



# Clustered airline flight scheduling: Evidence from airline deregulation in Korea



Joo Yeon Sun<sup>1</sup>

Korea Economic Research Institute (KERI), 45th Floor, FKI Tower, 24 Yeoui-daero, Yeongdeungpo-gu, Seoul 150-881, Republic of Korea

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## ABSTRACT

This paper explores the impacts of competition level on airline scheduling in the Korean domestic short-haul routes where a hub-and-spoke system is not the optimal air transport network strategy. The empirical findings using the Korean airline panel data for the period 2006–2010 suggest that competition leads to less differentiated departure flight times as expected from spatial competition theory. Unlike the previous study on the U.S. airline industry, the degree of this tendency for less differentiation differs across the type of routes: the Jeju island routes (*leisure* type) and the inland routes (*business* type), in the deregulated period. Following the May 2008 Deregulation Act we find an increasingly clustered pattern of airline scheduling in the Jeju island routes where there have been competitive pressures associated with new low cost entrants. This recent evidence would imply that airline carriers strategically schedule departure flight times and allocate flights between routes as competition increases in the deregulated period.

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## 1. Introduction

Low cost carriers (LCCs) have emerged and revolutionized short-haul flight markets around the world, expanding the choice of air transport to air passengers at lower fares as a global phenomenon at the end of the 20th century and the beginning of the 21st century. Even though the growth of the airline industry slowed down worldwide over the past few years, the largest LCCs, such as Southwest in the United States, have continued to grow rapidly while new smaller LCCs have collapsed. These have different product and market strategies than the traditional full service legacy carriers. Established legacy carriers, on the other hand, have responded to entry of LCC competitors by diversifying their strategies to compete for the short-haul flights market as well.

As aviation industry dynamics have changed, with deregulation around the globe, the emergence of LCCs has been linked with greater market competition. Previously, many empirical papers

assessed the effects of the U.S. Airline Deregulation Act of 1978 on travelers and carriers while there have been no such studies focused on the effects of deregulation of the Korean airline industry.<sup>2</sup> Morrison and Winston (1986) analyzed that changes in the route structures contributed greatly to the success of the deregulation of 1978 because development of hub-and-spoke route structures increased departure frequencies. Empirical studies of the U.S. deregulation have found hub-and-spoke effects to be important. The longest flight in Korean domestic routes, however, only takes about 65 min for jet airplanes and either less than or equal to 90 min for turboprop airplanes). Given that a hub-and-spoke system is not the optimal air transport network strategy for Korean domestic short-haul routes, the implications based on the U.S. airline deregulation cannot be directly applied to the point-to-point route structure in Korea.

Before 2005, the Korean domestic airline markets were characterized by duopolies: two legacy carriers, Korean Air (KAL) and Asiana Air (AAR) were the only carriers in each domestic city pair market. Since the May 2008 Deregulation Act, the Korean airline industry has undergone significant changes. The competition of the

<sup>1</sup> E-mail address: [jysun@keri.org](mailto:jysun@keri.org).

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<sup>2</sup> With allowing carriers more freedom in pricing and in entry and exit since 1978, all fare and entry regulations were eliminated in January 1983.

markets long dominated by the two legacy carriers has increased since the deregulation as new low cost carriers (LCCs) entered a few of these markets at ticket prices of about 70 or 80 percent of the prices being charged by the legacy carriers. The two incumbents have developed new business strategies in response to the entry of LCCs in the deregulation period. The legacy carriers, KAL and AAR, rebadged and entered a few of their own markets with LCC operations either replacing their prior service or flying under both legacy carrier brand and LCC brand for some city pair routes. It is worth investigating how the two-brand strategy by legacy carriers affects intensity of competition on a route in the deregulated Korean airline market with short-haul domestic routes.

During 2006, 2010, the entry of LCCs was limited to the routes either flying to Jeju island or having the two largest metropolitan areas – Seoul and Busan – as an end point city. Due to the lack of entry to inland routes for the two years following the May 2008 Deregulation Act, deregulation is expected to have an asymmetric effect depending on the type of markets. Thus, it is interesting to examine the effects of the deregulation policy on the domestic Korean city pair markets through the intensity of competition; how deregulation affected departure flight times scheduling patterns. And second, whether there are different responses in scheduling patterns following deregulation for the type of markets: the Jeju island routes (assumed to be primarily the *leisure* route) and the inland routes (assumed to be primarily the *business* route).

### 1.1. The May 2008 Deregulation Act in the Korean airline industry

Domestic air passenger traffic in Korea has been decreasing since it picked up around a 16% annual growth rate in the late 1980's and early 1990's. On the other hand, international air passenger traffic has been increasing since the Severe Acute Respiratory Syndrome (SARS) epidemic had a severe negative effect on Asian air travel markets in 2002–2003 and the economic crisis swept across the nation in the late 1990s.<sup>3</sup>

While two legacy carriers, KAL and AAR, target international routes instead of pursuing relatively low profits in domestic routes following the introduction of high-speed rail services, Korean Train eXpress (KTX), in 2004, LCCs have emerged and entered some domestic city pair markets in 2005, the first independent LCC, Hansung Airlines (HAN) received its Air Operator's Certificate (AOC). LCCs in Korea can be categorized into two types from the view point of ownership; independent LCCs and dependent LCCs. First, *independent* LCCs refer to LCCs that are not owned by full service legacy carriers.<sup>4</sup> Second, *dependent* LCCs refer to LCCs that are wholly-owned LCC subsidiaries of legacy carriers.<sup>5</sup> In response to the emergence of the independent LCCs the two full service carriers established their own subsidiary LCCs, either replacing their prior services with them or flying under both legacy carrier brand and LCC brand. AAR replaced its service on some routes with its own LCC, Air Busan (ABL), and KAL operated under two-brand strategy through its subsidiary LCC, Jin Air (JNA).

As shown in Fig. 1,<sup>6</sup> the volume of passengers using LCCs had been growing at a faster pace than before in the Korea domestic airline markets over the past few years. The volume of traffic by

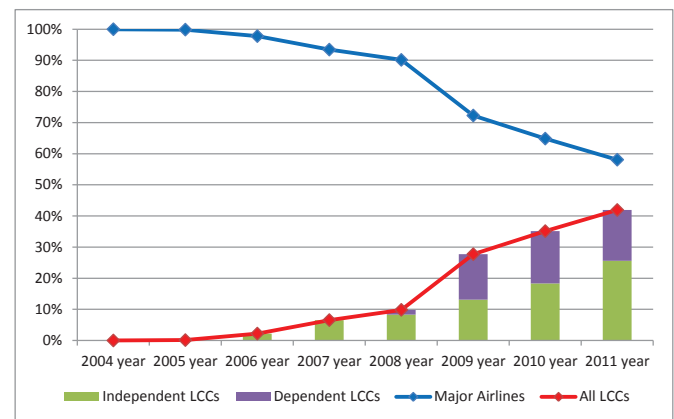


Fig. 1. Percentage of Korean domestic flight shares operated by legacy carriers and LCCs by year.

Table 1

List of aircraft carriers in Korea (June 2006–June 2010).

Types of airlines	Airline carrier	Launch date	Aircraft (fleet types)	Seats
Full service carrier	Korean Air (KAL)	March 1969	B-737-800/B-737-900 (Jet) A-300-600/A-330-300 (Jet)	149–188 266–296
Full service carrier	Asiana Airlines (AAR)	December 1988	B-737-400 (Jet) A-320-200/A-321-200 (Jet)	160 143–200
Low cost carrier	Hansung Airlines (HAN)	August 2005 <sup>a</sup>	ATR72-200 (Turboprop)	72
Low cost carrier	Jeju Air (JJA)	June 2006	Dash-8-Q400 (Turboprop) B-737-800 (Jet) <sup>c</sup>	78 186–189
<i>Korean Airline Deregulation Act of May 2008</i>				
Low cost carrier	Yeongnam Air (ONA)	July 2008 <sup>b</sup>	Fokker-100 (Turboprop)	109
Low cost carrier, KAL's subsidiary LCC	Jin Air (JNA)	July 2008	B-737-800 (Jet)	189
Low cost carrier, AAR's subsidiary LCC	Air Busan (ABL)	October 2008	B-737-400/B-737-500 (Jet)	127–162
Low cost carrier	Eastar Jet (ESR)	January 2009	B-737-600/B-737-700 (Jet)	131–149

<sup>a</sup> Hansung Airlines suspended operations in October 2008 and was re-launched in August 2010 under the changed new name T'way Air.

<sup>b</sup> Yeongnam Air stopped its operations in December 2008.

<sup>c</sup> Jeju Air took its first delivery of Boeing 737 in May 2008.

LCCs has rapidly grown relative to that of the two major airlines from 2008 to 2009. The independent LCCs have shown considerable growth rate of market share, recording an 8.3% in 2008, 13.1% in 2009, an 18.3% in 2010, and 25.6% in 2011. The passengers share using the dependent LCCs recorded an 1.6% in 2008, 14.6% in 2009, 16.8% in 2010, and 16.3% in 2011. In 2011, aggregate domestic market shares of LCCs were above 40%, a new record for LCC penetration in the North Asian nation, making a significant rise from 9.8% in 2008.<sup>7</sup> For the Korean airline industry, being slow to

<sup>3</sup> Annual growth rate for the domestic air passenger traffic in Korea is 15.7% in 1978–1987, 12% in 1988–1998, and –1.6% in 1998–2007, respectively while annual growth rate for the international air passenger traffic is 8.9% in 1978–1987, 8.3% in 1988–1997, and 11.3% in 1998–2007.

<sup>4</sup> Pure LCCs or true LCCs may also refer to independent LCCs.

<sup>5</sup> Unlike independent LCCs, dependent LCCs may have code-share flights with their parent company on a specific route.

<sup>6</sup> Data source: The Ministry of Land, Transport and Maritime Affairs (MLTM), own calculations.

<sup>7</sup> LCCs in Korea held an aggregate domestic market share of 48.9% in 2013, up from the 44.5% in 2012. In terms of total domestic capacity share, like total domestic market share, LCC penetration in Korea is higher than other North Asian countries, but is slightly above the average compared to world. Source: Centre for Asia Pacific Aviation & OAG Facts.

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