Airline Regulatory Issues: Mergers and and Alliances

J.K. Brueckner

Airline regulation ceased long ago in the U.S. (early 1980s) and more recently in Europe (1990s).

But government regulators are still called on to approve or disapprove some changes in the industry.

Key decisions involve mergers and alliances: should they be allowed to proceed or not?

Lecture shows how economic theory and empirical evidence can assist in these decisions.

Airline mergers

Airline mergers do three things.

They reduce competition, affect costs, and change product quality.

A bigger airline tends to serve more destinations, making it easier to get from one place to another and thus raising the quality of the airline product.

Costs may fall due to eliminating of duplicate fixed costs (e.g., two scheduling divisions).

Costs may also fall due to better exploitation of economies of traffic density (increasing returns).

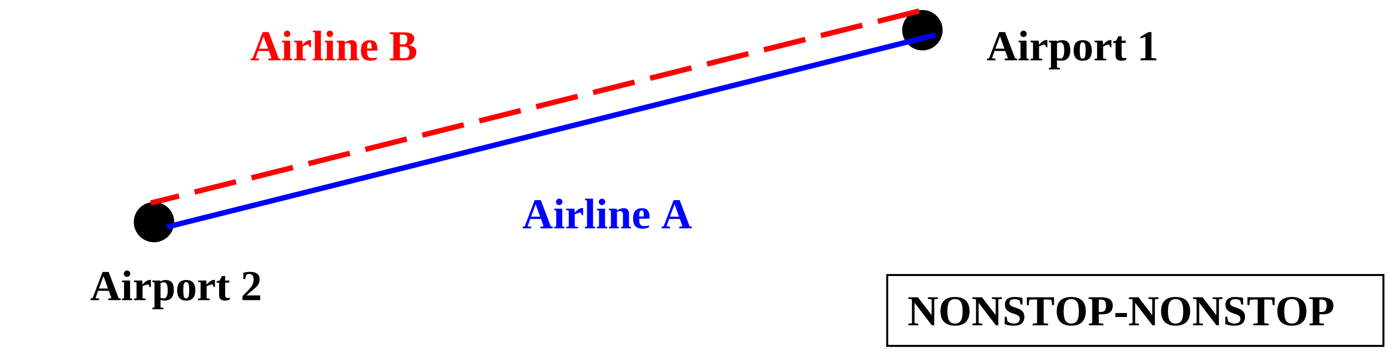
Consolidation of passengers split between two airlines reduces cost per passenger (bigger, more efficient planes can be used).

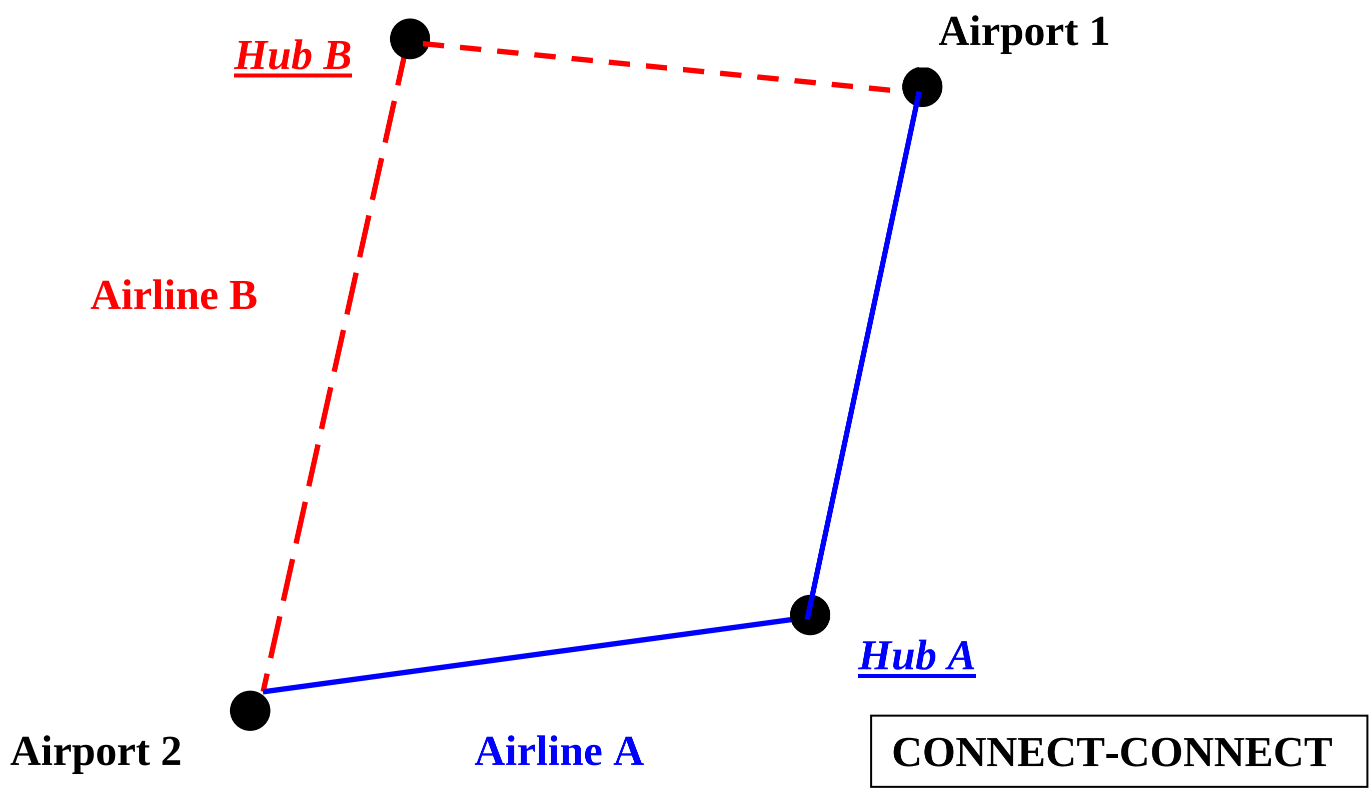
Let's focus on the competition effect, and how to quantify it.

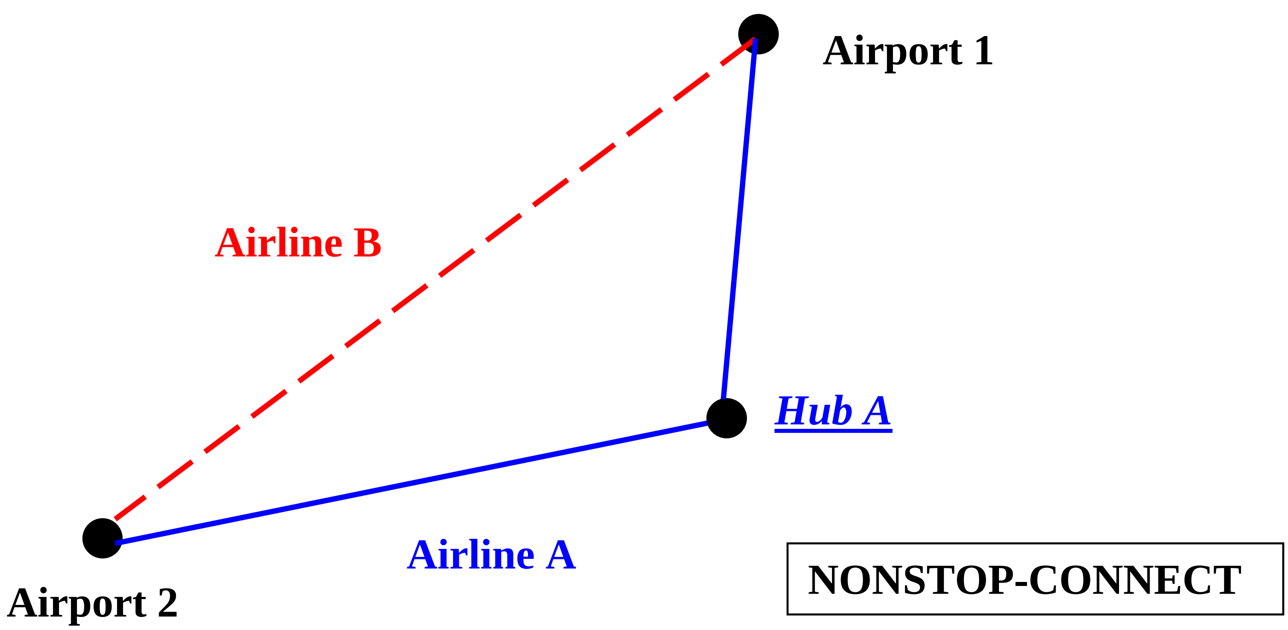
Merger partners could compete in different ways, including:

- both airlines could serve a market nonstop
- both could offer connecting service
- service could be of mixed types

Merger removes one competitor, tending to raise fares.


Airline B
Airport 1
Airline A
Airport 2
NONSTOP-NONSTOP


Hub B
Airport 1
Airline B
Hub A
Airport 2
Airline A
CONNECT-CONNECT


Airport 1
Airline B
Hub A
Airline A
Airport 2
NONSTOP-CONNECT

To predict the size of impact, we need an empirical model showing how fares respond to the level of competition.

Possible using excellent U.S. data (DB1B), based on quarterly 10% ticket sample.

Paper is Brueckner, Lee and Singer (2010), which follows previous studies of this type but uses a larger set of competition variables.

Base model:

Dependent variable = average fare charged by a given carrier in a particular airport-pair market

Explanatory variables = a variety of competition measures

endpoint characteristics (geometric mean of incomes, populations)

distance, January temp. differential

carrier identity dummies

Two different categories of markets studied:

- those with nonstop service by at least one legacy carrier
- those with no nonstop service (connecting model).

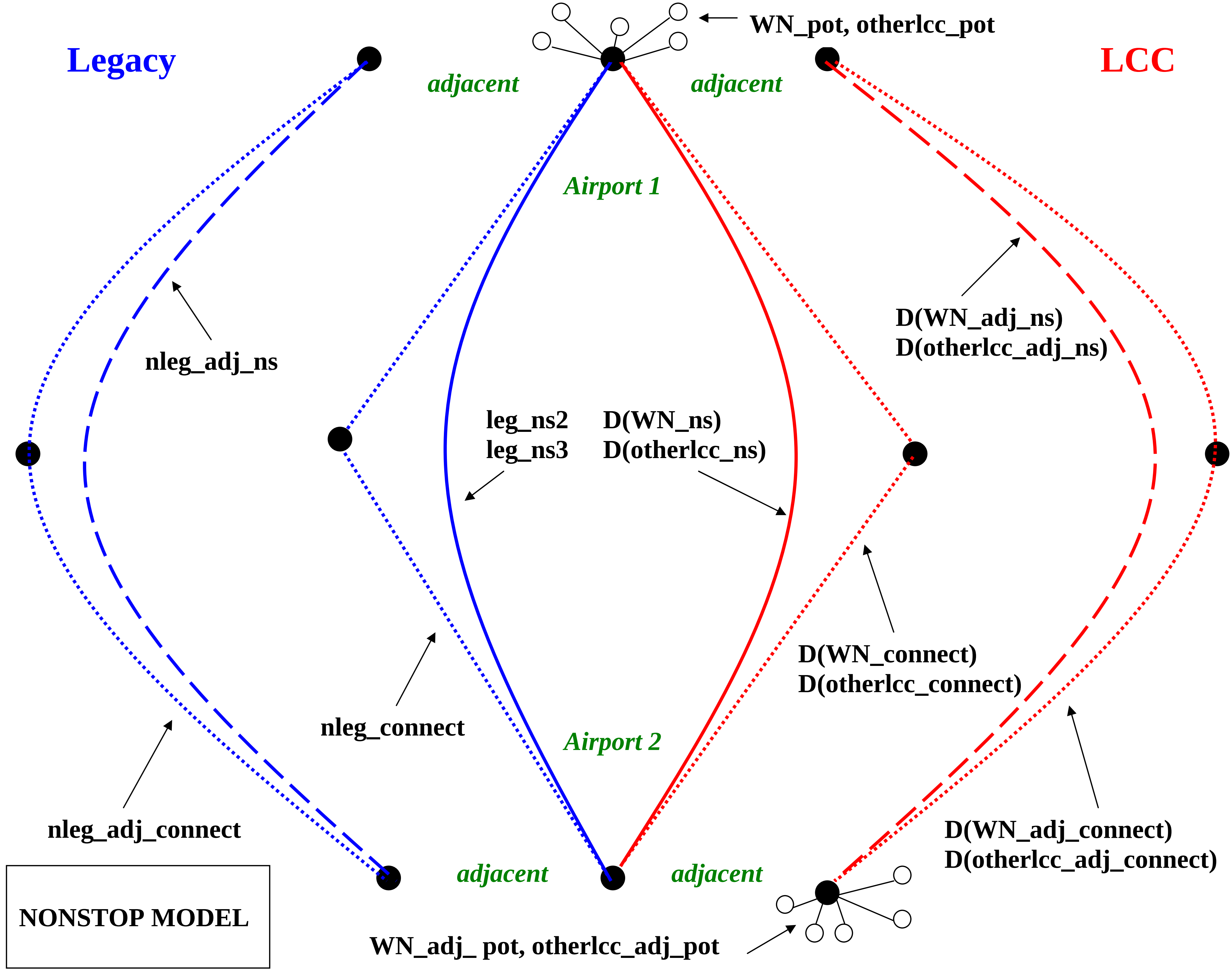
Key to approach is separately counting competition from legacy and low-cost carriers (LCCs).

Also competition from adjacent airports is counted, as is potential competition.

Can also aggregate model up to the market level by taking passenger-weighted average of fares charged by all the different carriers serving the market.

Most explanatory variables (those measured at market level) are unaffected.

Diagram shows competition variables for nonstop model:



WN_pot, otherlcc_pot
Legacy
LCC
adjacent
adjacent
Airport 1
D(WN_adj_ns)
D(otherlcc_adj_ns)
nleg_adj_ns
leg_ns2
leg_ns3
D(WN_ns)
D(otherlcc_ns)
D(WN_connect)
D(otherlcc_connect)
nleg_connect
Airport 2
nleg_adj_connect
D(WN_adj_connect)
D(otherlcc_adj_connect)
adjacent
adjacent
NONSTOP MODEL
WN_adj_ pot, otherlcc_adj_pot

Table 1: Non-Stop Model

VARIABLES	(1) base	(2) market
leg_ns2	-0.0302*	-0.0357**
leg_ns3	0.0356	0.0309
D(WN_ns)	-0.344**	-0.266**
D(otherlcc_ns)	-0.184**	-0.172**
nleg_connect	0.0134	-0.0486**
D(WN_connect)	-0.0528**	-0.0768**
D(otherlcc_connect)	-0.0639**	-0.0991**
nleg_adj_ns	-0.0209*	-0.0104
D(WN_adj_ns)	-0.185**	-0.169**
D(otherlcc_adj_ns)	-0.0523**	-0.0649**
nleg_adj_connect	0.0644**	0.0352**
D(WN_adj_connect)	0.0184	0.00720
D(otherlcc_adj_connect)	-0.0254	-0.0502
D(WN_pot)	-0.0893**	-0.0950**
D(otherlcc_pot)	0.0202	0.00471
D(WN_adj_pot)	-0.0982**	-0.0786**
D(otherlcc_adj_pot)	-0.0558	-0.0690**
ltdist	0.308**	0.275**
percent_connect		0.236**
D(connect)	-0.0412**	
roundtrip	0.00619	0.0456
slot	-0.0192	-0.0236*
pop	-0.000832	0.00251
income	0.00549**	0.00677**
tempdiff	-0.00388**	-0.00323**
Constant	3.089**	3.150**
Observations	41,625	5,948
Adjusted R-squared	0.725	0.798

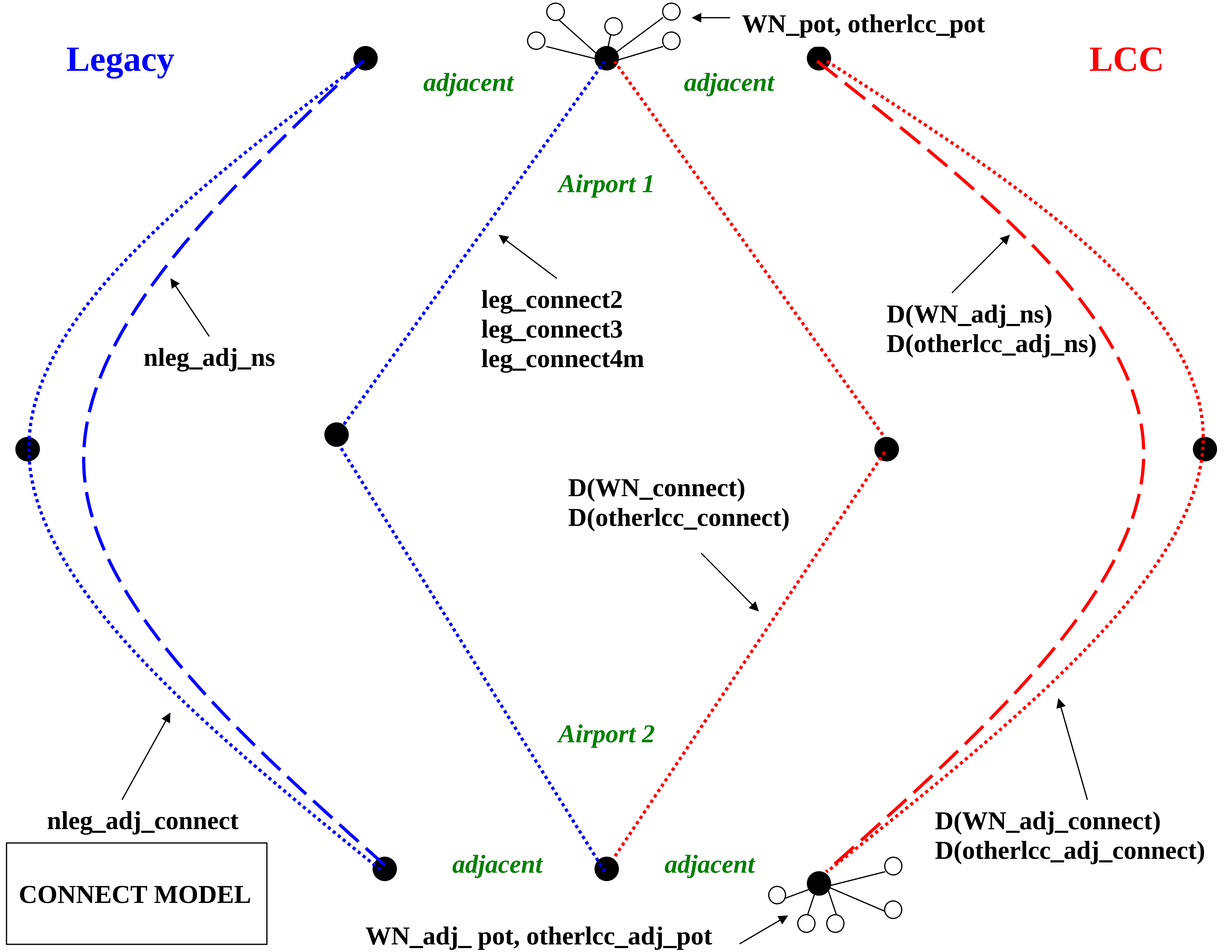

WN_pot, otherlcc_pot
Legacy
LCC
adjacent
adjacent
Airport 1
leg_connect2
leg_connect3
leg_connect4m
nleg_adj_ns
D(WN_adj_ns)
D(otherlcc_adj_ns)
D(WN_connect)
D(otherlcc_connect)
Airport 2
nleg_adj_connect
D(WN_adj_connect)
D(otherlcc_adj_connect)
adjacent
adjacent
CONNECT MODEL
WN_adj_ pot, otherlcc_adj_pot

Table 2: Connect Model

VARIABLES	(1) base	(2) market
leg_connect2	0.0258**	-0.000515
leg_connect3	-0.0166**	-0.0285**
leg_connect4m	-0.0190**	-0.0167**
D(WN_connect)	-0.108**	-0.0936**
D(otherlcc_connect)	-0.0954**	-0.0530**
nleg_adj_ns	-0.00648	0.00339
D(WN_adj_ns)	0.0377	0.0493**
D(otherlcc_adj_ns)	-0.0144	-0.0163
nleg_adj_connect	0.0173*	0.0129**
D(WN_adj_connect)	-0.0471**	-0.0330*
D(otherlcc_adj_connect)	-0.0720*	-0.0559*
D(WN_pot)	-0.0556**	-0.0569**
D(otherlcc_pot)	-0.0788**	-0.0573**
D(WN_adj_pot)	0.0159	0.0168*
D(otherlcc_adj_pot)	-0.0190	-0.0289
ltdist	0.250**	0.251**
roundtrip	-0.365**	-0.388**
slot	0.00491	-0.0102
pop	-0.00701*	-0.00659**
income	-0.00129*	-0.000829*
tempdiff	-0.00281**	-0.00238**
Constant	4.068**	4.095**
Observations	71,352	15,127
Adjusted R-squared	0.466	0.561

** p<0.01, * p<0.05

Merger impacts

Now, let's use the results to predict aggregate fare impact of the proposed United-Continental merger in the U.S.:

- Identify airport-pair markets with both UA and CO service, as well as nature of overlap (e.g., nonstop-nonstop)
- Eliminate 1 competitor in least-important category
- Increase average fare in market by corresponding percentage amount; multiply by market passengers.
- Sum across all markets with overlaps.

Table 3: Annual Increase in Domestic Aggregate Fare Outlays From A Hypothetical United/Continental Merger

Model	Overlap Type: Number of Markets	Aggregate Fare Effects ($ Millions): Base	Aggregate Fare Effects ($ Millions): Market
Routes with Non-Stop Legacy Service	Non-Stop/Non-Stop (2 Non Stop Legacies): 9	13.17	15.57
	Non-Stop/Non-Stop (3 Non Stop Legacies): 4		
	Non-Stop/Connect: 18		4.95
	Non-Stop/Adjacent Non-Stop: 12	28.50	
	Non-Stop/Adjacent Connect: 3		
	Connect/Connect: 4		1.18
	Connect/Adjacent Non-Stop: 7	0.81	
	Connect/Adjacent Connect: 0		
	Adjacent Non-Stop/Adjacent Non-Stop: 8	4.70	
	Adjacent Non-Stop/Adjacent Connect: 3		
	Adjacent Connect/Adjacent Connect: 0		
"Non-Stop" Subtotal		**47.18**	**21.70**
"Connect Routes"	Connect/Connect (2 Connect Legacies): 39		
	Connect/Connect (3 Connect Legacies): 207	7.22	12.39
	Connect/Connect (4+ Connect Legacies): 289	14.26	12.54
	Connect/Adjacent Non-Stop: 31		
	Connect/Adjacent Connect: 28		
	Adjacent Non-Stop/Adjacent Non-Stop: 11		
	Adjacent Non-Stop/Adjacent Connect: 2		
	Adjacent Connect/Adjacent Connect: 0		
	New Connect Competitor (1 Connect Legacy): 106		
	New Connect Competitor (2 Connect Legacy): 227	-6.0	-10.4
	New Connect Competitor (3+ Connect Legacy): 39	-1.5	-1.3
"Connect" Subtotal		**13.95**	**13.25**
Total		**61.13**	**34.95**
% of total fare outlays in sample		0.13%	0.08%

Merger fare impact is small and likely to be swamped by gains from cost synergies and better product quality.

Reasons:

- legacy competition, which the merger reduces, has only a slight effect on fares
- UA and CO networks don't overlap much

AIRLINE ALLIANCES

Alliances are a response to prohibitions on transatlanic airline mergers.

Airlines want to offer "seamless" service, as if they were a single carrier.

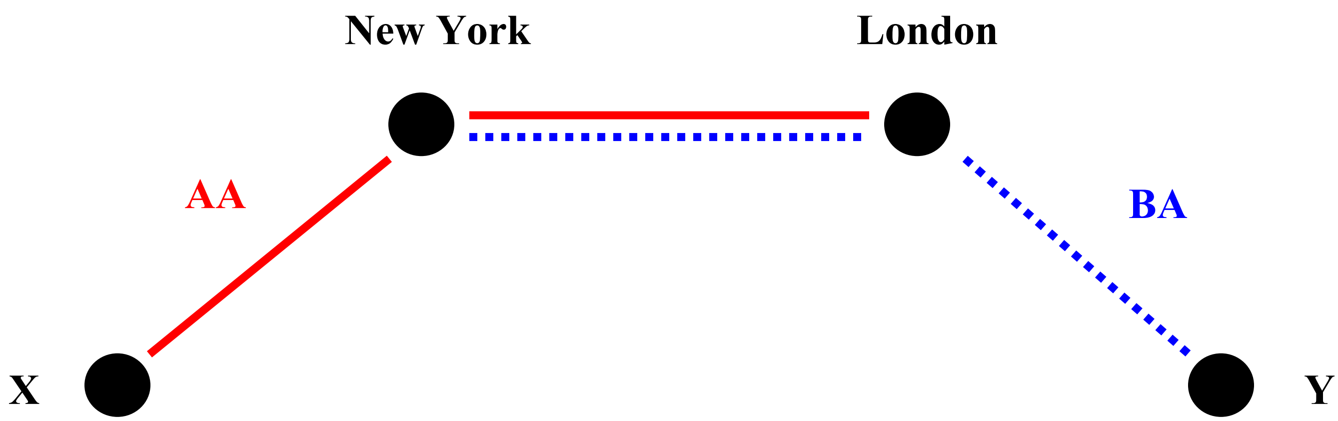
Try to coordinate services within an alliance to achieve this goal.

Antitrust immunity allows maximum degree of cooperation, which also extends to fare-setting process.

Both alliance partners typically provide service between one another's hubs.

Creates an "overlap" route, where passengers who just travel between hub cities have a choice of airline.

But some passengers have to make "interline" trip, traveling across both networks.



X – Y: ***interline market***
New York − London: ***overlap market***

Alliance appears to be anticompetitive on hub-to-hub route.

Cooperation in fare-setting would allow immunized carriers, who previously competed, to restrict seat capacity for hub-to-hub passengers, raising fares in this market.

But fare for interline passengers is set independently of hub-to-hub fare, as is seat capacity allocated to them (on same plane).

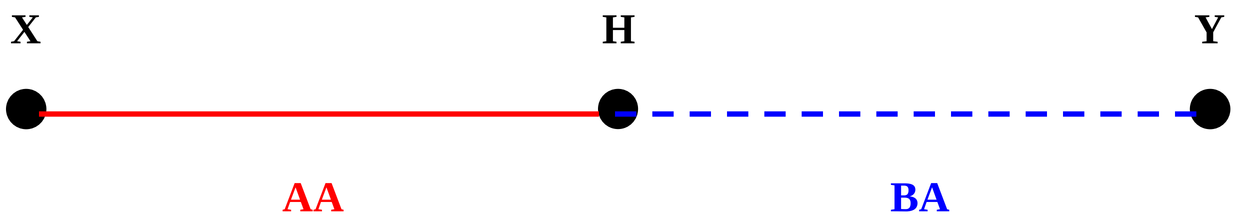
How does alliance's interline fare compare to pre-alliance fare?

Does anticompetitive hub-to-hub fare effect also extend to interline market?

Analysis of interline fares

To simplify the analysis, suppose unrealistically that carriers serve same hub.

Argument extends to more realistic network.


X
H
Y
AA
BA

In absence of alliance, carriers noncooperatively set subfares s_{XH} and s_{YH} for their portions of interline trip, with fare $p_{XY} = s_{XH} + s_{YH}$.

Increase in AA's subfare raises overall fare and reduces interline traffic.

AA has no incentive to consider negative effect on BA, so subfare is set too high.

Parallel argument applies to BA.

So pre-alliance p_{XY} is higher than alliance fare, which would be set to internalize these spillovers.

Alliance thus has a "procompetitive" effect in interline market, reducing fare.

Eliminates horizontal double marginalization.

To show mathematically, suppose economies of density are absent, so that cost per passenger is a constant c.

Means that pricing in XH, YH markets is independent of pricing in XY interline market.

Then, these other markets can be ignored in the XY analysis (not possible with density effect).

Letting $D(\cdot)$ denote demand in XY market, AA's profit from XY market in the pre-alliance case is given by

$$(s_{XH} - c)D(s_{XH} + s_{YH}), \tag{1}$$

AA chooses s_{XH} to maximize (1), viewing s_{YH} as parametric, and f.o.c. is

$$\frac{D}{D'} + s_{XH} = c. \tag{2}$$

By symmetry, AA's and BA's subfares will both equal $p_{XY}/2$.

Using $q_{XY} = D$ and $\partial p_{XY}/\partial q_{XY} = 1/D'$, (1) can then be rewritten as

$$2q_{XY}\frac{\partial p_{XY}}{\partial q_{XY}} + p_{XY} = 2c. \tag{3}$$

With alliance, AA and BA will set overall interline fare to maximize their combined profit:

$$2\left(\frac{p_{XY}}{2} - c\right) D(p_{XY}). \tag{4}$$

Using (4), the f.o.c. for choice of p_{XY} is

$$q_{XY}\frac{\partial p_{XY}}{\partial q_{XY}} + p_{XY} = 2c. \tag{5}$$

Because the 2 factor from before is absent, q_{XY} must be larger to satisfy the condition, implying p_{XY} is smaller with alliance, as claimed.

Same conclusion applies in more realistic network.

So alliance has upside (lower interline fares) and downside (higher hub-to-hub fares).

Concern about downside on important U.S.-London routes blocked AA-BA alliance twice.

Third time, opening of Heathrow airport via U.S.-E.U. Open Skies reduced worry, allowing alliance to go forward (awaiting final approval).

Empirical evidence on alliance pricing

Does the alliance interline fare discount really exist?

Several different studies confirm that it does (Brueckner, 2003a is representative).

Studies consider different measures of airline cooperation:

- alliance membership
- codesharing
- antitrust immunity (ATI)

Although full cooperation on fares requires ATI, less extensive cooperation may also lead to fare reductions.

Results come from international fare regression at carrier-pair level, using only interline itineraries.

Key variables are cooperation dummies.

Can use results to measure consumer surplus benefits from alliances for interline passengers (Brueckner, 2003b).

Table 1.

Effects of Variables on Interline Fares

DISTANCE	+
TICKET COUPONS	−
SIZE OF CITY-PAIR MARKET	+
BUSINESS-CLASS INDICATOR	+
LEVEL OF COMPETITION IN MARKET	−
NON-U.S. ENDPOINT IN CENTRAL AMERICA*	0
NON-U.S. ENDPOINT IN CARIBBEAN	−
NON-U.S. ENDPOINT IN SOUTH AMERICA	0
NON-U.S. ENDPOINT IN AFRICA	+
NON-U.S. ENDPOINT IN MIDDLE EAST	+
NON-U.S. ENDPOINT IN FAR EAST	+
NON-U.S. ENDPOINT IN AUSTRALIA/OCEANIA	+
NON-U.S. ENDPOINT IN CANADA	0
U.S. DESTINATION	−
CODESHARING	−7%
ALLIANCE MEMBERSHIP	−4%
ANTITRUST IMMUNITY	−16%

Table 2.

Aggregate Welfare Effects for Interline Passengers from Cooperation among Star Alliance Partners, 3rd Quarter 1999

Interline Passenger Surplus Loss if Antitrust Immunity Were Not Present

Carrier Pair	Elasticity = −0.5	Elasticity = −1.0	Elasticity = −2.5
United-Lufthansa	$13,180,000	$12,530,000	$10,550,000
United-Air Canada	$6,550,000	$6,220,000	$5,240,000
United-SAS	$2,000,000	$1,900,000	$1,600,000
Total	$21,730,000	$20,650,000	$17,390,000

Interline Passenger Surplus Gain if Antitrust Immunity Were Granted

Carrier Pair	Elasticity = −0.5	Elasticity = −1.0	Elasticity = −2.5
United-Ansett Australia	$1,820,000	$1,890,000	$2,100,000
United-Air New Zealand	$1,440,000	$1,490,000	$1,660,000
United-Thai Airways	$840,000	$870,000	$970,000
United-Varig	$760,000	$790,000	$880,000
Total	$4,860,000	$5,040,000	$5,610,000

What about downside of alliances, higher fares on hub-to-hub route?

Little study of this question, but Brueckner and Whalen (2000) show that an alliance between two previously competitive airlines would raise hub-to-hub fares by about 5%.

But coefficient was not statistically significant.

So clear evidence for downside doesn't exist.

Alliance carve-outs

Regulators can impose a "carve-out" on hub-to-hub routes.

Prohibits cooperation in fare-setting on these routes, while not affecting cooperation on interline routes.

Brueckner and Proost (2010) show that a carve-out can be beneficial, except in one case.

If the alliance involves a “joint venture,” where the partners basically merge their transatlantic operations, then a carve-out may be harmful.

Carve-out prevents full exploitation of economies of density on the hub-to-hub route, even though it increases competition.

If economies of density are strong, net effect could be negative, so that carve-out shouldn’t be imposed.

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