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THE PERFORMANCE OF THE AIRLINE PASSENGER MARKET IN THE UNITED ARAB EMIRATES

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Abstract

Despite a relatively short history, UAE airlines have managed to establish themselves alongside the best-performing airlines in the world, due to their spectacular growth in an economic environment that lacks many of the liberalization conditions that are perceived to be conducive to improved economic performance. This paper analyses the framework governing airlines and the impact of air traffic liberalization along routes served by Emirates on enplanement and fares. It finds that increased air traffic openness can result in higher enplanement and lower fares, yielding substantial net welfare gains to the UAE economy. This suggests working on pursuing further liberalization in the passenger airline market.

JEL Classifications: L1, O5

Keywords: UAE Airlines, Market Liberalization, Welfare

ملخص

على الرغم من تاريخها القصير نسبيا، تمكنت شركات طيران الإمارات العربية المتحدة إثبات وجودها جنبا إلى جنب مع أفضل شركات الطيران العاملة في العالم، وذلك بسبب نموها المذهل في بيئة اقتصادية والتى تفتقر الى الكثير من الشروط الازمة لتحرير السوق والذى ينظر إليه على أنه يؤدي إلى تحسين الأداء الاقتصادي. تحلل هذه الورقة الإطار الحاكم لشركات الطيران وأثر تحرير الحركة الجوية على طول الطرق التي تخدمها طيران الإمارات على عدد الركاب للرحلة وسعر التذكرة. تجد الورقة أن زيادة انفتاح حركة الملاحة الجوية يمكن أن تؤدي إلى ارتفاع عدد الركاب للرحلة وانخفاض الأسعار، مما أسفر عن صافي مكاسب كبيرة لاقتصاد دولة الإمارات العربية المتحدة. هذا يشير إلى العمل على متابعة المزيد من تحرير سوق شركات الطيران للركاب.

1. Introduction

Aviation in the United Arab Emirates (UAE) dates back to 1959 upon the establishment of Dubai International Airport and the creation of the first airfield in the UAE. Since then, the growth of aviation in the UAE has coincided with the transformation of Dubai into a major trading hub in the Middle East. Despite a relatively short history, UAE airlines have managed to establish themselves alongside the best-performing airlines in the world. They have particularly attracted attention due to their spectacular growth in an economic environment that lacks many of the liberalization conditions that are perceived to be conducive to improved economic performance. For instance, Emirates is entirely owned by the Dubai government, which, in turn, owns Dubai International Airport. Such common ownership coupled with restrictions on some air traffic freedoms may impose significant entry barriers to other carriers. In fact, Gonenc and Nicoletti (2000) find that such a relationship between a carrier and an airport can impose a burden on competing carriers from slot dominance, especially in the presence of congestion.[1] Given the substantial growth of air passenger traffic in the UAE in the recent years and the drive to create dedicated terminals for national UAE carriers, slot dominance has become a vivid reality.

Air transport liberalization can undoubtedly affect most, if not all, aspects of our daily lives. Liberalization can stimulate competition, improve the efficiency of airline operations, provide consumers with more choices, and exert downward pressure on traveling costs. The increased number of routes and the ensuing traffic growth from competitive pressures are expected to create positive externalities in various sectors, through the expansion of tourism, increased labor mobility, and increased trade flows, amongst others (Oum et al., 2009). In sum, the benefits of liberalization can have global scope and reach.

Research about UAE airlines is scarce. It is not clear, however, whether this is due to a lack of data or merely a lack of interest. To the author's knowledge, the relevant literature is limited to a single study by Inter VISTAS that assesses the potential impact of liberalization on certain performance indicators. The IATA following the Agenda for Freedom Meeting of October 2008 commissioned Inter VISTAS's study.[2]Inter VISTAS (2009) forecasts that the liberalization of market access and ownership and control in the UAE can increase international traffic by 48%, reduce fares by 37%, increase consumer welfare by USD $2.5 billion, create more than 125,000 new jobs, and contribute about USD $1.6 billion to the country's GDP. Inter VISTAS uses a gravity model and estimate the impact of liberalization by simulating changes to current air service agreements. It is not clear, however, how reasonable the ensuing predictions are and the time frame that they expect to cover. The present paper aims to conduct an ex-post-facto analysis of the effects of airline agreements and the framework governing airlines on the economic performance of UAE carriers. The rationale of such an analysis relies on the Structure-Conduct-Performance framework, which can be bi-directional. To this end, the paper is structured as follows: Section II describes the UAE airline industry. Section III describes UAE airports. Section IV describes the data and methodology. Section V summarizes estimation results. Section VI provides simulations assessing the impact of further liberalization on fares and enplanement. Section VII concludes.

2. The UAE Airline Industry

Despite the common perception that the UAE has distanced itself away from liberalizing its airline industry, recent government actions may suggest otherwise. In November 2009, the UAE signed the multilateral statement of policy principles for the implementation of bilateral

[1]Dresner and Windle (1992) and Morrison and Winston (2000) present similar evidence.

[2] This study is part of 12country studies that aim to investigate the potential impact of liberalization via market access and foreign ownership and control.

air service agreements alongside countries such as Chile, the European Commission, Malaysia, Panama, Singapore, Switzerland, and the United States of America, at the IATA Second Agenda for Freedom meeting. The policy principles that the agreement addresses include the liberalization of market access, ownership and control, and pricing. This step may have important consequences as the signatories represent about 60% of global aviation.[3]

Airlines in the UAE operate under the oversight of the General Civil Aviation Authority (GCAA). The GCAA was created in 1996 by government decree to develop and manage the rules and laws that govern all operational aspects of civil aviation in the UAE. The Civil Aviation Regulation part III item 6.10.1 of July 2005 dictates that, "foreign aircraft of any category are not permitted to be based in the UAE without authority". The GCAA deems aircrafts to be based in the UAE "when its principle operations, administrations, and/or maintenance facilities are located in the UAE in other than a temporary manner."[4] Furthermore, consistent with the Convention on International Civil Aviation, only foreign carriers belonging to a state with a current bilateral or multilateral agreement with the government of the UAE are allowed to operate scheduled flights into the UAE. Non-traffic stops are granted only to carriers of countries that are members of the International Civil Aviation Organization (ICAO). Airport authorities must approve non-scheduled flights.

As of December 1, 2010, the UAE has signed bilateral open skies agreements with more than 50 countries and has various other agreements with more than 40 countries at varying stages of completion. The UAE currently applies full reciprocity in its air services agreements. In other words, the rules and limits governing access of UAE carriers into foreign markets are reciprocated by the GCAA.

The rules set by the GCAA regarding the operations of foreign carriers in the UAE have resulted, at least in part, in the existence of only five UAE-based carriers (see Table 1).

Primarily three carriers dominate the UAE airline industry: Air Arabia, Emirates, and Etihad, each operating out of its own airport. Air Arabia, a low-cost carrier operating out of Sharjah, controls about 5% of all flights in and out of the UAE, whereas Etihad operates out of Abu Dhabi and controls about 13%, a number that is dwarfed by the 39% controlled by Emirates (InterVISTAS, 2009). Emirates has the largest fleet in the UAE, followed by Etihad and Air Arabia, and expects to control 70% of air traffic movement in and out of Dubai by 2010.[5]Furthermore, current aircraft orders are expected to double Emirates' fleet and triple Etihad's and Air Arabia's (see Figure 1).

3. Air Arabia

Air Arabia was founded in 2003 by decree by the ruler of Sharjah, Dr. Sultan Bin Mohamed Al-Qasimi. The airline was established as a low-cost carrier and was profitable from its second year of operations. As Figure 2 shows, Air Arabia has experienced a substantial increase in profits since 2005, topping over AED 500 million in 2008 before facing a slight drop in 2009, likely due to the global financial crisis.

Air Arabia issued an initial public offering valued at about AED 2.6 billion in March 2007 offering 55% of its shares in the Dubai Financial Market (DFM). It is currently classified as a Public Joint Stock Company with 45% of the shares held by the government of Sharjah and the remaining shares held by individual and institutional investors. The company shares are traded in the DFM under the ticker symbol AIRARABIA.

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[3]Alrroya.com, http://english.alrroya.com/content/uae-signs-air-liberalisation-policy-statement-iata, accessed on November 12, 2010.

[4]General Civil Aviation Authority, http://www.gcaa.gov.ae/en/epublication/pages/cars.aspx?CertID=CARs, accessed on September 12, 2011.

[5]Source: http://www.emirates.com/english/about/the_emirates_story.aspx, accessed on November 12, 2010.

Air Arabia operates out of Sharjah and has expanded over the past two years into Casablanca, Morocco and Alexandria, Egypt. Its fleet currently consists of 23 Airbus A-320 aircraft with 44 more on order (see Figure 1). In fact, as Figure 3 shows, Air Arabia's fleet has grown tenfold since the carrier was created in 2003 and is expected to grow even further with the carrier's expansion into other countries.

Air Arabia provides service to a total of 56 destinations, 38 out of Sharjah, 13 out of Casablanca, and 5 out of Alexandria. The carrier is also currently undergoing further expansion by forming an additional hub in Amman, Jordan. The Sharjah hub provides service to the Middle East and various Asian countries.

Air Arabia is not a member of any airline alliance and does not codeshare with any other carriers. The Casablanca hub is strategically important. It capitalizes on the open skies agreement between Morocco and the European Union by providing flights to various European countries. Hence, service to Istanbul, which is provided by both the Sharjah and Casablanca hubs, serves as a connecting point for flights originating from Morocco and the UAE. This route expands service originating from the UAE to all destinations serviced by the Casablanca hub.

4. Emirates

Al Maktoum family, the ruling family of Dubai, founded Emirates Airline in 1985. Since then, it has become the largest airline in the Middle East and one of the fastest growing in the world. The fact that 3.5 billion people live within an 8-hour flying radius to Dubai provides Emirates with a strategic advantage (Lohmann et al., 2009). Such an advantage allows Emirates not only to generate revenues by connecting passengers to other flights via Dubai but to also contribute to Dubai tourism. In fact, Dubai has gradually become an attractive tourist destination rather than just a transit location.

Emirates Airline operates with a young and large fleet, which includes 142 aircraft and 146 more on order. Its fleet is the largest in the Middle East and has been expanding at a steady rate over the past 10 years (see **Error! Reference source not found.**).

As **Error! Reference source not found.** shows, Emirates provides passenger service to 97 destinations and cargo service to 105 destinations in 62 countries. Emirates Airline currently is not a member of any alliances but has codeshare agreements with 12 airlines, allowing it to expand its coverage to many more destinations (see **Error! Reference source not found.**). Such a large expansion in destinations has resulted in a five-fold increase in enplanement for Emirates over a 10-year period. In fact, as **Error! Reference source not found.** shows, the number of passengers carried by Emirates increased from 4.78 million between 1999 and 2000 to 27.45 million between 2009 and 2010, a 474% increase in just 10 years. Emirates Airline has been vocal about its opposition to joining airline alliances in order to maintain its independence, flexibility, and high quality of service (Heasley, 2010).

The outer doughnut of **Error! Reference source not found.** shows that Emirates earned the largest share of passenger revenues (about 37%) in 2010 along European and American routes, followed by East Asia and Australasia (28%), West Asia and Indian Ocean (13%), Africa (11%), and the Gulf, Middle East, and Iran (11%). These shares have been relatively constant since 2005 along most routes except for a decrease in the Gulf, Middle East, and Iran routes by five percentage points since 2005, balanced by growth in the West Asia and Indian Ocean and Africa routes by three percentage points and two percentage points, respectively. This may be explained by entry of other UAE carriers (i.e. Air Arabia) over this time span along Gulf, Middle East, and Iranian routes.

Emirates' profitability has been undeniably impressive even in periods of poor economies. As **Error! Reference source not found.** shows, the carrier's profits have been on an upward trend since 2005 before dropping in 2008 due to the global financial crisis.

5. Etihad

The Al-Nahyan family, the ruling family of Abu Dhabi, founded Etihad in 2007. The carrier is entirely owned by the Abu Dhabi government. Etihad currently operates flights to 65 destinations in 42 countries (see **Error! Reference source not found.**) at a frequency of about 147 flights daily. The carrier is currently not a member of any alliances but has 23 codeshare agreements (see **Error! Reference source not found.**) and 73 special prorate agreements, allowing it to expand its market presence and revenue streams. As a result, enplanement for Etihad has grown six fold from about one million passengers in 2005 to more than 6 million in 2008 (see **Error! Reference source not found.**). The carrier's fleet size has also quadrupled over the same period from 10 aircrafts in 2005 to 42 in 2008 (see **Error! Reference source not found.**) before rising to 55 aircrafts in 2010 and 100 more on order.

Unlike Emirates, Etihad does not disclose its financial performance, nor does it provide specifics regarding its operations other than those published in its "Facts and Figures" reports. Nevertheless, it is common knowledge that the carrier has not been profitable since its inception and is on the road to breaking even in 2011 and earning profits in 2012.[6] Just like other carriers, Etihad did not escape the repercussions of the global financial crisis with initially projected break-even in 2010 (Morris, 2009).

6. UAE Airports

The UAE has seven international airports: Abu Dhabi International (AUH), Al Ain International (AAN), Dubai International (DXB), Dubai World Central-Al Maktoum International (DWC), Fujairah International (FJR), Ras Al Khaimah International (RAK), and Sharjah International (SHJ). Of these, only AUH, DXB, and SHJ are homes to major UAE and international carriers and handle most air traffic in the country. As **Error! Reference source not found.** shows, the combined passenger traffic in these three airports reached 32.5 million passengers in 2005, 45.7 million in 2007, and about 52 million in 2008.

6.1 Abu Dhabi international airport (AUH)

AUH was opened in 1968 and is owned and managed by the government of Abu Dhabi. It is home to the 57 carriers listed in **Error! Reference source not found.**.[7] Airlines in AUH operate out of four terminals. Terminal 1 hosts major international carriers (i.e. Air France, Singapore Airlines) whereas Terminals 1A and 2 host low-cost or Asian carriers (i.e. Air India, Bangladesh Airlines). Terminal 3 is entirely dedicated to Etihad Airways. Abu Dhabi International airport is also currently working on expanding its passenger traffic capacity by opening a new Terminal 3 in early 2009 and undertaking the building of a new Midfield Terminal Complex (MTC).[8] Passenger traffic capacity in Abu Dhabi currently stands at 12 million and is projected to gradually reach up to 40 million.

6.2 Dubai international airport (DXB)

DXB was built in 1959 and is owned and managed by the government of Dubai. It is home to the 124 airlines listed in **Error! Reference source not found.**. Airlines in DXB operate out

[6] Source: www.arabianaerospace.aero, January 13, 2011.

[7] The list of airlines operating in AUH includes those carriers that physically fly to AUH as well as those that operate under a codesharing agreement. For instance, US Airways codeshares flights to AUH with Lufthansa and Royal Air Maroc codeshares flights to AUH with Etihad Airways.

[8] Source: Abu Dhabi International Airport, available at http://www.abudhabiairport.ae/theairport/index.asp, accessed on November 11, 2010.

of three terminals. Terminal 1 has a capacity of 30 million passengers and handles all major international carriers. Terminal 2 has a capacity of 9 million passengers and handles low-cost carriers catering to the sub-continent and Gulf region. Terminal 3 is entirely dedicated to Emirates Airlines and will have a capacity of 43 million passengers upon the completion of Concourse 3 (Buyck, 2005). With the opening of Terminal 3 in Dubai International Airport in October 2008, passenger traffic capacity increases to about 60 million in Dubai alone. Recent upgrades and expansions to Terminal 2 are also expected to increase capacity by an additional 20 million by 2012 (Rahman, 2009). Further projections beyond 2015, that include the newly built Dubai World Central-Al Maktoum International airport in Jebel Ali, raise the passenger capacity in Dubai to 240 million.

6.3 Sharjah International Airport (SHJ)

SHJ was opened in 1977 and is owned and managed by the government of Sharjah. It is home to the 35 carriers listed in **Error! Reference source not found.**. Most of these carriers are low-cost airlines serving mainly the Middle East and the sub-continent. SHJ has experienced tremendous growth in passenger traffic over the past five years. In fact, passenger movement increased from 2.2 million in 2005 to more than 5.7 million in 2009.[9] In anticipation of further growth in passenger traffic, airport capacity is currently being expanded through the building a new 4 km runway, which is expected to be operational in 2012 (Broomhall, 2010).

7. Data and Methodology

7.1 The data

One of the most daunting tasks in conducting research about the UAE is the lack of reliable data and the reluctance of various organizations (i.e. Emirates, Etihad, and the GCAA) in assisting us with this research project.[10] This imposes serious limitations on the scope of this study and on our ability to effectively contribute to the understanding of the air transport sector in the UAE. Despite these challenges, we managed to create a data set that allows us, at least from a cross-sectional perspective, to assess the association between the framework governing airlines and performance.

The data used in this study come from two main sources: International Airline Industry Association (IATA) and International Civil Aviation Organization (ICAO). Unfortunately, ICAO data only include Emirates for the year 2007. Data for other years or other UAE carriers are not available in the provided data set. As a result, data for all other variables are restricted to the year 2007 and for only Emirates (when applicable). Our data set includes the following variables, summarized in **Error! Reference source not found.**, and their corresponding sources:

Data on the number of Emirates Airlines' passenger's is from ICAO.

Emirates' Airfares data are from IATA. This fare represents the average fare for all classes of travel.

Distance per route data for Emirates' flights is from http://www.world-airport-codes.com/.

Macroeconomic data including population and GDP per capita are from the International Monetary Fund World Economic Outlook. These two variables capture the country to which Emirates flies.

Load factor is calculated using ICAO data by dividing the number of passengers by the passenger seat capacity.

[9] Source: Sharjah Airport Statistics, http://www.sharjahairport.ae/sharjah-authority/media-centre/airport-statistics, accessed on December 13, 2010.

[10] Thomas Clarke from Etihad, T.G. Venugopal from Emirates, and Juan Carlos and ShashiChadha from the GCAA were contacted to assist in collecting data for the openness index. Emirates and the GCAA did not assist in developing specific route-based responses but chose to provide broad answers on the basis that the information requested was confidential.

Number of competitors is from ICAO and represents the number of carriers serving alongside Emirates within specific routes.

Emirates' Operating Costs per route, which represent fuel, wages, and capital costs are from the carrier's annual report for the year 2007. Dividing the total costs by the number of kilometers flown derives data for costs per km. Costs per route are derived by multiplying these figures by the numbers of kilometers flown in each route. Because total-operating costs, fuel costs, wages, and capital costs per route are perfectly correlated, only the total operating costs are used in our econometric estimations.

Emirates' Passenger Seats data are from ICAO. This variable is a proxy for capacity in the demand function.

Openness Index (OI) is created using data from ICAO World Air Services Agreement Database, World Trade Organization Trade Policy Review 162 Rev. 1, InterVISTAS (2009), and the author's own research using various news articles. The questions used for the construction of the OI are listed in **Error! Reference source not found.**. The third column provides a summary of how answers to these questions were derived. OI is derived using Multiple Correspondence Analysis (MCA). MCA is a descriptive method that helps identify patterns in latent variables and determines weights measuring the contribution of individual variables in explaining the OI. Only questions Q2, Q3, and Q6 have varying answers across the routes in our database, and, as a result, hold explanatory power. Other questions are constant, hence redundant and excluded from the construction of the OI and, as **Error! Reference source not found.** shows, OI ranges between -1.49 and 1.42. The higher OI the more open is a particular route.

7.2 Methodology

The paper estimates the following specifications:

$$\begin{aligned}\log(\text{pass})_i &= \alpha_0 + \alpha_1 \log(\text{pop})_i + \alpha_2 \log(\text{gdp})_i + \alpha_3 \log(\text{dist})_i + \alpha_4 \log(\text{fare})_i \\ &+ \alpha_5 \log(\text{seats})_i + \alpha_6 \text{comp}_i + \alpha_7 \text{OI}_i + \epsilon_i \qquad (1)\end{aligned}$$

$$\log(\text{fare})_i = \beta_0 + \beta_1 \log(\text{costs})_i + \beta_2 \log(\text{pass})_i + \beta_3 \log(\text{load})_i + \beta_4 \text{OI}_i + \mu_i \qquad (2)$$

The first equation estimates the number of passengers (pass) along route i with respect to the population (pop), GDP per capita (gdp), distance (dist), fare, number of passenger seats (seats), number of competitors (comp), and the openness index (OI). The second equation estimates the fare along route i with respect to operating costs (costs), the number of passengers, the load factor, and the openness index.

The two equations are estimated using OLS, 2SLS, and GMM. As **Error! Reference source not found.** shows, there exist a number of observations with high leverage that may be sufficiently influential to yield potentially biased estimates. As a result, we use robust regression instead of simple OLS to deal with potential heteroskedasticity and outliers. The benefit of robust regression lies on the use of an iterative process that reduces the weight of extreme values on estimation results. The results derived by robust regression would effectively be similar to those derived from least squares estimations after excluding observations with extreme values.

8. Empirical Results

The most striking result, as Table shows, indicates that there is no statistically significant relationship between passengers and fares, irrespective of the estimation technique used, and consistently across the two estimated specifications. To verify this result, we explore the data by analyzing a scatter plot of fares and passengers. As **Error! Reference source not found.** shows, there appears to exist no clear relationship between fares and passengers even after excluding potential outliers. For robustness, we exclude extreme values from the data and re-

estimate our specifications. The results remain unchanged, thereby confirming our initial results.

While this finding may seem odd at first glance, it is not surprising. In fact, "Emirates has carved a niche for itself as a profitable, successful player that writes its own script, rather than copying what others do" (Sull et al., 2005, p. 5). Such a statement provides support for the contention that Emirates' fares may not necessarily be the deciding factor for passengers, but rather it may be the search for better service.

Although Emirates does take into account its competitors when setting its fares, it is common knowledge that they hold the highest fares in most routes, especially along those where Emirates is the only carrier operating non-stop flights. Furthermore, the benefits arising from operating within a dedicated terminal in Dubai and under the umbrella of the local government (which plays multiple simultaneous roles as the GCAA, the owner of the carrier itself and owner and operator of the Dubai airport) make a strong case for classifying Emirates as a firm with a major competitive advantage over its competitors. Such a classification is consistent with the evidence presented in **Error! Reference source not found.** suggesting that fares do not determine enplanement.

The coefficients of interest in this study are α_7 and β_4, which measure the statistical association between openness and enplanement and fares, respectively. From the demand estimations, we can observe that longer routes are associated with a larger number of passengers, statistically significant at the 0.01 level. A 1 percent increase in the distance covered by Emirates is associated with a 0.24 percent increase in enplanement. This is somewhat expected since long-haul flights tend to use larger aircraft with a larger seat capacity. In fact, in support for this contention, a larger seat capacity is associated with proportionately higher enplanement, statistically significant at the 0.01 level. A 1 percent increase in seat capacity is associated with a 1.03 percent increase in enplanement. Surprisingly, there is no statistically significant relationship between the number of competitors and enplanement. This finding may suggest that the different carriers that operate alongside Emirates may be catering to a consumer segment other than those served (or targeted) by Emirates, consistent with the monopoly classification. As expected, increased openness is associated with higher enplanement, statistically significant at the 0.01 level. However, the coefficient estimate is smaller in magnitude when using GMM. A 1 percent increase in openness is associated with a 0.05 percent increase in enplanement.

As for the cost estimations, we can observe that operating costs represent an important determinant of fares, statistically significant at the 0.01 level. A 1 percent increase in operating costs is associated with a 0.69 percent increase in fares. Increased openness, on the other hand, is associated with lower fares, statistically significant at the 0.01 level. A 1 percent increase in openness is associated with a 0.16 percent decrease in fares.

In sum, consistent with theoretical expectations, there is evidence of a positive and statistically significant relationship between increased openness and enplanement and a negative and statistically significant relationship between increased openness and fares. The indirect effect that openness may exert on passengers via fares is not considered given the lack of statistical significance between fares and enplanement. The next section addresses the net effect of increased openness through simulations.

9. The Impact of Further Liberalization

In order to assess the potential effect of further liberalization on consumers and Emirates, we first complete simulations by setting OI at its highest observed value of 1.42 for all routes. We undertake this simulation using the full sample of 155 observations and a smaller MENA sample of 36 observations that only includes North African and Middle Eastern routes. We

then undertake the same simulations by adding one standard deviation (equal to 1 in this paper) to each route's observed level of OI.

As **Error! Reference source not found.** shows, setting OI at 1.42 results in a 91 percent increase in enplanement (from 119,189 to 228,252) and a 54 percent decrease in fares (from $555 to $255). These changes result in more than $35 million in additional consumer surplus and a loss of $825,000 in producer surplus.[11]The net effect represents an overall economic welfare gain of about $35 million.

As **Error! Reference source not found.** shows, fares and enplanement along MENA routes are lower than average. Surprisingly, however, setting OI at 1.42 is expected to raise fares by 51 percent (from $302 to $456) and to increase enplanement by 300 percent (from 112,332 to 451,462). This is a surprising result that goes against our theoretical expectations. In fact, the small MENA sample size (n=36) could be largely responsible for such counterintuitive results. Nevertheless, further liberalization is still expected to generate a net gain of about $600,000 in the MENA market.

Error! Reference source not found. reports the simulation results estimating the impact of a one-standard deviation improvement in OI on passengers. The reported effects for all passengers are identical to those reported in **Error! Reference source not found.**. As for MENA passengers, fares are expected to rise to $459 and enplanement is expected to rise to 364,397. Contrary to the first simulation, the price effect outweighs the passenger effect, resulting in a loss of more than $17 million in consumer surplus and a smaller gain in producer surplus of about $14 million, a net loss of about $4 million.

10. Conclusions

In the recent years, the UAE has pursued a policy directed towards the liberalization of its air traffic and expanding the global breadth of its flag carriers. Emirates, in particular, a young carrier by international standards, has risen to the ranks of other international leading carriers and has proven to bea serious contender.

This study analyzes the impact of air traffic liberalization along routes served by Emirates on enplanement and fares. Our results echo those voiced by InterVISTAS (2009) by providing overall support for further liberalization. We find that increased air traffic openness can resultin higher enplanement and lower fares, yielding substantial net welfare gains to the UAE economy. In fact, we believe that UAE carriers, and Emirates in particular, should welcome such results and work on pursuing further liberalization of their passenger airline market. Although some airlines may express concerns about the likely impact on their profits, we expect that the benefits to society would far outweigh the costs, resulting in a net positive gain to society.

[11] Emirates' profits have averaged 10.4 percent of revenues over the 2004-2010 period.

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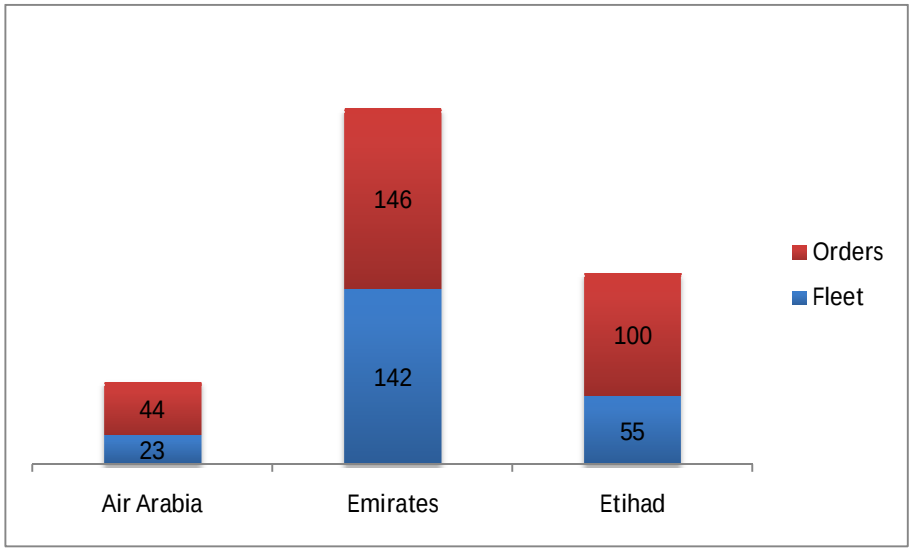
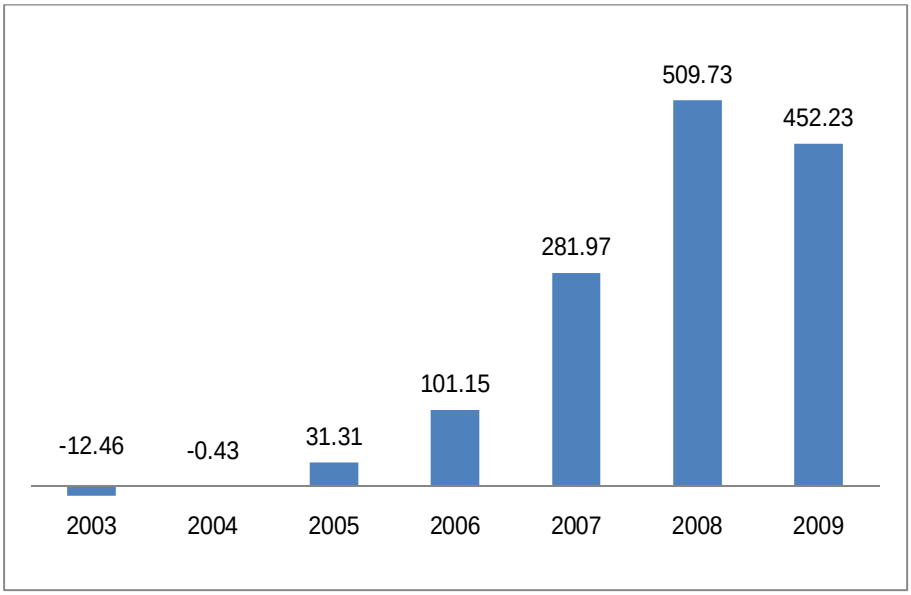
Figure 1: UAE Airlines' Fleet Size and Orders



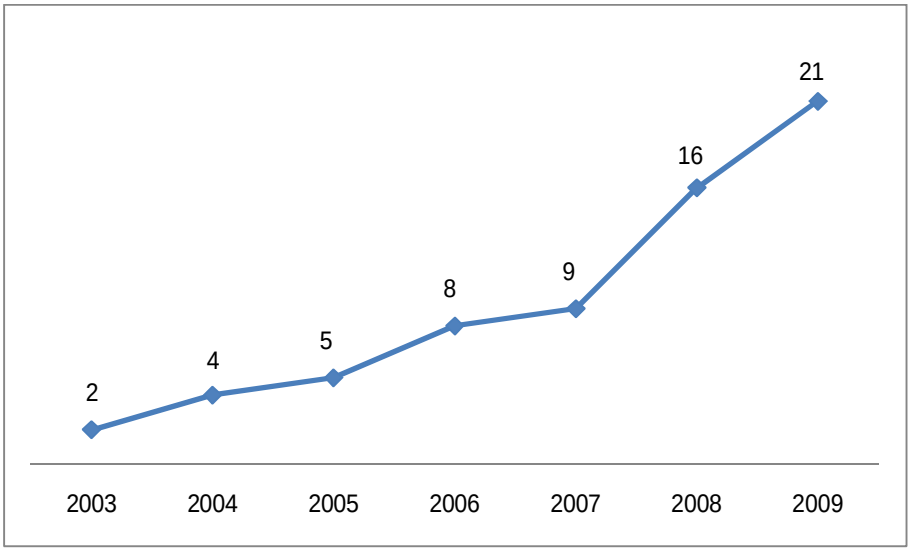
Sources: Air Arabia: (http://www.airarabia.com/crp_1/fleet&stitle=fleet&pid=125), accessed on November 14, 2010. Etihad: Etihad Airways Factsheet: (http://www.etihadmediacentre.com/file.php?f_ID=2106), accessed on November 14, 2010. Emirates: Emirates Annual Report 2009-2010: (http://www.theemiratesgroup.com/system/aspx/download.aspx?id=tcm:409-565425), accessed on November 14, 2010.

Figure 2: Air Arabia's Profits (in AED millions)



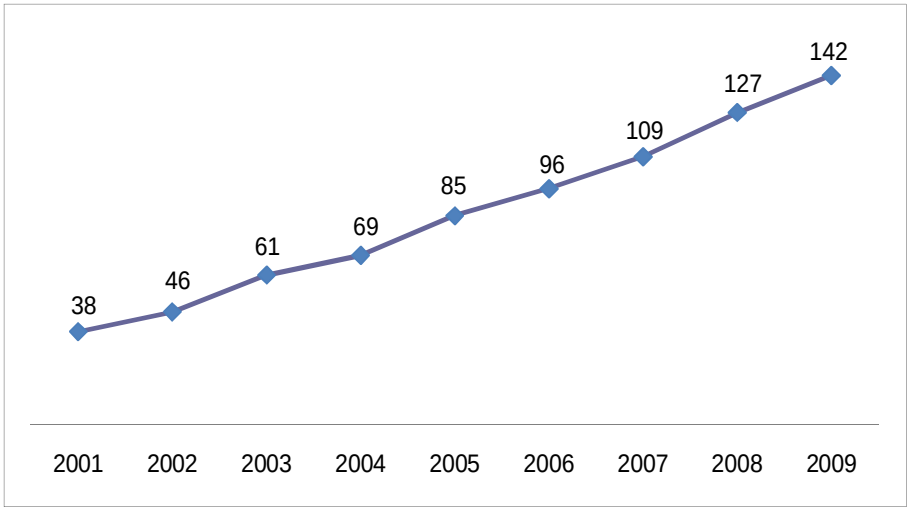
Notes: Air Arabia's fiscal year follows the calendar year.
Source: Air Arabia Financial Statements, available at http://www.airarabia.com/crp_1/financials&stitle=financials&pid=126, accessed on November 20, 2010.

Figure 3: Air Arabia Fleet Size (2003-2009)



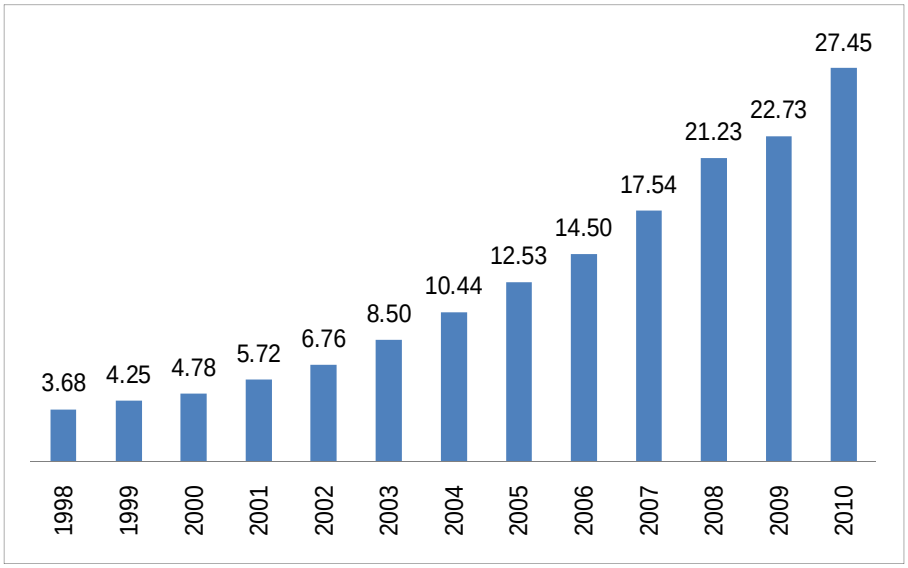
Source: Air Arabia Annual reports.

Figure 4: Emirates Fleet Size



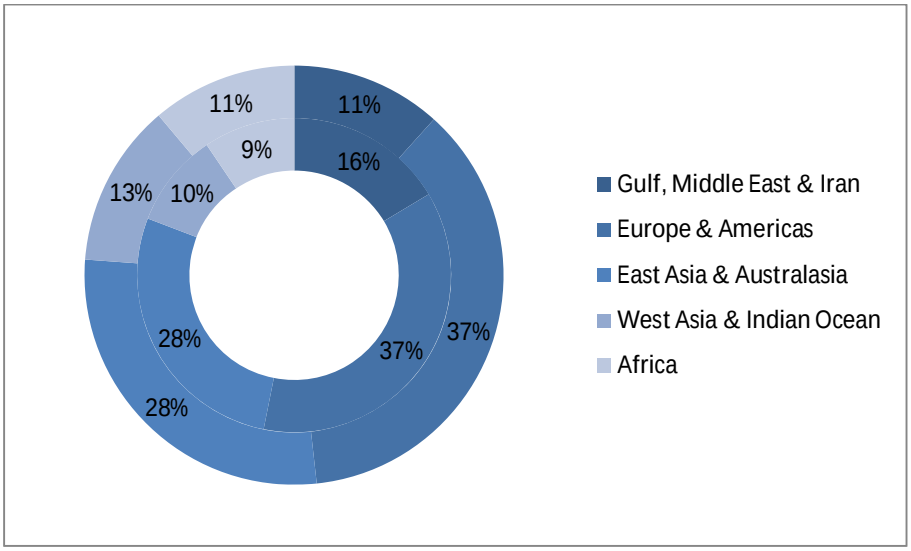
Source: The Emirates Group, Annual Report 2009-2010.

Figure 5: Passengers Carried by Emirates (in millions)



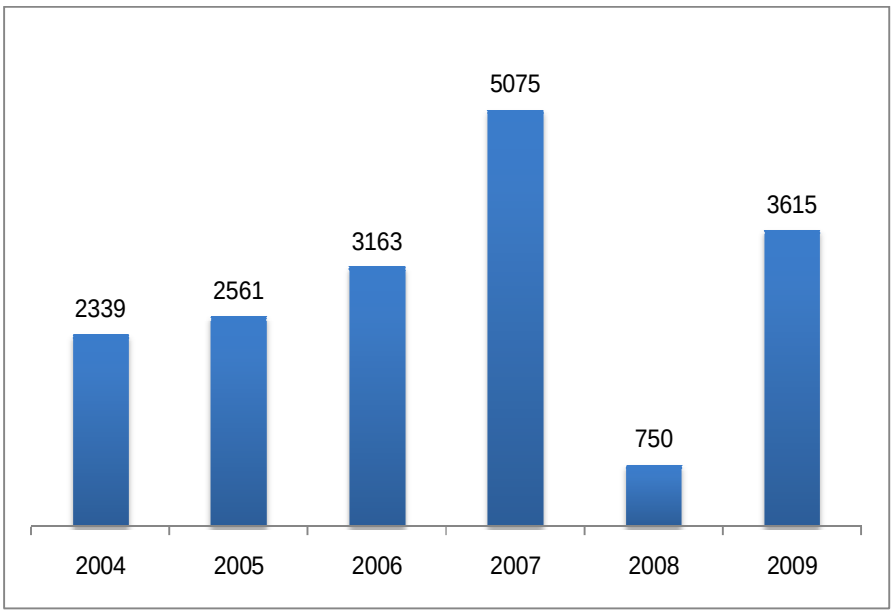
Source: Emirates annual reports, available at http://www.theemiratesgroup.com/english/facts-figures/annual-report.aspx

Figure 6: Distribution of Emirates Geographic Revenues for 2005 (inner donut) and 2010 (outer donut)



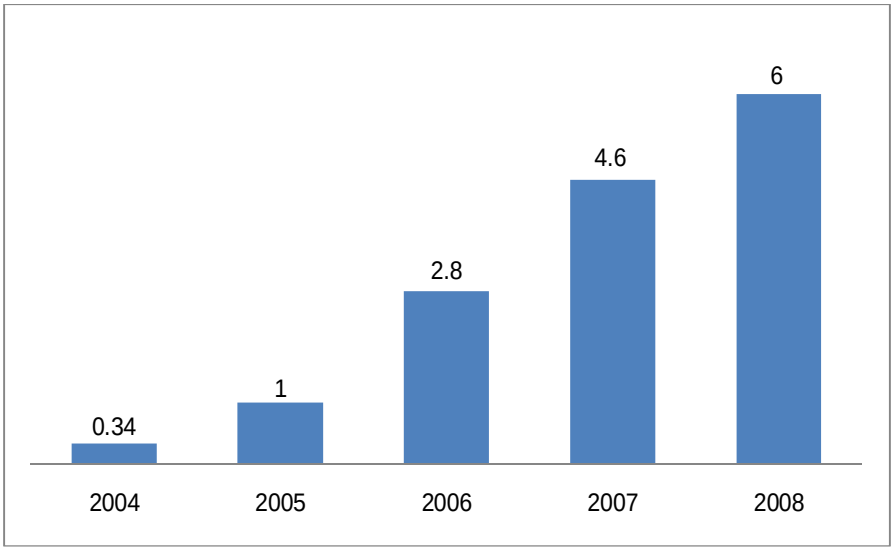
Source: Emirates annual reports.

Figure 7: Emirates Profits (in AED millions)



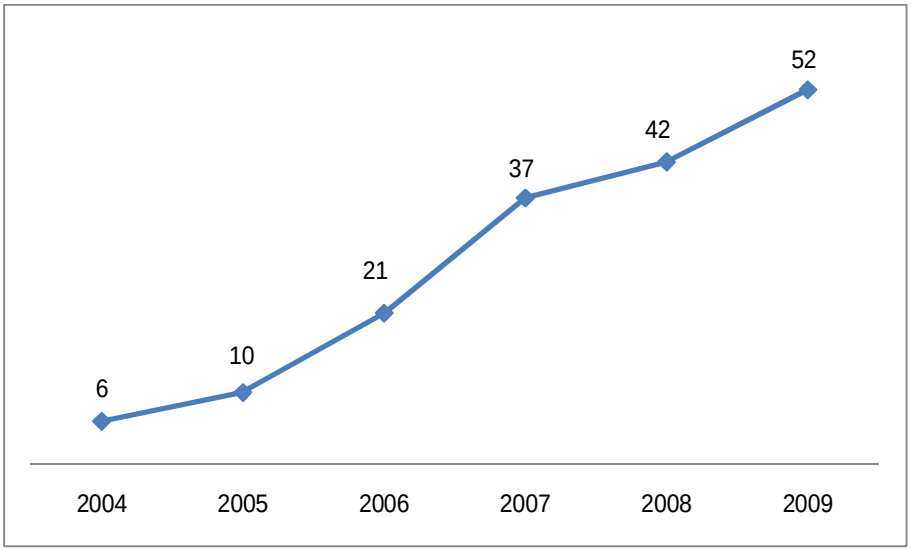
Note: Emirates' fiscal year runs through March of the following year.
Sources: Emirates' financial statements 2004-2005 to 2009-2010.

Figure 8: Passengers Carried by Etihad (in millions)



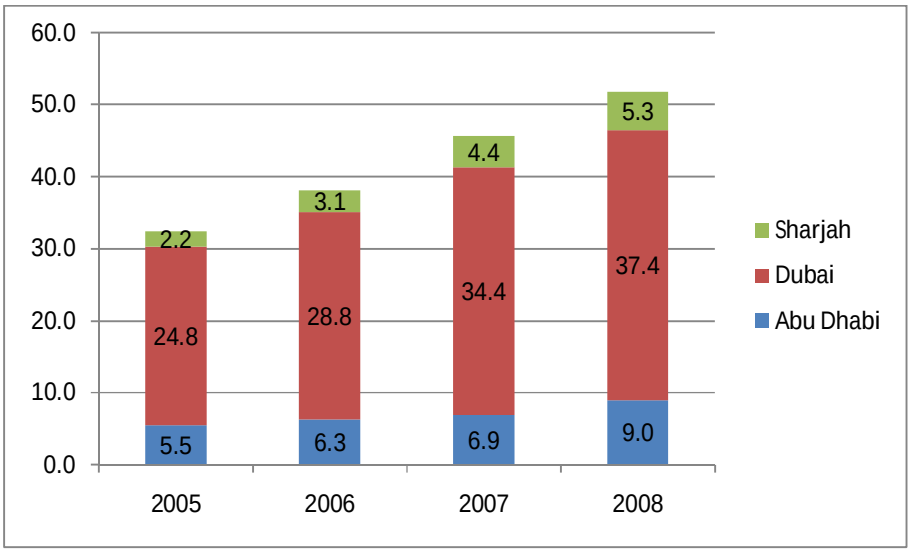
Source: Etihad Facts and Figures, January 2009.

Figure 9: Etihad Fleet Size



Source: Etihad Facts and Figures, January 2009.

Figure 10: Passenger Traffic in Abu Dhabi, Dubai, and Sharjah Airports (in millions, 2005-2008)



Sources: InterVISTAS (2009) and web sites of airports.

Figure 11: Potential Influence of Individual Observations on OLS Estimates

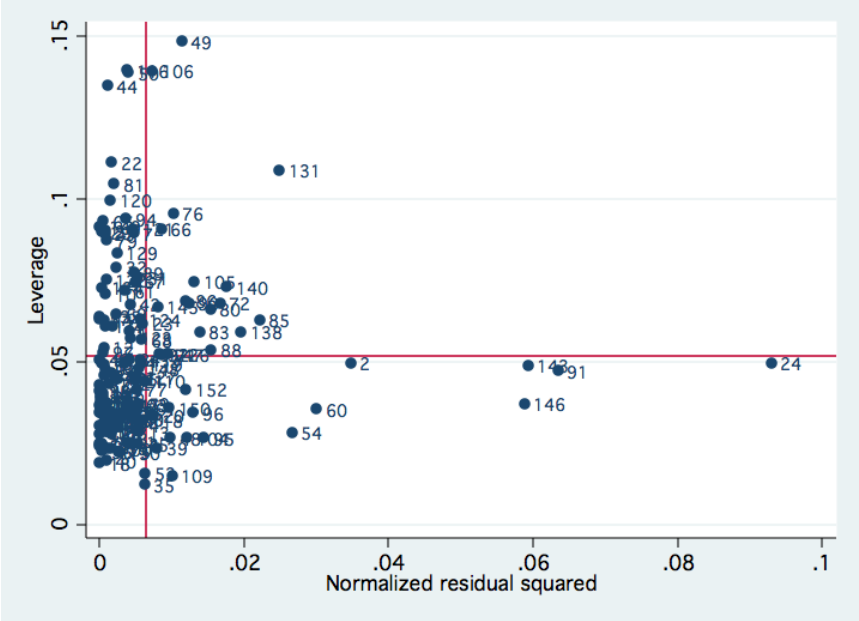


Figure 12: Scatter Plot of Fares and Passengers

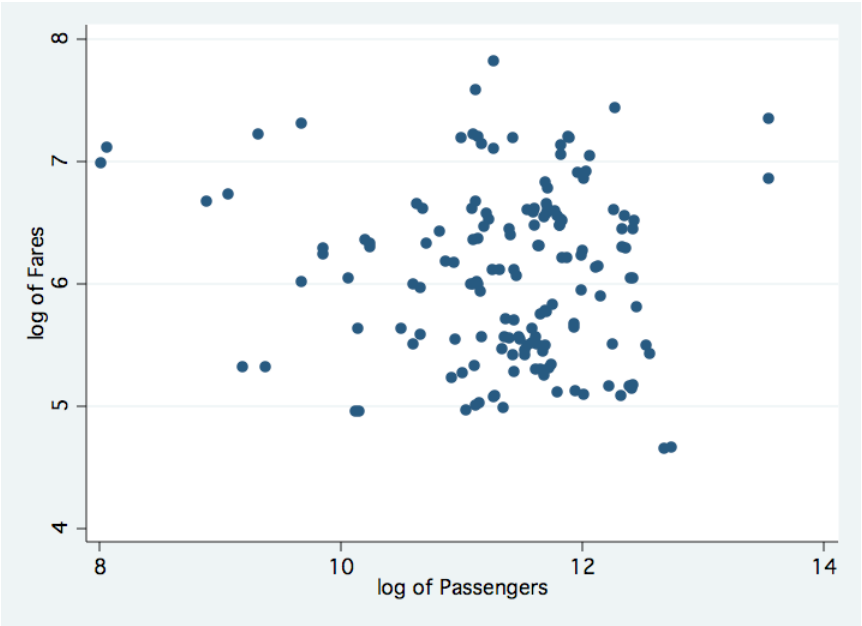


Table 1: List of UAE-based Airlines

Airlines	IATA Code	Ownership	Year founded
Air Arabia	G9	45% owned by the government of Sharjah	2003
Emirates	EK	Owned by the government of Dubai	1985
Etihad Airways	EY	Owned by the government of Abu Dhabi	2003
Flydubai	FZ	Owned by the government of Dubai	2008
Ras Al Khaimah Airways	RT	Owned by the government of Ras Al Khaimah	2006

Table 2: Destinations served by Air Arabia

Abu Dhabi**	Cologne*	Kathmandu	Nagpur
Ahmedabad	Colombo	Khartoum	Nairobi
Aleppo	Damascus	Khartoum**	Paris*
Alexandria	Dammam	Kiev	Peshawar
Alexandria*	Delhi	Kochi	Riyadh
Amman**	Dhaka	Kuwait	Sana'a
Amsterdam*	Doha	Kuwait City**	Sharjah
Barcelona*	Goa	Latakia	Shiraz
Basel-Mulhouse*	Hyderabad	Luxor	Tehran
Beirut**	Istanbul	Lyon*	Thiruvananthapuram
Bologna*	Istanbul*	Medina	Venice-Treviso*
Brussels*	Jaipur	Milan*	
Chennai	Jeddah	Montpelier*	
Chittagong	Kabul	Mumbai	
Coimbatore	Karachi	Muscat	

Note: Asterisks, * and **, denote flights originating from Casablanca and Alexandria, respectively.
Source: http://www.airarabia.com/crp_1/network&stitle=network&pid=125, accessed on November 20, 2010.

Table 3: Emirates Codeshare Partners

Air Malta
Air Mauritius
Continental Airlines
Japan Airlines
Korean Air
Oman Air
Philippines Airlines
Royal Air Maroc
South African Airways
TAROM
Thai Airways International
V Australia

Source: www.emirates.com
Note: Emirates cancelled its codeshare agreement with Jet Airways in July 2010.

Table 4: Destinations Served by Etihad

Alexandria	Colombo	Khartoum	Munich
Almaty	Dammam	Kochi	Mumbai
Amman	Damascus	Kozhikode	Muscat
Astana	Dhaka	Kuala Lumpur	Nagoya
Athens	Doha	Kuwait	New Delhi
Baghdad	Dublin	Lahore	New York
Bahrain	Erbil	Larnaca	Paris
Bangkok	Frankfurt	London Heathrow	Peshawar
Beijing	Geneva	Manama	Riyadh
Beirut	Hyderabad	Manchester	Seoul
Brisbane (via Singapore)	Islamabad	Manila	Singapore
Brussels	Istanbul	Melbourne	Sydney
Cairo	Jakarta	Milan	Tehran
Cape Town (via Johannesburg)	Jeddah	Minsk	Tokyo
Casablanca	Johannesburg	Moscow	Toronto
Chennai	Karachi	Mumbai	Trivandrum
Chicago	Kathmandu		

Source: http://www.etihadairways.com/sites/etihad/global/en/planatrip/routemaps/Pages/RouteMap.aspx, accessed on December 11, 2010.

Table 5: Etihad Codeshare Partners

American Airlines	Flybe	Qantas
ANA	Jet Airways	Royal Air Maroc
AerArann	Kuwait Airways	Saudi Arabia Airlines
Alitalia	Malaysia Airlines	Sri Lankan Airlines
Bangkok Airways	Malev	Turkish Airlines
bmi	Middle East Airlines	Ukraine International
Brussels Airlines	Olympic Air	Yemenia
Cyprus Airways	Philippine Airlines	

Source: Etihad Airways Factsheets, July 2010.

Table 6: Descriptive Statistics (n=155) for the Year 2007

Variable	Mean	Std. Dev.	Min	Max
Distance	4476.08	2861.59	370	13144
Fare	554.89	405.93	105	2480
GDP per capita	18945.26	17117.62	808	85371
Load Factor	61.68	15.69	20.70251	100
Number of Competitors	0.94	1.38	0	6
Number of Passengers	119189.2	100650.1	2998	760879
Operating Costs	1593.48	1018.72	131.72	4679.26
Passenger seats	195323.8	158928.3	5720	1169715
Population	2.11E+08	3.82E+08	85000	1.32E+09
Openness Index	7.79E-09	1.00	-1.49	1.42

Table 7: Questions for the Construction of the Openness Index

Mode 1: Cross Border Trade	**Questions**	**Explanation of the Answers**
Open Skies- Bilateral Agreements	Q1: Are domestic airlines allowed to join Open Skies agreements?	The GCAA always designates Etihad, Emirates, Air Arabia, RAK Airways, and Fly Dubai as its national carriers in its air services agreements. So the answer to this question is 'yes' for all routes.
Code Share Agreements	Q2: Is the practice of multiple airlines selling space on the same flights allowed? That is a seat can be purchased on one airline but is actually operated by a cooperating airline under a different flight number or code.	Routes that are "codeshared" are identified from the web site and annual reports of Emirates.
Restriction on 5th Freedom	Q3: Is the right of an airline of one country to carry traffic between two other countries, providing the flight **originates and terminates** in its own country, allowed?	ICAO World Air Services Agreement Database, World Trade Organization Trade Policy Review 162 Rev. 1, InterVISTAS (2009), and the author's own research using various news articles are used for this question.
Restriction on 6th Freedom	Q4: Is the right of an airline of one country to carry traffic between two other countries **via** its own country allowed?	The 6th Freedom is never included in UAE's air services agreements. As a result, we assume that such a freedom is not allowed and assign a 'No' answer to all routes.
Restriction on foreign Low cost carriers	Q5: Are foreign **low cost** carriers permitted to operate?	There are no low cost carriers operating alongside Emirates in the ICAO data used in this paper. Hence, we assign a 'No' answer to all routes.
Airports free for foreign movement	Q6: Is foreign movement is permitted?	Only airlines from ICAO states and countries with an air services agreement with the UAE are allowed into and out of UAE airports. Hence we use our database of air services agreements to derive answers for the routes included in our database.
Alliance Membership	Q7: Are domestic airlines allowed to join alliances? If there are many alliances, give the response for each.	To date, UAE airlines have not joined any alliances. So, we assign a 'No' answer to all routes.
Mode 3: Commercial Presence		
Foreign ownership in international scheduled service	Q8: Is foreign ownership in the provision of international scheduled services through commercial establishment, in the studied country, allowed?	Based on our discussions with GCAA and Emirates representatives, we assign a 'Yes' answer to all routes.
Foreign ownership in domestic scheduled service	Q9: Is foreign ownership in the provision of domestic scheduled services through commercial establishment, in the studied country, allowed?	Based on our discussions with GCAA and Emirates representatives, we assign a 'No' answer to all routes.
Restriction on airport management	Q10: Are foreign companies allowed to manage domestic airports?	Based on our discussions with GCAA and Emirates representatives, we assign a 'Yes' answer to all routes.

Table 8: Estimation Results

	Dependent Variable: Log(Passengers)					
	Robust regression		2SLS		GMM	
Variable	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Log(Population)	-0.011	-0.97	-0.009	-0.80	-0.026***	-2.73
Log(GDP per capita)	0.002	0.11	0.030	1.18	-0.05*	-1.96
Log(Distance)			0.242***	3.66	0.242***	3.62
Log(Fares)			-0.091	-1.39	-0.064	-0.96
Log(Costs)	0.183***	5.39				
Log(Seats)	1.037***	39.10	1.038***	39.98	1.036***	42.36
Competitors	0.009	0.63	0.010	0.61	0.021	1.36
Openness Index	0.107***	4.15	0.114***	3.96	0.051*	1.91
Constant	-2.088***	-4.22	-2.52***	-4.42	-1.54***	-2.65
Number of observations	155		155		155	
R^2/Adjusted R^2	0.76		0.91		0.90	

	Dependent Variable: Log(Fares)					
	Robust regression		2SLS		GMM	
Variable	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Log(Costs)	0.717***	13.99	0.694*	1.82	0.935***	14.38
Log(Passengers)	0.047	1.27	0.049	1.60	0.019	0.60
Log(Load Factor)	-0.117	-0.91	-0.114	-0.96	0.025	0.20
Openness Index	-0.155***	-4.36	-0.163***	-4.57	-0.164***	-4.65
Constant	0.873	1.50	1.021*	1.82	-1.014	-1.38
Number of observations	155		155		155	
R^2/Adjusted R^2	0.67		0.74		0.64	

Notes: R^2values are reported for robust regression. Asterisks, * and ***, represent statistical significance at the 0.10 and 0.01 levels, respectively.

Table 9: Simulation Results with OI=1.42

	Impact on all passengers	Impact on MENA passengers
a. Actual number of passengers	119,189	112,332
b. *Simulated number of passengers*	228,252	451,462
c. Difference: (b-a)	109,063	339,130
d. Actual average fare US$	555	302
e. *Simulated average fare US$*	255	456
f. *Difference: (e-d) US$*	-300	154
g. *Difference in total revenue:* (b – a) * d + b * f US$	-7,932,635	171,898,783
h. *Change in consumer surplus*: - f * a US$	35,743,649	-17,255,411
j. *Change in Emirates surplus*: g * 10.4%	-824,994	17,877,473

Table 10: Simulation Results with a One-Standard-Deviation Improvement in OI

	Impact on all passengers	Impact on MENA passengers
a. Actual number of passengers	119,189	112,332
b. Simulated number of passengers	228,252	364,397
c. Difference: (b-a)	109,063	252,065
d. Actual average fare US$	555	302
e. Simulated average fare US$	255	459
f. Difference: (e-d) US$	-300	157
g. Difference in total revenue: (b – a) * d + b * f US$	-7,932,635	133,290,334
h. Change in consumer surplus: - f * a US$	35,743,649	-17,592,407
j. Change in Emirates surplus: g * 10.4%	-824,994	13,862,195

Table 11: Destinations served by Emirates

Africa	Australia/N. Zealand	Europe/N. America		Far East	Middle East	Indian subcontinent	Indian Ocean	S. America
Abidjan	Auckland	Amsterdam	Manchester	Bangkok	Amman	Ahmedabad	Malé	Sao Paulo
Accra	Brisbane	Athens	Milan	Beijing	Bahrain	Bombay (Mumbai)	Mauritius	
Addis Ababa	Christchurch	Birmingham	Moscow	Guangzhou	Beirut	Bangalore	Seychelles	
Cairo	Melbourne	Düsseldorf	Munich	Hong Kong	Damascus	Chennai (Madras)		
Cape Town	Perth	Frankfurt	Newcastle	Jakarta	Dhahran	Cochin		
Casablanca	Sydney	Glasgow	New York	Kuala Lumpur	Doha	Colombo		
Dar es Salaam		Hamburg	Nice	Manila	Dubai	Delhi		
Entebbe		Houston	Paris	Osaka	Jeddah	Dhaka		
Johannesburg		Istanbul	Prague	Seoul	Kuwait	Hyderabad		
Khartoum		Larnaca	Rome	Shanghai	Muscat	Islamabad		
Lagos		London Gatwick	Toronto	Singapore	Riyadh	Karachi		
Luanda		London Heathrow	Vienna	Tokyo	Sanaa	Lahore		
Nairobi		Los Angeles	Zurich		Tehran	Peshawar		
Tripoli		San Francisco	Venice		Thiruvananthapuram			
Tunisia		Madrid			Kolkatta			
Durban		Malta			Kozhikode (Calicut)			

Source: www.emirates.com

Table 12: Airlines Operating in Abu Dhabi International Airport

Air Asia X	Egypt Air	Pakistan International Airlines
Air Astana	Etihad Airways	Philippine Airlines
Air Blue	Flybe	Qatar Airways
Air Canada	GMG Airlines	Royal Air Maroc
Air France	Gulf Air	Royal Jordanian
Air India	Iran Aseman Airlines	S7 Airlines
Air India Express	JAT Airlines	Saudi Arabian Airlines
Air Malta	Jazeera Airways	Shaheen Air International
Alitalia	Jet Airways	Singapore Airlines
All Nipon Airways	Kish Air	Sri Lankan Airlines
American Airlines	KLM-Royal Dutch Airlines	Sudan Airways
Bahrain Air	Kuwait Airways	Syrian Arab Airlines
Bangkok Airways	Lufthansa	Turkish Airlines
Bangladesh Airlines	Malaysia Airlines	Turkmenistan Airlines
BMI flights	MALEV flights	Ukraine International Airlines
British Airways	Middle East Airlines	United Flights
Brussels Airlines	NAS Air	US Airways
Cyprus Airways	Olympic Air	V Australia flights
Delta Flights	Oman Air	Yemen Airlines

Source: http://www.abudhabiairport.ae/operatingairlines/index.asp and skyscanner.net

Table 13: Airlines Operating in Dubai International Airport

Aeroasia	China Southern	Malaysia Airlines	Ukraine International
Aeroflot	Condor	MEA	United Airlines
Aeroflot-Don flights	Continental Airlines	Mihin Lanka	United Airways Bangladesh
Aerosvit Airlines	Daallo Airlines	Norwegian Airlines	Ural Airlines
African Express Airways	Delta Airlines	Olympic Airways	US Airways
Afriqiyah Airways	Dragon Air	Oman Air	Uzbekistan Airways
Air Algerie	Egypt Air	Palestinian Airlines	Vietnam Airlines
Air Baltic	Emirates	Philippine Airlines	Virgin Atlantic
Air Berlin	Ethiopian Airlines	Phuket Airlines	Wataniya Airways
Air Blue	Eva Air	PIA	Yemenia
Air Canada	Finnair	Qatar Airways	
Air China	Flydubai	Rossiya Airlines	
Air France	Garuda Indonesia	Royal Brunei	
Air Gabon	Georgian Airways	Royal Jordanian	
Air India	GMG Airlines	Royal Nepal Airlines	
Air Lanka	Gulf Air	Rwandair Express	
Air Malta	Hainan Airlines	S7 Airlines	
Air Mauritius	Hamburg International	Safi Airways	
Air Seychelles	Iberia Airlines	Samara Airlines	
Air-India Express	Indian Airlines	SAS	
Alitalia	Iran Air	Saudi Arabian Airlines	
All Nippon Airways	Iran Asseman Airlines	Shaheen Air	
Altyn Air	Iraqi Airways	Siberia Airlines	
American Airlines	Japan Airlines	Singapore Airlines	
Aria Air	JAT Airways	Smart Wings	
Ariana Afghan	Jazeera Airways	South African Airways	
Armavia	Jet Airways	Sri Lankan Airlines	
Armenian Airlines	Jubba Airways	Star African Airlines	
Austrian Airlines	Kam Air	Sudan Airways	
AZAL	Kenya Airways	Swiss Air	
Azerbaijan Airlines	Kingfisher	Syrian Air	
Bahrain Air	Kish Air	TAROM Romania	
Biman Bangladesh Airlines	KLM	Thai Airways	
Bmi flights	Korean Air	Trans Mediterranean	
British Airways	Kuwait Airways	TUIfly	
Cargolux	Libyan Airlines	Tunisair	
Cathay Pacific	Lufthansa	Turkish Airlines	
China Eastern	Mahan Air	Turkmenistan Airlines	

Source: http://www.dubaiairport.com/DIA/English/MainMenu/Passenger+Services/Airlines/ and skyscanner.net.

Table 14: Airlines operating out of Sharjah International Airport

Aerovista	Kish Air
African Express Airways	Kuban Airlines
Air Arabia	Mark Air
Air Blue	Martinair
Air India	Nas Air
Air-India Express	PIA
Anikay Air	Primera Air Scandinavia
Aria Tour	Royal Falcon
AVE.com	Saudi Arabian Airlines
BH Air	Shaheen Air
Daghestan Airlines	Starline.kz
Djibouti Airlines	Southern Air
Egypt Air	Sudan Airways
Felix Airways	Syrian Air
Indian Airlines	Tahmid Air
Jet Airways	Tajikistan Airlines
Jupiter Airlines	Uzbekistan Airways
Kam Air	

Sources: Sharjah Airport Statistics, http://www.sharjahairport.ae/sharjah-authority/media-centre/airport-statistics, accessed on December 13, 2010.