



August 2011

Aviation On-Time Performance Trend Stable for Past 2 Years

By Peg Young, Ph.D.

About the *Transportation Trends in Focus* Series

The *Transportation Trends in Focus* series reports on the underlying trends in key transportation data. Using a variety of statistical analysis techniques, these reports examine recent trends, seasonality, and pattern shifts that the data reveal. This report looks at recent trends in monthly on-time performance of the U.S. major air carriers.

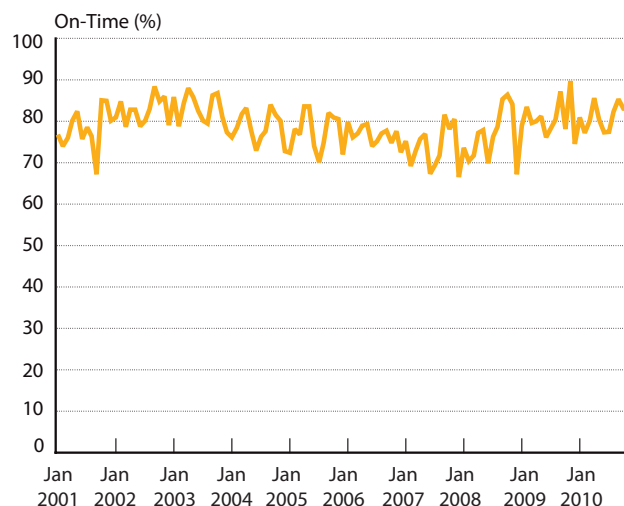
Airline on-time performance, measured by the percent of flights arriving at their destination on time, has attracted growing interest in recent years as the number of air travelers has increased. Figure 1 provides a graph of the percent of U.S. major air carriers' domestic flights arriving on time¹ from January 2001 to December 2010². The time series data in the graph exhibits strong seasonal variation, which masks the underlying trend.

"Seasonality is the systematic, although not necessarily regular, intrayear movement caused by the changes of the weather, the calendar, and timing of decision, directly or indirectly through the production and consumption decisions made by the agents of the economy."

S. Hylleberg. 1992. *Modelling Seasonality*. New York, NY: Oxford University Press.

Seasonality of the on-time arrival data can be viewed separately. One way to observe the seasonal patterns in the data, unaffected by the impact of changing long-term trends, is to

Figure 1: U.S. Major Air Carriers Domestic On-Time Arrivals (percent of total scheduled domestic operations), January 2001–December 2010



SOURCE: U. S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, available at http://www.bts.gov/publications/key_transportation_indicators/ as of Mar. 31, 2011

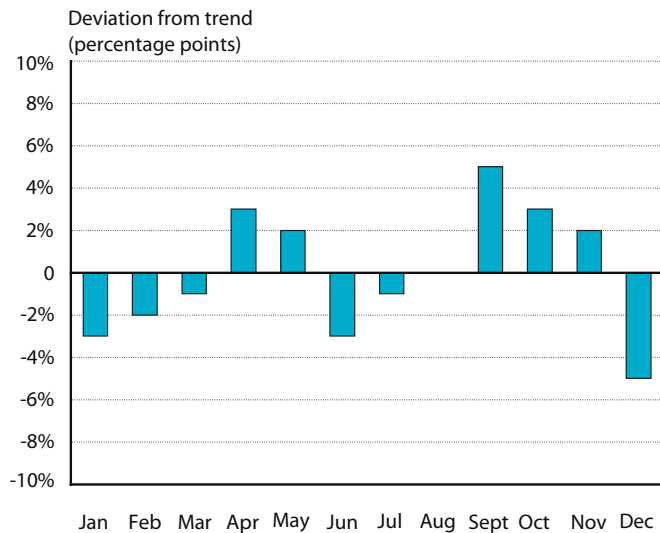
calculate the monthly seasonal factors³—as shown in figure 2. Such cyclical increases and decreases can suppress or magnify the underlying trend, depending on if they are in synchronization or out of synchronization with the direction the overall trend is taking. For example, growth in overall on-time arrivals may actually be masked if a seasonal decrease skews the number of on-time arrivals downward. Conversely, an increase in overall on-time arrivals can be magnified by a seasonal increase. Decreases or leveling in the overall trend can also be similarly masked by seasonal fluctuations.

¹ The percent of on-time flights is calculated as the number of flights arriving at their scheduled destinations less than 15 minutes after their scheduled arrivals, divided by the total number of scheduled operations. A scheduled operation consists of any nonstop segment of a flight.

² These data are reported on the BTS key transportation indicators webpage http://www.bts.gov/publications/key_transportation_indicators/ as of Mar. 31, 2011.

³ Seasonal factors estimate the effects that happen in the same month with the same magnitude and direction every year. These seasonal factors are additive and reflect movement away from the underlying trend. Positive factors indicate higher than average on-time arrivals (the original series is greater than the trend), and negative factors indicate lower than average on-time arrivals.

Figure 2: Monthly Seasonal Factors for U.S. Major Air Carriers Domestic On-Time Arrivals, (expressed as percentage point differences relative to the trend), based on data from January 2001 to December 2010

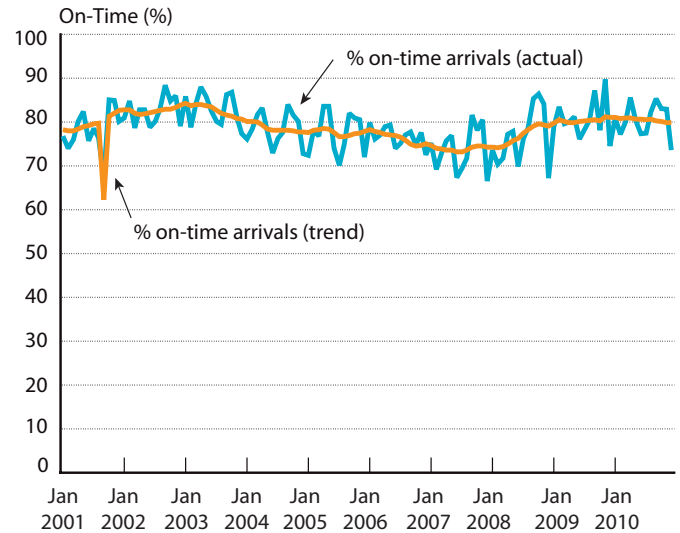


SOURCE:U. S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, special tabulations, December 2010.

As the histogram shows, the seasonal factors exhibit a distinctive pattern—typically higher percentages of on-time arrivals in the spring and fall, and lower percentages in summer and winter (attributable to increased travel and severe weather).

Once the seasonality is removed from the data, the long-term trend of on-time arrivals becomes more obvious. Figure 3, which compares the actual data to the underlying trend, indi-

Figure 3: U.S. Major Air Carriers Domestic On-Time Arrivals (percent of total scheduled domestic operations)—Actual and Underlying Trend, January 2001—December 2010



SOURCE:U. S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, special tabulations, December 2010.

cates a significant decrease in on-time arrivals in the month of September 2001. The trendline also indicates a decline in on-time arrivals from 2003 through 2007. However, the trend of on-time arrivals rose in 2008 before becoming relatively level in 2009 and 2010. The seasonality of the data tended to mask the level trend over these last 2 years. 🔄