

Jason Friedman

Capacity Planning and Learning in the Airline Industry

Commercial aviation is a notoriously risky business. While the industry has proven resilient over the years, adapting to major shocks like 9/11 and the Covid-19 pandemic, it seems to exist in a state of perpetual fragility – always teetering on the edge of the next big crisis. Since deregulation in 1978, over 200 U.S. airlines have failed despite steadily growing demand for air travel. The big three U.S. carriers that lead the industry today all declared bankruptcy at least once in their history.

Even when times are good, managing a successful airline is hard. High capital intensity coupled with volatile demand patterns require airlines to engage in capacity planning, a process meant to ensure the airline makes the best use of its available resources. This multi-step process offers different levels of flexibility and commitment at different stages in the planning cycle. Decisions about aircraft acquisition and fleet composition establish long-term capacity constraints, followed by medium-term network and route planning, and finally short-term inventory management. Each downstream decision is limited by the upstream choices made months or even years earlier.

In this modeling project, I would like to investigate the impact of the planning process on organizational learning. Each stage of the process has its own planning horizon and informational cues. Downstream decision-makers use close-in information to adjust for the uncertainties faced by those upstream. While these compensatory actions help the airline get closer to the right capacity “answer”, they may also foreclose important learning opportunities as they make it hard to pinpoint exactly which steps of the planning process may have gone wrong and how.

How can planners be confident they made the best decision with the information they had available at the time? Does the structure of the planning process itself properly account for feedback effects from previous planning cycles?

So my understanding here is “learning” is being considered at an organizational level, which is why adjustments that downstream teams might make to upstream projections/data might “hide” the real problem spots along the process that would be useful for holistic process improvements? And thus then if an adjustment is made to an upstream planning process, it will filter down unexpectedly?

I think it might be key to expand on what you mean by capacity “answer” - is this the necessary level of berths to properly meet demand? Overshooting leads to wasted or underutilized capacity, undershooting to missed out on profits?

How are you showing what effective “organizational learning” is? Would a model that converges more quickly to actual demand when there are shocks show that planning is having either a positive or neutral effect on learning, and longer convergence means planning is hindering learning through what it hides?

What are your planning levers? Size of adjustment to upstream plans? How will I know if my planning process is helping or hurting?

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Given that you start with stating that shocks seem to regularly occur in this industry, it might be worth spelling out that the model should respond to large capacity shocks.

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