

A FORECAST USER SPEAKS OUT

Harvey B. Safeer, Federal Aviation Administration

The purpose of this workshop is to talk about forecasting the activity of the aviation industry, an industry that is in flux and which has yet to attain a stable equilibrium. To illustrate the problem, it is not known how many airlines will be operating next week, much less next decade. Yet we boldly move ahead and year after year make our fearless forecasts. With this as a background, three questions will be covered in this presentation:

1. How credible are current aviation forecasts?
2. How useful are these forecasts to decision makers in government and industry?
3. What can forecasters do in the future to be more effective?

The short answers are:

1. Incredible;
2. Not very; and
3. Be right more often!

As glib as these answers are, they unfortunately reflect the attitude of most decision makers and others toward forecasters and forecasts. One writer of popular economic analyses started a recent column as follows:

"Beware. Forecasts are demonstrably unreliable. They get worse the further they peer into the future, and they have been especially bad in predicting turning points in the economy. A current illustration: the recovery now described as strong and robust was depicted only a few months ago as weak and anemic."

Another columnist chose a more humorous approach to taking a shot at forecasters:

"With last week's announcement by the Commerce Department that the economy was growing at a seasonally adjusted annual rate of 8.7 percent in the second quarter, everybody's favorite lagging indicator -- the forecasts of the economists -- will be shifting upward again. That forecast of the change in the economists' forecasts has proved to be more reliable than the forecasts themselves."

More important than the words themselves is the attitude -- forecasters are, to many, synonymous with crystal ball gazers, and witch doctors.

Forecast Credibility

Turning back to the first question, let us discuss the issue of credibility. Aviation forecasts are no better or no worse than any other forecasts. The Federal Aviation Administration has been strongly criticized for the accuracy, or lack thereof, of its forecasts. Last June, my staff looked at forecasting accuracy. They compared the forecasting accuracy of a few key FAA workload measures with the accuracy of some important macroeconomic variables produced by major forecasting services. Forecasts of economic variables were selected for comparison purposes since they met

criteria: the historical and forecast data were readily available, were produced on a timely, periodic basis; and, we assumed, were developed using the latest state-of-the-art methods. Interestingly enough, none of the available aviation industry forecasts other than those of the FAA met the three criteria.

The measure of accuracy employed was the average absolute percent error. The following series were looked at:

Macroeconomic series:

- Investment in residential structures;
- Nonresidential fixed investment;
- Personal consumption expenditures (durables);
- Personal consumption expenditures (non-durables and services); and
- Gross National Product.

FAA workload measures:

- Aircraft operations at towered airports;
- Instrument operations;
- Aircraft handled at en route air traffic control centers; and
- Total flight services at flight service stations.

The forecast horizon was one to two years. To gain a sense of overall reliability over time, variables, and forecasters, an aggregate accuracy index was developed. This index is the simple average of all average absolute percent errors for each forecast horizon.

For a one year horizon, the FAA index was 4.5, and forecasting services index was 4.0 percent. For a two year horizon, the FAA index was 7.8 percent and the forecasting services index was 7.0 percent. If we exclude total flight services, the one and two year FAA indices were 3.3 and 5 percent respectively.

We could take other time periods and other time series and come up with different results. However, the basic conclusion that FAA's forecasts are as good as and possibly better than other forecasts will not change.

What about non-FAA aviation forecasts? We have reviewed the major forecasts and find no real difference between them and FAA's. We generally tend to be lower than the manufacturers of airplanes and engines and higher than the users. This is probably because we neither sell nor buy hardware.

Usefulness of Forecasts

As we all know, forecasts are not an end unto themselves, even though some of the academic literature would lead you to conclude the contrary. A forecast is useful if it presents decision makers with a reasonable estimate of what they will be facing at some point in the future. The degree of precision required usually decreases the further out the time horizon. This is fortunate, of course, since the accuracy of forecasts diminishes the further out you go. Too often we find forecasts produced to agree with an *a priori* conclusion.

Forecasts are an important input to decision processes. In the Federal Aviation Administration, we use forecasts of aviation activity for a wide variety of programs. A summary listing would include:

- National Airspace System
 - Timing of investments
 - Type of investment
- Budgeting
 - Staffing
 - Resource allocation
- Facility Establishment Eligibility
 - Types of facilities
 - Specific site selection
- Airport Grant Planning
- Airport/Airway Finance
 - User charge proposals
 - Flow of funds planning
- Passenger Ceiling at Washington National Airport

Forecasts can be used to provide information about trends and order of magnitudes. In some very rare cases where there are strong and consistent lead-lag relationships, forecasts can provide valuable insights into turning points. The more forecasts available, the more likely it is that a decision maker will at least be looking in the right direction.

A recent National Bureau of Economic Research (NBER) working paper written by Victor Zarnowitz addressed the accuracy of individual and group forecasts from business outlook surveys. He concluded that group forecasts that average individual predictions are more accurate, over time, than the individual forecasts by themselves. Mr. Zarnowitz examined 79 different forecasts made between the fourth quarter of 1968 and the first quarter of 1979. He concluded that:

"It is still true, as earlier reports also indicate, that no single forecaster has been observed to earn a long record of superior overall accuracy, and indeed nothing in the present study would encourage us to expect any individual to reach this elusive goal."

Forecaster Effectiveness

Forecasters can do two things in the future to be more effective. First, they have to be honest with themselves and their clients. Forecasters should clearly differentiate between what is called a forecast and what is called a scenario. A forecast represents a reasonable expectation of future events based upon an assessment of relevant data. A scenario, on the other hand, is a representation of what one would like to see happen or hopes will happen as a result of some action which is taken. Often there is a fine line between the two, but nevertheless, one should clearly specify what the inputs were to the forecast.

A few years back, Stephen McNeas did a study of thirteen forecasters. Six of the thirteen did not have a published reference for their model documentation. Equally interesting was the fact that the forecasters attributed from 20 to 50 percent of the final forecast to the process of judgmental adjustments. There is nothing wrong with this. To the extent that such adjustments have been made, however,

it is usually helpful to know first, that they have been made, and second, the rationale for the adjustment. This is difficult when you deal with thousands of forecast variables as some do. We, in aviation, however, deal with a limited number of forecast variables and can provide more rationale for our forecasts.

Secondly, we have to consider the purpose of the product. FAA actually overforecasts if we strictly consider our requirements. At the national level, we need only aggregated forecasts of workload activity. We disaggregate by broad user categories in order to understand some of the dynamics within the industry.

In a similar vein, a number of different approaches to forecasting have been suggested. It is not clear what problem the proposals will solve since we are satisfied with the accuracy of what we have. We have been using our current system for about 4-5 years, and it is still too soon to say that our long-term forecasts need significant improvements. The short term performance of our models has been as good as or better than that of other forecasters. We will continue to track the accuracy of our models and make whatever fine tuning adjustments as are necessary, but there will not be any major structural changes. Remember, disaggregated national forecasts tend to be less reliable than aggregated ones and, in aggregating, errors tend to cancel out.

In summary, here is a restatement of the three answers given at the start of this presentation:

1. How credible are current aviation forecasts?
 - o Aviation forecasts are very credible if one considers the limitations of any forecast and uses them accordingly;
2. How useful are these forecasts to decision makers?
 - o Forecasts are extremely useful, particularly with respect to long-term trends;
3. What can forecasters do in the future to be more effective?
 - o Forecasters must recognize that their product is but one input to a decision making process, and a part of that process is to see to it that the forecasted results do not occur if they are not desired by the decision maker.