

Master Thesis Proposal

Choice-based Airline Schedule Design

The task of the schedule design (SD) is to assign frequencies and departure times for specific routes by choosing from a set of proposed flights while aiming for the highest possible profit. Schön (2008) states that the schedule in combination with the fare conditions mainly determine passenger choice behavior; similarly, Barnhart and Cohn (2004) call it the "single most important product of an airline". These arguments underline the large impact of the schedule on profitability and therefore suggest to include customer behavior in the modelling approach to account for the market side. Often, discrete choice models are used as they represent better the decision process between different travel options compared to a "traditional" demand function. Especially in hub and spoke networks one single new flight may have a big influence on the revenue and passenger allocation to other flights because most passengers transfer from one flight to another. All these influences make the subproblem so complex that Airlines are still challenged by using models for their schedule design and rely on a manual approach as Barnhart, Belobaba and Odoni (2016) suggest.

Aim of the master thesis should be to,

- introduce choice based SD models as well as other solution approaches and the underlying problem,
- summarize the most important empirical findings about airline market demand (especially for the class of discrete choice models),
- to discuss a choice-based SD model in detail,
- to create an academical example in which a flight network and its underlying travel market is modelled by using Ampl,
- to provide open research gaps and future trends.

Recommended basic literature:

Barnhart, C., & Cohn, A. (2004): Airline schedule planning: Accomplishments and opportunities. *Manufacturing & service operations management*, 6, 3-22.

Barnhart, C., & Vikrant, V. (2016): *Airline Schedule Optimization*, in: Belobaba, P., Odoni, A., & Barnhart, C. (Eds.). *The global airline industry*. John Wiley & Sons.

Schön, C. (2008): Integrated airline schedule design, fleet assignment and pricing. *DSOR-Beiträge zur Wirtschaftsinformatik*, 5, 73-88.

Wei, K., Vaze, V., & Jacquillat, A. (2019): Airline Timetable Development and Fleet Assignment Incorporating Passenger Choice. *Transportation Science*.