A Macroscopic Tool for Measuring Delay Performance in the National Airspace System

Airline delays lead to a tremendous loss of time and resources and cost billions of dollars every year in the U.S. To explore solutions for reducing the delay, it is essential to understand factors causing flight delay and also the network impact of delay at one single airport in the National Airspace System (NAS).

For air transportation planning and policy purposes, this study concentrates on providing answers from a macroscopic point of view without being distracted by volatile operational details. A set of multi-variate equations is proposed to model daily average arrival delay at one individual airport and that of the NAS excluding that airport. The model for the single airport considers independent variables such as deterministic arrival queuing delay, delay at other airports in the NAS, adverse weather (convective and local), different demand management regimes, and others. The model for the rest of the NAS considers arrival delay as a function of deterministic arrival queuing delay, arrival delay at the single airport, adverse weather (convective and local), and other factors. Observing the interactions between these two models, they are regressed with an econometrics technique, two stage least square (2SLS).

This macroscopic framework of delay impact analysis can be used for investigating the network effect of capacity improvement or new demand management strategies at one single airport. Hypothetical scenarios are generated, and the system-wide delay reduction is calculated. This is a powerful decision support tool for stakeholders to make the best possible decision to allocate resources optimally and to reduce delays in the future.

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All are welcome
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