Chapter 4
Stochastic Evaluation of Capacity and Demand Management of the Airline Industry:
The Case of Airlines of the AEA for Flights of Europe–Africa

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ABSTRACT

In the airline industry, the term load factor defined as the percentage of seats filled by revenue passengers and is used to measure efficiency and performance. This metric evaluates the airlines capacity and demand management. This paper applies stochastic models to analyse the load factor of the Association European Airlines (AEA) for flights of Europe - North Africa and Europe- Sub Saharan Africa. The estimation result prevails that the airlines have better demand management in the flights of Europe- Sub Saharan Africa than in the flight of Europe - North Africa. However, the capacity management of the airlines is poor for both regional flights. The autocorrelation structures for the load factor for both regional flights have both periodic and serial correlations. Consequently, the use of ordinal panel data models is inappropriate to capture the necessary variation of the load factor of the regional flights. Therefore, in order to control for the periodic autocorrelation, the author introduces dynamic time effects panel data regression model. Furthermore, in order to eliminate serial correlation the author applies the Prais–Winsten methodology to fit the model. Finally, the author builds realistic and robust forecasting model of the load factor of the Europe- North Africa and Europe-Sub Saharan Africa flights.

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1. INTRODUCTION

The yield, revenue per unit of output sold, is an extremely significant metric in the airline industry. By definition, it is only the mathematical outcome of two even more fundamental metrics: output sold and revenue earned. For more than five decades the yields across the industry as a whole has been in decline. The price stimulus from the decline accounts for a significant portion of the traffic growth achieved during the period (Netessine & Shumsky, 2002). Very broadly, yields will soften when:

1. Traffic growth is flat or insufficient to absorb output growth (low prices are used to sustain load factors),
2. Intense competition, lower prices, and yields will harden when:
    a. Load factors are already high and output is growing no faster than traffic,
    b. Traffic growth is outstripping growth in output and
    c. Lower competition keeps prices unchanged.

The fact that traffic, load factor, and revenue (therefore yield) will all be affected by these type of adjustments illustrates how intimately connected the variables are – all within the context of available output (Talluri and Ryzin, 2001).

The paper's main prominence is the airline industries load factors. The load factor measures the percentage of an airline´s output that has been sold – in effect, a measure of the extent to which supply and demand are balanced at prevailing price points. The achieved load factors for the industry conceal marked variations between different type of airline, with regional carriers at the lower end of the spectrum and charter airlines generally achieving higher load factors than scheduled carriers (Cross, 1997). The average load factor for any individual airline masks variations between different markets and cabins, with economy/coach achieving higher load factors because customers tend to book further in advance and expect lower levels of seat accessibility than is the case of premium cabins. It also conceals pronounced daily, weekly and – in particular – seasonal variations (Tesfay and Solibakke, 2015).

The load factors are mainly driven by six factors. The *first driver* is the industry's output decisions relative to demand growth. The output growth must be brought into closer alignment with demand growth. The *second driver* is pricing. Fare reductions generally stimulate demand and, depending upon what decisions are taken with respect to output, generate higher load factors. The *third driver* is the traffic mix. Historically, the higher the proportion of business travellers carried by an airline, the lower the average seat factor. That is, the random element in demand for business travels (volatile) implies a lower average load factor in business and first class cabins (McGill & van Ryzin, 1999). The *fourth factor* is payment policies. A carrier taking non-refundable payment at the time of reservation is likely to have relatively fewer no-shows and a relatively higher seat factor than on selling a greater portion of tickets on a fully flexible basis. The *fifth driver* is commercial success. A success of product design, promotions, marketing communications, distributions, and service delivery will clearly influence current load factors. The *sixth driver* is revenue management. The effectiveness of revenue management systems (RMS) will influence load factors. The RMS capabilities – specifically, the refinement of demand forecasting tools – will contribute significantly (Marriott and Cross, 2000).

The first driver of the load factor is reflecting the effectiveness and efficiency of the airline's capacity management efforts. Furthermore, the drivers of load factor (from two to six) are reflecting the effectiveness and efficiency of the airline's demand management efforts (Cynthia *et al.,* 2012). In this