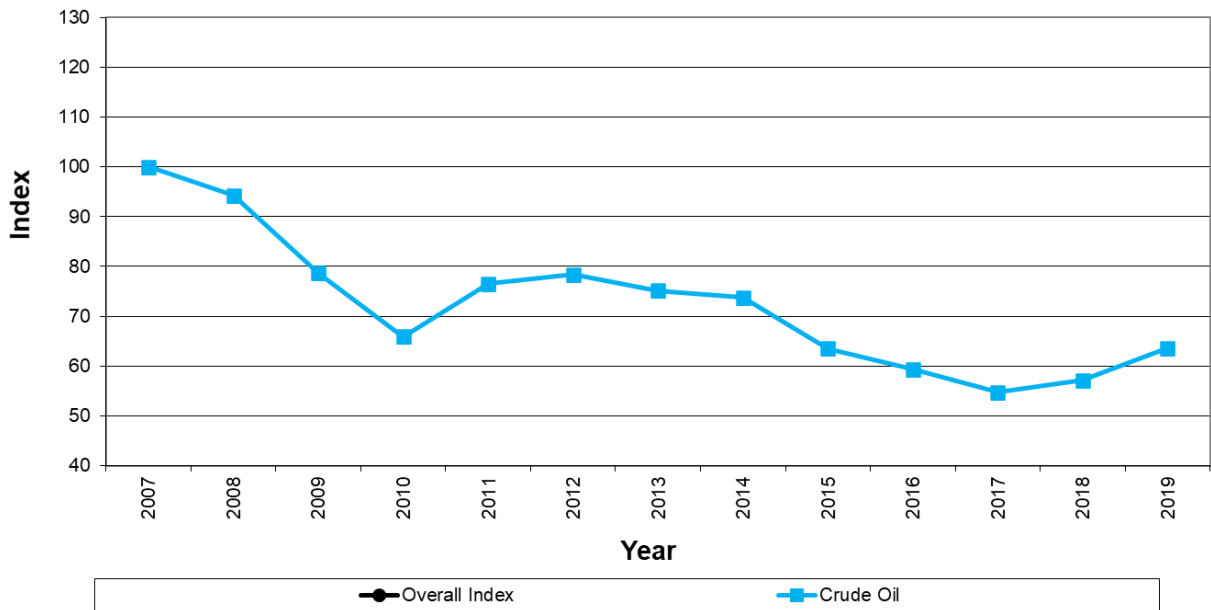
**Figure 4.3 Rail Rate Indices for Commodity Groups**  
 (Note: 1985=100)



**Figure 4.4 Rail Rate Indices for Commodity Groups**  
(Note: 1985=100)



**Figure 4.5 Rail Rate Indices for Commodity Groups**  
(Note: 2007=100)



## Methodology

The primary source of information on freight rail shipments terminated in the United States is our Waybill Sample. Using the Waybill Sample, we calculated revenue per ton-mile (RPTM) and used this measure as our proxy for rail rates.<sup>3</sup> For this analysis, the Office of Economics kept two principles in mind: (1) the study should account for the effects of inflation; and (2) the study should not allow a change in the mix of commodities or other traffic characteristics to bias the Rail Rate Index. To ensure that inflation plays no part in the Rail Rate Index, we use the GDP Implicit Price Deflator developed by the Bureau of Economic Analysis (BEA) to calculate real, inflation-adjusted dollars. To ensure that the traffic mix does not bias the Rail Rate Index, we employ what is known as a Tornqvist index.

In developing our Tornqvist index, we first assigned each railroad movement to one of 70 separate categories based on its commodity and service characteristics. The Tornqvist index measures the change in prices within each category and assigns a percentage weight to each category based on its share of total revenues, essentially creating a weighted average of price changes within the various categories. This ensures that the Rail Rate Index is not biased by a shift in traffic from one category to another. The following equation shows how we calculate the Tornqvist index, where “t” indicates the year and “c” indicates the commodity and service characteristics category, which consists of STCC, distance, car ownership, and train type.

$$TornqvistIndex_t = TornqvistIndex_{t-1} * e^{\sum_{c=0}^n [\ln\left(\frac{RealRPTM_{c,t}}{RealRPTM_{c,t-1}}\right) * RealRevenueShare_{c,t}]}$$

Table 1 lists the categories we selected for this rate study. Not every combination of the categories listed above is used, in the interest of not having any categories with little to no traffic. For example, there are many commodities which move almost entirely in privately-owned or railroad-owned cars, or as a particular shipment size.

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<sup>3</sup> Any mileage-related calculation needs to account for a change in mileage methodology in the Waybill data beginning in 2015. We accomplish this by including a 2015 figure that has been adjusted with a linking factor, which allows for a relevant comparison to 2014 figures. The unadjusted 2015 figures can then be compared to unadjusted 2016 figures, and so on.

**Table 1. Categories of Railroad Output Since 2008**

<b>Commodity+</b>	<b>STCC</b>	<b>LOH</b>	<b>Car Own</b>	<b>Shipment Size</b>
Intermodal	NA	S, M, L, VL	Not Used	Not Used
Farm Products (not Grain)	01	Not Used	Not Used	Not Used
Grain	0113, 0114	S, M, L	P, R	S, M, U
Metallic Ores	10	S, M, L*	Not Used	Not Used
Coal	11	S, M, L, VL	P, R	Not Used
Crude Oil (Single-Car)	13	SML, VL**	Not Used	S
Crude Oil (not Single-Car)	13	Not Used	Not Used	MU**
Non-Metallic Minerals	14	S, M, L*	Not Used	Not Used
Food and Kindred	20	S, M, L	Not Used	Not Used
Lumber and Wood Products	24	S, M, L	Not Used	Not Used
Pulp, Paper and Allied	26	S, M, L	Not Used	Not Used
Chemical	28	S, M, L	Not Used	Not Used
Petroleum	29	S, M, L	Not Used	Not Used
Stone, Clay and Glass	32	S, M, L	Not Used	Not Used
Primary Metal Products	33	S, M, L	Not Used	Not Used
Transportation Equipment	37	S, M, L	Not Used	Not Used
Waste and Scrap	40	S, M, L	Not Used	Not Used
All Other	NA	S, M, L	Not Used	Not Used

**Definitions:**

<u>Item</u>	<u>Meaning</u>
STCC	Standard Transportation Commodity Code
LOH	<i>Length of Haul Category</i>
S	Short (<500 miles)
M	Medium (from 500 but <1,000 miles)
L	Long (from 1,000 but <1,500 miles)
VL	Very Long (1,500 miles or more)
Car Own	<i>Car Ownership Category</i>
P	Privately Owned
R	Railroad Owned
Shipment Size	<i>Carload Shipment Size Category</i>
S	Single (<6 cars)
M	Multicar (6-49 cars)
U	Unit (>49 cars)
Not Used	Indicates that the dimension represented by that cell is not used to calculate rate trends. For example, "Farm Products (not Grain)" is not separated by distance groups.

**Notes**

\*For these cases, a short distance is less than 100 miles, a medium distance is from 100 miles to less than 250 miles, and a long distance is 250 miles or more.

\*\*Crude oil tends to be shipped long distances, so the short, medium, and long distance groups, that is, those less than 1,500 miles, are a single category called "SML". Also, the multicar and unit train shipment types are combined and labelled "MU".

+Also note that all commodity groups include traffic moving under the specified STCC, except for intermodal traffic which is grouped in its own category.