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The impact of low cost airline entry on competition, network expansion, and stock valuations

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A B S T R A C T

We conduct event studies and statistical analysis to explore the impact of low cost carriers' entry on legacy airline stock prices. Oligopoly structures, entry barriers, and high fixed costs make the airline industry highly susceptible to competitive and network expansion impact of low cost airlines' entry. Positive stock returns are observed, which we interpret as the spillover effects of network expansion. Thus, rising passenger traffic and improved connectivity increase the revenues of legacy airlines to sufficiently offset the low cost carriers' competitive threats.

1. Introduction

Since its 1978 deregulation, the US airline industry has experienced drastic changes, and the emergence of low cost carriers (LCC) has had one of the largest impacts on airline revenues and stock prices. With a business model solely focused on cost reduction, LCCs can penetrate barriers to entry and contest the oligopoly structure of the airline industry. While the old hub-and-spoke network created cost efficiencies for large airlines and lowered high fixed operating costs, the entry of an LCC impacts the network by forcing a reduction of spoke ticket prices on the legacy airlines (Brueckner et al., 1992). As incumbents lost market share to LCC competitors and the pioneer Southwest Airlines became the second largest domestic US carrier, traditional airlines responded with mergers and acquisitions to achieve economies of scale.

We analyze two effects of LCC entry on legacy airline profitability and stock prices. The first is based on a more efficient LCC cost structure, which significantly altered the competitive positioning of the legacy airlines, resulting in negative pressure on legacy airline margins. Alternately, the entry of additional airlines may create a positive network expansion through economies of scope and increased industry-wide connectivity. The spillover effect of expanded networks, especially new connections, may positively impact legacy carriers' financial performance. This trade-off between competitive and spillover effects determines the net impact of LCC entry on legacy airline stock prices, and we analyze the impact of LCC entries on both the direction and magnitude of legacy airlines' stock price changes.

We expand prior work on stock price reactions of incumbent airlines by analyzing entries of six low cost airlines into 31 major airports. Although airline industry restructuring and new mergers continue, our analysis is restricted to 1970 through 2007 to avoid stock return impacts of the 2008 financial crisis. We conduct an event study for both announcement and entry dates of legacy airline stock market responses to LCC entry[1]. In addition, we examine event spillover effects as LCC entry may also bring additional customers for the existing airlines.

2. Competition versus network expansion and economies of scope

The legacy airlines use hub-and-spoke networks seeking maximum connectivity while leaving smaller routes to regional carriers and LCCs. A characteristic of the system is largely fixed operating costs, independent of the passengers transported, so that carrying a marginal passenger has close to zero cost over an empty seat (Brueckner, 2004). In a hub-and-spoke network, however, lower costs and extensive coverage of regional markets provide a penetrable barrier of entry for low cost airlines. The simple model of a hub and spoke network is shown in Fig. 1A while Fig. 1B shows

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[1] An event is viewed as LCC entry into an airport instead of a route, as airport dominance determines carrier pricing power rather than dominance at the route level (Evans and Kessides, 1993).

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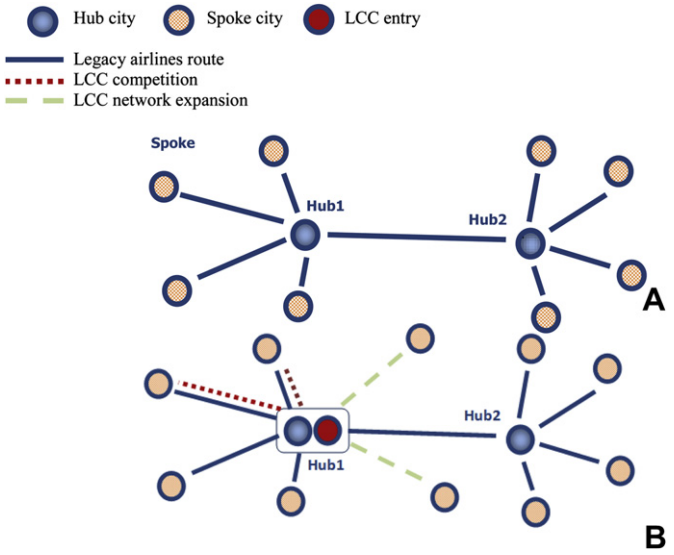

Fig. 1. A hub-and-spoke network used by legacy airlines to achieve maximum connectivity between highly congested cities (hubs) and less congested cities (spokes). (A) hub-and-spoke model and (B) competition and network expansion.

an illustration of the effects of competition and network expansion resulting from an LCC entry.

Competition and network expansion are two important effects of LCC entry with a trade-off between competitive and complementary effects (Economides and Salop, 1992) so that LCC entry has both potential costs and benefits. While LCC entry may be a catalyst for price wars among airlines, as incumbents face increased price competition, complementarities emerge from added LCC routes that provide an alternative transportation mode for passengers previously without flight options. For example, the entry of AirTran into Pittsburgh reduced airfares of US Airways by 27% and increased demand by over 76,000 new passengers (Wilbur Smith Associates, 2007). The entry of AirTran and JetBlue into Richmond increased the number of passengers by 400,000 in 2006 and average fares were reduced across airlines (Chmura Economics and Analytics, 2006). While incumbents adjust airfares to stay competitive, they also adjust fares when a route is only threatened by LCC entry (Goolsbee and Syverson, 2008).

Most research on LCC entry has mainly focused on increased competition and reduced market power of incumbents, finding that these price effects generate lower profits and reduce stock prices of legacy airlines. Little has been done on the trade-off between competition and network expansion effects; the benefit that a participant in a network derives from actions of other market participants, including competitors, so that incumbent utility or profit increases with network expansion. Even though competing firms differentiate their services and dominate the market, they may also have an incentive to create compatible products or services that increase market size and benefit consumers with a larger network (Katz and Shapiro, 1985). LCC introduction of new routes or schedules can provide a network benefit that can outweigh the competitive losses of the traditional airlines.

3. Data and methodology

We developed datasets for the established carriers and the low cost carriers, number of airports, LCC announcement and entry dates, and the relevant daily stock prices of the legacy airlines during the period of analysis. Our sample period is limited to 1970 and 2007 to avoid stock returns sample contamination by the effects of the more recent extreme volatility of outliers. We include the six major airlines in 2007 (American Airlines, Continental Airlines, Delta Airlines, Northwest Airlines, United Airlines, and US Airways[2]) in our analysis and the six largest LCCs (AirTran Airways, ATA Airlines, Frontier Airlines, JetBlue Airways, Southwest Airlines, and Spirit Airlines). Table 1 presents basic data for the legacy and low cost airlines. Panel C shows the number of event dates by carrier. Passenger numbers are shown in Table 2 for the 34 airports included in the analysis.

Announcement and entry dates for each of the six LCCs were individually retrieved from airline websites, press releases, and the Lexis Nexis database (Fig. 2).

Using the Airline Origin and Destination Survey database of enplaned passengers from the BTS, we confirmed that each traditional airline served the 31 airports at the time of LCC entry and verified their presence in these airports from 1993. The DB1B data include all 1993 to 2007 LCC entry and announcement dates, encompassing 93% of our events, with 7% prior to 1992. Legacy airline stock prices were retrieved from the Center for Research in Security Prices database. The market portfolio is proxied by the S&P 500 Index.

Two methodologies are used; stock price event studies and Gaussian statistical analysis. The first approach tests security price performance surrounding an event date by calculating a cumulative abnormal return (CAR) as the summation of three-day abnormal returns (AR) for the preceding $(t-1)$, the event (t), and the following day $(t+1)$ (Brown and Warner, 1980). An abnormal or excess return ($AR_{i,t}$) is the difference between the legacy airline stock return ($R_{i,t}$) and the market benchmark return expressed as the daily S&P 500 return in period t ($R_{m,t}$):

$$AR_{i,t} = R_{i,t} - R_{m,t} \tag{1}$$

$$CAR_{i,t} = \sum_{t=-1}^{+1} R_{i,t} \tag{2}$$

To obtain a broader view of LCC entry into the industry, we also used linear models with coefficients estimated using regression analyses that examine quarterly stock returns data for the effects of competition and network expansion. We expect LCC entry to not only increase industry competition but also to expand the number of airline travelers. Because returns of the legacy airlines are affected by investor expectations about competition and revenue expansion, we estimate a system of simultaneous equations using two-stage least squares (2SLS) to test our hypotheses.

First, we posit that when LCCs enter the market, the level of competition in the industry will increase and the concentration level as measured by the Herfindahl–Hirschman Index (HHI) will decrease (equation (3)) reducing the legacy airlines' higher profits and stock returns.

$$HHI = \sum_{i=1}^{n} \text{marketshare}_i^2 \tag{3}$$

where n is the number of firms in the industry

Second, network externalities are created by an expansion of the base number of travelers. We use total revenue passenger miles (RPM) as a proxy for network expansion or economies of scope. An increased number of LCCs in the network will encourage travelers to fly more, as LCCs bring more passengers from different routes

[2] United and Continental and Delta and Northwest have merged since the end of the data series.