My Research Journey in Airline Economics

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Nature of presentation

In this presentation, I will offer an overview of my research on airline economics.

For each of the broad topics I've studied, a brief summary of the research will be presented.

I'll refer to the articles relevant to the topic, which are listed in the reference section at the end.

Airline economics is a fascinating subject, and I hope that this overview will spur interest in it.

The economics of hub-and-spoke networks

Hub-and-spoke (HS) networks exploit economies of traffic density, where cost-per-passenger falls on a route segment as passenger volume increases.

One prediction is that, since large networks (which connect many endpoints) generate high traffic volumes, they should have lower fares.

Prediction successfully tested in article #3.

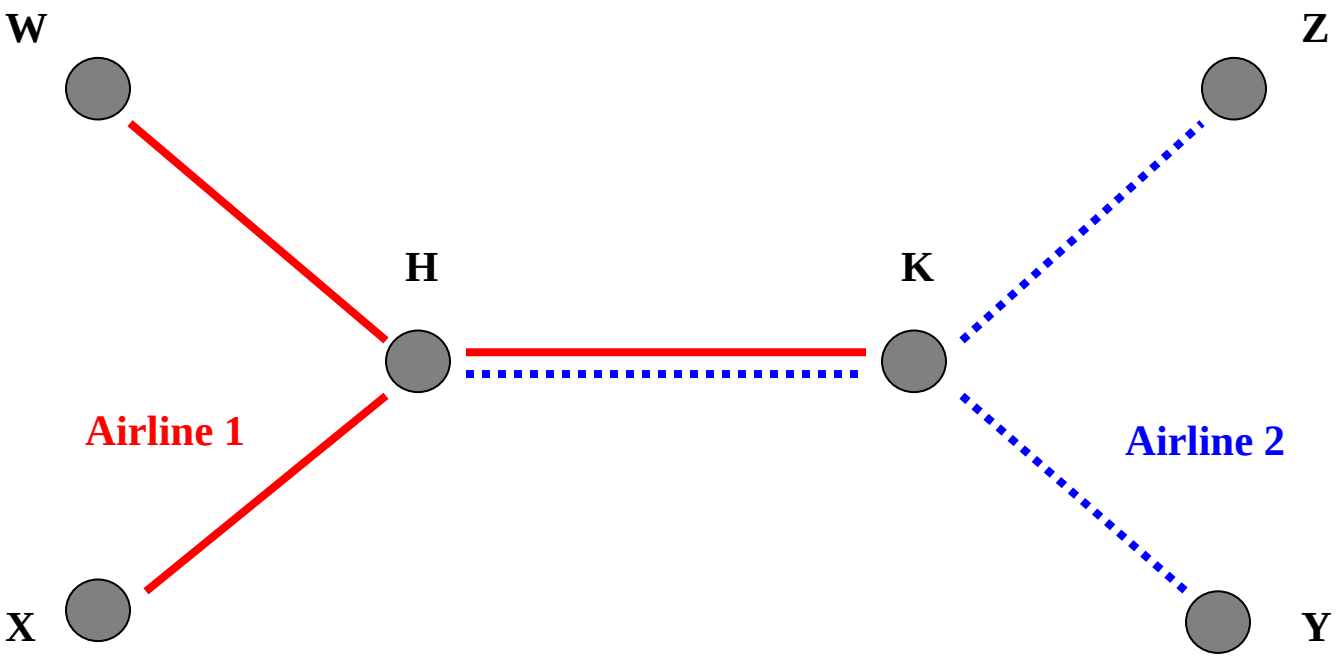
Article #4 shows empirically that cost per passenger is about 30% higher in a low density network (see also article #2).

International airline alliances

These alliances connect HS networks of US carriers and foreign partners.

From airlines' point of view, next best thing to a international merger, which are prohibited.

Theory in article #7 shows that, compared to trips on nonaligned carriers, alliance trips have lower fares for passengers who connect between partner networks.



Airline Alliance

International airline alliances

Prediction confirmed in articles #5, #10, #11, #25.

Alliance fare discount started out as large as 25% but has since fallen to about 10%.

On alliance hub-to-hub overlap routes, where partners collaborate in fare-setting while flying side-by-side, theory predicts a drop in competition and higher fares.

Prediction confirmed in article #34 for the period after 2010.

Articles #14, #24, #35 deal with other alliance issues.

Airport congestion

Road congestion involves a "congestion externality," where each car on a road slows down other cars by its presence.

Requires imposition of congestion toll, which charges drivers for the externality and thus reduces traffic.

Airport congestion is different: instead of being atomistic, solo agents like drivers, airlines are big, each operating many flights at a congested airport.

Airport congestion

As a result, airline will consider self-imposed congestion (which slows its own flights) in scheduling decisions.

So some congestion is "internalized."

Congestion tolls should then only charge for congestion imposed on other carriers.

Ideas developed in articles #8, #9, #15, #18, #20, #21.

One implication is that congestion tolls may be unneeded at "dominated" hub airports, where almost all congestion is internalized.

Schedule competition

Most theoretical and empirical analyses of airline competition focus only on fares, as in article #27.

But schedule competition exists too, with airlines attracting passengers via convenient schedules.

With more frequent flights, a passenger will find one closer to preferred departure time, thus favoring the airline.

Idea developed in articles #6, #13, #16, #23, #26, #30, #32.

Theory in #13 shows that traffic concentration following emergence of HS networks should have raised flight frequencies.

Prediction confirmed in research by others.

Aviation externalities: noise and emissions

Two of my theoretical papers (#17, #22) explore effect of levying noise charges or emission taxes on airlines.

With noise charges, planes become quieter, fares rise, planes become larger, and flight frequencies fall.

With emission taxes, planes become more fuel efficient, fares rise, and flight frequencies fall, with aircraft size unaffected.

Emissions effect of higher fuel tax

Empirically, articles #33 and #36 relate total fuel usage at the airline or aircraft-type level to various factors.

Include total flight miles, load factor, stage length, aircraft vintage, airport congestion, and fuel price.

Fuel usage falls with price holding fleet characteristics constant, evidence of conservation measures.

Imposition of optimal extra fuel tax (capturing environmental damage) reduces usage by 2% via conservation.

Product unbundling by airlines

Airlines have unbundled their services, charging for checked bags and onboard food.

Article #31 explores economics of bag fees, with theory deriving optimal fare and optimal bag fee.

Shows that the fare should fall when fee is imposed, while fare + bag fee could either rise or fall.

Empirical results show that economy fares fell by about $7 with introduction of $15 bag fee, so fare + bag fee rose.

Yields benefits for non-bag-checking passengers.

Market-definition analysis

Knowing whether airports in multiple-airport metro areas should be grouped (treated as single endpoint) is important for competition analysis.

Article #29 provides method for deciding on airport groupings.

Looks for competition spillovers across airports, where service at one airport affects fares at a nearby airport.

For California airports, method says SFO and OAK should be grouped, but LAX is not grouped with other LA-area airports.

Schedule buffers

Airlines add "schedule buffers" to minimum feasible flight and ground times to prevent delays.

Articles #37, #38 provide theory and empirics for buffers.

Incoming flight delay can make outbound flight late departing and arriving (delay propagation).

Theory says that propagation should addressed by ground buffer, not by flight buffer for first flight.

Method allows measurement of share of arrival delays caused by delay propagation.

Higher for LCCs and at for flights originating at non-hub airports.

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