1 Introduction

2 De…nitions

A market is de…ned as directional round-trip air travel between an origin and a destination airport

(2000), Brueckner (2003), Ito and Lee (2007) and Gayle (2008) …nd evidence that traditional

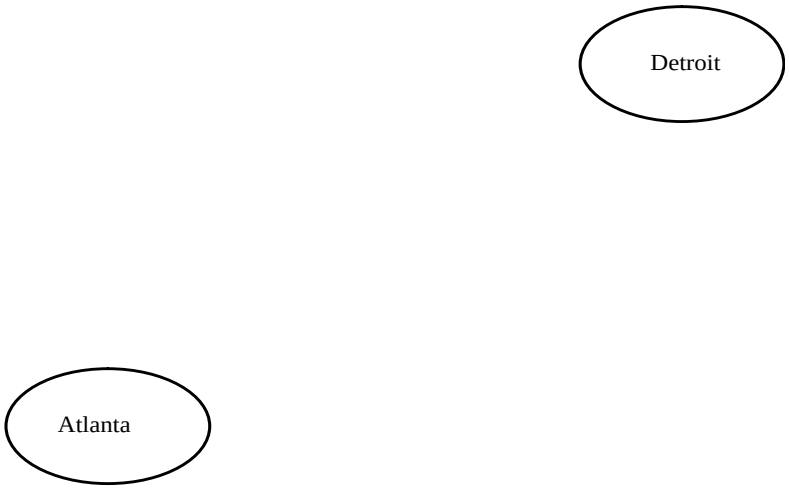

Figure 2 shows an alternate situation in which the airlines' route networks may overlap. In Figure 2, Northwest operates a non-stop flight in the Atlanta to Detroit market, while Delta operates a one-stop itinerary in the Atlanta to Detroit market, but unlike Figure 1, Delta does not operate a non-stop flight in this market. Northwest and Delta's networks are st(it)-caav-348(thd(it)1(edDel

3 Data

Data are drawn from the Origin and Destination Survey (DB1B), which is a 10% random sample of airline tickets from reporting carriers. DB1B is a database that is maintained and published by the U.S. Bureau of Transportation Statistics. Among other things, the database includes: (1) number of passengers that choose a given flight itinerary; (2) the fares of these itineraries; (3) the

regional feeder carriers to have their major carrier codes. In the absence of such recoding of feeder carriers, products that only include a major carrier and its associated regional feeder carrier(s) may mistakenly be counted as codeshare products since the operating and ticketing carrier codes would di¤er.[6]

Based on our previously stated research objectives, we focus on origin-destination markets in which at least two of the three airlines (Delta, Continental an prevm-31o.nest) o¤ere pcompetingppure online products both in the pre an post-alliance periods. In other words, the three carriers'

passengers who chose the speci…c itinerary-airline(s) combination. "Hub" is a zero-one dummy

Table 2
List of Airlines in the Data Set

Airlines Involved in Virtual Codeshare Products

3.1 Preliminary Descriptive Analysis

Following many event studies [for example see Borenstein (1990) and Kim and Singal (1993)], we

DCN

Table 4
Reduced-form Codeshare Market Logit Regression
Dependent Variable: *Codeshare_mkt*

In addition to observed market characteristics such as market size and nonstop flight distance,

4 The Model

We proceed by …rst describing the demand-side of the model. The supply-side is then laid out, which is where we model competitive interactions between airlines.[10]

are grouped by airlines, can also be thought of as measuring the correlation of the consumers'

allows frequent-flyer members of any one of the three carriers to accumulate and redeem frequent-flyer points across any of the three partner carriers. The larger is the pre-alliance joint passenger

4.2 Supply

market.[14] Carrier r

such, the marginal cost function is effectively:

$$W_j + a_f + \xi_j = \begin{cases} w_j^f & \text{if } j \text{ is virtual codeshare} \\ c_j^r & \text{if } j \text{ is pure online} \end{cases} \tag{8}$$

A pure strategy Nash equilibrium in final prices requires that p_j of any product j offered by carrier r must satisfy the first-order condition:

$$d_j(p) + \sum_{k \in F_r} (p_k - z_k) \frac{\partial d_k(p)}{\partial p_j} = 0$$

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structure matrix. In particular, let ^{Collude} be the modi..ed J J product ownership structure matrix in which the three alliance partners are treated as a single carrier rather than distinct carriers. Let $^{Collude}(j;k)$ denote an element in ^{Collude}, where

$$^{Collude}(j;k) = \begin{cases} 1 & \text{if distinct products k and j are o¤ered by the same ticketi10.90e carrie,e} \end{cases}$$

We …rst estimate the demand parameters, use these demand parameter estimates to compute product markups under each alternate pricing behavior ($mkup_j$ versus $mkup_j^{Collude}$), then use these product markups as variables when estimating the alternate supply equations, Model h and Model g. Finally, in the spirit of Villas-Boas (2007), we use non-nested statistical tests based on Vuong (1989) to see which supply speci…cation best …ts the data. Note that the estimated markups ($mkup_j$ versus $mkup_j^{Collude}$) are di¤erent under each alternate pricing behavior, as such, the competing estimated supply equations are not n

Prob(Codeshare_mkt = 1)

tively) by using a Hausman statistical test to compare estimates from Estimation A and Estimation B. The endogeneity of variables associated with the C_{t-7} share_mkt

Table 5
Demand Parameter Estimates

	Potential endogeneity of the *Codeshare_mkt* variable not taken into account.	Potential endogeneity of the *Codeshare_mkt* variable taken into account by using its associated fitted values from a first-stage logit regression.
	Estimation A: Ordinary Least Squares (OLS)	

It has been argued that passengers are more likely to choose itineraries o¤ered by hub airlines for the following reasons: (1) ‡ight schedules o¤ered by hub airlines may be more convenient; and (2) it is more likely that passengers have frequent-‡yer membership with an airline that has a hub

Interestingly, we ..nd that $_5 < 0$ and ^{0}

pronounced in these markets. In particulc- ce marupn pardyd thn tree

Presence at Destination)^2

g) in these markets. To the best of our knowledge, this is the …rst paper to explicitly test and statistically reject that collusive pricing behavior is associated with a codeshare alliance.

creates new opportunities for passengers to accumulate and redeem frequent-flyer points across partner carriers.

Second, a statistical non-nested test applied to air travel supply model selection suggests that

References

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