Sources of Gain in Airline Merger: Evidence from China Eastern and Shanghai Airlines

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Abstract: This paper examines the motives behind the horizontal merger between China Eastern and Shanghai Airlines in 2009. We develop testable hypotheses, incorporating the two merging airlines, their domestic rivalries, and relevant airports into a unified framework. Our results are based on an event study approach show that the merging airlines, namely China Eastern and Shanghai Airlines, experience significantly positive abnormal returns around the days of the merger announcement. There is also evidence showing that rivals and the hub airport experience positive abnormal returns. These results are robust to the use of alternative estimation period, alternative samples and event windows, and are confirmed by analyst forecasts and long-run stock performance. Further, we find positive long-run operating performances of the merged airline relative to its rivals, and utilize a decomposition analysis to verify the positive role of cost savings in this merger. Our results indicate that the sources of gain for the merging firms are market power and efficiency improvement, but not bargaining power towards airports.

Keywords: Merger, Event Study, Analyst Forecast, Long-run Performance, Decomposition

JEL: G14, L22, L41, L43, L93, L98

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1 Introduction

Early research on the competition and consolidation of the airline industry focuses on the U.S. Since deregulation began in 1978, escalating competition and the removal of entry barriers have greatly reshaped the market structure, making a profound impact on the welfare of passengers and performance of incumbent airlines. Numerous studies exploit the major mergers that occurred in the past 30 years to investigate the competitive effect of these mergers and evaluate whether the regulatory authority had made the right call on approving these mergers. Empirical work typically examines the prices of various city-pair routes before and after the merger.[1]

Alternatively, an event study approach evaluates the competitive effects of mergers by examining the reaction in the stock market. Represented by Eckbo (1983), Mullin et al. (1995), Fee and Thomas (2004), event studies are well developed and employed in the context of horizontal mergers. In these settings, to distinguish the market power hypothesis and efficiency gain hypothesis, not only stock price reactions of merging firms, but also of their rivals, consumers and suppliers are examined. The event study approach has several advantages over the price regression approach in analyzing airline mergers. First, an event study with stock market data can be timelier, which is often desirable for policy evaluation and merger review. Second, an event study relies on publicly available data, which is more accessible for researchers, especially for researchers not in the U.S. market.

Knapp (1990) conducts an event study for nine airline mergers proposed in 1986, in which positive abnormal returns for both merging airlines and rival portfolios support the market power hypothesis. Using NW-RC merger in 1986 as a particular event, Hergott (1997) presents evidence for the argument that increasing concentration at the airport level may lead to market power. Singal (1996) integrates the investigation of stock prices and airfares by examining the same set of airline mergers in Kim and Singal (1993). He finds that abnormal returns to rival firms are correlated with profit changes that take place later, which validates that results obtained separately using stock price and product price data are consistent with each other. However, there are two gaps in the literature. First, there are few works employing an event study approach to examine airline mergers in other countries.[2] Second, the previous studies do not

[1] For example, Borenstein (1990) utilizes the mergers between Northwest-Republic and TWA-Ozark and finds significant fare increases for NW-RC but none for TWA-OZ. Kim and Singal. (1993) exploits 14 mergers during 1985-1988 to perform price regressions and finds about 9.55% fare increases for all merger-involved airlines. Morrison (1996) focuses on the long-run price effects after the mergers but still relies on the price regression framework. Kwoka and Shumilkina (2010) conclude that prices rose by 5%-6% on routes that one carrier served and the other was a potential entrant before being merged.

[2] For examples, see Zhang and Aldridge (1997) for Canada and Cortes et al. (2015) for Latin America.

include the reaction of airports, which identifies the effect of an airline merger along the supply chain and potentially helps to identify incentives for the merger.

In this paper, we employ an event study approach to explore the motives behind the merger between China Eastern and Shanghai Airlines, two Shanghai-based Chinese airlines. Our approach exploits the fact that, at the time of the merger announcement, the rival airlines and suppliers of merging airlines are listed on the stock market. Air China, China Eastern, China Southern, Hainan Airlines, Shanghai Airlines and Shandong Airlines were listed in domestic or foreign stock markets at the time of the merger announcement. Interestingly, we exploit the unique setting of China, in which airports were privatized starting in 2000, to include the stock price reaction of airports into our empirical analysis. For example, Shanghai Airport Co. Ltd. became publicly listed on the Shanghai Stock Exchange in 1998, followed by Guangzhou, Shenzhen and Xiamen airports in the domestic stock market and Beijing and Haikou airports in Hong Kong.[3]

According to the framework of Eckbo (1983), we identify the dominance between market power hypothesis and productive efficiency hypothesis by looking into the stock price reaction of the rivals of merging airlines. Further, the services of airports, such as ground parking, fueling and freight, which largely rely on runway operations, hardstands and storage depots as well as retailing that largely relies on terminal activities, constitute the major inputs of the airlines. We also adopt the framework proposed by Fee and Thomas (2004) to analyze whether there is any source of gain coming from bargaining power towards these upstream airports.

Our results show that the merging airlines, namely China Eastern and Shanghai Airlines, experience significantly positive abnormal returns around the days of the merger announcement. There is also evidence showing that some of their rivals, e.g., Air China and railways, experience significantly positive abnormal returns. Further, we find that there are significantly positive abnormal returns for Shanghai Airport, which is the hub of China Eastern and Shanghai Airlines, but not for other airports. Our evidence suggests that the merger between China Eastern and Shanghai Airlines is more likely motivated by market power towards downstream consumers, and the hub airports extract a part of gain from the merged airline.

[3] Zhang and Yuen (2008) suggest that the Chinese government encourages airports to be publicly listed in order to improve their efficiency. They also document that listed airports are more efficient than unlisted ones, but the efficiency growths of unlisted airports exceed the listed ones. Moreover, the relatively poor corporate governance caused by dominant state ownership, lack of external discipline, internal control and many other factors make these airports less competitive than their counterparts in rest of the world.

Further, we examine the long-run operating performance after the merger. The new China Eastern shows the most prosperous progress in terms of size and productivity compared to other industry players, which suggests the efficiency improvements also motivated the merger. We then develop an analytical framework to decompose the relative importance of increased market power and cost efficiency saving in explaining post-merger profits. We find that increased market power and cost saving are both important in explaining profit increases after the merger.

Encouragingly, we show that our empirical results withstand various robustness checks. First, the results of the event study are robust to the use of estimation periods, alternative samples and event windows. In addition to the event study approach, we employ analyst forecasts as an additional source of information in looking how the capital market reacts to the merger. Consistent with the event study, China Eastern and Air China have more positive ratings and higher price prediction premiums after the merger announcement. We also examine the long-run stock performance after the merger. In a long-run perspective, investors still value the new China Eastern more than the rival airlines confirming the benefits offered by the merger.

This paper contributes to the literature on studying the economic effects of airline mergers in China. Zhang and Round (2009) finds no significant airfare increase for a sample of markets served by the merged China Eastern and China Southern based on monthly price data from 2002-2004. The results suggest that the 2002 mergers did not significantly hurt consumer welfare, at least until two years after the merger. Zhang (2012) looks into the same 2002 merger, but focuses on the prices that China Eastern charged on its Shanghai-Beijing, Shanghai-Guangzhou and Shanghai-Shenzhen routes. He finds that airfares on those three routes relative to the other six control routes of China Eastern had not been significantly higher after the merger until 2007. Yan et al. (2018) also examine the same 2002 merger, and show that there are productivity gains and cost reductions for Air China, China Eastern and China Southern.

This study examines the 2009 merger between China Eastern and Shanghai Airlines, complementing studies by Zhang (2015) and Ma et al (2017). Zhang (2015) examines prices on seven domestic Shanghai-based routes of China Eastern and finds that average fares on these routes increased 22% two years after the merger, suggesting that the merger increased China Eastern's market power. Ma et al. (2017) finds a 2% increase in prices on routes that were only served by China Eastern and Shanghai Airline after they merged. Our research extends their work and contributes to the literature in three ways. First, in a unified framework, we investigate the economic effects of the merger on merging airlines, rival airlines and airports. Second, our approach uses capital market data, which does not require proprietary access to price

data. Thus, our approach is more accessible to other researchers. Third, we use a simple theoretical framework to estimate the distributional effects of the merger on market power and cost efficiency savings.

Section 2 profiles China's airline industry and the circumstances that led up to the merger between China Eastern and Shanghai Airline. Section 3 discusses alternative motives for the merger. Section 4 discusses the methodology and data. Sections 5 and 6 report the empirical results and robustness checks, respectively. Section 7 concludes.

2 Institutional Background

2.1 China's Airline Industry

China's airline industry experienced a wave of deregulation and merger actions since the late 1990s.[4] Before the 1980s, namely the era of the centrally planned economy, China's airline industry was closely affiliated with the military sector. The industry was controlled by a so-called four-tier administration system, which consists of the Civil Aviation Administration of China (CAAC), six regional civil aviation bureaus, 23 provincial civil aviation bureaus and 78 civil aviation stations. Due to the lack of market-oriented operations, the industry suffered huge losses during that period. As part of the economic transition, the CAAC emerged as the regulatory authority and its managerial roles in operating airlines and airports were removed.

From 1987 to 1991, six major airlines (Air China, China Eastern, China Northwest, China Northern, China Southwest and China Southern) and several city-based regional airlines were created. However, effective competition had not been introduced into the industry until the second half of 1990s when the relaxation of pricing and entry gradually began. With the relaxation came the release of a few important policies and regulations: (1) China's 1994 circulation of the "Notice on Policies concerning Foreign Investment in Civil Aviation" and 1997 China Eastern Airline's going public in 1997 allowed foreign and domestic investors to invest in Chinese airlines or airports, respectively;[5] (2) The "Scheme of Domestic Airfare Reform (2004)" granted carriers the freedom to set prices in a bounded-range of government guided-price; and (3) the "Regulation on the Operation on the Domestic Routes (2006)" formally declared that the airlines need not go through CAAC's case-by-case review before entering most domestic markets.

[4] See Zhang and Round (2008) for a more thorough review of China's airline industry.

[5] The state still owns a major of share of many Chinese airlines, even though they all are listed on stock the exchange and they embraced foreign strategic investors. State ownership can directly affect the corporate governance of these major airlines, including strategic decisions and the appointment and dismissal of executives.

The consolidation of nine airlines in 2002 substantially reshaped China's airline industry. It gave birth to the three major airline groups: Air China, China Eastern, and China Southern, based in Beijing, Shanghai, and Guangzhou, respectively. These horizontal consolidations greatly increased the market concentration on some domestic routes, which aroused anti-competitive concerns on whether the merged airlines would have significant market power from the increased market shares.

2.2 China Eastern and Shanghai Airline Merger

On 8 June 2009, China Eastern and Shanghai Airlines simultaneously announced the notice of trading suspension, claiming that they were undergoing a material reorganization. The notice was interpreted as confirmation of the conjecture that China Eastern would acquire Shanghai Airline as its subsidiary and thus began the largest horizontal merger of the Chinese aviation industry in recent years. One month later, the two airlines' boards of directors announced the merger plan, according to which China Eastern and Shanghai Airlines would exchange stock with each other at the ratio of 1:1.3. With the approval of the regulatory authorities, including the China Securities Regulatory Commission (CSRC), the Civil Aviation Administration of China (CAAC) and the State-owned Assets Supervision and Administration Commission (SASAC), the merger encountered little resistance.

According to the Rules on Notification of the Concentrations of Business Operators in China, China Eastern and Shanghai Airlines should notify the Ministry of Commerce (MOFCOM) before launching the merger.[6] According to the merger plan of China Eastern Airlines on December 2009, MOFCOM granted the company approval on September 16 2009 in which MOFCOM concluded that the merger would not generate anti-competitive effects and thus require no further investigation.[7] On 25 February 2010, the Shanghai Stock Exchange delisted Shanghai Airlines. The merger was finally completed before the end of 2010 on schedule.

The merger acquirer, China Eastern is one of China's largest airlines with its headquarters in Shanghai. According to its 2008 income statement, China Eastern's operating revenue reached RMB 41.84 billion (or USD 6.15 billion). The target of the merger, Shanghai Airlines also has its headquarters in Shanghai and in 2008 generated over RMB 13.37 billion (or USD 1.97 billion) in revenues. However, the two airlines suffered huge financial losses before the merger. For example, the financial statements of China

[6] The merger review is triggered if both of the following criteria are satisfied: (1) combined revenues of all parties exceed RMB 10 billion worldwide or RMB 2 billon in China, and (2) individual revenues of at least two parties exceed RMB 400 million in China.

[7] Nonetheless, there was not any concrete evidence provided in the approval.

Eastern and Shanghai Airlines recorded a net loss of RMB 14 billion and RMB 1.3 billion in 2008, respectively. After the merger, China Eastern reported a large increase in profits, which significantly reduced the company's financial stress.

3 Hypotheses

This section establishes testable hypotheses along the supply chain of the Chinese airlines industry. Specifically, we group these hypotheses into two aspects according to their implications for the competitors and upstream suppliers of the merging firms, namely rival airlines and airports respectively.[8]

First, we expect a positive stock price reaction for the two merging airlines. There are three sources for China Eastern's potential gain: improved productive efficiency, increased market power over downstream customers and increased bargaining power over upstream airports. These potential gains lead to the following stock price reaction hypotheses.

Hypothesis 1: China Eastern and Shanghai Airline experience positive abnormal returns after the merger announcement.

However, the stock price movements of merging airlines are silent on the motives of the merger. To answer this question, we turn to the impact on rival airlines and airports. In the following sub-sections, we discuss how each of the three motives (efficiency, market power, and bargaining) would affect the different stakeholders, which enables us to identify the separate effect on the merger decision.

3.1 Competitors

In the framework of Eckbo (1983), stock prices of rival firms react in opposite directions in two distinct cases, when merging firms pursue market power or productive efficiency. First, the market power hypothesis suggests that a decrease in the total number of firms after the merger will increase the market power of the remaining firms, enabling them to charge higher prices and potentially giving them a higher incentive to collude with rivals. In this case, we expect the stock prices of rival airlines to increase in response to the merger.

[8] Considering that the downstream customers of airlines are primarily passengers, we do not have capital market information for them.

The merger between China Eastern and Shanghai Airlines may mitigate the competition with the other major airlines. On the route-level, China Eastern admitted in the merger report of China Eastern and Shanghai Airlines in December 2009 that for years it had faced fierce competition from the other two major airlines on specific routes between hub airports. For example, it competes with Air China on the Shanghai-Beijing route and China Southern on the Shanghai-Guangzhou/Shenzhen route. Zhang (2015) examines China Eastern's seven domestic Shanghai-based routes and documents a 20% price increase on the routes two years after the merger. Ma et al. (2017) finds a 2% price increase for routes only served by China Eastern and Shanghai Airline after they merged with each other. The post-merger price increase is consistent with the highly overlapping routes of China Eastern and Shanghai Airlines.[9] Furthermore, at the airport-level, Table 1 reports the market shares of major airlines at their base airports. After the merger, the new (merged) China Eastern accounts for as much as 50% and 30% market shares of passenger and cargo markets, respectively. These effects provide the merged airline an opportunity to exert more market power unilaterally.[10]

[Insert Table 1 here]

Moreover, collusion among airlines in China is not uncommon. For example, Chen (2006) reports that Air China, China Southern and China Eastern held talks from time to time to prevent airfares from competitively sliding down to train fare levels. Zhang and Round (2011) provides evidence of price collusion by China Eastern and China Southern. A higher airport concentration may facilitate collusion in some circumstances. After the merger between China Eastern and Shanghai Airlines, the higher airport concentration of the merged airline may increase the ticket price through collusion. Zhang et al. (2014) provides further evidence that collusions are more likely to happen when the demand is high.[11]

Hypothesis 2A: The rival airlines experience positive abnormal returns after the merger announcement if market power primarily drives the merger between China Eastern and Shanghai Airlines.

[9] Ma et al. (2017) document that there are 112 domestic routes only served by these two airlines.
[10] Regulatory oversight typically requires merged airlines to sell some gates and/or reduce presence significantly at airports where both have a large presence (e.g., Delta-NWA merger) in order to weaken the market power of the merged airlines. We do not find any evidence that a similar measure was adopted in response to the China Eastern-Shanghai Airlines merger.
[11] The 2010 World Expo was held in Shanghai one year after the merger. Demand was predicted to be high during the Expo-period and the following periods thanks to the advertising effect by the Expo for the Shanghai city.

Second, the productive efficiency hypothesis suggests that there are cost savings after the merger. Reduced marginal costs lower prices in the product market, which in turn imposes price pressure on the rival airlines. If rivals of the merged airline cannot replicate these cost savings, we expect the stock price effect for the rival airlines to be negative.

The merger between China Eastern and Shanghai Airline may achieve cost reduction by scale economies, scope economies or elimination of inefficient operations and facilities. In the merger report of China Eastern and Shanghai Airlines (Dec. 2009), China Eastern mentioned the merger "*aims at achieving synergy by integrating the route composition, rearranging flight timetable, establishing uniform information system, enhancing operation management, optimizing the distribution and marketing channels, sharing customer resources and reducing financial cost.*"[12]

In fact, the load factors, the measure of capital utilization in transporting passenger and freight, are fluctuating in the range of 60%-70% before the merger. After the merger, the load factor of the merged airline jumps up to 70% or above, consistent with the merged airline becoming more efficient in filling seats or cargo space and generating revenue.

[Insert Figure 1 here]

Even though the two merging airlines have headquarters in Shanghai and numerous overlapping routes, each has some advantages that the other does not possess. One example is the proactive internationalization of Shanghai Airlines before the merger. Stepping into the new century, Shanghai Airlines gradually launched several Shanghai-based international routes (passenger and cargo) and established its dominance in these sub-markets. As a part of its international blueprint, Shanghai Airlines built code-sharing reciprocal business relationships with other international airlines.[13]

[Insert Table 2 here]

Table 2 shows these international innovations that Shanghai Airlines made before the merger. The pre-merger development of international routes potentially benefits the new China Eastern by providing

[12] See section 3.2 on page 1-1-27 in the Dec-2009 version merger plan: http://static.sse.com.cn/disclosure/listedinfo/announcement/c/2009-12-31/600115_20091231_4.pdf.

[13] Before the merger, Shanghai Airlines was a member of Star Alliance. After the merger, it quitted from the alliance and join China Eastern in Sky Team.

an expanded scope of its product portfolio through acquisition rather than having to incur fixed costs in building these routes.

Hypothesis 2B: The rival airlines experience negative abnormal return after the merger announcement if productive efficiency primarily drives the merger between China Eastern and Shanghai Airlines.

3.2 Airports

In our case, Shanghai has two airports, Hongqiao and Pudong, both of which the Shanghai Airport Authority (SAA) controls. Thus, there is no competition between them. Any airline flying in and out of Shanghai does not have a third option, which means airports in Shanghai have strong market power in setting aeronautical charges, which follows a non-linear pricing (Civil Aviation Administration of China, 2007).[14] Therefore, as the merger may increase the profit of new China Eastern by increasing its market power and reducing its cost, Shanghai Airports can use non-linear pricing to extract the increased profit.

However, previous studies show that a downstream merger weakens the upstream market power. As a result, such a merger not only increases the market power of the downstream firm, but also reduces the input prices for downstream firms. Thus, there are mixed impacts on downstream output and price (Ziss 1995; Lommerud et al. 2005; Symeonidis 2010). After the merger, we expect the new China Eastern, as the unique dominant airline, would have a stronger bargaining position to negotiate lower aeronautical charges with Shanghai Airports (Haskel et al. 2013; Bottasso et al. 2017). A negative price effect for the airport stocks is consistent with the loss of bargaining power of Shanghai Airports against the remaining airlines.

Hypothesis 3A: Shanghai Airports experience positive abnormal returns after the merger announcement if it extracts a part of an increased profit of China Eastern and Shanghai Airlines. However, this situation is consistent with an increase or a decrease in bargaining power of Shanghai Airports against the remaining airlines.

Hypothesis 3B: Shanghai Airports experience negative abnormal returns after the merger announcement if it loses bargaining power against the remaining airlines.

[14] According to the Civil Aviation Airport Charges Reform Implementation Plan, there are fixed charges for airlines such as rental fees for office and ticket counter, and there are variable charges based on number of passengers such as landing, taxi, gates and security fees.

To sum up, Table 3 lists the stock price reaction associated with alternative motives from the airline merger. Since multiple motives may drive airline mergers, we exploit the reactions of merging airlines, rival airlines and airports to identify the relevant motives of the merger. The significant reaction of rival airlines helps identify whether the market power effect dominates the productive efficiency effect. If the market power hypothesis dominates, we expect the merger is positive news to the rival airlines. If the productive efficiency dominates, the merger is negative news to the rival airlines. Further, the negative reaction of airports identifies whether the merger endows any significant increase in bargaining power to the merged airline.

[Insert Table 3 here]

4 Methodology and Data

4.1 Methodology

4.1.1 Event Study

An event study analyzes the impact that an 'event' has on firm value. Researchers (e.g. Eckbo, 1983; Mullin et al., 1995; Fee and Thomas, 2004) have used event study methodology to study the competitive effects of a merger. To assess the impact of a merger, the methodology compares the reaction of a firm's stock price against the expected normal return at the time of a merger announcement (MacKinlay, 1997). Specifically, we estimate the following system of equations:

$$\begin{cases} R_{1,t} = \alpha_{10} + \alpha_{11}R_{m,t} + \alpha_{12}R_{m,t-1} + \alpha_{13}R_{m,t+1} + \sum_{k=-4}^{4}\beta_{1k}D_k + \varepsilon_{1,t} \\ \vdots \\ R_{i,t} = \alpha_{i0} + \alpha_{i1}R_{m,t} + \alpha_{i2}R_{m,t-1} + \alpha_{i3}R_{m,t+1} + \sum_{k=-4}^{4}\beta_{ik}D_k + \varepsilon_{i,t} \\ \vdots \\ R_{N,t} = \alpha_{N0} + \alpha_{N1}R_{m,t} + \alpha_{N2}R_{m,t-1} + \alpha_{N3}R_{m,t+1} + \sum_{k=-4}^{4}\beta_{Nk}D_k + \varepsilon_{N,t} \end{cases} \quad (1)$$

The system of equations includes *N* firms that the merger potentially affects. The variable $R_{i,t}$ is the daily return of firm *i* on date *t*. $\varepsilon_{i,t}$ is the disturbance term of firm *i* on date *t*. The normal return is estimated with a capital asset pricing (CAPM) framework, which relates the stock return of a firm to the market portfolio and an idiosyncratic component. $R_{m,t}$, $R_{m,t-1}$ and $R_{m,t+1}$ are the daily returns of market portfolio

on date *t*, *t-1* and *t+1*, respectively. The lead and lag of market returns control for non-synchronous trading and partly capture the temporal structure of returns. The estimation period includes the trading days ranging from 1 December 2008 (120 days before the merger announcement) to 2 December 2009 (120 days after the merger announcement). Along with the event day (8 June 2009), there are 241 total trading days included in the sample for stocks traded in Shanghai, Shenzhen and New York Stock Exchanges. Note that there are 239 trading days for stocks listed in Hong Kong Stock Exchange because of the different holiday schedules.

The dummy variable D_k equals one on the date that is k days away from the date of the merger announcement (8 June 2009).[15] The set of dummy variables tracks the return of those *N* firms over the period four days before and after the merger announcement. Equation-specific coefficients β_{ik} capture the reaction of firm *i* to the merger announcement during these 9 days. If the coefficient is significantly positive (negative), then the price of firm *i* is higher (lower) than the expected normal return. In other words, the coefficient β_{ik} is the abnormal return (AR) for firm *i* on day *k*. Moreover, we compute the cumulative abnormal return (CAR[-j,+j]) of firm *i* by summing up all of its ARs over the event window of [-j, +j]. In our context, CAR may be more meaningful than AR because the CSRC imposes a price limit (±10% for normal stocks) for the Chinese stock markets, which restricts the stock price from conveying all information of investors. In fact, when China Eastern and Shanghai Airlines delivered their merger announcement, the stocks of both companies traded under the condition of special treatment (ST) because they suffered from financial losses for two consecutive years. Under the ST, the CSRC imposed more rigorous limits on the companies' stock price fluctuations (±5%).

It is noteworthy that the set of dummy variables $D_{-4},..,D_{-1}$ captures whether investors anticipate the merger announcement. Finding CAR[-4,0] or CAR[-2,0] to be insignificant from zero suggests that the merger announcement is exogenous. Further, the errors of different return equations can be positively correlated because our samples may share common input and output markets. We address this cross-equations contemporaneous correlation in error terms by employing the Seemingly Uncorrelated Regression (SUR) model to estimate the system of equations.[16]

[15] For the merging airlines, i.e., China Eastern and Shanghai Airlines, because the trading of their stocks was suspended, we set the day when they resumed to be traded (13 July 2009) as 0, and so on afterwards.

[16] See Binder (1985) and Karafiath (1988) for discussions of SUR's application in event study. Table A1 in the appendices shows the correlation matrix of residuals after SUR estimation. The Breusch-Pagan test of independence rejects the null hypothesis that the errors are uncorrelated, which further justifies our application of SUR model.

4.1.2 Long-Run Operating Performance

Synergy between merging airlines is one of the top objectives of a merger. To determine whether the China Eastern-Shanghai merger achieved this, we use industry-specific measures to investigate the pre- and post- operating performances (Eckel et al., 1997). These measures fall into two categories: scale and productivity. In particular, we use Available Seat Kilometer (ASK), Revenue Passenger Kilometer (RPK) and the total number of employees as measures of scale. Increases in any of these measures indicates a larger scale of operations. To measure productivity, we use load factor as a proxy for capital productivity and employees per million ASK (RPK) as a proxy for labor productivity. A higher load factor means better utilization of aircrafts and thus higher capital productivity. Fewer employees per ATK (RPK) means greater per employee output and thus higher labor productivity.

We compute the growth rates for the measures according to the following definition. OP^{after} and OP^{before} are operational performances after and before the merger, respectively, and computed using three-year averages.

$$\%\Delta\mathrm{OP} = \left(\frac{\mathrm{OP}^{after}}{\mathrm{OP}^{before}} - 1\right) * 100\%$$

4.2 Data

The daily stock prices in our sample firms are from WIND database (http://www.wind.com.cn/en). We include three groups of listed firms in our empirical analysis: merging airlines, rival airlines and airports. We construct a panel dataset with 18 trading stocks listed in various stock exchanges for 6 Chinese airlines and 6 Chinese airports. Merging airlines are China Eastern Airlines and Shanghai Airlines. Rival airlines include Air China, China Southern Airlines, Hainan Airlines and Shandong Airlines.[17] Airports include Beijing airport, Shanghai airport, Guangzhou airport, Shenzhen airport, Xiamen airport and Haikou airport. For the market portfolio, we employ HS300 Index for stocks listed in Mainland China. We use Hang Seng Index (HSI) and S&P500 Index as the market portfolios for stocks listed in Hong Kong Stock Exchange and New York Stock Exchange (NYSE), respectively. See Table 4 for more details of stocks and market portfolios.

[Insert Table 4 here]

[17] We do not include foreign airlines into our analysis because they have negligible market shares in China's domestic routes.

Table 4 reports the descriptive statistics of daily returns in our sample period. The return is computed as $R_t = (P_t - P_{t-1})/P_{t-1}$. Daily stock prices are adjusted for stock splits and dividend payments before computing daily return. All the stocks and market portfolios show slightly positive average returns. Further, the standard deviations of stocks listed in Hong Kong and New York Stock Exchanges are larger than those of Mainland China, suggesting that the −10% and 10% price limits in Shanghai or Shenzhen Stock Exchange are binding constraints on the stock returns.

In addition, we collect measures of long-run operational performance for the airlines from CSMAR database (http://www.gtadata.com) and airlines' websites. Finally, for the robustness checks, we collect the ratings and consensus analysts' predicted price that analysts provided on the sample firms from WIND Database.

5 Empirical Results

This section first presents the results from the event study, and then discusses the results from operating performances. Finally, we conduct a decomposition analysis to identify the channels.

5.1 Event Study

We report the empirical results of Equation (1) in Table A2 in appendices, which includes all the stocks listed in mainland China. Consistent with the prediction of the CAPM model, all coefficients of market returns, R_{mt}, are significantly positive. The coefficients of interest are those of the dummy variables around the merger announcement, which measure the abnormal returns. Except for the coefficient of D_{-1} for Shanghai and Shandong Airlines, none of the coefficients from D_{-4} to D_{-1} is significant. This suggests that the merger announcement provides new information content to the stock prices. In the remaining part of this section, we discuss the results on CAR based on the following three groups: merging airlines, rival airlines, and airports (see Panel A, Table 5).

5.1.1 Merging Airlines

Figure 2 depicts that the CAR of merging airlines increases beginning from Day 0. The first two columns in Panel A of Table 5 report the estimates for the merging airlines. There are significantly positive abnormal returns for China Eastern and Shanghai Airlines after the merger announcement. In particular, the CAR[0,+2] for China Eastern and Shanghai Airline reaches 12.7% and 14.3%, respectively, suggesting that investors expected that China Eastern and Shanghai Airlines would benefit from the merger. On

average, the two merging airlines achieve CAR[0,+2] at 13.5%, as reported in Column 3 of Panel A, Table 5. Figure 2 depicts that the CAR of merging airlines increases beginning from Day 0. Overall, our results support Hypothesis 1.

Further, these positive abnormal returns last four days, from Day 0 to Day 3 (see the coefficients of D_0,..,D_3 in the first two columns in Table A2). CAR[0,4] for China Eastern and Shanghai Airline reaches 17.1% and 19.4%, respectively. The persistence of abnormal returns over those days may reflect the limitation that the stock price can only fluctuate within the [-5%,5%] interval in Shanghai and Shenzhen Stock Exchanges.[18] As a result, the stock prices fail to reflect the news efficiently on the day of the merger announcement.[19]

[Insert Table 5 and Figure 2 here]

5.1.2 Rival Airlines

Figure 2 depicts that the CAR of rival airlines shows a slight uptick on Day 1. The middle six columns in Panel A of Table 5 report estimates for the rival airlines, which provide evidence supporting the market power hypothesis. First, the 6.3% CAR[0,2] for Air China is statistically significant at a 0.09 level, suggesting that investors expected that Air China would benefit from the merger.

These results suggest that the merger between China Eastern and Shanghai Airline increases Air China's market power. For instance, Zhang et al. (2013) reports that China Eastern and Air China dominated the Beijing-Shanghai routes with a combined market share of over 90% (measured in RPK) in 2010. Air China would benefit from the merger between China Eastern and Shanghai Airline if Shanghai Airline had operated in this route before the merger.[20] Overall, our results support Hypothesis 2A.

5.1.3 Airports

Figure 2 depicts that the CAR of Shanghai Airport jumps up on Day 2 while the CAR of the other airports remains stable during the same period. The last five columns in Panel A of Table 5 report estimates for the sample airports. The CAR[0,+2] for Shanghai Airport is statistically significant at 7.7%. These results suggest that Shanghai Airport would benefit from the merger between China Eastern and Shanghai

[18] The limits for China Eastern and Shanghai Airline were [-5%,+5%] because they were in financial distress.
[19] Although the estimated abnormal returns can be larger than 5%, the raw returns of both stocks are kept below the upper bound of price limit for those days.
[20] Consistently, Ma et al. (2017) report that China Eastern and Shanghai Airline overlap in 112 domestic routes.

Airline. However, we do not find any significant pattern for the abnormal returns of other airports. This suggests that the other sample airports do not benefit from the merger.

Our results are consistent with our hypothesis that Shanghai Airports extract increased profits (potentially from the increased market power as shown in the previous sub-section) from the merged airline. Since the previous sub-section suggests that the market power hypothesis rather than the productive efficient hypothesis was dominant in driving the merger, one would expect that the merged airline would use its market power to restrain output. This would lead to negative abnormal returns for Shanghai Airport. However, the positive CAR for Shanghai Airport suggests that it did not suffer a significant loss in bargaining power with the merged airline and potentially benefited from the increased profit of the merged airline. Overall, our results support Hypothesis 3A.

5.2 Operating Performance

Table 6 shows long-run operating performance for China Eastern, Air China and China Southern airlines. Panel A documents a 76% increase in Available Seat Kilometer (ASK) and a 61% increase in Revenue Passenger Kilometer (PRK) for China Eastern after the merger, both of which are higher than the two rival airlines. The number of China Eastern employees increased 40% after it acquired Shanghai Airlines, which suggests that there are potential scale or scope economies for China Eastern after the merger.

[Insert Table 6 here]

Panel B, Table 6 shows the productivity changes for the three airlines. China Eastern's passenger load factor is 13.86% higher three years after the merger than before. Moreover, the airline uses 13% fewer employees per million ASK and 20% fewer employees per million RPK after the merger. These results suggest that the merged airline experienced a significant degree of efficiency gains. During the same period, although Air China achieved a 6% increase in its load factor, it used 19% and 13% more employees per ASK and RPK, respectively. China Southern, on the other hand, showed a 7% increase in load factor and a 5% decrease in the number of employees per million RPK, but employed 2% more employees per million ASK. These results suggest that efficiency gain of the merged airline is unlikely to reflect an industry trend and might not be replicated by other competitors.

These results are also consistent with Shanghai Airport's positive abnormal returns after the merger announcement. As the hub for China Eastern, Shanghai Airport enjoys greater passenger flows and input demands due to the rapid growth of merged airline. When we look at the load factors on different routes, we can infer how these contribute to the overall efficiency uptick. Figures 3(a)-(c) depict the yearly load factors on domestic routes, international routes and routes connecting Hong Kong, Macao and Taiwan (HMT). In 2010 (1 year after the merger), China Eastern's overall load factor increased 11%. Among the three kinds of routes, load factor of domestic routes increased 9% while load factors on international and HMT increased 15% and 13%, respectively. Even though international and HMT routes do not have the largest shares in the route portfolio, they contribute more to promoting efficiency. This is consistent with the fact that Shanghai Airlines has advantages in serving non-domestic routes as discussed in Section 3, which implies that China Eastern performed better in those routes than other competitors after the acquisition. However, the efficiency seems to be a one-time gain since the load factors roughly remained constant at its 2010-level.

[Insert Figure 3 here]

5.3 A Decomposition Analysis

The event study suggests that China Eastern and Shanghai Airline are likely to merge for acquiring market power. [21] However, we cannot rule out the possibility that the merged airline harvests efficiency gains as we report improvements in operating performance of the merged airline. Thus, the reality may be a mix of these motives.

Under the market power hypothesis, a higher price and lower output level reduce consumer surplus. Part of the reduction is a transfer to the airlines in the form higher airlines' profits and part is a loss of consumer surplus from a higher post-merger price that reduces flights demanded. In the case of productive efficiency hypotheses, these would lead to a lower marginal cost, which in turn leads to a greater amount of profit for a given output level. The question is how much of the increase in profits can be attributed to market power and how much to cost saving, respectively. In this section, we provide a decomposition to quantify the relative importance of these two effects.

[21] We assume away the possibility of bargaining power in bumping up the profit since our event study results show no significant evidence for it.

Figure 4 plots the welfare changes subject to the price increase from P_0 to P_1. Assuming the downward-sloping demand, output level decreases from Q_0 to Q_1. The increase of producer surplus (profit) is therefore $(P_1 - C_1)Q_1 - (P_0 - C_0)Q_0$, which is S_1-S_2+S_3. Among them, $S_3/(S_1-S_2+S_3)$ is the proportion from cost saving, whereas $(S_1-S_2)/(S_1-S_2+S_3)$ is the proportion from market power.

[Insert Figure 4 here]

Using financial data, we compute the profit increase in 2005 constant prices. Specifically, we use the average 2 to 4 years before the 2009 merger (2005-2007) to proxy the pre-merger profit level and the average 3 to 5 years after the merger (2012-2014) to proxy the post-merger profit level. There are two reasons for not using the period 2008-2011. First, year 2008 marks the beginning of the financial crisis. The unusual fluctuations of oil prices make the marginal cost and profit of airlines deviate from the equilibrium. Second, it could take time for the two merging airlines to adjust to a new equilibrium where their relationship changes from competition to cooperation.

Since we cannot directly observe airline marginal costs in any official report, we derive the cost saving amount as a proportion of the operating cost:

$$S_3 = (C_0 - C_1)Q_1 = \left(\frac{1}{1+\%\Delta C} - 1\right) C_1 Q_1, \quad where\ \%\Delta C = \frac{C_1 - C_0}{C_0} \qquad (2)$$

where Q is volume and C_0 and C_1 is marginal cost in the period before and after merger, respectively. Operating cost C_1Q_1 can be found in financial statement. This makes $\%\Delta C$ the only unknown part in computing S_3. Following Brander and Zhang (1990, 1993), the route-specific marginal cost can be estimated by

$$MC_{kt} = CPK_t\left(\frac{AFL_t}{D_k}\right)^{\theta} D_k \qquad (3)$$

where D_k is the distance of route k, AFL_t is the average flight length in period t, CPK_t is the cost per passenger-kilometer in period t, and θ is an elasticity parameter ranging from 0 to 1. Zhang et al. (2014) estimate the value of θ to be around 0.4 in the context of China's airline industry. Notice that even though the marginal cost is route-specific, its percentage change is airline firm-specific. This allows us to pin

down the yearly $\%\Delta C$ by only knowing the changes in *CPK* and *AFL*. Again, we compute this change in marginal cost using the average 2-4 years before and the average 3-5 years after the merger.

Table 7 shows the details of the computation. For China Eastern, the real cost savings amounts to nearly 2/3 of the overall profit change, while increased market power from the merger generates about 1/3 of the profit change. This decomposition is consistent with our conclusions in previous sections that both the increased market power and cost saving motivate the merger.

[Insert Table 7 here]

We performed the same calculation for the two major competitors of China Eastern: Air China and China Southern. During the same period, market power contributes 122% of the profit increase for Air China and China Southern in total. It suggests that market power is the dominant factor driving the profit increase in the absence of a merger.

These findings suggest that a trend of rising market power can be a common factor underlying increasing profits for China Eastern, Air China and China Southern. However, the larger contribution of efficiency improvement to profit increase for China Eastern supports the conclusion that market power and efficiency improvement are both important to explain the profit increase of China Eastern in a longer-run.

6 Robustness Checks

This section first discusses several robustness checks for the event study, and then discusses the use of alternative stock market indicators.

6.1 Event Study Related Checks

6.1.1 Alternative Estimation Period

We extend the estimation period from [-120, +120] to [-200, +200], and report the results in Table A3. Overall, the magnitudes and signs of the coefficients are similar and there is little change in the significance. China Eastern, Shanghai Airlines, Air China and Shanghai Airport have positive CAR[0,+2] in contrast to other stocks (see Panel B, Table 5). These results are consistent with our earlier findings and indicate that our primary results are robust to alternative sample length.

6.1.2 Inclusion of Stocks Listed Abroad

Instead of using stocks listed only in mainland China, we expand our sample to include stocks listed in Hong Kong and New York Exchanges. Foreign investors mainly trade the stocks of Chinese airlines listed overseas because capital account restrictions limit their access to stocks in the mainland China stock exchanges.[22] Foreign investors, mainly consisting of institutional investors, are more rational when analyzing a merger relative to mainland China where individual stock investors represent a higher proportion of investors. Including Hong Kong and New York stocks of Chinese airlines in the estimation makes the picture more complete.

Table A4 reports the results. China Eastern (listed in Shanghai, Hong Kong and New York), Shanghai Airlines and Shanghai Airport have positive CAR[0,+2] in contrast to other stocks. These results suggest that foreign investors revised upward their expectations on China Eastern after the merger announcement. These results support our main findings and indicate that these are not driven by the reaction of a particular group of investors, but from the impact of merger announcement.

Interestingly, we observe significantly negative CAR[0,+2] for Beijing Airport, Air China's hub. This result, and the positive CAR[0,+2] for Air China, suggest that investors expected an increase in market power for the merged airline and for Air China, which is positive news to Air China but negative news for Beijing Airport.

6.1.3 Additional Event Window

When China Eastern and Shanghai Airlines announced their stock trading suspensions on 8 June 2009, they only revealed that the two airlines were under material assets reorganization. It was not until 13 July 2009, one month after the announcement, that investors would learn more specifics from the draft of the merger plan released before the stock trading suspension expired. If investors react similarly to these later released details as they did to the initial announcement, we are more confident that consistent expectation rather than uninformed speculation drives the stock price reactions.

Table A5 reports the results estimated with an alternative event window, i.e. 4 days before and after 13 July 2009. China Eastern and Shanghai Airlines have positive CAR[0,+2] (see Panel D, Table 5).

[22] China has been restricting the capital flows to stabilize the exchange rate of RMB. It is not until 2002 when "Qualified Foreign Institutional Investor (QFII) scheme" was initiated that licensed foreign investors can invest yuan-denominated A shares listed in mainland China. Still, QFII funds are subject to rigorous quota management of foreign exchange. By the time when the merger happened, there were only less than 100 foreign institutes granted with QFII licenses and their total quotas amounts to less than 20 billion USD.

Interestingly, in this case, rival airlines show even more prominently positive abnormal returns ex-ante, with almost all positive coefficients from Day -4 to Day -2 for every rival airline. The abnormal return of Air China, Hainan Airlines and Shandong Airlines is significantly positive on Days -2, -3 and -4, respectively. These results provide stronger evidence for the market power hypothesis.

In addition, the results indicate that investors anticipated the merger before the plan was officially published. At the time of this announcement, even new information came out but nothing that substantively altered investors' initial evaluations. Further, we find that there are more positive coefficients for the airports, in particular there are positive and significant CAR[-2,0] for Shanghai and Shenzhen airports.

Overall, these results suggest that informed investor decisions rather than uninformed speculation underlie observed stock price changes.

6.2 Railways as an Alternative Competitor

Chinese railways, especially high-speed railways, are potential substitutes for airline passengers. Consider, for example, a typical business passenger travelling from Guangzhou to Shanghai. His/her choice set includes express railways offered by China Railway Corp in addition to the airlines flying between these two cities.[23] In our context, railways is a potential competitor of China Eastern because Shanghai is also a railway hub serving as a junction of some of the busiest railway lines in Eastern China, including Beijing-Shanghai and Guangzhou-Shanghai.

Existing literature recognizes the competitive relationship and substitution pattern between airlines and railways, especially between high-speed railway (HSR) and airlines.[24] However, when the China Eastern-Shanghai Airlines merger occurred, there was no established high-speed railway from Shanghai.[25] Neither China Railway Corp nor its subsidiary of high-speed railways was listed before the merger. The only public firm affiliated with China Railway Corp was Guangshen Railway Company Limited.[26] With passenger transport as its major business, Guangshen Railway operates several modernized railway lines

[23] These railway expresses are usually slower but cheaper than flights. For instance, Express T100, being one of the most popular options for train passengers, takes about 16 hours from Guangzhou to Shanghai overnight and charges less than 380 RMB per sleeper ticket. On the other hand, flights from Guangzhou to Shanghai take about 2 hours and costs no less than 500 RMB often time.

[24] See Fu et al. (2012), Wei et al. (2017) and Zhang et al. (2017), among many others.

[25] High-speed railway from Shanghai to Beijing came into service in 2011 and high-speed railways from Shanghai to Guangzhou came into service in 2014.

[26] Two other listed firms were affiliated with China Railway Corp back in 2009. One is Daqin Railway Co., Ltd and the other is China Railway Tielong Container Logistics Co., Ltd. Daqin Railway specialized in railway transportation of coal and Tielong specialized in railway transportation of containers. Neither firm is a competitor of the merging airlines.

in southern China, including some from Guangzhou to Shanghai.[27] During our event window, Guangshen Railway did not have any important announcements. We expect that as an alternative competitor of the merging airlines, railways can also benefit from the spillover of increasing market power after the merger, i.e., Guangshen Railway will exhibit positive abnormal return in respond to the merger announcement.

Table A6 reports the event study results with the railway stock included, and Panel E of Table 5 reports the corresponding CAR of that model. The magnitudes and significances of the coefficients for airlines are consistent with our baseline results. Consistent with the market power hypothesis, Guangshen Railway shows a significant CAR of 7.5% over the [0,+2] window.[28] In other words, investors believe that that the railway will enjoy a stronger demand as the merged firms increase their prices by exercising market power. Even though the highly regulated railway fare in China may hinder the railway company to exercise marker power after the merger, Guangshen Railway, being the only exception nationwide, is offered full discretion by the Ministry of Railways to charge a higher price than the regulated baseline. There is anecdotal evidence suggesting an increase of train fare following the airline merger.[29]

6.3 Another Horizontal Merger

Unique to this study is using an event study to analyze the effect of two rival merging Chinese airlines. Substantively similar to the China Eastern-Shanghai Airlines merger was Air China's announcement on 21 March 2010 to raise its stock share stake in Shenzhen Airlines, the largest private airlines in China, to 51%. Not having a rivalry relationship (in contrast to China Eastern and Shanghai Airlines), Air China's control of Shenzhen Airlines raised less government anti-competitive concerns. But common to the China Eastern-Shanghai Airlines merger, Air China's takeover of Shenzhen Airlines was that one of the partnering airlines was in financial distress. Shenzhen Airlines suffered a huge loss of 440 million RMB in 2008, leaving it no other choice but to ask for a capital injection from Air China.

Although Shenzhen Airlines is not listed in any stock market, Air China and its hub airport (i.e. Shenzhen Airport) are. We conducted an event study for Air China, rival airlines and related airports with the model outlined in Section 4.1. The number of firms in the sample and the length of the estimation

[27] In 2009, passenger revenue accounts for 58.1% of its total revenue. Passenger revenue (volume) from long-distance train takes up 66.3% (55.7%) in its total revenue (volume) of passenger transport.
[28] Guangshen Railway was also listed on the Hong Kong and New York stock exchanges. We included those stocks in the event study and find similar results.
[29] Take express T100 from Shanghai to Guangzhou as an example. The price of a normal sleeper ticket increased from RMB 367 to RMB 379 and the price of a luxurious sleeper ticket increased from RMB 584 to RMB 642 in August 2009.

window are the same as in the baseline model, but Day 0 in the event window is assigned as the first trading day after the announcement, 22 March 2010.

Table A7 reports the results for the effective merger between Air China and Shenzhen Airlines, and Panel F of Table 5 reports the corresponding CAR of that model. Air China shows a significant CAR[-2,0] at 7.2%. However, nearly none of the rival airlines show significant AR during the window, except for China Eastern whose AR reaches 4.4% and is significant on Day -4.[30] There is no strong evidence for the market power hypothesis in this case.

The route structure effect of the partnering relationships potentially explains the differing results. Ma et al. (2017) points out that the China Eastern-Shanghai Airlines rival merger and the Air China friendly takeover of Shenzhen Airlines are both horizontal and complementary relationships but that the flight network of China Eastern and Shanghai Airlines had more overlapping routes than that of Air China and Shenzhen Airline.[31] Consequently, when Air China acquired Shenzhen Airline, fewer routes experienced substantial changes in market structure, which limits the rise in market power.[32] This is also consistent with the price effect analysis in Ma et al (2017) where the magnitude of short run price increases in the Air China and Shenzhen Airlines case is smaller than that in China Eastern and Shanghai Airlines' case.

In contrast to Shanghai Airport, Shenzhen Airport did not report any significantly positive abnormal returns after the merger announcement. In fact, its abnormal return on Day 3 even went down to -1.53%, a statistically significant result. Investors seemed to believe that the merger would weaken Shenzhen Airport because of the stronger bargaining power acquired by Air China. Moreover, unlike China Eastern and Shanghai Airlines which are both based in Shanghai Airport, Air China does not rely only on Shenzhen Airport when it flies in/out Southern China.[33] Potentially, the merger weakens the bargaining power of Shenzhen airport in setting aeronautic charges because of competition from nearby airports. As a result, the merger between Air China and Shenzhen Airlines reduced Shenzhen Airport's profit.

6.4 Alternative Stock Market Indicators

To gain additional insights on the effects of the merger, we analyzed analyst forecasts for China Eastern, rival airlines and Shanghai airport during the merger year. We then examined the long-run stock

[30] Since Air China, Shenzhen Airline and China Eastern compete in the same market, China Eastern is a rival airline of Air China and Shenzhen Airline.
[31] Table 2 and 3 of Ma et al (2017) show the number of overlapping routes in these mergers are 112 and 36, respectively.
[32] This outcome suggests the network effect was minimal, at least in the short-run.
[33] Guangzhou Airport, the third largest airport nationwide and the regional hub in Southern China, is only about 100km away from Shenzhen Airport.

market returns for the merged and rival airlines in the post-merger period. Finding results from these alternative stock market indicators that are consistent with the event studies' findings will further strengthen our conclusion from the previous sections.

6.4.1 Analyst Forecasts

An event study reveals investor expectations regarding the merger. We supplement the event study with analyst forecasts, which incorporates another source of information. What makes analyst forecasts different from investors' expectations is that the forecasts are more likely to contain private information that is unavailable or hard for investors to obtain.

Previous studies employ analyst forecasts to assist an event study in evaluating horizontal mergers. Houston et al (2001) investigates bank mergers from 1985 to 1996 in the U.S. and tests the hypotheses of cost saving and revenue enhancement. The study takes analysts as the outsiders and investigates whether analyst forecasts are consistent with management forecasts and post-merger performance. Harford (2005) takes analyst forecasts along with traditional industry benchmarks as a proxy for expected performance absent the merger.

In the spirit of these studies, we analyze how analysts revised their forecasts in reaction to the merger. We employ two types of analyst forecasts provided to China Eastern, rival airlines and Shanghai Airport. First, we employ analyst ratings for those firms. The ratings have five categories: *Buy, Outperform, Neutral, Underperform* and *Sell*. Second, we examine the consensus predicted price that analysts provided for those firms. The event study results can be strengthened if they are consistent with those from analyst forecasts. For example, if there is a positive abnormal return estimated for the merging airlines, then observing improved analyst ratings and predicted price increases after the merger announcement provides consistent evidence.

Figure 5 plots the percentages of different types of analyst ratings in year 2009. Figure 4(a) depicts the proportions of *Buy* and *Outperform* ratings for China Eastern, gradually increasing from March and reaching a maximum two months after the announcement. For Air China and Shanghai Airport, in June 2009, the month when the merger was announced, the percentage of *Buy* ratings rapidly increases to over 50% from less than 10% in the prior month. Further, the position revisions in analysts' ratings for China Eastern, Air China and Shanghai Airports are consistent with the positive abnormal returns estimated in the event study. China Southern, on the other hand, does not receive any positive revision in its ratings on

and after the merger announcement in June, which is also consistent with its insignificant stock price reaction estimated in the event study.

[Insert Figure 5 here]

Figure 6 depicts how predicted prices move for the relevant firms in 2009. The most obvious finding is that analysts started to revise predicted prices for the airlines two months before the announcement. The predicted prices stay at a higher level even long after the merger announcement. Price predictions for Shanghai Airport did not go up immediately after the announcement but rose about three months later. Again, these results are largely consistent with those from the event studies.

[Insert Figure 6 here]

6.4.2 Long-Run Stock Performance

Some of the merger impacts may not be immediate but may take time as the newly merged airline consolidates its operations and as the rival airlines adjust in the new market structure. To examine whether investors value the merger in a longer period as they do around the announcement, we perform a long-run stock performance comparison for the relevant firms. Following Dionysiou (2015), we measure the long-run stock return with Buy-and-Hold Abnormal Return (BHAR), which accounts for compounded return. We first estimate a typical CAPM asset pricing model:

$$R_{it} - R_{ft} = \alpha_i + \beta_i(R_{mt} - R_{ft}) + \varepsilon_{it} \quad (4)$$

where R_{it} and R_{mt} are daily returns for firm *i* and market index *m* at time *t*, respectively. R_{ft} is the risk-free interest rate at time *t*.[34] We compute BHAR in a given period *T* as:

$$BHAR_{iT} = \prod_{t=1}^{T}\left(1 + R_{i,t}\right) - \prod_{t=1}^{T}\left(1 + E(R_{i,t})\right) \quad (5)$$

[34] Previous studies compute BHAR by contrasting returns of event stocks against returns of benchmark portfolio consisting of matched stocks. In our case, it is difficult to construct a control group of non-event stocks since there are few listed airlines in the market.

We estimate the stock-specific equation in a sample interval of [-240,0], then compute BHAR since Day 0.[35] Specifically, we report long run stock performance 6 months and one, two, and three years after the merger announcement.

Panel A of Table 8 shows the stock market performance from 6 months to 3 years for the new China Eastern and its major competitors. The new China Eastern exhibited the highest BHAR during all time intervals. For example, one year after the announcement, China Eastern's BHAR rose to 81.0%, while the BHARs for Air China and China Southern rose 68.0% and 29.1%, respectively, which is about the time that the merger entered its final stage. Even three years after the merger, China Eastern outperformed its two competitors with a BHAR of 37.9%. Interestingly, Air China's BHAR moved closer to China Eastern's while China Southern's BHAR becomes negative after two years. The consistent ranking of these three airlines in long run and short-run stock market performance confirms that Air China is more likely to benefit from the merger because of the market power effect.

[Insert Table 8 here]

Panel B of Table 8 depicts airports' BHAR. Specifically, we choose Shanghai, Beijing and Guangzhou airports, which are respective hub airports for China Eastern, Air China and China Southern, in order to examine whether the performance of an airport hub's dominant airline affects the respective airport's performance. The BHARs of Shanghai Airport reach 44.7% and 61.7% one year and three years after the merger. These results are in line with the positive abnormal returns from the event study. In contrast, Beijing's Airport has negative BHARs throughout the periods. This is consistent with Beijing Airport's negative short-run abnormal returns (Table A3) and confirms that Air China's increased market power would drag down the performance of its hub airport, which in turn confirms our market power hypothesis.

These results are also robust to the use of Fama-French three-factor model (Fama and French, 1993; 1995) as the asset pricing model (see Table 8) and the use of long-run CAR as the long-run stock return.[36]

[35] We do not estimate the asset pricing model in the long run using the SUR framework as in the event study because estimating abnormal returns over a long horizon requires the inclusion of numerous daily dummies into the specification and thus results in a significant loss in degrees of freedom.

[36] The results of long-run stock return based on long-run CAR are available upon request.

7 Conclusion

China Eastern and Shanghai Airlines announced to merge on 8 June 2009, making it the largest horizontal merger in Chinese airline industry ever. This paper examines the motivations of this merger. We develop testable hypotheses incorporating the two merging airlines, their domestic rivalries and relevant airports into a unified framework.

Based on an event study approach, we find significantly positive abnormal returns for China Eastern, Shanghai Airlines and Air China on the announcement day and afterwards, which provides evidence to the market power hypothesis. We also find significantly positive abnormal returns for Shanghai Airports, which is consistent with the rent extraction of Shanghai Airports from the merged airline. Encouragingly, the results from the event study are robust to a series of specification checks, and are consistent with those from analyst forecasts, long-run stock movements and operating performances. The long-run operating performance also indicates that there is an efficiency improvement from the merger.

Finally, we decompose the increased profit after the merger into two components. First, the component of increased market power, which relates to a higher price and lower output level. Second, the component of cost saving, which relates to a lower cost incurred by the merged airline by harvesting efficiency gains. We find that both components contribute to the increased profit of the post-merger merged airline, with market power accounting for one-third of the increase and efficiency gains accounting for two-thirds of the increase.

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Table 1: Market shares of major airlines in their base airports (2006-2008)

Year	China Eastern	Shanghai Airlines	The new China Eastern	Air China	China Southern
A. Passenger Market					
2006	35.7%	14.4%	50.1%	38.3%	53.2%
2007	33.9%	14.6%	48.5%	39.1%	50.7%
2008	32.1%	14.5%	46.6%	39.8%	49.0%
B. Cargo Market					
2006	19.4%	9.5%	28.9%	45.8%	42.1%
2007	17.5%	9.5%	27.0%	44.2%	39.7%
2008	17.6%	9.0%	26.6%	45.9%	37.0%

Note: This table reports the ex-ante market shares of major airlines in their base airports during 2006-2008. Panel A shows the shares in passenger market and Panel B shows the shares in cargo market. Source: Merger Report of China Eastern and Shanghai Airlines (Dec. 2009). The market shares of the "New China Eastern" is simply the sum of China Eastern and Shanghai Airlines.

Table 2: Internationalization of Shanghai Airlines (2004-2008)

Year	International/Interregional Routes	Code Sharing
2004	Osaka(P), Seoul(P)	Lufthansa, ANA, Korean Air
2005	Hong Kong(C), Frankfurt(C)	
2006	Hong Kong(P), Singapore(C), Los Angeles(C)	United, Tai Airways
2007	Haneda(P), Gimpo(P), Busan(P), Ho Chi Minh City-Singapore(C), Anchorage-Chicago(C)	Air Canada, Air New Zealand
2008	Copenhagen(P), Bangkok(P), Bombay(CHT), Taiwan(CHT), Saipan(CHT), Izumo(CHT)	

Note: This table presents the international/interregional routes opened by Shanghai Airlines and Code-sharing services provided since 2004 until 2008. P in the parenthesis stands for passenger route. C stands for cargo route. CHT stands for chartered route. Shanghai Airlines became an official member of Star Alliance in 2006 but switched to Sky Team with China Eastern after the merger in 2011. The code sharing information are from Baidu Encyclopedia. The route information are from "Management Discussion and Analysis" of Shanghai Airline's annual reports, various years. See http://ggjd.cnstock.com/gglist/search?code=600591&sort_text=010301 for a list of these annual reports. Source: media coverage and airline's website.

Table 3: Predicted stock price reactions of airlines merger based on different hypotheses

Hypothesis	**Merging airlines**	**Rival airlines**	**Airports**
1. Market power	positive	positive	N/A
2. Productive efficiency	positive	negative	N/A
3. Bargaining power	positive	N/A	Negative

Note: This table shows all the hypotheses discussed in Section 3. These three hypotheses do not necessarily include all the cases of stock price reaction since the airlines can merge for more than one motive. We infer the corresponding hypothesis to be the dominant motive behind the merger if the stock price reaction is close to one of the cases listed above.

Table 4: Background Information and Descriptive Statistics

Firm	Trading Code	Market Capitalization*	Listed Exchange	Obs	Mean	Min	Max	Std.Dev
Airlines								
Air China	601111.SH	86004.56	Shanghai	241	0.004	-0.091	0.101	0.035
	0753.HK	46555.18	Hong Kong	239	0.006	-0.128	0.221	0.044
China Eastern	600115.SH	33602.05	Shanghai	241	0.002	-0.100	0.100	0.031
	0670.HK	10969.53	Hong Kong	239	0.007	-0.085	0.413	0.047
	CEA.N	1418.47	New York	241	0.007	-0.179	0.526	0.060
China Southern	600029.SH	35562.07	Shanghai	241	0.003	-0.100	0.101	0.033
	1055.HK	14106.72	Hong Kong	239	0.006	-0.145	0.430	0.049
	ZNH.N	1834.53	New York	241	0.005	-0.176	0.302	0.051
Hainan Airlines	600221.SH	18957.46	Shanghai	241	0.003	-0.100	0.101	0.035
	900945.SH	10853.25	Shanghai†	241	0.004	-0.086	0.102	0.026
Shandong Airlines	200152.SZ	1269.40	Shenzhen†	241	0.006	-0.091	0.100	0.032
Shanghai Airlines	600591.SH	7718.04	Shanghai	241	0.002	-0.100	0.101	0.028
Airports								
Beijing airport	0694.HK	23516.73	Hong Kong	239	0.002	-0.110	0.175	0.038
Guangzhou airport	600004.SH	29598.08	Shanghai	241	0.001	-0.083	0.069	0.022
Haikou airport	0357.HK	11005.50	Hong Kong	239	0.006	-0.100	0.153	0.035
Shanghai airport	600009.SH	13048.68	Shanghai	241	0.001	-0.064	0.063	0.023
Shenzhen airport	000089.SZ	4654.77	Shenzhen	241	0.001	-0.063	0.076	0.023
Xiamen airport	600897.SH	2266.69	Shanghai	241	0.001	-0.075	0.072	0.024
Market portfolios								
HS300 Index			Shanghai & Shenzhen	241	0.003	-0.071	0.067	0.021
HSI Index			Hong Kong	239	0.002	-0.055	0.087	0.023
S&P500 Index			New York	241	0.002	-0.089	0.071	0.020

Note: This table presents the basic information and market capitalization of all the stocks used in the event study estimation, and the summary statistics for all the market returns and stock returns used in the baseline estimation ([-120, +120] window). The daily return is calculated as $R_t = (P_t - P_{t-1})/P_{t-1}$.

*The market capitalization is measured in million RMB and calculated on the last trading day before the merger was announced (5 June 2009).

†These stock shares, which are also called B shares, are priced in RMB and settled in USD or HKD. The discrepancy of the number of observations comes from the different holiday arrangements of different stock exchanges.

Table 5: Cumulative Abnormal Return

	Merging Airlines			*Rival Airlines*						*Airports*				
Variables	**China Eastern SH**	**Shanghai Airlines SH**	**Avg**	**Air China SH**	**China Southern SH**	**Hainan Airlines SH**	**Hainan Airlines SH(B)**	**Shandong Airlines SZ**	**Avg**	**Shanghai SH**	**Guangzhou SH**	**Shenzhen SZ**	**Xiamen SH**	**Avg**
Panel A: Baseline														
CAR[-2,+2]	0.119**	0.184***	0.151***	0.048**	-0.007	-0.008	0.007	0.042	0.016	0.051***	0.016	0.022	-0.039	0.000
	[0.029]	[0.001]	[0.001]	[0.352]	[0.887]	[0.903]	[0.890]	[0.413]	[0.666]	[0.134]	[0.598]	[0.518]	[0.317]	[0.587]
CAR[-2,0]	0.044*	0.094**	0.069*	-0.012	-0.026	-0.023	-0.013	0.055	-0.004	-0.014	-0.006	-0.014	-0.052	-0.024
	[0.333]	[0.030]	[0.076]	[0.769]	[0.546]	[0.650]	[0.732]	[0.170]	[0.904]	[0.609]	[0.797]	[0.584]	[0.082]	[0.230]
CAR[0,+2]	0.127***	0.143***	0.135***	0.063***	0.020	-0.001	0.021	-0.011	0.018	0.077***	0.029	0.041	-0.002	0.022**
	[0.000]	[0.000]	[0.000]	[0.091]	[0.571]	[0.978]	[0.557]	[0.781]	[0.488]	[0.004]	[0.213]	[0.123]	[0.938]	[0.044]
Panel B: Alt. Est Period														
CAR[-2,+2]	0.121**	0.181***	0.151***	0.048	-0.007	-0.007	0.009	0.052	0.019	0.048	0.017	0.023	-0.040	0.012
	[0.030]	[0.001]	[0.002]	[0.337]	[0.885]	[0.910]	[0.866]	[0.299]	[0.608]	[0.259]	[0.681]	[0.548]	[0.338]	[0.672]
CAR[-2,0]	0.047	0.098**	0.073*	-0.012	-0.025	-0.021	-0.010	0.061	-0.001	-0.016	-0.005	-0.014	-0.053	-0.022
	[0.315]	[0.030]	[0.080]	[0.776]	[0.546]	[0.657]	[0.813]	[0.119]	[0.968]	[0.630]	[0.879]	[0.639]	[0.100]	[0.313]
CAR[0,+2]	0.127***	0.138***	0.132***	0.063*	0.018	-0.002	0.020	-0.006	0.019	0.075**	0.028	0.039	-0.004	0.035
	[0.000]	[0.000]	[0.000]	[0.078]	[0.581]	[0.960]	[0.597]	[0.881]	[0.451]	[0.021]	[0.384]	[0.178]	[0.909]	[0.109]
Panel C: Listed Abroad														
CAR[-2,+2]	0.126**	0.183***	0.124***	0.048	-0.007	-0.007	0.007	0.043	-0.016	0.052	0.016	0.022	-0.039	0.002
	[0.019]	[0.001]	[0.002]	[0.353]	[0.892]	[0.905]	[0.881]	[0.407]	[0.596]	[0.131]	[0.595]	[0.513]	[0.320]	[0.238]
CAR[-2,0]	0.048	0.093**	0.043	-0.012	-0.026	-0.022	-0.013	0.055	-0.024	-0.014	-0.006	-0.014	-0.052*	-0.015
	[0.295]	[0.030]	[0.218]	[0.764]	[0.548]	[0.650]	[0.737]	[0.168]	[0.339]	[0.604]	[0.796]	[0.587]	[0.083]	[0.320]
CAR[0,+2]	0.134***	0.143***	0.127***	0.064*	0.020	-0.001	0.021	-0.011	0.003	0.077***	0.029	0.041	-0.002	0.022
	[0.000]	[0.000]	[0.000]	[0.089]	[0.564]	[0.981]	[0.551]	[0.781]	[0.869]	[0.003]	[0.210]	[0.122]	[0.944]	[0.751]

Note: Panel C – Stocks listed aboard are reported in Table A3. All Panels: SH and SZ denote Shanghai and Shenzhen Stock Exchange, respectively. P-values of F-test for the sum of ARs equal to zero in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Table 5: Cumulative Abnormal Return (Con't)

	Merging Airlines			*Rival Airlines*						*Airports*					*Railways*
Variables	**China Eastern SH**	**Shanghai Airlines SH**	**Avg**	**Air China SH**	**China Southern SH**	**Hainan Airlines SH**	**Hainan Airlines SH(B)**	**Shandong Airlines SZ**	**Avg**	**Shanghai SH**	**Guangzhou SH**	**Shenzhen SZ**	**Xiamen SH**	**Avg**	**Guangshen**
Panel D: Alternative Event															
CAR[-2,+2]	0.131***	0.189***	0.160***	-0.002	-0.004	0.003	-0.041	0.085*	0.008	0.067*	0.016	0.034	-0.001	0.029	
	[0.007]	[0.000]	[0.000]	[0.945]	[0.947]	[0.969]	[0.322]	[0.084]	[0.821]	[0.058]	[0.581]	[0.277]	[0.989]	[0.197]	
CAR[-2,0]	0.063*	0.109***	0.086***	0.020	0.002	0.008	-0.035	0.117***	0.022	0.067**	0.025	0.066***	0.014	0.043**	
	[0.079]	[0.001]	[0.005]	[0.631]	[0.964]	[0.871]	[0.271]	[0.002]	[0.406]	[0.013]	[0.235]	[0.006]	[0.617]	[0.012]	
CAR[0,+2]	0.127***	0.140***	0.134***	-0.040	-0.007	-0.013	-0.025	0.028	-0.011	0.037	0.013	0.021	-0.006	0.016	
	[0.001]	[0.000]	[0.000]	[0.308]	[0.866]	[0.763]	[0.445]	[0.450]	[0.687]	[0.180]	[0.561]	[0.389]	[0.838]	[0.357]	
Panel E: Railway															
CAR[-2,+2]	0.121**	0.182***	0.151***	0.048	-0.007	-0.008	0.007	0.042	0.016	0.051	0.016	0.022	-0.039	0.013	0.075**
	[0.027]	[0.001]	[0.001]	[0.352]	[0.888]	[0.903]	[0.890]	[0.413]	[0.666]	[0.134]	[0.598]	[0.518]	[0.317]	[0.587]	[0.022]
CAR[-2,0]	0.046	0.092**	0.069*	-0.012	-0.026	-0.023	-0.013	0.055	-0.004	-0.014	-0.006	-0.014	-0.052*	-0.022	0.045*
	[0.315]	[0.033]	[0.075]	[0.769]	[0.546]	[0.650]	[0.732]	[0.170]	[0.904]	[0.609]	[0.797]	[0.584]	[0.082]	[0.230]	[0.077]
CAR[0,+2]	0.129***	0.142***	0.135***	0.063*	0.020	-0.001	0.021	-0.011	0.018	0.077***	0.029	0.041	-0.002	0.036**	0.075***
	[0.000]	[0.000]	[0.000]	[0.091]	[0.571]	[0.978]	[0.557]	[0.781]	[0.488]	[0.004]	[0.213]	[0.123]	[0.938]	[0.044]	[0.003]

	Air China SH	**China Eastern SH**	**China Southern SH**	**Hainan Airlines SH**	**Hainan Airlines SH**	**Shandong Airlines SZ**	**Avg**	**Shanghai SH**	**Guangzhou SH**	**Shenzhen SZ**	**Xiamen SH**	**Avg**
Panel F: Alternative Merger												
CAR[-2,+2]	0.050	0.019	0.005	-0.004	-0.029	-0.009	-0.004	0.017	-0.019	-0.024	-0.019	-0.011
	[0.301]	[0.683]	[0.913]	[0.940]	[0.605]	[0.829]	[0.921]	[0.401]	[0.594]	[0.391]	[0.591]	[0.575]
CAR[-2,0]	0.072*	0.028	0.034	0.020	-0.004	0.004	0.016	0.012	0.002	-0.015	0.002	0.000
	[0.055]	[0.444]	[0.338]	[0.630]	[0.924]	[0.899]	[0.552]	[0.440]	[0.930]	[0.476]	[0.942]	[0.986]
CAR[0,+2]	-0.008	0.022	-0.030	0.000	-0.023	-0.019	-0.010	0.010	-0.020	-0.016	-0.023	-0.013
	[0.840]	[0.553]	[0.389]	[0.994]	[0.591]	[0.560]	[0.716]	[0.533]	[0.462]	[0.446]	[0.400]	[0.421]

Note: Panel F – Air China was the merging airline and China Eastern was a rival airline. All Panels: SH and SZ denote Shanghai and Shenzhen Stock Exchange, respectively. P-values of F-test for the sum of ARs equal to zero in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Long-run Operating Performance Changes

Panel A: Size	**ASK**	**RPK**	**# of Employees**
China Eastern	61.06%	76.13%	40.29%
Air China	26.59%	33.41%	50.92%
China Southern	43.45%	43.14%	35.88%
Panel B: Productivity	**Load Factor**	**Employees per mil ASK**	**Employees per mil RPK**
China Eastern	13.86%	-12.98%	-20.47%
Air China	6.15%	19.32%	13.33%
China Southern	6.78%	1.99%	-4.94%

Note: This table reports the percentage changes in long-run operating performances for three major airlines: China Eastern, Air China and China Southern. ASK is Available Sear Kilometer and RPK is Revenue Passenger Kilometer. The number is computed as the percentage changes of 3-year average before and after the merger.

Table 7: Decomposition Analysis

Panel A: China Eastern			
	Operating Revenue	***Operating Cost***	***Operating Profit***
Pre-merger	43005.37	37886.02	5119.35
Post-Merger	60360.40	53787.99	6572.40
% Δ	40.36%	41.97%	28.38%
	CPK	***AFL***	***MC***
Pre-merger	0.68	1434.32	
Post-Merger	0.66	1511.36	
% Δ	-3.75%	5.37%	-1.71%
	Profit Change	***Cost Saving***	***Market Power***
Amount	1453.05	936.74	516.31
%		64.47%	35.53%
Panel B: Air China + China Southern			
	Operating Revenue	***Operating Cost***	***Operating Profit***
Pre-merger	91771.57	79925.33	11846.24
Post-Merger	139883.19	119038.56	20844.63
% Δ	52.43%	48.94%	75.96%
	CPK	***AFL***	***MC***
Pre-merger	0.63	1614.56	
Post-Merger	0.62	1721.60	
% Δ	-0.85%	6.63%	1.73%
	Profit Change	***Cost Saving***	***Market Power***
Amount	8998.39	-2023.74	11022.13
%		-22.49%	122.49%

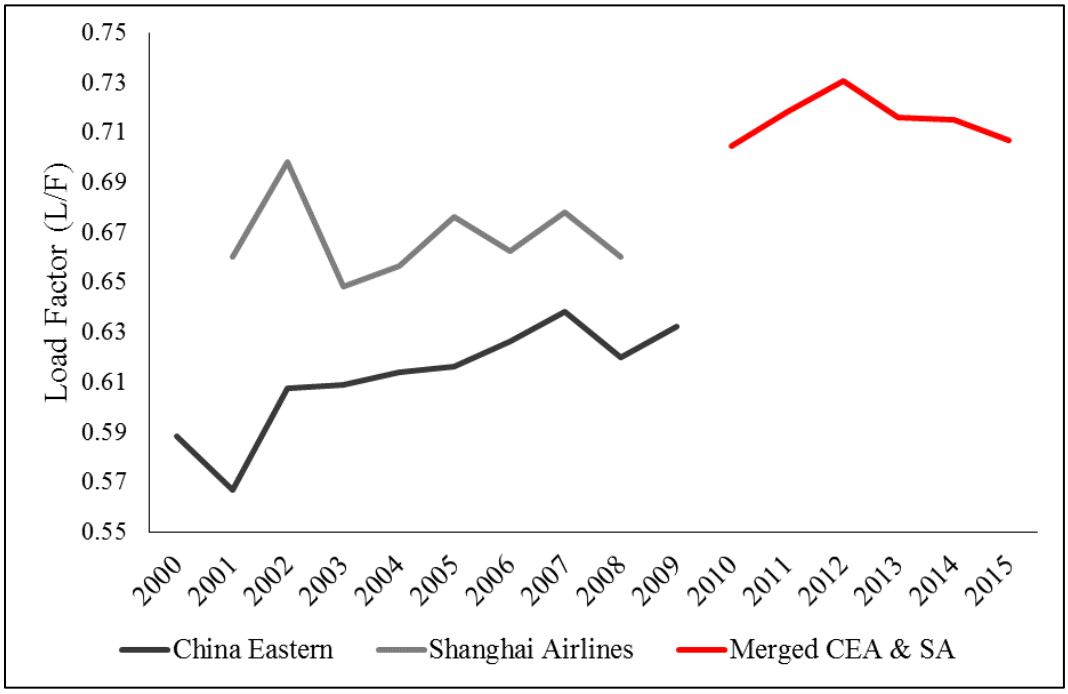
Note: This table reports the decomposition of profit change of merging airlines along with their major rival airlines. The numbers are computed using three-year averages before and after the merger (pre: 2005-2007; post: 2012-2014) and measured in RMB million. Operating revenue, cost and profit are deflated to 2005-constant prices using GDP deflator from World Bank. In Panel A, pre-merger statistics are the sum of those of China Eastern and Shanghai Airlines, while post-merger statistics are those of the new China Eastern. The separate calculation for Air China and China Southern are consistent with the combined calculation reported in Panel B, and is available upon request.

Table 8: Long-run Stock Price Performance

	Panel A: Airlines			**Panel B: Airports**		
	China Eastern	China Eastern	China Eastern	Shanghai	Beijing	Guangzhou
CAPM						
6-month	0.244	0.065	-0.076	0.223	-0.660	0.138
1-year	0.810	0.680	0.291	0.447	-1.019	0.402
2-year	0.456	0.344	0.268	0.567	-2.175	0.403
3-year	0.379	0.317	-0.238	0.617	-1.718	0.374
3-Factor						
6-month	0.253	0.096	-0.016	0.225	-0.604	0.167
1-year	0.826	0.697	0.358	0.442	-0.916	0.433
2-year	0.550	0.430	0.500	0.562	-1.619	0.477
3-year	0.497	0.414	0.116	0.617	-0.925	0.475

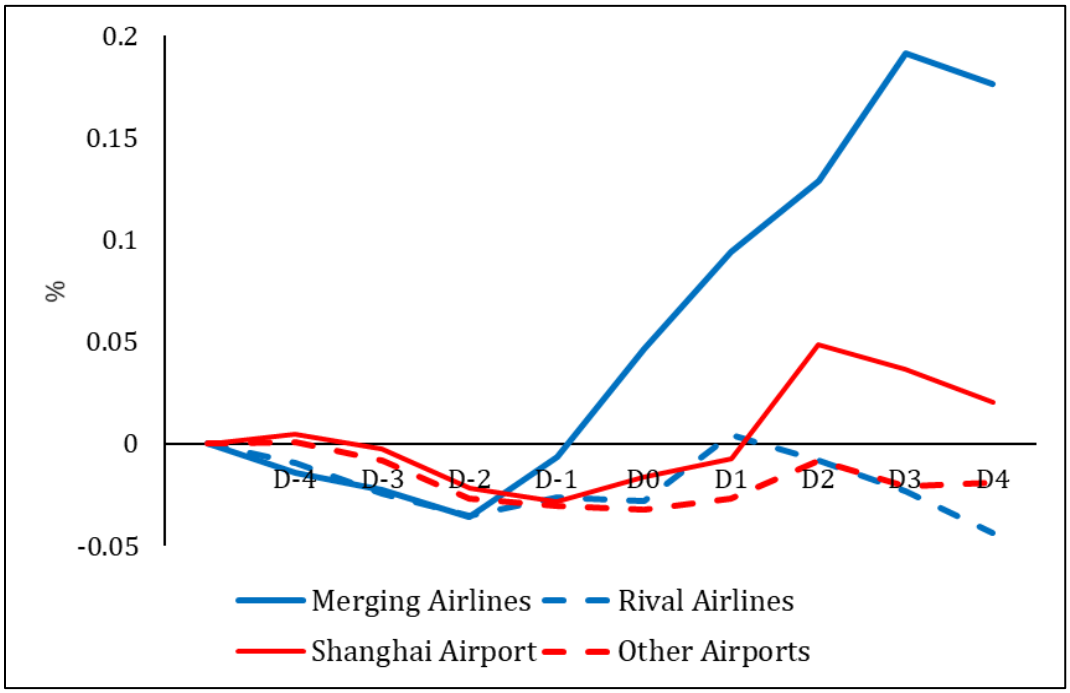
Note: This table reports the long-run BHAR for three major airlines, China Eastern, Air China and China Southern, and their hub airports, Shanghai, Beijing and Guangzhou. The BHAR are computed using CAPM or 3-Factor model with an estimation window of [-240,0] and the merger announcement day (Day 0) is 8 June 2009.

Figure 1: Load factors before and after the merger



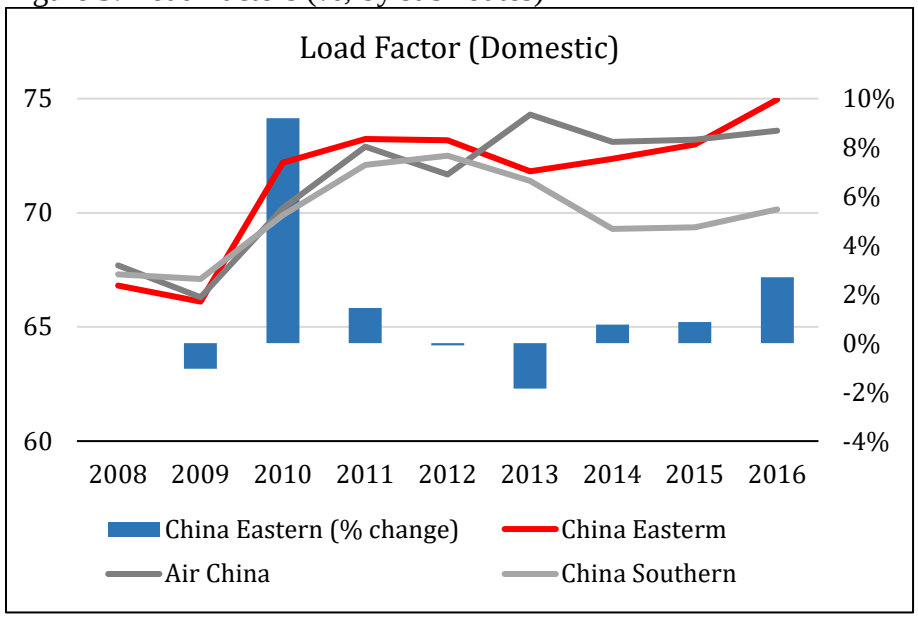
Note: This figure depicts yearly load factors for China Eastern and Shanghai Airlines before the merger and the "New China Eastern" after the merger. Source: Annual reports of China Eastern and Shanghai Airlines, various years.

Figure 2: CAR(-4,+4)

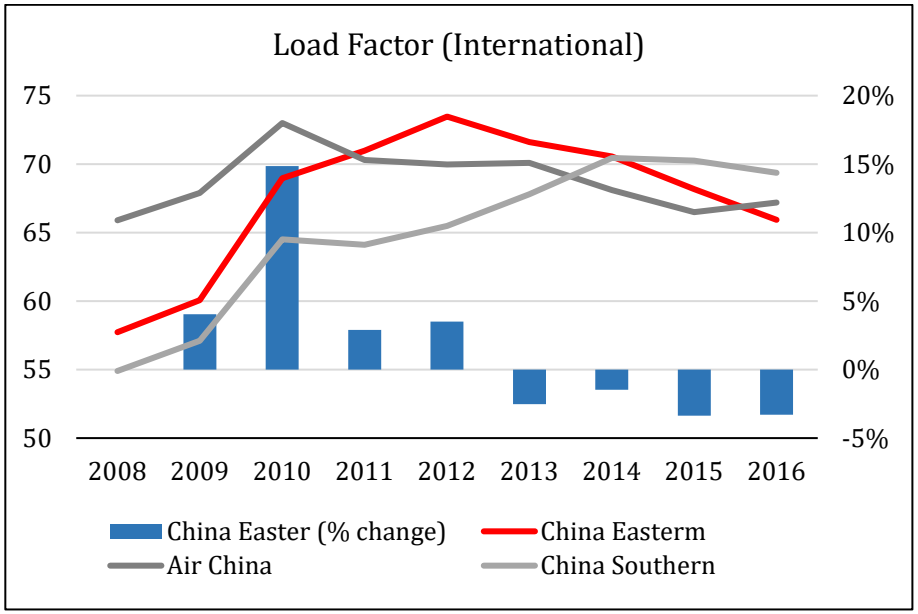


Note: This figure depicts the average CAR of 4 groups of stocks, Merging Airlines, Rival Airlines, Shanghai Airports and Other Airports, 4 days before and after the merger announcement. The CARs are computed based on the estimated coefficients of shown in Table 5.

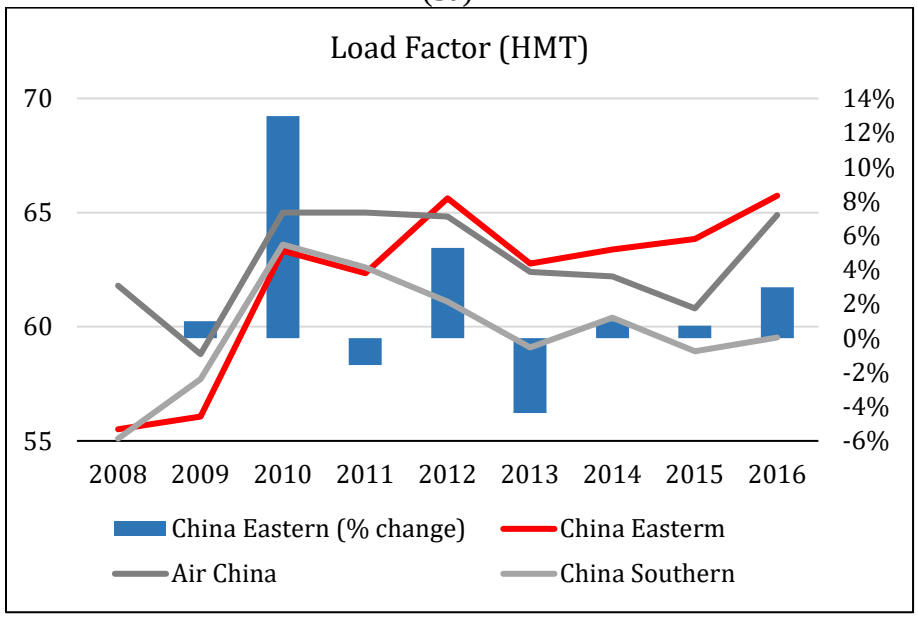
Figure 3: Load Factors (%; by sub-routes)



(3a)



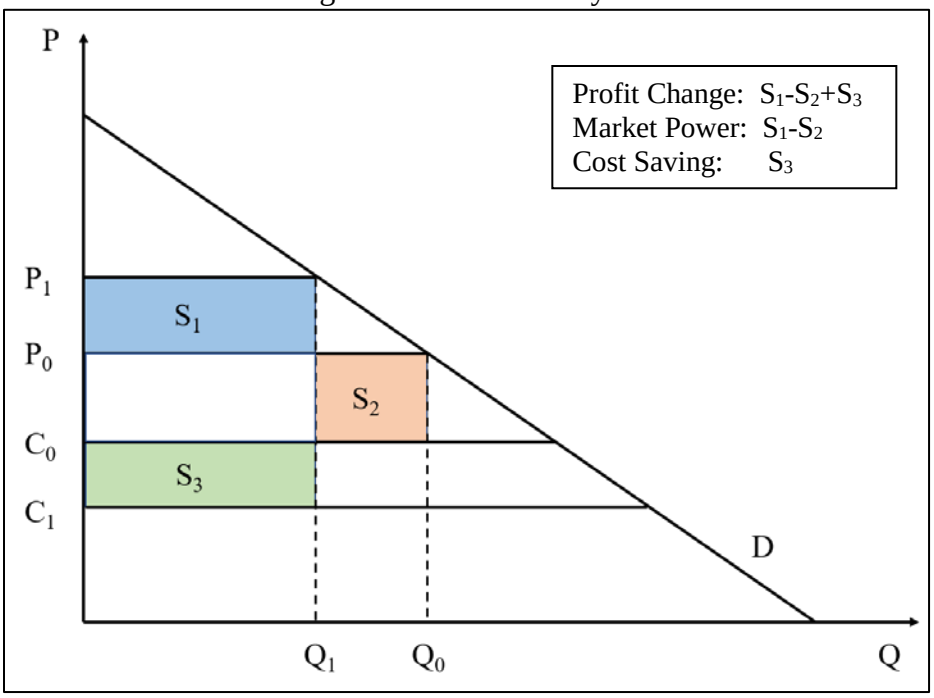
(3b)



(3c)

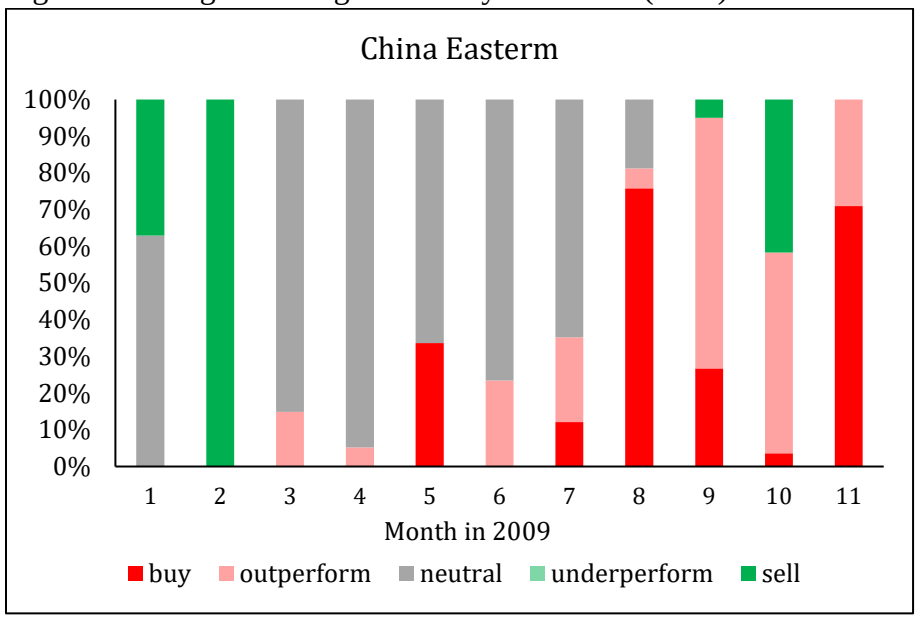
Note: These three figures plot the absolute levels and yearly changes of load factors for three major airlines in domestic, international and HMT (Hong Kong, Macau and Taiwan) markets.

Figure 4: Welfare Analysis

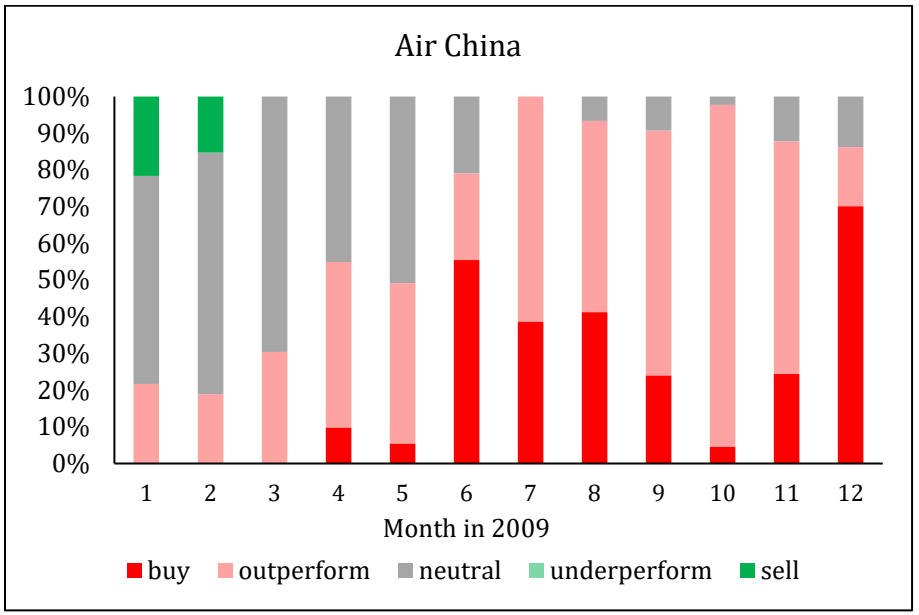


Note: This figure illustrates the decomposition of wealth effect attributed to the increased marker power and efficiency improvement. Subscripts 0 and 1 denote ex-ante and ex-post, respectively. Colored rectangles represent the compositions of merging airlines' profit changes.

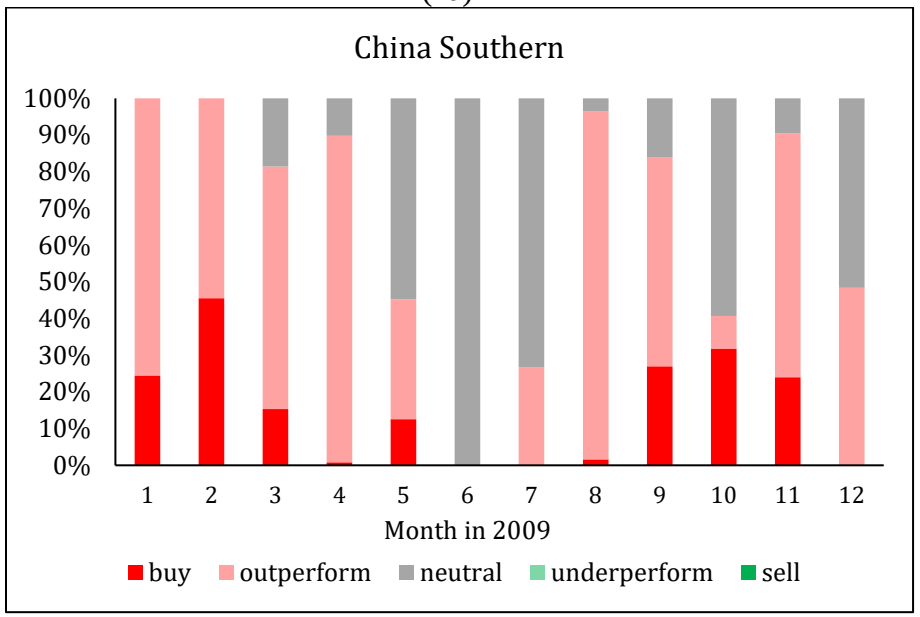
Figure 5: Rating Percentages of Analyst Forecast (2009)



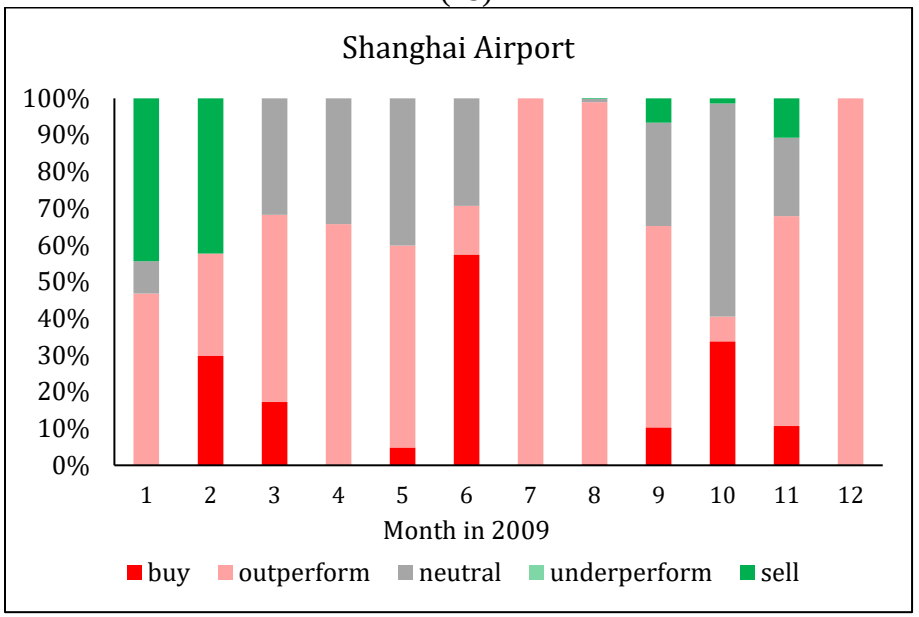
(4a)



(4b)



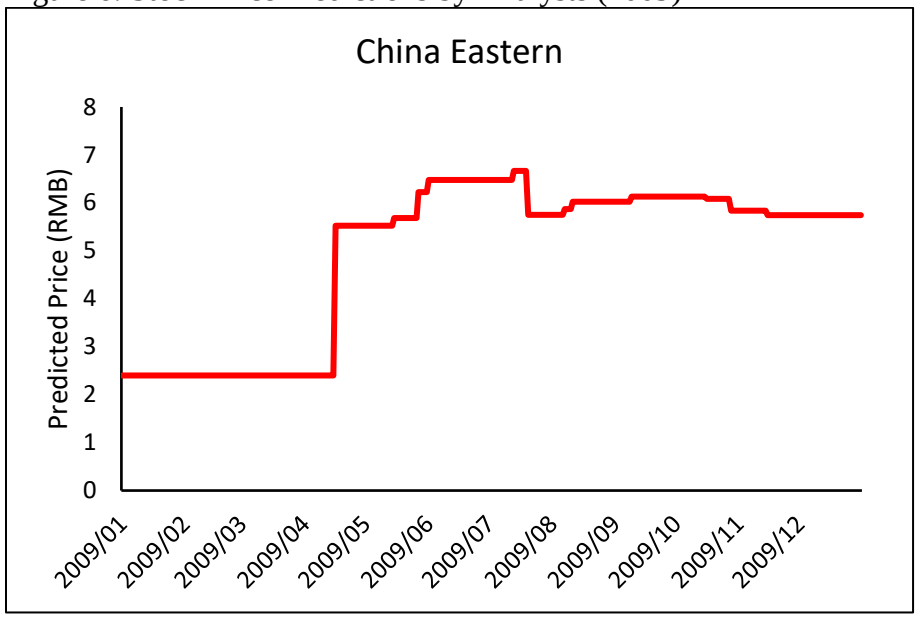
(4c)



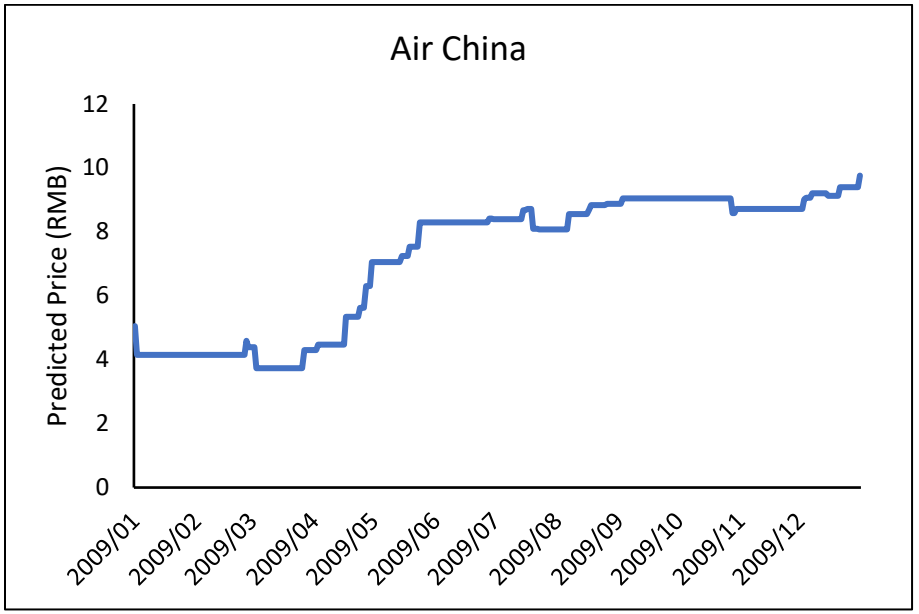
(4d)

Note: These figures plot the percentages of each type of rating given by stock analysts in various months of 2009. Source: CSMAR Database.

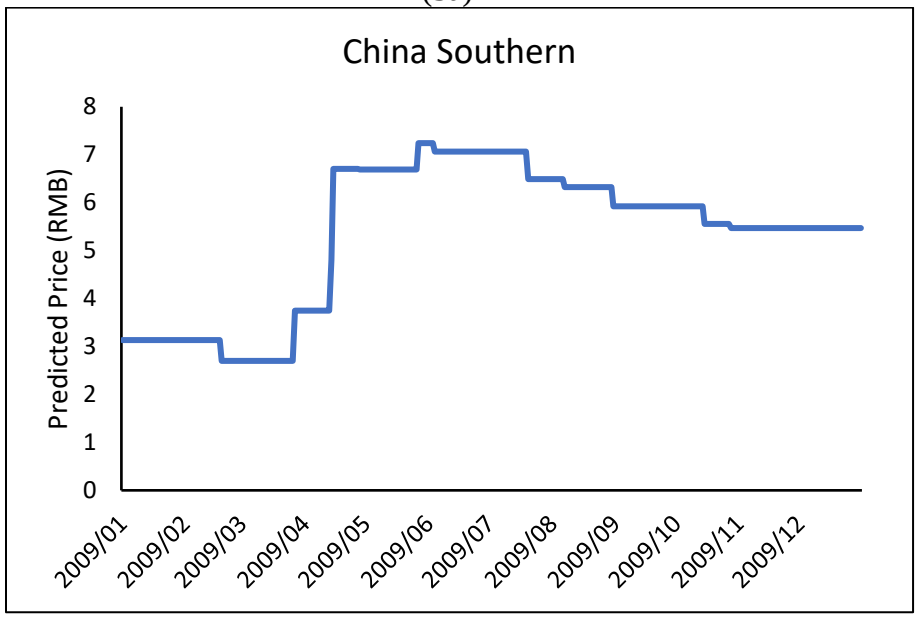
Figure 6: Stock Price Predictions by Analysts (2009)



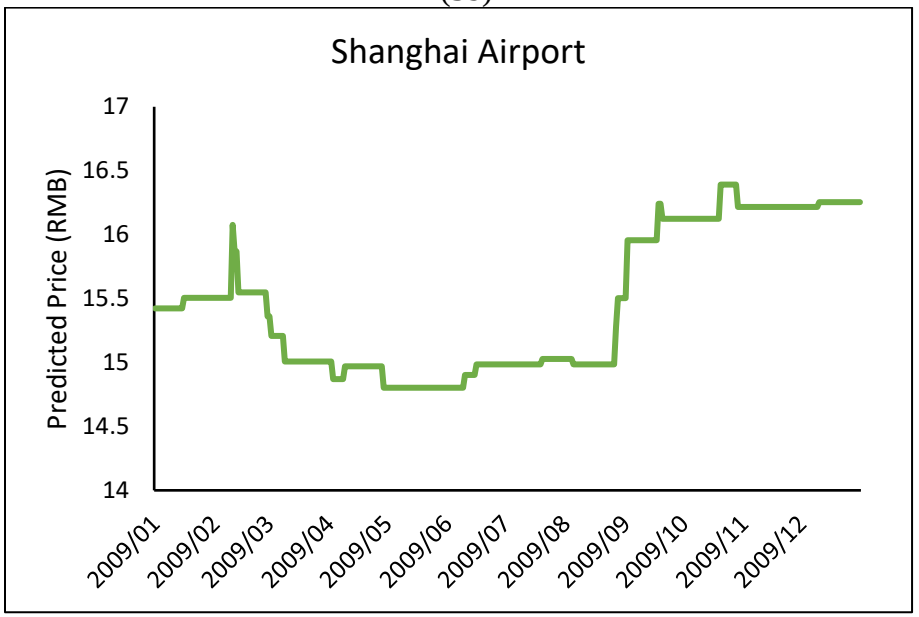
(5a)



(5b)



(5c)



(5d)

Note: These figures show the price predictions by stock analyst for relevant firms in 2009. Source: WIND Database.

Appendices

Table A1: Correlation Matrix of Residuals

	e1	e2	e3	e4	e5	e6	e7	e8	e9	e10	e11	e12	e13	e14	e15	e16	e17
e2	0.0184																
e3	-0.016	0.1097															
e4	0.5512	0.1237	-0.1286														
e5	0.4614	0.0501	-0.0677	0.438													
e6	-0.0382	0.2802	0.0545	-0.0261	0.128												
e7	0.6556	0.0482	-0.0029	0.373	0.666	0.1099											
e8	-0.0531	0.8272	0.0272	0.0801	0.0771	0.2939	0.0761										
e9	-0.0017	0.1071	0.8281	-0.1026	-0.0935	0.0778	0.0176	0.0555									
e10	0.4157	-0.0247	-0.0869	0.3434	0.5187	0.0691	0.5148	0.0129	-0.0649								
e11	0.388	0.0882	-0.0158	0.317	0.4494	0.1161	0.4568	0.0969	-0.0215	0.7377							
e12	0.2115	0.1473	-0.0154	0.2406	0.184	0.0401	0.1827	0.1466	0.024	0.2894	0.4636						
e13	0.0472	0.123	0.0356	0.0923	0.0916	0.0587	0.0144	0.1518	-0.0032	0.0702	0.002	0.0559					
e14	0.0024	0.0962	-0.0372	-0.053	-0.0984	0.2588	-0.0568	0.214	0.0387	0.0333	0.151	0.0381	0.0654				
e15	-0.0743	0.0465	0.0359	0.0899	0.0793	-0.046	-0.0281	0.1254	0.0437	0.0803	0.0985	0.1043	0.4247	-0.0186			
e16	0.0772	0.0523	0.045	0.1191	0.1025	-0.0583	-0.0022	0.0794	0.1371	0.1788	0.1775	0.2462	0.3701	-0.0081	0.36		
e17	-0.1078	0.0444	-0.0082	-0.0078	0.0152	-0.0886	-0.0651	0.0711	-0.0297	0.1006	0.0635	0.1712	0.1876	0.1215	0.1664	0.1864	
e18	0.0378	0.2137	0.0419	0.0254	0.0686	0.1661	0.0506	0.2254	0.0534	0.1051	0.105	0.0469	-0.1042	0.1108	-0.0654	-0.0927	-0.1301

Note: This table reports the correlation matrix of residuals after the SUR estimation.
Breusch-Pagan test of independence: chi2(153) = 1587.312, Pr = 0.0000.

Table A2: Baseline Results

	Merging Airlines			*Rival Airlines*						*Airports*				
Variables	**China Eastern SH**	**Shanghai Airlines SH**	**Joint Sig P-value**	**Air China SH**	**China Southern SH**	**Hainan Airlines SH**	**Hainan Airlines SH**	**Shandong Airlines SZ**	**Joint Sig P-value**	**Shanghai SH**	**Guangzhou SH**	**Shenzhen SZ**	**Xiamen SH**	**Joint Sig P-value**
Panel A: Model														
Rm,t	0.661***	0.549***		1.083***	0.873***	0.876***	0.656***	0.984***		0.789***	0.811***	0.768***	0.780***	
	(0.088)	(0.080)		(0.076)	(0.082)	(0.090)	(0.067)	(0.071)		(0.047)	(0.042)	(0.047)	(0.053)	
Rm,t-1	0.165*	0.115		0.112	0.146*	0.0985	0.101	0.00401		-0.0089	-0.00167	-0.0316	-0.00722	
	(0.088)	(0.080)		(0.076)	(0.082)	(0.090)	(0.067)	(0.071)		(0.047)	(0.042)	(0.047)	(0.053)	
Rm,t+1	-0.0562	-0.142*		-0.0697	-0.145*	-0.190**	-0.0577	-0.0227		-0.0358	-0.0518	-0.0595	-0.0271	
	(0.088)	(0.080)		(0.076)	(0.082)	(0.090)	(0.067)	(0.071)		(0.047)	(0.042)	(0.047)	(0.053)	
D-4	-0.0177	-0.0113		-0.0273	-0.00461	0.0132	-0.0125	-0.015		0.00496	-0.00216	-0.000187	0.00496	
	(0.029)	(0.026)	0.822	(0.025)	(0.027)	(0.030)	(0.022)	(0.024)	0.989	(0.015)	(0.014)	(0.015)	(0.018)	0.991
D-3	-0.0122	-0.00384		-0.0211	-0.00239	-0.0235	-0.0189	-0.0105		-0.0076	-0.00495	-0.00308	-0.0185	
	(0.029)	(0.026)	0.909	(0.025)	(0.027)	(0.030)	(0.022)	(0.023)	0.761	(0.015)	(0.014)	(0.015)	(0.017)	0.871
D-2	-0.0214	-0.00533		-0.00643	-0.0192	-0.00925	-0.015	-0.00275		-0.0194	-0.0133	-0.0215	-0.022	
	(0.029)	(0.026)	0.733	(0.025)	(0.027)	(0.030)	(0.022)	(0.023)	0.365	(0.015)	(0.014)	(0.015)	(0.017)	0.476
D-1	0.0134	0.0459*		-0.00851	-0.00841	0.0029	0.000961	0.0559**		-0.00612	0.000321	0.00304	-0.0147	
	(0.029)	(0.026)	0.171	(0.025)	(0.027)	(0.029)	(0.022)	(0.023)	0.837	(0.015)	(0.014)	(0.015)	(0.017)	0.903
D0	0.0523**	0.0530**		0.00273	0.00131	-0.0162	0.00127	0.00189		0.0119	0.00692	0.00397	-0.0157	
	(0.021)	(0.023)	0.017	(0.022)	(0.020)	(0.027)	(0.020)	(0.023)	0.723	(0.015)	(0.013)	(0.015)	(0.017)	0.759
D1	0.0477**	0.0473**		0.0733***	0.0305	0.029	0.0286	0.000919		0.00912	0.00096	0.014	0.00129	
	(0.021)	(0.023)	0.035	(0.022)	(0.020)	(0.027)	(0.020)	(0.023)	0.815	(0.015)	(0.013)	(0.015)	(0.017)	0.892
D2	0.0273	0.0427*		-0.0127	-0.0116	-0.0141	-0.00932	-0.0137		0.0559***	0.0212	0.0226	0.0121	
	(0.021)	(0.023)	0.145	(0.022)	(0.020)	(0.027)	(0.020)	(0.023)	0.311	(0.015)	(0.013)	(0.015)	(0.017)	0.009
D3	0.0649***	0.0605***		-0.0325	-0.0319	0.00219	0.00213	-0.015		-0.0125	-0.0169	-0.0211	-0.000788	
	(0.021)	(0.023)	0.003	(0.022)	(0.021)	(0.027)	(0.020)	(0.023)	0.443	(0.015)	(0.014)	(0.015)	(0.017)	0.610
D4	-0.0212	-0.009		-0.0207	-0.00897	-0.0212	-0.0238	-0.0284		-0.0158	0.00171	-0.0102	0.0148	
	(0.021)	(0.023)	0.596	(0.022)	(0.021)	(0.027)	(0.020)	(0.023)	0.668	(0.015)	(0.014)	(0.015)	(0.017)	0.576
Panel B: CARs			Average						Average					Average
CAR[-2,+2]	0.119**	0.184***	0.151***	0.048	-0.007	-0.008	0.007	0.042	0.016	0.051	0.016	0.022	-0.039	0.000
	[0.029]	[0.001]	[0.001]	[0.352]	[0.887]	[0.903]	[0.890]	[0.413]	[0.666]	[0.134]	[0.598]	[0.518]	[0.317]	[0.587]
CAR[-2,0]	0.044*	0.094**	0.069*	-0.012	-0.026	-0.023	-0.013	0.055	-0.004	-0.014	-0.006	-0.014	-0.052	-0.024
	[0.333]	[0.030]	[0.076]	[0.769]	[0.546]	[0.650]	[0.732]	[0.170]	[0.904]	[0.609]	[0.797]	[0.584]	[0.082]	[0.230]
CAR[0,+2]	0.127***	0.143***	0.135***	0.063*	0.020	-0.001	0.021	-0.011	0.018	0.077***	0.029	0.041	-0.002	0.022**
	[0.000]	[0.000]	[0.000]	[0.091]	[0.571]	[0.978]	[0.557]	[0.781]	[0.488]	[0.004]	[0.213]	[0.123]	[0.938]	[0.044]
CAR[-4,+4]	0.133**	0.220***	0.176***	-0.053	-0.055	-0.037	-0.047	-0.027	-0.044	0.021	-0.006	-0.012	-0.038	-0.019
	[0.077]	[0.003]	[0.006]	[0.451]	[0.444]	[0.665]	[0.468]	[0.705]	[0.401]	[0.658]	[0.880]	[0.788]	[0.466]	[0.772]
CAR[-4,0]	0.014	0.078	0.046	-0.061	-0.033	-0.033	-0.044	0.030	-0.028	-0.016	-0.013	-0.018	-0.066	-0.032
	[0.815]	[0.171]	[0.373]	[0.270]	[0.569]	[0.615]	[0.367]	[0.572]	[0.495]	[0.638]	[0.668]	[0.606]	[0.093]	[0.228]
CAR[0,+4]	0.171***	0.194***	0.183***	0.010	-0.021	-0.020	-0.001	-0.054	-0.017	0.049	0.014	0.009	0.012	0.012
	[0.000]	[0.000]	[0.000]	[0.836]	[0.654]	[0.735]	[0.980]	[0.287]	[0.616]	[0.155]	[0.647]	[0.785]	[0.763]	[0.368]

Note: Panel A - Standard errors of coefficients in parentheses. P-values for the joint significance test beside major columns. Panel B - P-values of F-test for the sum of ARs equal to zero in brackets of CARs. *** p<0.01, ** p<0.05, * p<0.1.

Table A3: Robustness Check 1 – An Alternative Estimation Period

	Merging Airlines			*Rival Airlines*						*Airports*				
Variables	**China Eastern SH**	**Shanghai Airlines SH**	**Joint Sig P-value**	**Air China SH**	**China Southern SH**	**Hainan Airlines SH**	**Hainan Airlines SH**	**Shandong Airlines SZ**	**Joint Sig P-value**	**Shanghai SH**	**Guangzhou SH**	**Shenzhen SZ**	**Xiamen SH**	**Joint Sig P-value**
Panel A: Model														
Rm,t	0.839***	0.802***		1.157***	0.942***	0.998***	0.881***	1.080***		0.809***	0.819***	0.728***	0.703***	
	(0.0640)	(0.0603)		(0.0536)	(0.0563)	(0.0611)	(0.0529)	(0.0501)		(0.0410)	(0.0400)	(0.0367)	(0.0404)	
Rm,t-1	0.102	0.0469		0.114**	0.0830	0.0715	0.0914*	0.0160		0.0199	-0.102**	-0.127***	-0.0728*	
	(0.0642)	(0.0605)		(0.0536)	(0.0564)	(0.0612)	(0.0530)	(0.0502)		(0.0411)	(0.0401)	(0.0367)	(0.0405)	
Rm,t+1	0.0112	-0.0980		-0.0608	-0.0708	-0.141**	-0.0722	0.00855		-0.0582	-0.0469	-0.0238	-0.00127	
	(0.0641)	(0.0604)		(0.0536)	(0.0564)	(0.0612)	(0.0530)	(0.0501)		(0.0410)	(0.0401)	(0.0367)	(0.0405)	
D-4	-0.0174	-0.0106		-0.0275	-0.00456	0.0131	-0.0112	-0.0141		0.00397	0.000821	0.00178	0.00592	
	(0.0300)	(0.0278)	0.845	(0.0251)	(0.0264)	(0.0285)	(0.0247)	(0.0233)	0.496	(0.0190)	(0.0185)	(0.0170)	(0.0187)	0.998
D-3	-0.0167	-0.0104		-0.0228	-0.00452	-0.0264	-0.0235	-0.0108		-0.00857	-0.00540	-0.00259	-0.0173	
	(0.0299)	(0.0277)	0.855	(0.0250)	(0.0263)	(0.0285)	(0.0246)	(0.0232)	0.864	(0.0189)	(0.0185)	(0.0169)	(0.0187)	0.916
D-2	-0.0201	-0.00453		-0.00653	-0.0176	-0.00846	-0.0148	-0.00102		-0.0208	-0.0112	-0.0193	-0.0207	
	(0.0299)	(0.0277)	0.745	(0.0250)	(0.0263)	(0.0285)	(0.0246)	(0.0232)	0.971	(0.0189)	(0.0185)	(0.0169)	(0.0187)	0.636
D-1	0.0146	0.0474*		-0.00790	-0.00809	0.00393	0.00330	0.0586**		-0.00658	0.000387	0.00260	-0.0157	
	(0.0299)	(0.0277)	0.163	(0.0250)	(0.0263)	(0.0284)	(0.0246)	(0.0232)	0.144	(0.0189)	(0.0184)	(0.0169)	(0.0186)	0.919
D0	0.0529**	0.0548**		0.00276	0.000373	-0.0164	0.00172	0.00388		0.0116	0.00594	0.00288	-0.0168	
	(0.0209)	(0.0221)	0.014	(0.0205)	(0.0192)	(0.0246)	(0.0220)	(0.0216)	0.952	(0.0188)	(0.0184)	(0.0169)	(0.0186)	0.818
D1	0.0463**	0.0440**		0.0731***	0.0295	0.0286	0.0290	0.00254		0.00868	0.000743	0.0135	0.000653	
	(0.0210)	(0.0221)	0.048	(0.0205)	(0.0192)	(0.0246)	(0.0220)	(0.0216)	0.019	(0.0188)	(0.0184)	(0.0169)	(0.0186)	0.928
D2	0.0274	0.0390*		-0.0131	-0.0114	-0.0143	-0.0105	-0.0121		0.0549***	0.0211	0.0231	0.0124	
	(0.0209)	(0.0221)	0.182	(0.0205)	(0.0192)	(0.0246)	(0.0221)	(0.0216)	0.975	(0.0188)	(0.0184)	(0.0169)	(0.0186)	0.068
D3	0.0676***	0.0623***		-0.0314	-0.0294	0.00497	0.00521	-0.0112		-0.0135	-0.0162	-0.0204	-0.00128	
	(0.0209)	(0.0221)	0.002	(0.0205)	(0.0193)	(0.0246)	(0.0221)	(0.0216)	0.501	(0.0188)	(0.0184)	(0.0169)	(0.0186)	0.783
D4	-0.0199	-0.00894		-0.0191	-0.00989	-0.0197	-0.0183	-0.0248		-0.0152	0.000375	-0.0132	0.0114	
	(0.0209)	(0.0221)	0.636	(0.0205)	(0.0193)	(0.0246)	(0.0221)	(0.0216)	0.822	(0.0188)	(0.0184)	(0.0169)	(0.0186)	0.737
Panel B: CARs			Average						Average					Average
CAR[-2,+2]	0.121**	0.181***	0.151***	0.048	-0.007	-0.007	0.009	0.052	0.019	0.048	0.017	0.023	-0.040	0.012
	[0.030]	[0.001]	[0.002]	[0.337]	[0.885]	[0.910]	[0.866]	[0.299]	[0.608]	[0.259]	[0.681]	[0.548]	[0.338]	[0.672]
CAR[-2,0]	0.047	0.098**	0.073*	-0.012	-0.025	-0.021	-0.010	0.061	-0.001	-0.016	-0.005	-0.014	-0.053	-0.022
	[0.315]	[0.030]	[0.080]	[0.776]	[0.546]	[0.657]	[0.813]	[0.119]	[0.968]	[0.630]	[0.879]	[0.639]	[0.100]	[0.313]
CAR[0,+2]	0.127***	0.138***	0.132***	0.063*	0.018	-0.002	0.020	-0.006	0.019	0.075**	0.028	0.039	-0.004	0.035
	[0.000]	[0.000]	[0.000]	[0.078]	[0.581]	[0.960]	[0.597]	[0.881]	[0.451]	[0.021]	[0.384]	[0.178]	[0.909]	[0.109]
CAR[-4,+4]	0.135*	0.213***	0.174*	-0.053	-0.056	-0.035	-0.039	-0.009	-0.038	0.015	-0.003	-0.012	-0.041	-0.010
	[0.079]	[0.005]	[0.010]	[0.444]	[0.419]	[0.664]	[0.580]	[0.894]	[0.452]	[0.799]	[0.951]	[0.821]	[0.463]	[0.782]
CAR[-4,0]	0.013	0.077	0.045	-0.062	-0.034	-0.034	-0.044	0.037	-0.028	-0.020	-0.009	-0.015	-0.065	-0.027
	[0.834]	[0.202]	[0.421]	[0.254]	[0.541]	[0.583]	[0.412]	[0.478]	[0.504]	[0.632]	[0.820]	[0.701]	[0.124]	[0.333]
CAR[0,+4]	0.174***	0.191***	0.183***	0.012	-0.021	-0.017	0.007	-0.042	-0.012	0.047	0.012	0.006	0.006	0.018
	[0.000]	[0.000]	[0.000]	[0.791]	[0.631]	[0.760]	[0.885]	[0.391]	[0.710]	[0.271]	[0.772]	[0.877]	[0.878]	[0.528]

Note: Panel A - Standard errors of coefficients in parentheses. P-values for the joint significance test beside major columns. Panel B - P-values of F-test for the sum of ARs equal to zero in brackets of CARs. *** p<0.01, ** p<0.05, * p<0.1.

Table A4: Robustness Check 2 – Inclusion of Stocks Listed Abroad

	Merging Airlines					*Rival Airlines*								
Variables	**China Eastern SH**	**China Eastern HK**	**China Eastern NY**	**Shanghai Airlines SH**	**Joint Sig P-value**	**Air China SH**	**Air China HK**	**China Southern SH**	**China Southern HK**	**China Southern NY**	**Hainan Airlines SH**	**Hainan Airlines SH**	**Shandong Airlines SZ**	**Joint Sig P-value**
Panel A: Model														
Rm,t	0.678***	0.695***	1.172***	0.555***		1.081***	1.366***	0.873***	0.928***	1.268***	0.875***	0.636***	0.976***	
	(0.087)	(0.120)	(0.171)	(0.078)		(0.074)	(0.083)	(0.081)	(0.111)	(0.126)	(0.089)	(0.066)	(0.070)	
Rm,t-1	0.153*	0.339***	-0.215	0.129*		0.138*	0.0123	0.155*	0.306***	-0.238*	0.103	0.091	-0.00251	
	(0.087)	(0.121)	(0.169)	(0.078)		(0.074)	(0.084)	(0.081)	(0.113)	(0.125)	(0.089)	(0.066)	(0.071)	
Rm,t+1	-0.0698	-0.344***	-0.0916	-0.144*		-0.0598	0.0427	-0.138*	-0.273**	0.114	-0.185**	-0.0456	-0.0152	
	(0.087)	(0.120)	(0.176)	(0.078)		(0.074)	(0.083)	(0.081)	(0.112)	(0.129)	(0.089)	(0.066)	(0.070)	
D-4	-0.0169	-0.0574	-0.0543	-0.0117		-0.0284	-0.0374	-0.00499	-0.0652	-0.0395	0.013	-0.0125	-0.015	
	(0.029)	(0.045)	(0.058)	(0.026)	0.621	(0.025)	(0.031)	(0.027)	(0.043)	(0.044)	(0.030)	(0.022)	(0.024)	0.510
D-3	-0.0124	0.0184	0.0175	-0.00398		-0.021	-0.00618	-0.00232	0.0379	0.0263	-0.0235	-0.0184	-0.0103	
	(0.029)	(0.045)	(0.057)	(0.026)	0.979	(0.025)	(0.031)	(0.027)	(0.043)	(0.043)	(0.030)	(0.022)	(0.023)	0.939
D-2	-0.0212	0.0086	0.0146	-0.00569		-0.00691	-0.016	-0.0193	-0.0185	-0.0134	-0.00928	-0.0146	-0.00251	
	(0.029)	(0.044)	(0.057)	(0.026)	0.952	(0.025)	(0.030)	(0.027)	(0.042)	(0.043)	(0.030)	(0.022)	(0.023)	0.996
D-1	0.0137	-0.041	-0.0278	0.0459*		-0.00854	-0.0202	-0.00834	-0.0359	-0.0459	0.00293	0.000863	0.0559**	
	(0.029)	(0.045)	(0.057)	(0.026)	0.295	(0.025)	(0.031)	(0.027)	(0.042)	(0.043)	(0.029)	(0.022)	(0.023)	0.262
D0	0.0552***	0.0249	0.0505	0.0531**		0.00296	0.0181	0.00146	-0.0292	-0.0163	-0.0161	0.00122	0.00184	
	(0.020)	(0.024)	(0.031)	(0.022)	0.016	(0.022)	(0.029)	(0.020)	(0.024)	(0.024)	(0.026)	(0.020)	(0.022)	0.909
D1	0.0427**	0.0138	0.0427	0.0456**		0.0732***	-0.0109	0.0305	0.000244	-0.036	0.029	0.0286	0.000889	
	(0.020)	(0.024)	(0.031)	(0.022)	0.086	(0.022)	(0.029)	(0.020)	(0.024)	(0.024)	(0.026)	(0.020)	(0.022)	0.067
D2	0.0360*	0.0472**	0.0512*	0.0445**		-0.0126	-0.0337	-0.0115	0.0041	0.0386	-0.014	-0.00899	-0.0135	
	(0.020)	(0.024)	(0.031)	(0.022)	0.039	(0.022)	(0.029)	(0.020)	(0.024)	(0.024)	(0.026)	(0.020)	(0.022)	0.771
D3	0.0609***	0.0439*	0.0331	0.0586***		-0.0325	-0.00677	-0.0318	-0.0475**	-0.0324	0.00229	0.00226	-0.0148	
	(0.020)	(0.024)	(0.031)	(0.022)	0.008	(0.022)	(0.029)	(0.021)	(0.024)	(0.024)	(0.027)	(0.020)	(0.022)	0.326
D4	-0.0251	0.0285	-0.0696**	-0.0125		-0.0205	-0.0251	-0.00889	-0.0245	-0.0296	-0.0212	-0.0246	-0.0288	
	(0.020)	(0.024)	(0.031)	(0.022)	0.051	(0.022)	(0.029)	(0.021)	(0.024)	(0.025)	(0.027)	(0.020)	(0.023)	0.729
Panel B: CARs					Avg									Avg
CAR[-2,+2]	0.126**	0.054	0.131	0.183***	0.124***	0.048	-0.063	-0.007	-0.079	-0.073	-0.007	0.007	0.043	-0.016
	[0.019]	[0.479]	[0.176]	[0.001]	[0.002]	[0.353]	[0.348]	[0.892]	[0.280]	[0.331]	[0.905]	[0.881]	[0.407]	[0.596]
CAR[-2,0]	0.048	-0.007	0.037	0.093**	0.043	-0.012	-0.018	-0.026	-0.084	-0.076	-0.022	-0.013	0.055	-0.024
	[0.295]	[0.912]	[0.665]	[0.030]	[0.218]	[0.764]	[0.728]	[0.548]	[0.197]	[0.253]	[0.650]	[0.737]	[0.168]	[0.339]
CAR[0,+2]	0.134***	0.086**	0.144***	0.143***	0.127***	0.064*	-0.027	0.020	-0.025	-0.014	-0.001	0.021	-0.011	0.003
	[0.000]	[0.040]	[0.007]	[0.000]	[0.000]	[0.089]	[0.600]	[0.564]	[0.549]	[0.748]	[0.981]	[0.551]	[0.781]	[0.869]
CAR[-4,+4]	0.133*	0.087	0.058	0.214***	0.123**	-0.054	-0.138	-0.055	-0.179*	-0.148	-0.037	-0.046	-0.026	-0.085**
	[0.075]	[0.408]	[0.667]	[0.004]	[0.027]	[0.442]	[0.127]	[0.446]	[0.080]	[0.157]	[0.665]	[0.472]	[0.706]	[0.045]
CAR[-4,0]	0.018	-0.046	0.001	0.078	0.012	-0.062	-0.062	-0.033	-0.111	-0.089	-0.033	-0.043	0.030	-0.050
	[0.765]	[0.616]	[0.996]	[0.174]	[0.791]	[0.260]	[0.365]	[0.567]	[0.212]	[0.328]	[0.614]	[0.375]	[0.567]	[0.141]
CAR[0,+4]	0.170***	0.158***	0.108	0.189***	0.156***	0.011	-0.059	-0.020	-0.097*	-0.076	-0.020	-0.001	-0.054	-0.040
	[0.000]	[0.004]	[0.122]	[0.000]	[0.000]	[0.828]	[0.373]	[0.663]	[0.072]	[0.173]	[0.738]	[0.974]	[0.281]	[0.151]

Table A4: Robustness Check 2 (continued)

	Airports						
	Shanghai	**Beijing**	**Guangzhou**	**Shenzhen**	**Xiamen**	**Haikou**	**Joint Sig**
Variables	**SH**	**HK**	**SH**	**SZ**	**SH**	**HK**	**P-value**
Panel A: Model							
Rm,t	0.764***	1.235***	0.798***	0.767***	0.753***	0.579***	
	(0.0455)	(0.0652)	(0.0408)	(0.0451)	(0.0516)	(0.0867)	
Rm,t-1	-0.00348	-0.0168	-0.00143	-0.0379	-0.00804	0.180**	
	(0.0456)	(0.0659)	(0.0409)	(0.0452)	(0.0518)	(0.0876)	
Rm,t+1	-0.0264	0.105	-0.0488	-0.0614	-0.0249	-0.179**	
	(0.0455)	(0.0655)	(0.0408)	(0.0451)	(0.0517)	(0.0868)	
D-4	0.00456	0.0333	-0.00223	0.0000847	0.00492	0.0120	
	(0.0154)	(0.0247)	(0.0137)	(0.0153)	(0.0175)	(0.0317)	0.918
D-3	-0.00703	0.0267	-0.00464	-0.00304	-0.0179	0.00302	
	(0.0153)	(0.0244)	(0.0137)	(0.0152)	(0.0175)	(0.0313)	0.842
D-2	-0.0194	-0.0214	-0.0133	-0.0213	-0.0219	-0.0131	
	(0.0153)	(0.0244)	(0.0137)	(0.0152)	(0.0175)	(0.0312)	0.621
D-1	-0.00632	0.0104	0.000232	0.00307	-0.0149	0.00000257	
	(0.0153)	(0.0244)	(0.0136)	(0.0152)	(0.0174)	(0.0313)	0.963
D0	0.0120	0.0209	0.00694	0.00394	-0.0157	-0.00760	
	(0.0151)	(0.0242)	(0.0134)	(0.0151)	(0.0173)	(0.0306)	0.815
D1	0.00909	-0.0630***	0.000967	0.0140	0.00130	-0.0381	
	(0.0151)	(0.0243)	(0.0134)	(0.0151)	(0.0173)	(0.0307)	0.187
D2	0.0562***	-0.0356	0.0213	0.0226	0.0123	-0.0521*	
	(0.0151)	(0.0242)	(0.0134)	(0.0151)	(0.0173)	(0.0307)	0.007
D3	-0.0126	-0.0195	-0.0170	-0.0210	-0.00107	0.0253	
	(0.0151)	(0.0242)	(0.0134)	(0.0151)	(0.0173)	(0.0307)	0.670
D4	-0.0164	-0.00350	0.00139	-0.0102	0.0142	-0.0162	
	(0.0151)	(0.0242)	(0.0135)	(0.0151)	(0.0173)	(0.0305)	0.776
Panel B: CARs							Avg
CAR[-2,+2]	0.052	-0.089	0.016	0.022	-0.039	0.048	0.002
	[0.131]	[0.105]	[0.595]	[0.513]	[0.320]	[0.111]	[0.238]
CAR[-2,0]	-0.014	0.010	-0.006	-0.014	-0.052*	-0.012	-0.015
	[0.604]	[0.815]	[0.796]	[0.587]	[0.083]	[0.702]	[0.320]
CAR[0,+2]	0.077***	-0.078*	0.029	0.041	-0.002	0.064*	0.022
	[0.003]	[0.065]	[0.210]	[0.122]	[0.944]	[0.066]	[0.751]
CAR[-4,+4]	0.020	-0.052	-0.006	-0.012	-0.039	-0.054	-0.024
	[0.664]	[0.485]	[0.879]	[0.796]	[0.465]	[0.357]	[0.304]
CAR[-4,0]	-0.016	0.070	-0.013	-0.017	-0.065	-0.062	-0.017
	[0.638]	[0.203]	[0.673]	[0.615]	[0.096]	[0.936]	[0.709]
CAR[0,+4]	0.048	-0.101*	0.014	0.009	0.011	0.011	-0.001
	[0.156]	[0.064]	[0.653]	[0.785]	[0.778]	[0.197]	[0.389]

Note: Panel A - Standard errors of coefficients in parentheses. P-values for the joint significance test beside major columns. Panel B - P-values of F-test for the sum of ARs equal to zero in brackets of CARs. *** p<0.01, ** p<0.05, * p<0.1.

Table A5: Robustness Check 3 – Alternative Event Window

	Merging Airlines			*Rival Airlines*						*Airports*				
Variables	**China Eastern SH**	**Shanghai Airlines SH**	**Joint Sig P-value**	**Air China SH**	**China Southern SH**	**Hainan Airlines SH**	**Hainan Airlines SH**	**Shandong Airlines SZ**	**Joint Sig P-value**	**Shanghai SH**	**Guangzhou SH**	**Shenzhen SZ**	**Xiamen SH**	**Joint Sig P-value**
Panel A: Model														
Rm,t	0.785***	0.575***		1.139***	1.016***	0.966***	0.735***	1.012***		0.773***	0.822***	0.788***	0.763***	
	(0.0724)	(0.0670)		(0.0740)	(0.0729)	(0.0820)	(0.0611)	(0.0714)		(0.0482)	(0.0379)	(0.0443)	(0.0510)	
Rm,t-1	0.140*	0.0855		0.0708	0.0932	0.0295	0.0290	-0.0411		-0.0192	-0.0556	-0.0549	-0.00281	
	(0.0727)	(0.0672)		(0.0740)	(0.0729)	(0.0820)	(0.0611)	(0.0714)		(0.0482)	(0.0379)	(0.0443)	(0.0510)	
Rm,t+1	0.0327	-0.111*		-0.0573	-0.0861	-0.195**	-0.0822	-0.0411		-0.0422	-0.0356	-0.0553	-0.0235	
	(0.0725)	(0.0671)		(0.0740)	(0.0729)	(0.0820)	(0.0611)	(0.0715)		(0.0482)	(0.0379)	(0.0443)	(0.0510)	
D-4	-0.0163	-0.00666		0.0264	0.0276	0.0182	0.0185	-0.00641		-0.00497	0.00673	-0.00205	0.0206	
	(0.0192)	(0.0188)	0.697	(0.0218)	(0.0198)	(0.0245)	(0.0183)	(0.0219)	0.705	(0.0151)	(0.0117)	(0.0138)	(0.0159)	0.597
D-3	-0.00977	0.000641		0.0274	0.0165	0.0310	0.0562***	0.0184		-0.0209	-0.0136	-0.0112	-0.00156	
	(0.0191)	(0.0187)	0.830	(0.0218)	(0.0198)	(0.0245)	(0.0183)	(0.0219)	0.051	(0.0151)	(0.0117)	(0.0138)	(0.0159)	0.670
D-2	-0.00949	0.00818		0.0383*	0.0181	0.0301	-0.00325	0.0585***		0.0361**	0.00633	0.0119	0.00384	
	(0.0191)	(0.0187)	0.647	(0.0218)	(0.0198)	(0.0244)	(0.0183)	(0.0219)	0.004	(0.0151)	(0.0117)	(0.0137)	(0.0159)	0.184
D-1	0.0123	0.0409**		-0.000327	-0.0146	-0.0143	-0.0133	-0.00111		-0.00691	-0.00367	0.00117	0.00140	
	(0.0191)	(0.0186)	0.079	(0.0218)	(0.0198)	(0.0245)	(0.0183)	(0.0219)	0.934	(0.0151)	(0.0117)	(0.0138)	(0.0159)	0.986
D0	0.0594***	0.0603***		-0.0193	-0.00188	-0.00881	-0.0191	0.0608***		0.0360**	0.0217*	0.0530***	0.00865	
	(0.0227)	(0.0209)	0.008	(0.0235)	(0.0232)	(0.0260)	(0.0194)	(0.0226)	0.010	(0.0152)	(0.0120)	(0.0140)	(0.0161)	0.004
D1	0.0304	0.0363*		-0.0221	-0.0245	-0.0203	-0.0104	-0.0141		0.00804	-0.000584	-0.0133	-0.0117	
	(0.0227)	(0.0209)	0.206	(0.0235)	(0.0232)	(0.0260)	(0.0194)	(0.0226)	0.903	(0.0152)	(0.0120)	(0.0140)	(0.0161)	0.670
D2	0.0377*	0.0423**		-0.000117	0.0195	0.0155	0.00383	-0.0171		-0.00857	-0.00899	-0.0188	-0.00272	
	(0.0227)	(0.0209)	0.109	(0.0234)	(0.0231)	(0.0260)	(0.0193)	(0.0226)	0.808	(0.0152)	(0.0120)	(0.0140)	(0.0161)	0.758
D3	0.0479**	0.0482**		-0.0208	-0.0264	-0.0278	-0.00735	-0.00656		-0.00547	-0.0114	-0.0235*	-0.0169	
	(0.0226)	(0.0209)	0.044	(0.0234)	(0.0231)	(0.0259)	(0.0193)	(0.0225)	0.831	(0.0152)	(0.0120)	(0.0140)	(0.0161)	0.433
D4	-0.0256	-0.0118		-0.0106	-0.0159	-0.0144	0.000415	0.00743		0.0183	-0.00598	0.00473	-0.00943	
	(0.0226)	(0.0209)	0.523	(0.0234)	(0.0231)	(0.0259)	(0.0193)	(0.0226)	0.964	(0.0152)	(0.0120)	(0.0140)	(0.0161)	0.465
Panel B: CARs			Avg						Avg					Avg
CAR[-2,+2]	0.131***	0.189***	0.160***	-0.002	-0.004	0.003	-0.041	0.085*	0.008	0.067*	0.016	0.034	-0.001	0.029
	[0.007]	[0.000]	[0.000]	[0.945]	[0.947]	[0.969]	[0.322]	[0.084]	[0.821]	[0.058]	[0.581]	[0.277]	[0.989]	[0.197]
CAR[-2,0]	0.063*	0.109***	0.086***	0.020	0.002	0.008	-0.035	0.117***	0.022	0.067**	0.025	0.066***	0.014	0.043**
	[0.079]	[0.001]	[0.005]	[0.631]	[0.964]	[0.871]	[0.271]	[0.002]	[0.406]	[0.013]	[0.235]	[0.006]	[0.617]	[0.012]
CAR[0,+2]	0.127***	0.140***	0.134***	-0.040	-0.007	-0.013	-0.025	0.028	-0.011	0.037	0.013	0.021	-0.006	0.016
	[0.001]	[0.000]	[0.000]	[0.308]	[0.866]	[0.763]	[0.445]	[0.450]	[0.687]	[0.180]	[0.561]	[0.389]	[0.838]	[0.357]
CAR[-4,+4]	0.127*	0.221***	0.174***	0.023	-0.002	0.011	0.028	0.096	0.031	0.057	-0.008	0.002	-0.008	0.011
	[0.051]	[0.000]	[0.002]	[0.786]	[0.982]	[0.905]	[0.658]	[0.142]	[0.525]	[0.264]	[0.794]	[0.963]	[0.873]	[0.759]
CAR[-4,0]	0.037	0.105**	0.071*	0.075	0.046	0.057	0.040	0.128***	0.069**	0.043	0.018	0.053*	0.033	0.037
	[0.421]	[0.017]	[0.070]	[0.147]	[0.323]	[0.314]	[0.350]	[0.009]	[0.042]	[0.248]	[0.511]	[0.089]	[0.360]	[0.101]
CAR[0,+4]	0.150***	0.177***	0.163***	-0.071	-0.049	-0.054	-0.031	0.028	-0.035	0.051	-0.004	0.002	-0.032	0.004
	[0.003]	[0.000]	[0.000]	[0.168]	[0.347]	[0.340]	[0.455]	[0.549]	[0.335]	[0.159]	[0.847]	[0.945]	[0.377]	[0.882]

Note: Panel A - Standard errors of coefficients in parentheses. P-values for the joint significance test beside major columns. Panel B - P-values of F-test for the sum of ARs equal to zero in brackets of CARs. *** p<0.01, ** p<0.05, * p<0.1.

Table A6: Robustness Check 4 – Railways Included

	Merging Airlines			*Rival Airlines*						*Airports*					*Railway*
Variables	**China Eastern SH**	**Shanghai Airlines SH**	**Joint Sig P-value**	**Air China SH**	**China Southern SH**	**Hainan Airlines SH**	**Hainan Airlines SH**	**Shandong Airlines SZ**	**Joint Sig P-value**	**Shanghai SH**	**Guangzhou SH**	**Shenzhen SZ**	**Xiamen SH**	**Joint Sig P-value**	**Guangshen SH**
Panel A: Model															
Rm,t	0.661***	0.549***		1.082***	0.872***	0.875***	0.655***	0.984***		0.789***	0.811***	0.768***	0.780***		0.829***
	(0.0878)	(0.0798)		(0.0761)	(0.0819)	(0.0897)	(0.0672)	(0.0713)		(0.0467)	(0.0417)	(0.0465)	(0.0530)		(0.0450)
Rm,t-1	0.164*	0.116		0.112	0.145*	0.0983	0.101	0.00398		-0.00888	-0.00157	-0.0316	-0.00713		-0.0107
	(0.0879)	(0.0801)		(0.0761)	(0.0819)	(0.0897)	(0.0673)	(0.0714)		(0.0467)	(0.0417)	(0.0466)	(0.0531)		(0.0451)
Rm,t+1	-0.0552	-0.142*		-0.0695	-0.144*	-0.189**	-0.0575	-0.0226		-0.0358	-0.0520	-0.0595	-0.0273		-0.109**
	(0.0878)	(0.0799)		(0.0762)	(0.0820)	(0.0898)	(0.0673)	(0.0714)		(0.0467)	(0.0417)	(0.0465)	(0.0530)		(0.0451)
D-4	-0.0177	-0.0113		-0.0273	-0.00461	0.0132	-0.0125	-0.0150		0.00496	-0.00216	-0.000187	0.00496		0.00461
	(0.0288)	(0.0261)	0.822	(0.0252)	(0.0272)	(0.0296)	(0.0222)	(0.0235)	0.509	(0.0154)	(0.0137)	(0.0153)	(0.0175)	0.991	(0.0148)
D-3	-0.0122	-0.00384		-0.0211	-0.00238	-0.0235	-0.0189	-0.0105		-0.00760	-0.00495	-0.00308	-0.0185		-0.0198
	(0.0287)	(0.0259)	0.909	(0.0250)	(0.0271)	(0.0295)	(0.0221)	(0.0234)	0.894	(0.0153)	(0.0137)	(0.0152)	(0.0174)	0.871	(0.0148)
D-2	-0.0214	-0.00534		-0.00642	-0.0192	-0.00924	-0.0150	-0.00275		-0.0194	-0.0133	-0.0215	-0.0220		0.00555
	(0.0287)	(0.0259)	0.734	(0.0251)	(0.0271)	(0.0295)	(0.0221)	(0.0234)	0.962	(0.0153)	(0.0137)	(0.0153)	(0.0174)	0.476	(0.0148)
D-1	0.0134	0.0459*		-0.00851	-0.00841	0.00290	0.000960	0.0559**		-0.00612	0.000321	0.00304	-0.0147		-0.00516
	(0.0286)	(0.0259)	0.171	(0.0250)	(0.0270)	(0.0294)	(0.0221)	(0.0234)	0.184	(0.0153)	(0.0136)	(0.0152)	(0.0173)	0.903	(0.0147)
D0	0.0539***	0.0515**		0.00273	0.00130	-0.0162	0.00127	0.00189		0.0119	0.00693	0.00397	-0.0157		0.0447***
	(0.0209)	(0.0226)	0.016	(0.0215)	(0.0204)	(0.0265)	(0.0202)	(0.0226)	0.968	(0.0152)	(0.0134)	(0.0151)	(0.0172)	0.759	(0.0145)
D1	0.0469**	0.0480**		0.0733***	0.0304	0.0290	0.0286	0.000919		0.00912	0.000961	0.0140	0.00129		0.0135
	(0.0209)	(0.0226)	0.036	(0.0215)	(0.0204)	(0.0265)	(0.0202)	(0.0226)	0.028	(0.0152)	(0.0134)	(0.0151)	(0.0172)	0.892	(0.0145)
D2	0.0280	0.0421*		-0.0127	-0.0116	-0.0141	-0.00931	-0.0137		0.0559***	0.0212	0.0226	0.0121		0.0167
	(0.0209)	(0.0226)	0.148	(0.0215)	(0.0204)	(0.0265)	(0.0202)	(0.0226)	0.978	(0.0152)	(0.0134)	(0.0151)	(0.0172)	0.009	(0.0146)
D3	0.0631***	0.0622***		-0.0325	-0.0319	0.00220	0.00214	-0.0150		-0.0125	-0.0169	-0.0211	-0.000790		-0.0131
	(0.0208)	(0.0225)	0.003	(0.0216)	(0.0205)	(0.0266)	(0.0202)	(0.0226)	0.459	(0.0152)	(0.0135)	(0.0151)	(0.0172)	0.610	(0.0146)
D4	-0.0213	-0.00898		-0.0207	-0.00900	-0.0212	-0.0239	-0.0284		-0.0158	0.00171	-0.0102	0.0148		-0.00163
	(0.0208)	(0.0225)	0.594	(0.0216)	(0.0206)	(0.0266)	(0.0202)	(0.0227)	0.758	(0.0153)	(0.0135)	(0.0152)	(0.0173)	0.576	(0.0146)
Panel B: CARs			Avg						Avg					Avg	
CAR[-2,+2]	0.121**	0.182***	0.151***	0.048	-0.007	-0.008	0.007	0.042	0.016	0.051	0.016	0.022	-0.039	0.013	0.075**
	[0.027]	[0.001]	[0.001]	[0.352]	[0.888]	[0.903]	[0.890]	[0.413]	[0.666]	[0.134]	[0.598]	[0.518]	[0.317]	[0.587]	[0.022]
CAR[-2,0]	0.046	0.092**	0.069*	-0.012	-0.026	-0.023	-0.013	0.055	-0.004	-0.014	-0.006	-0.014	-0.052*	-0.022	0.045*
	[0.315]	[0.033]	[0.075]	[0.769]	[0.546]	[0.650]	[0.732]	[0.170]	[0.904]	[0.609]	[0.797]	[0.584]	[0.082]	[0.230]	[0.077]
CAR[0,+2]	0.129***	0.142***	0.135***	0.063*	0.020	-0.001	0.021	-0.011	0.018	0.077***	0.029	0.041	-0.002	0.036**	0.075***
	[0.000]	[0.000]	[0.000]	[0.091]	[0.571]	[0.978]	[0.557]	[0.781]	[0.488]	[0.004]	[0.213]	[0.123]	[0.938]	[0.044]	[0.003]
CAR[-4,+4]	0.133*	0.220***	0.176***	-0.053	-0.055	-0.037	-0.047	-0.027	-0.044	0.021	-0.006	-0.012	-0.038	-0.009	0.045
	[0.078]	[0.003]	[0.006]	[0.451]	[0.444]	[0.665]	[0.468]	[0.705]	[0.401]	[0.658]	[0.880]	[0.788]	[0.466]	[0.772]	[0.309]
CAR[-4,0]	0.016	0.077	0.046	-0.061	-0.033	-0.033	-0.044	0.030	-0.028	-0.016	-0.013	-0.018	-0.066	-0.028	0.030
	[0.795]	[0.179]	[0.372]	[0.270]	[0.569]	[0.615]	[0.367]	[0.572]	[0.495]	[0.638]	[0.668]	[0.606]	[0.092]	[0.228]	[0.367]
CAR[0,+4]	0.171***	0.195***	0.183***	0.010	-0.021	-0.020	-0.001	-0.054	-0.017	0.049	0.014	0.009	0.012	0.021	0.060*
	[0.000]	[0.000]	[0.000]	[0.837]	[0.654]	[0.735]	[0.980]	[0.287]	[0.616]	[0.155]	[0.647]	[0.785]	[0.763]	[0.368]	[0.067]

Note: Panel A - Standard errors of coefficients in parentheses. P-values for the joint significance test beside major columns. Panel B - P-values of F-test for the sum of ARs equal to zero in brackets of CARs. *** p<0.01, ** p<0.05, * p<0.1.

Table A7: Robustness Check 5 – Alternative Horizontal Merger

	Acquiring Airlines	*Rival Airlines*						*Airports*				
Variables	**Air China SH**	**China Eastern SH**	**China Southern SH**	**Hainan Airlines SH**	**Hainan Airlines SH(B)**	**Shandong Airlines SZ**	**Joint Sig P-value**	**Shenzhen SZ**	**Shanghai SH**	**Guangzhou SH**	**Xiamen SH**	**Joint Sig P-value**
Panel A: Model												
Rm,t	1.198***	0.913***	1.138***	1.205***	0.891***	0.905***		0.924***	0.993***	0.865***	0.918***	
	(0.0860)	(0.0838)	(0.0811)	(0.0979)	(0.0987)	(0.0743)		(0.0359)	(0.0637)	(0.0497)	(0.0640)	
Rm,t-1	0.0259	0.0975	-0.00586	0.105	0.0740	0.00268		-0.0405	0.00545	-0.0279	0.0333	
	(0.0860)	(0.0838)	(0.0811)	(0.0979)	(0.0987)	(0.0743)		(0.0359)	(0.0637)	(0.0498)	(0.0640)	
Rm,t+1	0.0967	0.0481	0.0594	-0.0878	-0.148	-0.00513		-0.0294	-0.0204	0.0499	0.000576	
	(0.0867)	(0.0846)	(0.0818)	(0.0988)	(0.0996)	(0.0749)		(0.0362)	(0.0643)	(0.0502)	(0.0645)	
D-4	0.0251	0.0440**	0.00759	0.0152	0.00591	0.00543		0.00421	0.0223	0.00651	0.0117	
	(0.0215)	(0.0210)	(0.0203)	(0.0245)	(0.0247)	(0.0186)	0.333	(0.00898)	(0.0159)	(0.0125)	(0.0160)	0.698
D-3	-0.0139	0.00809	-0.00118	-0.0204	-0.0107	-0.0104		-0.00289	0.0129	-0.00256	-0.000303	
	(0.0215)	(0.0209)	(0.0203)	(0.0245)	(0.0247)	(0.0186)	0.844	(0.00897)	(0.0159)	(0.0124)	(0.0160)	0.876
D-2	0.00345	0.00627	0.00442	-0.0116	-0.00965	0.00162		0.00607	-0.00301	-0.00432	-0.00224	
	(0.0215)	(0.0210)	(0.0203)	(0.0245)	(0.0247)	(0.0186)	0.985	(0.00897)	(0.0159)	(0.0124)	(0.0160)	0.890
D-1	0.0540**	-0.00855	0.0308	0.00718	0.00391	0.00815		0.00116	0.00422	-0.00320	0.00628	
	(0.0214)	(0.0209)	(0.0202)	(0.0244)	(0.0246)	(0.0185)	0.405	(0.00893)	(0.0159)	(0.0124)	(0.0159)	0.983
D0	0.0142	0.0301	-0.00152	0.0249	0.00164	-0.00569		0.00480	0.00121	-0.00788	-0.00204	
	(0.0214)	(0.0209)	(0.0202)	(0.0244)	(0.0246)	(0.0185)	0.329	(0.00894)	(0.0159)	(0.0124)	(0.0159)	0.864
D1	-0.00572	-0.0126	-0.0174	-0.0129	-0.00822	-0.0111		-0.00396	-0.0116	-0.00249	-0.0120	
	(0.0214)	(0.0209)	(0.0202)	(0.0244)	(0.0246)	(0.0185)	0.962	(0.00893)	(0.0159)	(0.0124)	(0.0159)	0.913
D2	-0.0160	0.00398	-0.0113	-0.0117	-0.0164	-0.00203		0.00886	-0.00991	-0.00607	-0.00931	
	(0.0214)	(0.0209)	(0.0202)	(0.0244)	(0.0246)	(0.0185)	0.958	(0.00895)	(0.0159)	(0.0124)	(0.0159)	0.529
D3	0.00591	0.00322	0.0196	-0.00446	-0.000948	0.000730		-0.0153*	-0.00612	-0.0211*	0.0195	
	(0.0215)	(0.0209)	(0.0202)	(0.0244)	(0.0246)	(0.0185)	0.861	(0.00896)	(0.0159)	(0.0124)	(0.0160)	0.145
D4	0.00547	0.00219	0.0246	0.00869	-0.000421	0.0184		0.00271	0.0157	0.00178	-0.00139	
	(0.0216)	(0.0210)	(0.0203)	(0.0246)	(0.0248)	(0.0186)	0.665	(0.00900)	(0.0160)	(0.0125)	(0.0161)	0.899
Panel B: CARs							Avg					Avg
CAR[-2,+2]	0.050	0.019	0.005	-0.004	-0.029	-0.009	-0.004	0.017	-0.019	-0.024	-0.019	-0.011
	[0.301]	[0.683]	[0.913]	[0.940]	[0.605]	[0.829]	[0.921]	[0.401]	[0.594]	[0.391]	[0.591]	[0.575]
CAR[-2,0]	0.072*	0.028	0.034	0.020	-0.004	0.004	0.016	0.012	0.002	-0.015	0.002	0.000
	[0.055]	[0.444]	[0.338]	[0.630]	[0.924]	[0.899]	[0.552]	[0.440]	[0.930]	[0.476]	[0.942]	[0.986]
CAR[0,+2]	-0.008	0.022	-0.030	0.000	-0.023	-0.019	-0.010	0.010	-0.020	-0.016	-0.023	-0.013
	[0.840]	[0.553]	[0.389]	[0.994]	[0.591]	[0.560]	[0.716]	[0.533]	[0.462]	[0.446]	[0.400]	[0.421]
CAR[-4,+4]	0.072	0.077	0.056	-0.005	-0.035	0.005	0.020	0.006	0.026	-0.039	0.010	0.001
	[0.268]	[0.229]	[0.368]	[0.946]	[0.643]	[0.927]	[0.686]	[0.836]	[0.597]	[0.299]	[0.833]	[0.984]
CAR[-4,0]	0.083*	0.080*	0.040	0.015	-0.009	-0.001	0.025	0.013	0.038	-0.011	0.013	0.013
	[0.087]	[0.091]	[0.380]	[0.781]	[0.874]	[0.983]	[0.483]	[0.509]	[0.295]	[0.683]	[0.709]	[0.515]
CAR[0,+4]	0.004	0.027	0.014	0.005	-0.024	0.000	0.004	-0.003	-0.011	-0.036	-0.005	-0.014
	[0.937]	[0.567]	[0.759]	[0.934]	[0.661]	[0.993]	[0.904]	[0.885]	[0.765]	[0.200]	[0.885]	[0.500]

Note: Panel A - Standard errors of coefficients in parentheses. P-values for the joint significance test beside major columns. Panel B - P-values of F-test for the sum of ARs equal to zero in brackets of CARs. *** p<0.01, ** p<0.05, * p<0.1.