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MULTIMARKETCONTACTANDMERGERSANDACQUISITIONSTHECASESOFSOUTHWESTAIRLINESANDAIRTRANAIRWAYSINTHEUSAIRLINEINDUSTRY

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Multimarket Contact and Mergers and Acquisitions: The Cases of Southwest Airlines and Airtran Airways in the US Airline Industry

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Abstract- Many studies have empirically shown that multimarket contact (MMC) has collusive effects in the US airline industry. The US airline industry has recently undergone large changes. For example, some airlines have implemented mergers and acquisitions (M&A), while Low-cost carriers (LCCs) have matured over time and developed according to multiple business models. Few previous empirical studies of MMC have taken these changes into account. Thus, this paper analyzes the impact of M&A on the effects of MMC while taking into consideration the presence of LCCs. We focus on Southwest's "acquisition of Airtran Airways and estimate the simultaneous demand and price equations using unbalanced panel data for the fourth quarters of 2009, 2010, 2011, 2012, 2013 and 2014. We made three findings. First, MMC has collusive effects on airlines' pricing in the US airline industry. Second, the effect of MMC on Southwest Airlines' pricing did not increase after the acquisition of Airtran Airways. Third, Southwest Airlines' rivals may show more collusive effects of MMC after an acquisition is made by Southwest Airlines.

I. Introduction

Multimarket contact (MMC) refers to a situation in which there are many inter-firm rivalries between a limited number of firms in multiple markets. Many researchers have suggested that MMC leads to mutual forbearance and weakens competition. In particular, MMC has had collusive effects in the airline industry. Some studies have shown empirically that MMC causes increases in airfares and a decrease in the quality of services.

In recent years, the airline industry has experienced many mergers and acquisitions (M&A). M&A decrease the number of airlines and increase market concentration. As a result, many studies have empirically shown that M&A weaken the intensity of competition in the airline industry. On the other hand, airlines may improve their cost efficiency through M&A. Accordingly, some analyses have implied that M&A induce competition in the airline industry. In addition, M&A may extend MMC and may intensify the collusive effect of MMC. The effect of MMC may change through the reinforcement of market power by M&A. However, few studies have analyzed the relationship between MMC and M&A.

In this paper, we empirically analyze the impact of M&A on the collusive effects of MMC. This analysis focuses on the acquisition of Airtran Airways by Southwest Airlines. We estimate the simultaneous equation system of the price and demand function to analyze the changes induced in the effects of MMC by M&A. We made three findings. First, MMC has a collusive effect on airfares. Second, the collusive effect of MMC on Southwest Airlines did not change before and after "its acquisition of Airtran Airways. Third, the collusive effects of MMC on Southwest's rivals became weaker after the acquisition. These have the political implication that full-service carriers (FSCs) may reinforce the collusive effect of MMC through M&A conducted by low-cost carriers (LCCs) [2].

In section 2, we review the literature on MMC, M&A and LCCs. In section 3, we describe the econometric model used in this study and our data. In section 4, we show the empirical results. In section 5, we state our concluding remarks.

II. Literature Review

Researchers have pointed out for a long time that MMC has collusive effects (for example, Bernheim and Whinston (1990)). These effects have been empirically analyzed in diversified firms(Scott(1982), Feinberg(1985), Scott(1991)), the banking industry (Pilloff(1999), DeBonis and Ferrando (2000), Coccorese and Pellecchia(2009), Kasman and Kasman(2015)), the manufacturing industry(Stickland(1985), Hughes and Oughton (1993)), the cement industry (Jans and Rosenbaum(1996)), the cellular phone industry(Parker and Röller(1997), Busse (2000), Dominguez et al(2016)), and others. Many of these studies showed the collusive effects of MMC, which raises prices and decreases the quality of service.

Some studies have focused on MMC in the airline industry. Sandler (1988) showed that MMC intensified the competition in the US airline industry before the industry was deregulated. Evans and Kessides (1994) demonstrated that MMC increased airfares in US airline industry using panel data from 1985 to 1988. Singal (1996) found that MMC caused

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[2] LCCs are airlines which keep operating expenses low and set low airfares.

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significant increases in airfares on long-distance routes. Baum and Korn (1999) showed an inversed-U sharp relationship between MMC and the rates of market entry and market exit. Their results implied that the rates of entry and exit increase as MMC is extended. Gimeno and Woo (1999) suggested that the scope of economic intensify the collusive effect of MMC. Most of these studies showed that MMC had an anti-competitive effect in the US airline industry in the 1980s. In addition, Zhang and Round (2009) found that MMC did not raise airfares in the Chinese airline industry from 2002 to 2004.

There have been many studies on M&A in the airline industry. Most of these indicated that M&A strengthened market power (Borenstein(1990), Kim and Singal(1993), and Morrison(1996)). Although these analyses focused on M&A in the 1980s, there has been an increasing trend in M&A in recent years. As a result, many researchers have been studying recent M&A. Luo (2014) showed that airfares did not increase after the merger between Delta Airlines and Northwest Airlines on routes in which these airlines participated. Hüschelrath and Müller(2015) indicated that the airfareson routes run by Delta and Northwest Airlines increased in the short run after the merger between these airlines. Hüschelrath and Müller(2014) suggested that there were many routes on which airfares increased as a result of the merger of US Airways and America West. In many empirical studies of the airline industry, Bilotkach (2011) identified a relationship between MMC and M&A. Bilotkach (2011) analyzed the relationship between MMC and flight frequencies before and after the merger of US Airways and America West Airlines and suggested that MMC had an effect on frequency and that the merger intensified this effect.

Recent studies have shown have shown a variety of results when assessing M&A. The development of LCCs may be a factor in the variation in the effects of M&A. Many studies have analyzed the impact of LCCs. Dresner et al. (1996) and Windle and Dresner (1999) showed that LCCs caused airlines to significantly decrease their rates. Vowles(2000) found that LCCs had statistically significant airfare-lowering effects. Morrison (2001) also showed that the entry of LCCs influenced airfares on the LCCs' potential routes. Goolsbee and Syverson (2008) found that incumbents significantly decrease their airfares when threatened with the entry of Southwest Airlines. Huse and Oliveira (2012) found that incumbents responded to an actual entry but not to a potential entry, and that product differentiation responded to an actual entry but not to a potential entry, and that product differentiation softened the intensity of the reaction in the Brazilian airline industry. Murakami et al (2015) found that new carriers discounted their prices at the time of an entry and raised their airfares year by year in the Japanese airline industry. Recently, some studies have researched the effects of MMC and LCCs. Zou et al (2011a) researched the impact of MMC between high-cost carriers and LCCs on airfares. They showed that MMC raise yields and that MMC between high-cost carriers and LCCs did not have significant effects. Zou et al (2011b) studied the effect of MMC in the international airline industry. They found that MMC has collusive effects in the international airline industry and that MMC between alliance members has positive impacts on airfares. Murakami and Asahi (2011) indicated that the collusive effect of MMC may be weakened by competition with LCCs.

On the other hand, LCCs have diversified in recent years. Some studies have focused on this change in the strategies of LCCs and FSCs. Dziedzic and Warnock-Smith (2016) indicated that LCCs try to capture business passengers. Dobruszke et al (2017) suggested that LCCs are increasing their routes from major airports. Daft and Albers (2015) showed empirically that the similarity among airlines' business models increases over time.

Airlines have executed M&A and changed their corporate organization and market power. Some LCCs have also tried to transform their traditional strategies into new strategies that include some characteristics of FSCs. Although many studies have focused on MMC in the US airline industry, variations of the airline industry may change previous researches' results. Based on these previous studies, we analyzed the impact of M&A conducted by Southwest Airlines on the effect of MMC in the US airline industry.

III. Econometric Model and Data

To analyze the effect of MMC and the impact of M&A, many studies have used a price function. We estimated simultaneous demand and price equations to determine the effect of MMC on pricing behavior by using unbalanced panel data for the fourth quarters of the years 2009–2014(2009Q4, 2010Q4, 2011Q4, 2012Q4, 2013Q4 and 2014Q4) in the US airline industry. This analysis employs the following model specifications. The demand function is given by:

$$\log q_{ijt} = \alpha_0 + \alpha_1 \log p_{ijt} + \alpha_2 \log \mathrm{Dist}_j + \alpha_3 \log \mathrm{INC}_{jt} + \alpha_4 \log \mathrm{POP}_{jt} + \sum_{t=10}^{14} \tau_t D_\mathrm{time}_t + \sum_{k=2}^{9} \varphi_k D_\mathrm{MT}_j^k + \nu_{ijt} \quad (1)$$

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The price function is given by:

$$\log p_{ijt} = \beta_0 + \beta_1 \log q_{ijt} + \beta_2 \log MC_{ijt} + \beta_3 \log HHI_{jt} + (\beta_4 + \gamma_1 WF_i^{09} + \delta_1 WF_i^{14} + \gamma_2 WFR_i^{09} + \delta_2 WFR_i^{14} + \gamma_3 WN_i^{09} + \delta_3 WN_i^{14} + \gamma_4 WNR_i^{09} + \delta_4 WNR_i^{14} + \gamma_5 EXFLR_i^{09} + \delta_5 EXFLR_i^{14} + \gamma_6 CWNR_i^{09} + \delta_6 CWNR_{ij}^{14}) \log MMC_{ijt} + \beta_5 LCC_i + \sum_{t=10}^{14} \tau_t D_time_t + \varepsilon_{ijt}, \quad (2)$$

where p_{ijt} and q_{ijt} are the average airfare and output of route j of carrier i in year t, respectively. $Dist_j$ is the distance between a pair of cities on route j, INC_{jt} is the arithmetic per capita income of route j in year t, POP_{jt} is the arithmetic average of the O/D population in year t, D_time_t is the time dummy variable that takes 1 for year t(the benchmark year of this binary variable is 2009Q4), and $D_MT_j^k$ is a binary variable that takes 1 for a market where k carriers compete (the benchmark market of this binary variable is a duopoly). $D_MT_j^k$ is introduced to control the market size in the demand equation.

MC_{ijt} is the marginal cost of route j for carrier i in year t[3]. is the Herfindahl index of route j in year t. Since a high concentration may lead to strong market power, the parameter will be positive. is the MMC of route j for carrier i in year t. In this paper, MMC is defined as followed:

$$MMC_{ijt} = \frac{\sum_{l \neq k}^{n} a_{klt} D_{kjt} D_{ljt}}{f_{jt}(f_{jt} - 1)/2} \quad (3)$$

$$a_{klt} = \sum_{j=1}^{m} D_{kjt} D_{ljt}$$

where n is the number of firms and m is the number of routes. f_{jt} is the number of firms in route j in year t.

We analyze the impact of M&A on the effect of MMC to estimate the coefficients of the binary variables (WF_i^{09}, WF_i^{14}, WFR_i^{09}, WFR_i^{14}, WN_i^{09}, WN_i^{14}, WNR_i^{09}, WNR_i^{14}, $EXFLR_i^{09}$, $EXFLR_i^{14}$, $CWNR_i^{09}$ and $CWNR_i^{14}$) and test the hypotheses regarding whether these coefficients were equal before and after the acquisition (for example, we test the null hypothesis $\gamma_1 = \delta_1$). The superscript numbers in the variables represent years. WF_i^{09} and WF_i^{14} are binary variables that take 1 for Southwest Airlines, in routes where Airtran Airways was present in 2009Q4 and 2014Q4. WFR_i^{09} and WFR_i^{14} are binary variables that take 1 for carriers in 2009Q4 and 2014Q4 which operated on routes where Southwest Airlines competed with Airtran Airways in 2009Q4. WN_i^{09} and WN_i^{14} are binary variables that take 1 for Southwest Airlineson routes where Airtran Airways was not present in 2009Q4 and 2014Q4. WNR_i^{09} and WNR_i^{14} are binary variables that take 1 for carriers that compete with Southwest Airlines and that operated from 2009Q4 to 2014Q4on routes where Airtran Airways was not present in 2009Q4 and 2014Q4. $EXFLR_i^{09}$ and $EXFLR_i^{14}$ are binary variables that take 1 for carriers which operated in 2009Q4 and 2014Q4 on routes where Airtran Airways exited and Southwest Airlines did not enter after the acquisition. $CWNR_i^{09}$ and $CWNR_i^{14}$ are binary variables that take 1 for carriers which operated in 2009Q4 and 2014Q4 on routes from which Airtran Airways had exited and in which Southwest Airlines have operated instead of it after the acquisition.

We used unbalanced panel data from the US airline industry for the fourth quarters of the years 2009–2014. We chose the fourth quarters in order to analyze more competitive behavior in a period when airlines avoided competitive behavior because demand in the fourth quarters is large. These carrier-specific data from scheduled operations in city-pair routes were drawn from Data Base "DB1A". Per-capita individual income and demographic data were obtained from the Regional Accounts Data, Bureau of Economic Analysis. Carriers that did not have a 10% market share in duopoly markets, carriers that did not have a 5% share in triopoly or greater markets and monopoly markets were excluded. Carriers reported as carrier XX (carriers that are not filed in IATA codes) in DB1A were also omitted. We drew cost data from the Air Carrier Financial Reports, Form 41 Financial Data to calculate the marginal cost. Descriptive statistics for the continuous variables are given in Table 1.The number of samples was 26,248.

[3] We used the following equation to calculate marginal cost: $MC_{ijt} = AC_t^i \left(\frac{Dist_j}{AFL_t^i} \right)^{-\lambda} Dist_j$, where AC_t^i is the average cost of carrier i in year t. AFL_t^i is the average distance flown by airline i in year t. This method has been used by Brander and Zhang (1990, 1993), Oum et al. (1993), Murakami(2011a, 2011b), and Zhang et al. (2014). To obtain λ, we estimate the following price equation by the nonlinear least-squares method.

$$p_{ijt} = \frac{\{AC_t^i (Dist_j / AFL_t^i)^{-\lambda} Dist_j\}\eta}{\eta - (1+\theta)s_{ijt}} + \varepsilon_{ijt}.$$

η is the route-specific price elasticity of demand, θ is the conduct variation and s_{ijt} is the market share of route j of carrier i in year t. Previous studies, such as Brander and Zhang (1990, 1993) and Murakami (2011a, 2011b), found that λ ranges between 0.15 and 0.67. This study uses 0.634.

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Table 1: Descriptive statistics

Name	Mean	St. Dev	Minimum	Maximum
p (Airfare)	163.140	54.802	18.020	510.930
q (Passenger)	1,109.200	1,358.000	45.000	15,128.000
HHI(Herfindahl index)	4,244.700	1,548.200	1233.900	9,047.400
Dist(Distance)	1,322.900	730.300	100.000	4,962.000
MC(Marginal cost)	0.205	0.076	0.020	0.505
POP(Population)	4,112,300	2,506,900	250,480	16,324,000
INC(Per-capita income)	40,457.000	4,716.000	24,225.000	57,514.000
MMC (Multimarket contact)	154.140	110.340	0.500	573.000

IV. Empirical Results

The demand and price functions were estimated simultaneously by an iterative three stage least square (3SLS). Table 2 indicates the empirical results and Wald test results. The coefficients in the demand function were significantly reasonable sign. The coefficients of the output, the marginal cost and the Herfindahl index in the price function were also significantly reasonable sign.

The coefficient of MMC was significantly positive. This suggests that MMC raises airfares in the US airline industry. The coefficients of WF^{09} and WF^{14} are not significant. This indicates that the effect of MMC on Southwest Airlines' pricing did not change before and after the acquisition on routes where Southwest Airlines and Airtran Airways were present in 2009Q4. The coefficients of WFR^{09} and WFR^{14} were significantly negative. This result indicated that the collusive effect of MMC on rivals' pricing went down on routes where Southwest Airlines and Airtran Airways were present. The coefficient of WFR^{09} was also significantly lower than that of WFR^{14}. This implied that the acquisition increased the collusive effect of MMC among rivals.

The coefficients of WN^{09} and WN were significantly positive and the coefficient of WN^{09} was higher than the coefficient of WN^{14}. These findings suggested that Southwest Airlines may show a more collusive effect of MMC on routes where Airtran Airways had not been present and may have become more competitive by extending MMC through the acquisition of Airtran. The coefficients of WNR09 and WNR14were significantly negative. This indicated that the anticompetitive effect decreased in routes where Southwest Airlines was present. The value of WNR^{09} was higher than that of WNR^{14}. This implied that the acquisition increases the collusive effect of MMC on rivals' pricing on routes where Southwest Airlines has operated and Airtran Airways has not operated.

The coefficients of CWNR and CWNR were significantly negative and the value of $CWNR^{09}$ was higher than that of $CWNR^{14}$. These results showed that MMC may have a collusive effect by replacing Airtran Airways with Southwest Airlines. We also did not reject the null hypothesis. This implied that the collusive effect of MMC in the US airline industry may depend on the presence of Southwest Airlines.

The value of $EXFLR^{09}$ is significantly negative, and the value of $EXFLR^{14}$ is not significant. These findings indicated that the anticompetitive effect of MMC on rivals became stronger as a result of Airtran Airways' exit. This implied that the collusive effect of MMC might be weakened by competition with LCCs and be reinforced by the exit of LCCs'.

These results characterize the relationship between MMC and M&A. First, Southwest Airlines did not show a more collusive effect of MMC after the acquisition. Southwest Airlines increased its market share in the US airline industry by the acquisition. As a result, Southwest Airlines may have more competitive awareness to prepare forits rivals' competitive behavior as they attempt to retake their market shares. Second, Southwest's rivals showed a more collusive effect of MMC after the acquisition. This may result from the reduction in the number of LCCs resulting from the acquisition. Because Southwest Airlines has superiority, its rivals may attempt to avoid competitive behaviors when taking MMC into account.

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Table 2: Empirical results and Wald test results

Price function			Demand function		
Variable	Coefficient	S E	Variable	Coefficient	S E
q	0.017***	0.004	p	-1.429***	0.046
MC	1.025***	0.009	Dist	0.276***	0.021
HHI	0.054***	0.009	INC	0.557***	0.068
MMC(β_4)	0.039***	0.003	POP	0.613***	0.013
LCC	0.356***	0.007	MT^3	-0.371***	0.018
$WF^{09}(\gamma_1)$	0.009	0.006	MT^4	-0.708***	0.021
$WF^{14}(\delta_1)$	0.008	0.005	MT^5	-0.991***	0.025
$WFR^{09}(\gamma_2)$	-0.030***	0.005	MT^6	-1.377***	0.031
$WFR^{14}(\delta_2)$	-0.008**	0.004	MT^7	-1.652***	0.050
$WN^{09}(\gamma_3)$	0.020***	0.003	MT^8	-2.003***	0.083
$WN^{14}(\delta_3)$	0.010***	0.003	MT^9	-2.037***	0.353
$WNR^{09}(\gamma_4)$	-0.027***	0.002	$time_{10}$	0.043*	0.023
$WNR^{14}(\delta_4)$	-0.012***	0.002	$time_{11}$	0.137***	0.024
$CWNR^{09}(\gamma_6)$	-0.031***	0.006	$time_{12}$	0.053**	0.024
$CWNR^{14}(\delta_6)$	-0.015***	0.005	$time_{13}$	0.143***	0.024
$EXFLR^{09}(\gamma_5)$	-0.021***	0.006	$time_{14}$	0.151***	0.024
$EXFLR^{14}(\delta_5)$	-0.008	0.005	CONSTANT	-3.064***	0.633
$time_{10}$	-0.114***	0.007	System R^2	0.944	
$time_{11}$	-0.200***	0.007			
$time_{12}$	-0.223***	0.007			
$time_{13}$	-0.233***	0.007	Test of overall significance	$\gamma_{(71)} = 75800$	
$time_{14}$	-0.214***	0.008			
CONSTANT	6.182***	0.036			

Wald Test					
Null hypothesis	Statistic	Null hypothesis	Statistic	Null hypothesis	Statistic
$\gamma_1 = \delta_1$	0.001	$\gamma_2 = \delta_2$	14.156***	$\gamma_3 = \delta_3$	6.657***
$\gamma_4 = \delta_4$	25.703***	$\gamma_5 = \delta_5$	3.098*	$\gamma_6 = \delta_6$	3.827*
$\beta_4 + \gamma_2 = 0$	2.591	$\beta_4 + \gamma_4 = 0$	13.156***	$\beta_4 + \gamma_5 = 0$	8.045***
$\beta_4 + \delta_2 = 0$	46.002***	$\beta_4 + \delta_4 = 0$	61.760***	$\beta_4 + \delta_5 = 0$	30.202***
$\beta_4 + \gamma_6 = 0$	1.196	$\beta_4 + \delta_6 = 0$	14.849***		

** ,** and *** show that the null hypothesis is rejected at significance levels 10%, 5% and 1%.*

V. Conclusions

Many studies have shown that MMC has a collusive effect in the US airline industry. However, the US airline industry has undergone a variety of changes. For example, LCCs have grown in size, and many airlines have implemented M&A. In analyses of MMC, a lot of attention has not been paid to these changes. This paper focused on the acquisition of Airtran Airways by Southwest Airlines, which has been enlarging its network, and analyzed the impact of M&A on the effect of MMC. We made three main findings. First, MMC has collusive effects on airlines' pricing. Second, Southwest Airlines' MMC effect did not increase after the acquisition of Airtran. Third, Southwest Airlines' rivals may show more collusive effects of MMC after the acquisition of Airtran by Southwest.

These results have political implications. The regulatory agency must take into account the possibility that M&A with LCCs result in MMC having stronger collusive effects. M&A by LCCs may increase the number of routes where LCCs are present, and thus airlines may face a more competitive environment. However, airlines may engage in more collusive behaviors as a result of MMC. In the case of M&A that decrease the number of LCCs, the collusive effect of MMC also increases by disentangling FSCs from the pressures of competition with LCCs. When a regulatory

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agency determines whether to approve M&A in the airline industry, it must take into account the change induced by M&A in the effects of MMC.

Further study is required on a number of issues. First, analyses of these topics should be continued over a long term. Airlines may take a long time to optimize their organizations after M&A. We should analyze MMC in keeping with these optimizing processes. Second, we should take account of other M&As. Some airlines have implemented M&As recently. Because this paper did not did not take into account the impacts of these M&As, we have to analyze the effects of MMC after considering them.

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