

## AIRLINE METHODOLOGY - REVENUE FORECASTING AT TWA

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### Purpose of the Forecast

Let me begin by saying that since the change of ownership in 1986, TWA has been remade in terms of management style and financial performance. As many of you know, our operating earnings last year were nearly triple the amount of our strongest year before Mr. Icahn took control, and executive accountability is strictly enforced. The sole criterion of one's longevity in my position at TWA is reasonable accuracy as well as an ability to provide good advice on trends in the current marketplace. Obviously, the fact that I am here this morning means that I have done tolerably well during the past three years.

Regarding forecasting accuracy, my 1986 projections were way off mark but for good reasons: 1) terrorism which destroyed U.S. - origin North Atlantic traffic and 2) our flight attendant strike which further depressed results over a four-month period. Luckily, for me, our leader acknowledged that these failures were aberrations.

As the Table 1 indicates, our forecast variances were +1.1 percent in 1987 and zero in 1988, results which obviously owe a great deal to luck. The traffic and average price pieces were less precise; but since the movements of one tend to counter movements in the other, the overall results were highly satisfactory.

TABLE 1. TWA PASSENGER REVENUE -  
ACTUAL VS. FORECAST  
(\$ millions)

	1987			1988		
	FCST*	Actual	% Change	FCST*	Actual	% Change
Domestic	\$2272	\$2294	+1.3%	\$2409	\$2406	(0.1)%
N. Atlantic	1108	1124	+1.4%	1290	1294	+0.3
System	\$3380	\$3418	+1.1%	\$3699	\$3700	0.0%

\* Produced November of prior year and revised the following May.

The point I wish to emphasize here, beyond self-congratulation, is that, for us at least, the forecast is not just an intellectual exercise but a serious guideline; and so becoming a slave to one methodology or another just will not do. Consequently, at TWA, we always inject a large dose of judgment and number massaging into any econometric output before a forecast is formalized. Inviting comments from informed individuals and showing the forecast scenario around the company can be valuable in terms of discovering overlooked factors.

### Rigid versus Flexible Methodology

Before our change of ownership in 1986, the annual revenue forecasting exercise tended to be a political football, meaning that we would employ a rather rigid methodology (that I will describe shortly) to determine a revenue projection and then wait to see what profit and loss resulted. Because TWA was a high-cost carrier, the outcome was usually a substantial operating loss. Since cost control was never paid more than lip service under the old management, this in turn meant that the revenue forecast had to be arbitrarily increased, whether it made sense or not, in order to make sure that the plan showed a profit. Inevitably the blame for the all-but-sure revenue shortfalls and operating losses during the forecast period would be rationalized away as aberrations, unseen forces, etc. Needless to say, TWA's financial performance was nearly always sub-par under this system.

Happily, since the change in ownership, the operating line now is very healthy. Moreover, since cost control is a serious ongoing concern at TWA, almost any reasonable revenue projection (assuming an expanding economy) will yield an operating profit. Hence, the former need to force the revenue higher at the end of the forecasting process is now absent. To further illustrate the change in the planning mentality, Mr. Icahn insisted that we have been too optimistic on the revenue side in 1989 but accepted the forecast anyway. However, through the first quarter, we are running 2 percent ahead of the target, traceable to stronger-than-anticipated domestic prices and the Eastern strike windfall which more than offset some transatlantic terrorism damage.

### Top-Down versus Bottom-Up Methodology

Although we produce long-term forecasts, largely for equipment planning, 95 percent of my forecasting work is short-term, meaning one year

or less. Also, our domestic and transatlantic divisions are projected separately. We use a top-down and industry-share approach as opposed to a markets-aggregation or bottom-up process. The reasons we opted for the top-down were two-fold: 1) We could monitor accuracy more quickly, establish causality for the variances, and embark on corrective action where possible. Even if we were highly accurate with the markets approach, we would still not be able to differentiate overall market strength or weakness from competitive strength or weakness because of the approximately nine-month lag in receiving the industry origin-destination tapes from DOT. 2) Individually treating the 400+ markets that TWA serves was too time-consuming, given the sharp reduction in staffing in which two people essentially do the work that eight did pre-1978. Let me reemphasize the first point. The major advantage of the top-down forecasting technique has to do with establishing a monitoring framework. For example, under this methodology we are able very quickly to single out industry size, TWA share, or price in explaining forecast misses. When we seek a remedy for a revenue shortfall, a shrinking industry will evoke a different marketing or pricing response than a smaller traffic share. With a market-aggregation or bottom-up approach, you would not be able to pinpoint causality nearly as quickly because of the long lag in DOT origin-destination reporting. On the other hand, macro-industry data is usually available within a week at the close of a month.

#### TWA's Methodology

Now let me briefly outline our methodology. (See Figure 1.) We begin with annual industry traffic forecasts in which multiple regression and auto-regressive models are used. The former incorporates real gross national product, industry yield, and time as explanatory variables in the domestic model and real U.S. gross national product with real TWA average prices (as a proxy for the industry) for the North Atlantic. Over the years, we have also experimented with business/pleasure models domestically and U.S.- and European-originating models for the North Atlantic. The auto-regressive or trend model incorporates the latest monthly traffic data and is useful provided economic and pricing conditions are stable throughout the forecast period. Before arriving at an assumption regarding the price variable, we consult our pricing people as to the prospective competitive and cost environment and trends in traffic mix by fare type. Macro-economic inputs more often than not conform to those of a consensus of

economists. After obtaining the mechanical output of the models, we analyze the results for reasonableness. Here we are essentially dealing with confidence in the models and qualitative exogenous factors.

Last week I re-ran our industry traffic models for 1988 with actual values for the explanatory variables. The result -- a domestic industry variance of 0.2 percent but a 4 percent North Atlantic miss. The latter was probably caused by applying U.S. rather than European economic variables. European origin traffic has grown by over 80 percent since 1985 when the dollar weakness began. Once our industry forecasts are selected, we move to estimate TWA's traffic share by first projecting a share of industry capacity and then determining our "share gap". In forecasting industry capacity, we rely on equipment delivery and retirement information, trends in utilization, and advance schedules. The "share gap" represents the difference between the capacity and traffic shares and may be the equivalent of competitive position, i.e., a positive share gap means that your traffic share exceeds your share of capacity. Applying a derived traffic share to industry size supplies TWA traffic volumes. Finally, we attach a TWA price (yield), which is a by-product of our industry price assumption estimated earlier as a regression input, to obtain TWA passenger revenue. The annual figures are subsequently broken down into months according to seasonal relationships. It is at this point that others around the company scrutinize the monthly forecasts. If, for instance, the net annual sum of the new collective wisdom exceeds what I have presented, I may be encouraged to raise the forecast. The final step is the Chairmen's review. Once approved, the Controller's department will publish a financial plan which combines our revenue projection with their expense forecasts to reveal the annual and monthly profit and loss targets. This process is repeated again in May as an update. In 1988, we were running a little ahead of plan during the first half so we raised the forecast a touch, which we failed to meet. The net result for the year, however, was the zero variance that I noted earlier. I also have responsibility for station boardings (we serve 86 domestic and 32 international cities) which are used for staffing purposes as well as sales quotas which we use to measure the performance of our city sales managers. Both measures are derived from the monthly macro-traffic and revenue distributions by mechanical and judgmental means.

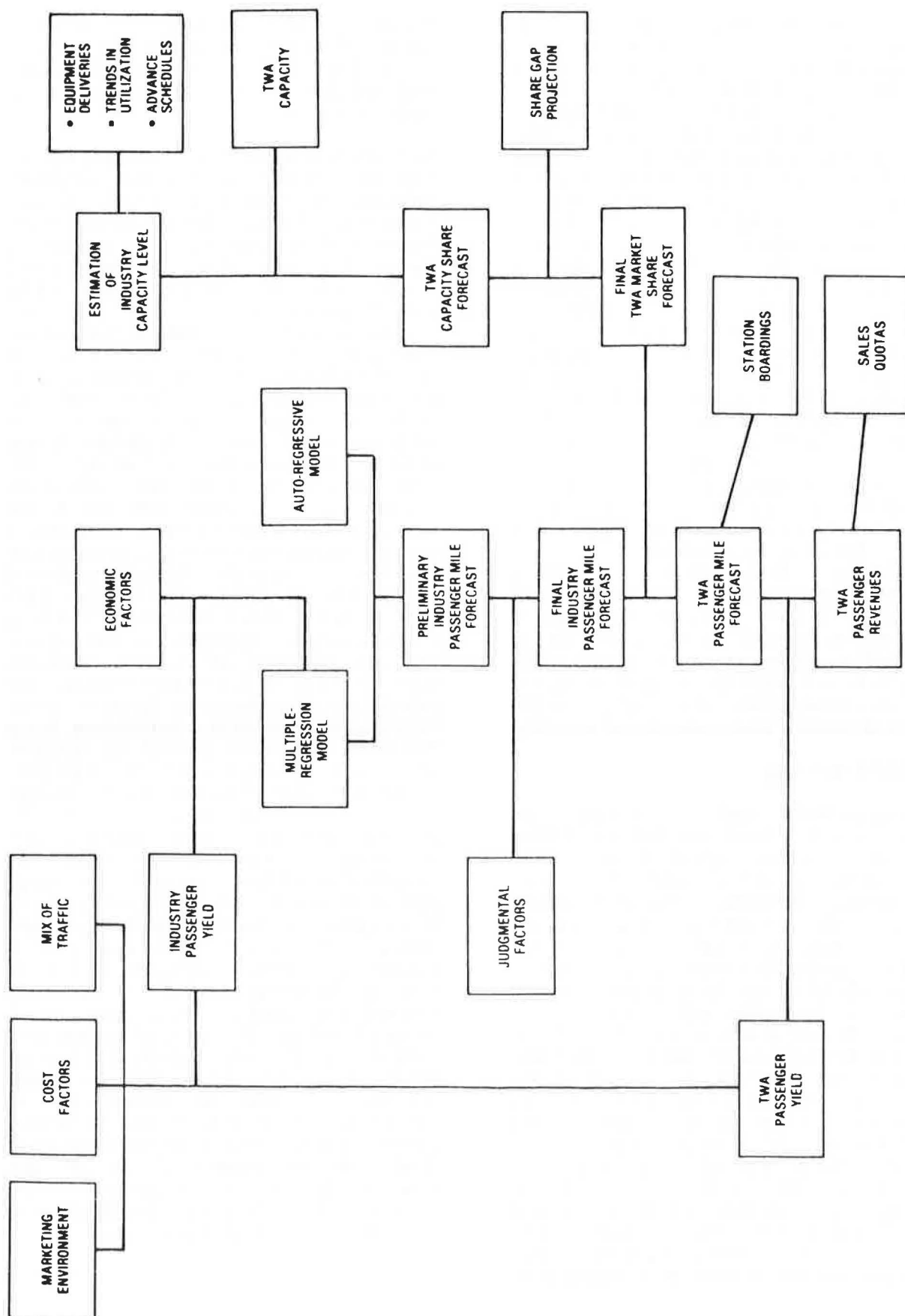


FIGURE 1. TWA Revenue Forecast Development

### Conclusion

I would conclude my remarks by saying that our current forecasting approach is highly eclectic or non-doctrinaire but that our forecast process

does not end with a set of projections. Rather it becomes a working management tool that can locate areas of strength or weakness and encourage marketing and pricing initiatives.

## **U.S. AIRCRAFT MANUFACTURERS METHODOLOGY**

Jack Howard  
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### Air Travel Growth and Airplane Replacement Rate Drives Forecast.

The demand for commercial airplanes is dependent on two drivers -- air travel growth and replacement of the current fleet.

Air Travel Growth The Boeing forecast for air travel growth is driven by two parameters -- airline yields and disposable income (GNP is used

as a surrogate) -- as can be seen in Figure 1. First, Gross National Product is projected to grow at an average rate of 3 percent per year worldwide. No attempt is made to project cycles in the long term. However, recognition of the U.S. Federal Reserve Bank's announced intent to drive down the U.S. economic growth rate to 2.0 - 2.5 percent in the short term, an economic slowdown bottoming out at 2 percent is included in the forecast. This economic forecast defines the growth in air traveler income.

Next, an assessment of airline operating costs is made. These operating costs are projected to decrease at a rate of 2.1 percent per year. These reductions are driven by a 1.7 percent per year

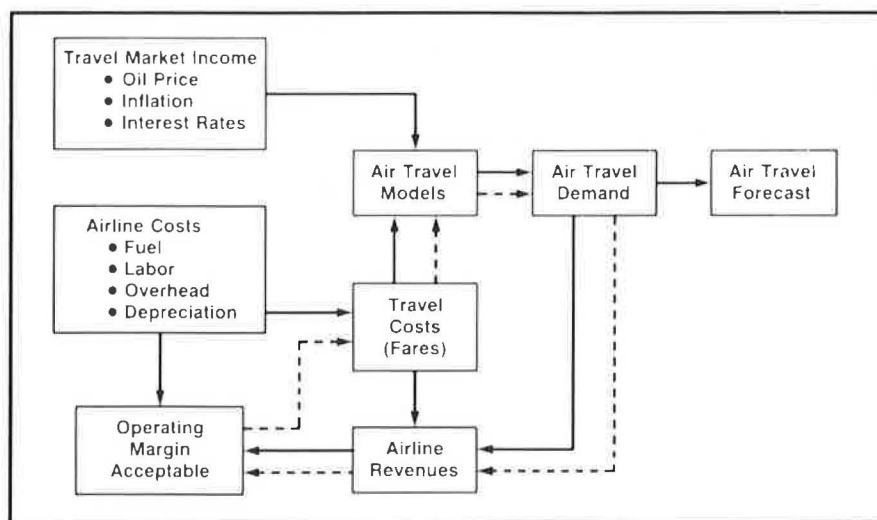


FIGURE 1. Air Travel Demand