# APPENDIX I FORECAST ACCURACY

Forecasts, by their nature, have a degree of uncertainty incorporated in them. They involve not only statistical analyses and various scientific methods, but also judgment, and reliance on industry knowledge and the forecaster's experience to incorporate industry trends not yet reflected in recent results. The FAA's annual Aerospace Forecast is no exception. Given the volatile nature of the U.S. airline industry, it is not surprising that each year's forecast would contain a certain degree of forecast variance. Therefore, FAA forecasters have tried to build forecast models that give a consistent and predictable pattern of results. Analysts relying on the forecasts produced by the models would then be able to adjust for the predictable variance from actual results.

The table on the next page presents an analysis of the variance from historical results for five key forecast metrics during the FY 2002–FY 2006 forecast period. Although this brief period experienced industry upheaval created by the September 11th terrorist attacks, FAA's forecast methodology remained consistent during this time. For these reasons, inclusion of prior periods in an analysis of forecast variance might lead to inconclusive, or inaccurate, implications about the accuracy of FAA's current forecast methodology.

The table contains the weighted average forecast errors expressed in percentage terms of the projected values versus the eventual results for U.S. Carriers' Domestic operations. Each metric has five values showing the relative forecast variance by the number of years in advance the preparation of the forecast took place. For example, the 3 Years column for ASM shows the average forecast error was 4.7 percent for ASM forecasts prepared 3 years in advance. For the period under examination, preparation of the forecasts for FY 2004, FY 2005 and FY 2006 occurred in FY 2002, FY 2003 and FY 2004, respectively.[1]

[1] *It should be noted that the first forecasted year for each respective fiscal year is that very same year. Therefore, FY 2002's first forecasted year is FY 2002, and the third forecasted year is FY 2004. This also means that the 5 Years column in the table above consists of only one observation point, while the 4 Years column is based upon two observations.*

| U.S. AIR CARRIERS<br>DOMESTIC SCHEDULED PASSENGER OPERATIONS<br>FORECAST EVALUATION | | | | | |
|---|---|---|---|---|---|
| Forecast Variable | Forecast Percent Error (Combined FY 2002 - FY 2006)<br>(Forecast Greater/Less than Actual)<br>Forecast Published Years Prior to Actual | | | | |
| | 1 Year | 2 Years | 3 Years | 4 Years | 5 Years |
| ASM | 0.3% | 3.9% | 4.7% | 5.8% | 14.7% |
| RPM | -2.3% | -0.8% | -2.8% | -4.1% | 0.3% |
| Pax Enplanement | -1.3% | 2.0% | 1.9% | 1.4% | 5.7% |
| Mainline Pax Yield | 1.9% | 7.3% | 13.5% | 17.4% | 18.9% |
| IFR Aircraft Handled | -0.5% | 1.0% | 0.4% | 1.0% | 5.4% |

Presenting forecast variances in such a manner simplifies a review of longer-term trends. Typically, one would expect the variances to decline as the forecast year draws closer to the year the forecast is prepared. In addition, presenting forecast variance in this way allows an examination of changes in the relative variances by time horizon, signaling when dramatic shifts in accuracy occur. Finally, it also shows whether forecast values are greater or lower than actual results.

The result of this examination of forecast variance reveals several noteworthy items. First, the Passenger Yield and ASM forecasts display declining variances as the forecast time horizon decreases, as expected. For Yields, large improvements in variance occur in the Years 3, 2, and 1 horizon. With ASMs, there is significant decline in variance in the 4 Years and 1-Year period. However, for both ASMs and Yield, the variances are relatively large except in the 1-Year period. Second, the FAA's forecast model produces small variances for the IFR metric, except in the 5 Years horizon. Although the variance trend-line varies in amplitude, the annual variances are small.

Third, the two traffic metrics – RPM and Enplanements – show relatively small variances, except for Enplanements in Year 5 and RPMs in Year 4. However, the respective trend lines rise and fall and do not suggest a clear pattern. For Enplanement the trend turns negative in Year 1, and there is a significant 3.3 percentage point swing in variance from Year 2 to Year 1. For RPM, there are significant improvements in forecast accuracy in Years 3 and 2 compared to previous years, but then there is a significant worsening in Year 1 versus Year 2. Fourth, the relative divergence in forecast variances between RPM and Enplanements, where the former tends to be underestimated and the latter overestimated, suggests errors in forecasting passenger trip lengths.

The table above suggests two primary implications. First, added focus on passenger trip length in the forecasting process – as passenger trip length is the linchpin between RPM and Enplanements – might help improve the forecast model's robustness. Specifically, by integrating trip length estimation into its forecast model FAA believes a reduction in the divergence in annual variations between RPM and Enplanements can occur.

Second, annual yield changes are notoriously difficult to forecast, as carriers often react to changing market conditions that are unpredictable. For example, the particular phase of the business cycle can influence airline pricing. During the upswing of the cycle, carriers can exert added pricing power, even in the face of strong demand resulting in higher yield, and lower traffic decreases, in contrast to results based on historical elasticity – as FY 2006 showed. Therefore, exploration of the link between the business cycle and market demand and carrier performance might also improve the forecast model's efficiency.