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The Transportation Services Index Shows Monthly Change in Freight and Passenger Transportation Service

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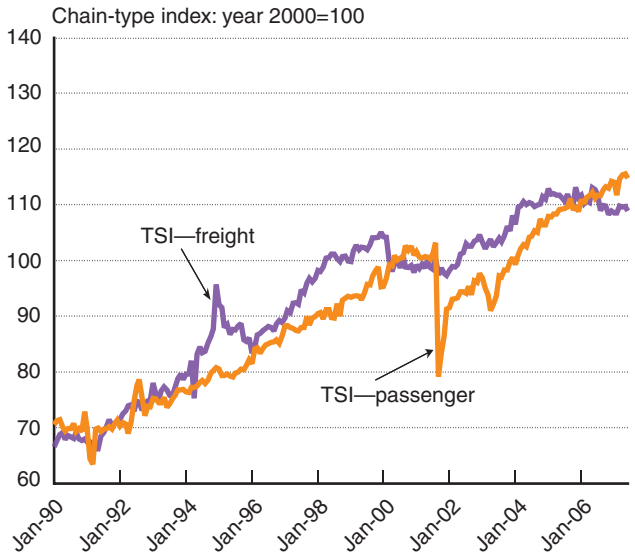
After ringing the opening bell of the New York Stock Exchange, on Jan. 29, 2004, then U.S. Transportation Secretary Norman Y. Mineta announced the Transportation Services Index (TSI), a new economic indicator intended to use changes in freight and passenger activity as a measure of the performance of the economy. Six weeks later, the first monthly release of the TSI, on March 10, marked the entry of the Bureau of Transportation Statistics (BTS) into the company of federal statistical agencies that produce monthly U.S. economic indicators (see box 1). In each ensuing month, BTS has released the updated index showing the change in level of transportation services.

The TSI provides a monthly measure of freight and passenger service. Statistical and economic techniques are used to present the output of the different transportation modes in comparable terms, adjusted to correct for the seasonal nature of transportation. The TSI consists of two indexes, a freight TSI and a passenger TSI, which are then combined into a total TSI (see figure 1). Using 2000 as a base year with an index value of 100, the overall TSI has ranged from a value of 66 at the beginning of 1990 to approximately 110 at the end of 2006, reflecting an increase of nearly 70 percent over 17 years.

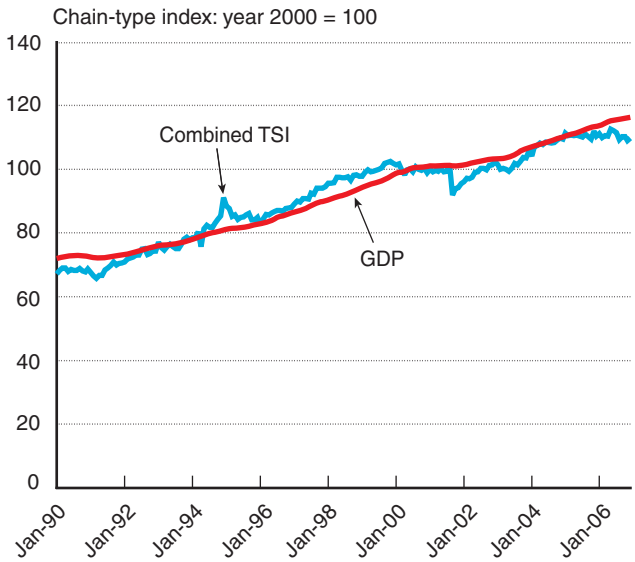
Research has been undertaken on how the pattern of change in the TSI compares with the growth of Gross Domestic Product (GDP) and with measures of the business cycle (see figure 2). The passenger TSI has grown over time, despite a sharp drop at the time of the terrorist acts of Sept. 11, 2001, and its growth tends to coincide with growth in GDP. The freight TSI has grown over time as well, though it has grown more slowly than GDP. It tends to move ahead of GDP – that is, it begins to increase its rate of growth before GDP does, and it tends to decrease before GDP declines or slows down.

Figure 1: Freight and Passenger TSI, 1990-2006



SOURCE: U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, August 2007.

Figure 2: Combined TSI and GDP, 1990-2006



SOURCE: U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, August 2007.

While preliminary research indicates that only the freight index is likely to be a leading indicator of the economy, both indexes are valuable on their own account. By showing both passenger transportation output and freight transportation output, the TSI provides a comprehensive picture of trends in the transportation industry. As an example, the TSI clearly showed the different impact of 9/11 on the freight and passenger sectors. The freight TSI suffered a one-month drop of nearly 3 percent but then exceeded its pre-9/11 level in May 2002, just eight months later. The passenger TSI dropped over 23 percent in a single month and did not recover to its August 2001 level until June 2004, almost three years later. The impact of 9/11 on the passenger index reflects that index's heavy weighting of airline passenger travel.

Box 1: Economic Indexes and Indicators

An economic **index** is a single statistic that is calculated from two or more other economic statistics through an aggregation procedure. Important examples include the Consumer Price Index, which aggregates prices of multiple goods and services, and the Federal Reserve Board's Industrial Production Index, which aggregates production quantities across different industries. Indexes are often expressed as a ratio to some base year.

An economic **indicator** allows analysis of economic performance and predictions of performance.

Prior to the TSI, there was no single integrated monthly measure of the economic output of all modes of transportation. With policymakers increasingly concerned about transportation's role in enabling, stimulating, and predicting economic growth, the TSI provides a monthly measure to track the short-term fluctuations in the transportation sector. The TSI can be used to examine the relationship of monthly changes in transportation output to various statistics relating to manufacturing output, employment, logistics indicators, transportation equipment sales, and many other things that influence or are influenced by transportation.

Freight transportation activity is directly tied in to the supply chain and to the buildup and maintenance of inventories, so transportation of finished goods may anticipate growth in sales at the retail and wholesale levels. A major portion of freight volume consists of raw materials and other intermediate goods that may be ordered in anticipation of growing activity in the manufacturing sector. Alternatively, a decline in freight shipments may result from anticipations of declines in economic activity in the downstream sectors. In particular, rail traffic figures have historically been used as a general economic indicator ("Wrong Side of the Tracks," *Fedgazette*, November 2003, Federal Reserve Bank of Minneapolis).

Because the freight and passenger sectors are likely influenced by different forces in the economy and as a result may exhibit different long-term patterns, the presentation of passenger and freight indexes separately makes possible more refined economic and statistical analyses. For example, current research into the TSI indexes indicates that the two indexes have different cycles – the freight TSI cycles being shorter but deeper; the passenger TSI cycles being longer and less strong.

How is the TSI calculated?

The TSI consists of a weighted composite of domestic "for-hire" transportation services. For-hire transportation is operated on behalf of, or by, a company that provides transport services to an external individual or company for a fee. A trucking company that hauls freight for a fee or a transit agency that provides bus service for a fare are examples of "for-hire" transportation services. The following is a brief description (for more detail, see the technical report referenced in current research section at end). The sources of the monthly data for the TSI are provided in table 1.

Table 1: Data Sources for the Transportation Services Index

Mode		Source	Measure
Freight	Trucking	American Trucking Associations	Index of tonnage
	Air	BTS and carrier websites	Freight ton-miles
	Rail	Association of American Railroads	Carloads & Intermodal units
		Federal Railroad Administration	Quarterly ton-miles
	Water	U.S. Army Corps of Engineers	Tons
	Pipeline	Energy Information Administration	Thousands of barrels, billion cubic feet
Passenger	Air	BTS and carrier websites	Revenue passenger-miles
	Rail	Federal Railroad Administration	Revenue passenger-miles
	Transit	American Public Transportation Association	Unlinked trips

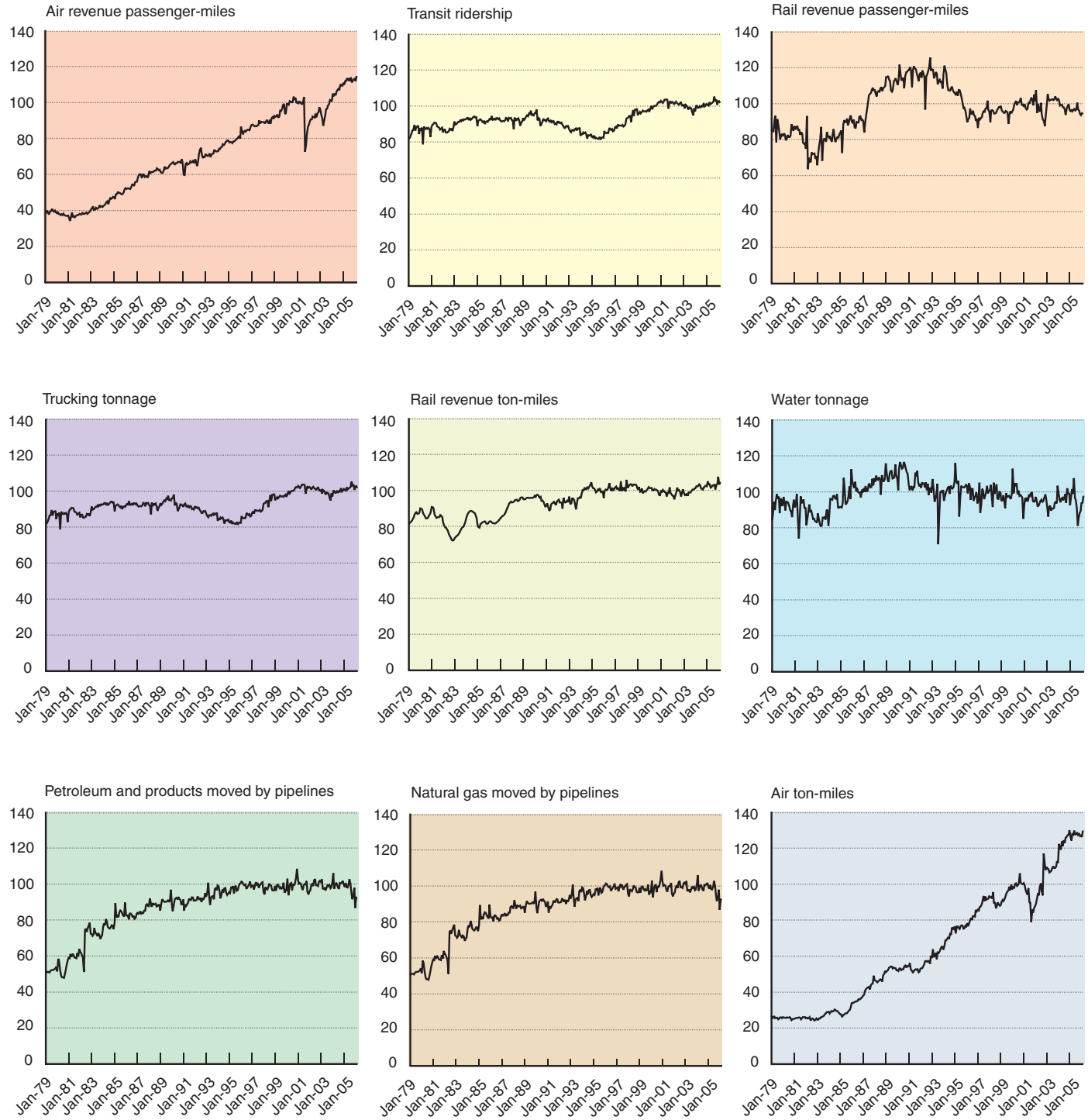
SOURCE: U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, 2007.

The components have been selected based on the availability of monthly data and to give the best coverage possible of the for-hire transportation industry. Not included in the for-hire component is transportation in vehicles owned by private firms to provide services to that firm, or transportation provided by private individuals (e.g., trips in the family car). In addition, the TSI does not include international or coastal steamship, courier services, the U.S. Postal Service, intercity bus, sight-seeing, taxi, or bicycling and other nonmotorized means of transportation due to data availability problems.

Because the principal purpose of the index is to identify the salient monthly shifts in transportation services output, the data are adjusted for the normal seasonal changes that impact the transportation sector, using standard seasonal adjustment methodologies. To combine the data, the modal time series are standardized by using the year 2000 as the base year to index the data.

These monthly seasonally adjusted and indexed data sets are shown graphically in figure 3. Juxtaposition of these indexed series highlights how the modes have behaved differently through the recent years. For example, while truck tonnage and air ton-miles have experienced strong growth, rail ton-miles have leveled off and water tonnage seems to be declining slightly.

Figure 3: Comparison of Seasonally Adjusted Indexes for the Various Domestic Transportation Modes, 1979 to 2005 (Year 2000 = 100)



SOURCE: U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, various sources—see table 1, 2007.

The individual modal numbers are merged into the freight, passenger, and combined indexes using weighting based on the relative economic value added by each mode. Weights are determined annually and applied throughout the year. These weights are applied to actual physical measures of transportation services.

Publication of TSI

The TSI is produced monthly. The TSI monthly press releases and data are available at: http://www.bts.gov/xml/tsi/src/index.xml. This website provides details on the sources of the data and the history of the index in addition to current research on the topic.

TSI Revision Policy

The index numbers for the latest four months are considered to be preliminary. BTS releases the preliminary number for the latest month and replaces the number for the oldest preliminary month with a revised number. All other revisions are held until an annual comprehensive revision of the TSI.

Current Research

BTS continues to study the monthly indexes in relation to other key economic variables. Research on the freight TSI has focused on whether it is a leading indicator of the national economy, in particular of cycles of GDP growth, thereby being a possible predictor of recessions and growth slowdowns. The BTS technical report, *Transportation Service Index and the Economy* (forthcoming) provides greater detail on this relationship.

Because the current passenger TSI only reflects services for-hire, BTS is considering a broader index of passenger travel that would incorporate vehicle miles travelled in automobiles and other personal-use vehicles. Such a passenger measure would incorporate modal shifts not presently captured in the current TSI and would provide a more comprehensive picture of trends in the transportation industry.

About this Report

The Bureau of Transportation Statistics is a component of DOT's Research and Innovative Technology Administration.

This BTS Special Report presents research from the TSI research team: Peg Young, Ken Notis, Gary Feuerberg, and Long Nguyen.

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Data —

- http://www.bts.gov/tsi/src/index.xml

Publications —

- K. Lahiri, H. Stekler, W. Yao, and P. Young. "Monthly Output Index for the U.S. Transportation Sector," *Journal of Transportation and Statistics*, vol. 6, no. 2/3, 2003.