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## Fare differences between Gulf carriers and incumbents

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## Abstract

The Gulf carriers, Emirates, Etihad and Qatar Airways benefit from their geographic centrality and the supportive policies put in place by their governments to develop their aviation industries. This provides them with cost-advantages over incumbent carriers. In this paper we investigated whether the incumbent carriers are still able to compete with the Gulf carriers on price. It was found that the incumbents and Gulf carriers offer similar fares in OD-markets where the carriers compete head-to-head with direct flights. In connecting markets where the incumbents and Gulf carriers both compete with indirect flights, the Gulf carriers appeared significantly cheaper, although the price difference has decreased since 2010. Whether this is the result of the incumbents reducing costs, increasing productivity or simply reducing their profit margin, requires further research. The results indicate that the incumbents are able to compete with the Gulf carriers on price in the OD-markets. In the connecting markets the incumbents have become more competitive.

Keywords: Gulf carriers, air fares, airline competition.



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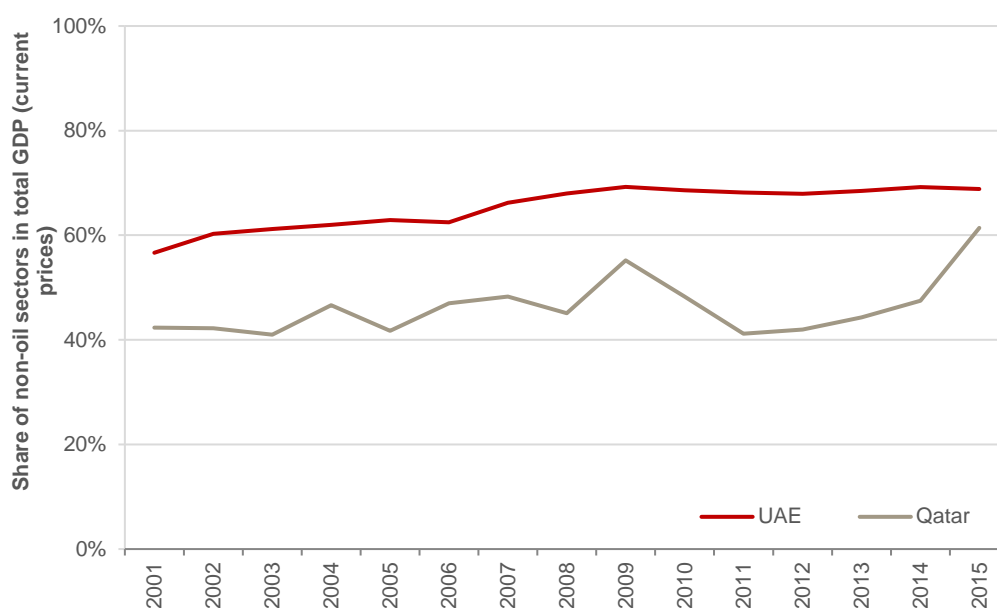


# 1 Introduction

*The rise of the Gulf carriers, Emirates Etihad and Qatar Airways is watched with skepticism and suspicion by incumbent carriers. In this paper we investigate whether incumbent carriers are able to compete on price with the Gulf carriers.*

Since the discovery of oil, the states in the Gulf region have undergone rapid economic development. The states are however already preparing for the post-oil era by diversifying their industrial base. Figure 1.1 shows that the share of non-oil sectors in total GDP is slowly but gradually increasing. Aviation is perceived as an important condition for attracting foreign investment and tourism. The governments of Dubai, Abu Dhabi and Qatar have therefore launched strategic plans to develop their aviation industries (Vespermann, 2008). These plans consist of (1) developing their own hub carriers: Emirates, Etihad and Qatar Airways, (2) providing ample airport capacity for these carriers to grow and (3) to put in place the right policies to support the growth of the aviation industries.

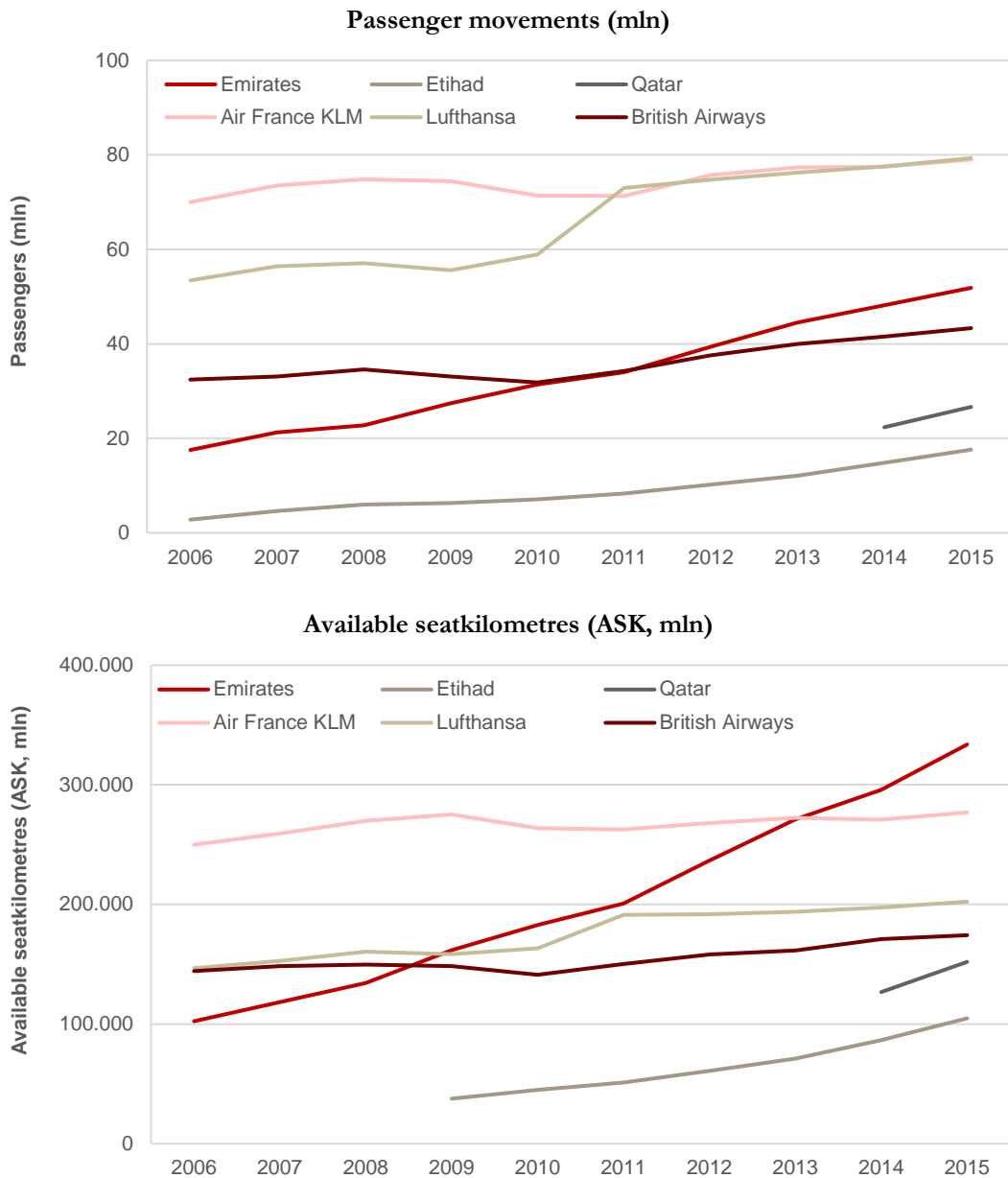
**Figure 1.1** Share of non-oil sectors in total GDP gradually increasing



Source: UAE Federal Competitiveness and Statistics Authority, 2016; Qatar Ministry of Development Planning and Statistics, 2016.

These strategies have been highly successful. Emirates Airline, Etihad Airways and Qatar Airways, have grown at an unprecedented rate (see Figure 1.2). Since 2010, Emirates and Etihad for instance have grown their passenger numbers by a respective 11% and 20% per year. Over the same period the main European hub carriers Air France KLM, Lufthansa and British Airways only managed to increase their passenger traffic by 2-6% per year. In terms of available seatkilometres offered, the differences are even larger. In fact, Emirates has already surpassed the European hub carriers in terms of total seatkilometres offered. Furthermore, the growth of the Gulf carriers does not seem to be slowing down.

Figure 1.2 Gulf carriers show stronger growth than European hub carriers



Source: The Emirates Group, 2007-2016; Etihad, 2011-2016; Qatar Airways Group, 2016; Air France KLM, 2007-2016; Lufthansa, 2007-2016; British Airways 2007-2016.

Note: Emirates and Qatar Airways report from April to March in their Annual Reports. Fiscal years have been compared with the figures for other carriers in the preceding year. This means that the figures for Emirates and Qatar Airways over fiscal year 2016 (April 2015 - March 2016) have been compared with the figures for other carriers over 2015, whereas the other airlines report over a full year. Figures for Air France KLM exclude Transavia. Figures for Lufthansa include Germanwings and Eurowings.

The strong growth of the Gulf carriers are watched with skepticism and suspicion by incumbent carriers and their unions. The supportive policies of the governments in the Gulf allow the Gulf carriers to operate at relatively low costs. Incumbents call their governments to restrict market access to the Gulf carriers by pointing at an unlevel playing field. Since the liberalization of the intra-European market, the network carriers saw their European networks being attacked by more



efficient low-cost carriers like Ryanair and easyJet. Now they fear that the same will happen to their most lucrative intercontinental markets by the Gulf carriers.

In this paper we analyze whether the incumbents are able to compete with the Gulf carriers on price by analyzing the price difference between the incumbents and the Gulf carriers. It took the European network carriers a few years to adjust their business model and reduce costs to better withstand competition from the low-cost carriers in the intra-European market. By analyzing how the price difference between the Gulf carriers and the incumbents has developed over time, we also investigate whether the incumbents have been successful at adjusting to these new competitors.

In the next section we first describe the success of the Gulf carriers in more detail. Section 3 presents the available literature regarding measuring fare differences within the aviation industry. Section 4 describes the econometric models and data used to estimate the price difference between the Gulf carriers and the incumbents. The results are discussed in section 5. Section 6 concludes and identifies areas for further research.

## 2 The success of the Gulf carriers

*The success of the Gulf carriers is mainly attributable to the geographic centrality of their home bases and the policies instigated by their national governments to stimulate their aviation industries. This allows the Gulf carriers to engage in route development in every hemisphere and operate at lower unit costs than most of their competitors.*

Section 2.1 first describes the benefits of the geographical location of the Gulf hubs. In section 2.2 the favorable governmental policies are described that benefit the Gulf carriers. The implications on the competitive position of the incumbent carriers is discussed in section 2.3.

### 2.1 Geographical location

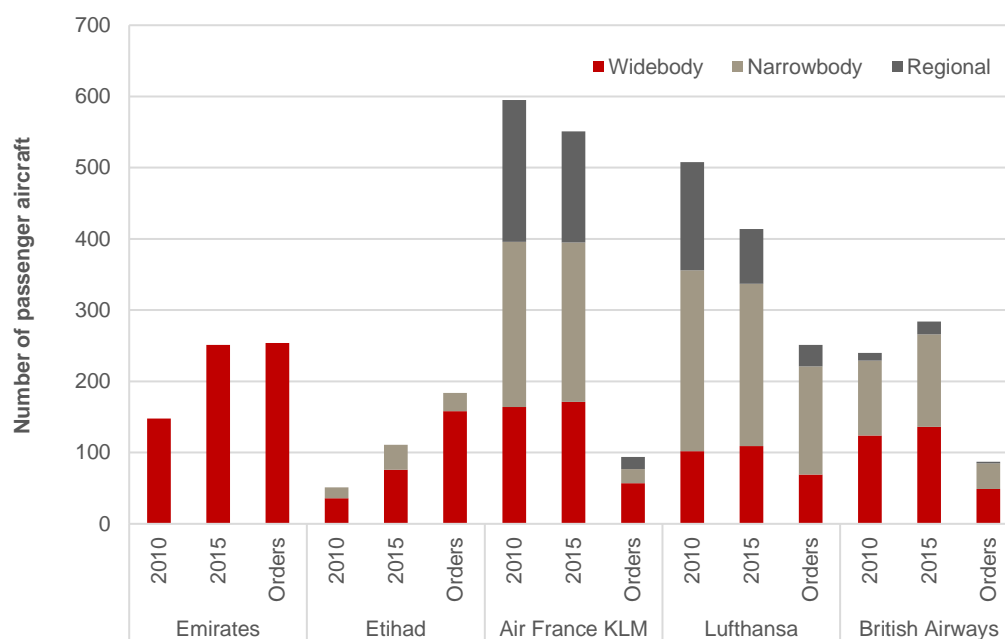
An estimated 4.5 billion people live within an 8 hour radius from the Gulf. This makes the Gulf region an ideal location for a hub airport. This is not something that has been discovered only recently; already in the pre-jet era, airports in the Middle East served as a junction between the East and West (Taneja, 1988). European and Oriental carriers used airports in the Middle East to connect colonial Europe with its territories in the Far and Near east as well as its colonies in Africa and Asia (Feiler and Goodovitch, 1994).

The Gulf carriers capitalize on their geographical location between large and rapidly developing markets. With new-generation long-range widebody aircraft, such as the Boeing 787, they can reach any point in the world from their home bases. This means that any two big cities in the world can be linked via the Gulf without additional stops (The Economist, 2010). Where European or Asian network carriers mainly connect passengers from their respective continents to elsewhere in the world, the Gulf carriers connect passenger between all six continents (O'Connell, 2011). This not only allows them to engage in route development in every hemisphere (Rozario, 2011), it also makes them less vulnerable to regional economic downturns such as the European credit crisis and to regional epidemics like SARS and the Zika virus.

Furthermore, by connecting secondary airports with secondary airports elsewhere, the Gulf carriers obtain a competitive advantage over most other carriers, that only serve these markets with two stops (Grimme, 2011). This competitive advantage is largest between Europe and Asia and between Europe and Australia (Brützel, 2006) and this has led to the cannibalization of traffic from traditional carriers (O'Connell, 2011).

The Gulf carriers mainly operate long-haul widebody aircraft, whereas their European rivals operate a mix of small and large aircraft (see Figure 2.1). The difference in fleet mix between the Gulf carriers and their European competitors is explained by the geographical location of their hubs. European carriers mainly connect short-haul routes within Europe to long-haul routes elsewhere in the world. This requires a high frequent short-haul network operated by small aircraft to build optimal connections at the hub. The Gulf carriers however mainly connect long-haul routes to other long-haul routes, which explains their large fleets of widebody aircraft.

**Figure 2.1** Gulf carriers operate large widebody fleets to capitalize on the geographic centrality of their hubs



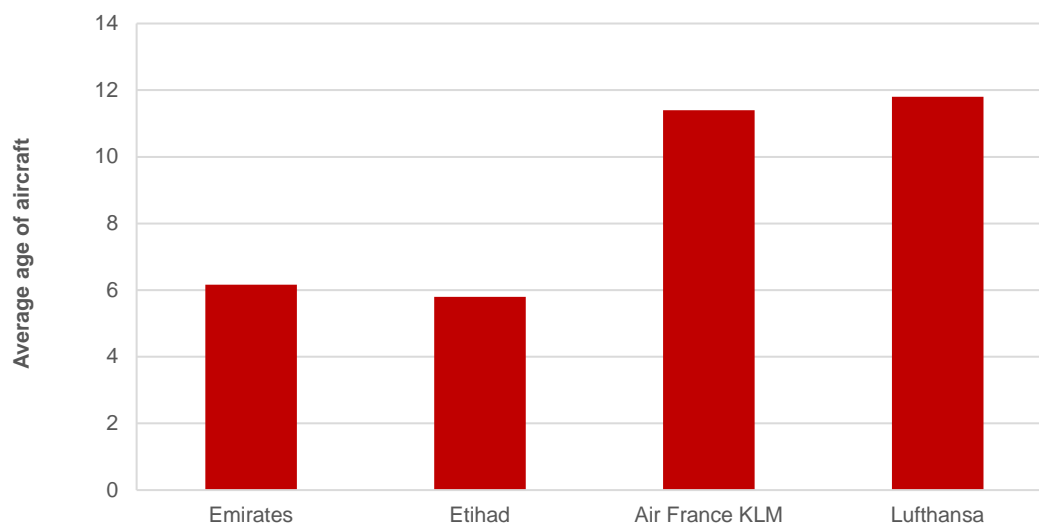
Source: Emirates, 2011 & 2016; Etihad, 2011 & 2016; Air France KLM, 2011 & 2016; Lufthansa, 2011 & 2016; British Airways, 2011 & 2016.

Note: Figures for Lufthansa include Germanwings and Eurowings. Insufficient data available for Qatar Airways.

An added benefit of a large fleet of widebody aircraft are their low unit costs. Analysts have estimated that the relatively long trip length of Emirates provides it with operating efficiency relative to legacy carriers such as British Airways, Air France and Lufthansa (London Business School, 2005). These large aircraft are especially useful in heavily slot-constrained airports such as London Heathrow, Tokyo Narita and Sydney. Furthermore, the Gulf carriers operate younger aircraft than their European competitors. Figure 2.2 shows that the aircraft operated by Air France KLM and Lufthansa are almost twice the age of the aircraft operated by Emirates and Etihad. The younger fleets operated by the Gulf carriers are more efficient in terms of fuel burn and require less maintenance, which also lower their unit costs compared to their European competitors.

Looking at the order books of the respective carriers, shows that the fleet expansions of the Gulf carriers will continue in the coming years (see Figure 2.1). The bulk ordering and skilled maneuvering between Airbus and Boeing allow the companies to achieve volume discounts. The airlines are also early buyers of new generation aircraft, whose new technology and unproven economics creates a certain risk (O'Connell, 2011). Early buyers of the A380 however also received as much as a 40% discount (Rothman, 2007). Besides the discounts given for bulk orders, this helps to keep unit costs low. Air France KLM and British Airways have relatively few aircraft on order. The ordered aircraft shall for a large part serve to replace older aircraft and not to expand their networks.

**Figure 2.2 Gulf carriers operate younger fleets than European rivals, 2015**



Source: Emirates, 2016; Etihad, 2016; Air France KLM, 2016; Lufthansa, 2016.

## 2.2 Favorable governmental policy

### Governance

Airports, airlines and tourism bodies in the Gulf region are state-owned. In Dubai for instance, the sheikh is responsible for all aviation related activities. As a result policy can be aligned with airline and airport development to support the aviation industries. In addition, the absence of a fully democratic system ensures continuity in policy-making. This assists in realizing ambitious long-term projects, such as the development of new airport infrastructure (Lohmann et al., 2009).

### Providing sufficient airport capacity

Airport capacity in the Gulf region is provided according to demand, or ahead of demand to support the aviation industries (Knorr and Eisenkopf, 2007; Rozario, 2011). This contrasts the European and American situation where many large hubs increasingly face capacity constraints which hinder their hub carriers to expand.

Megaprojects are the norm for the region. Dubai International Airport (DXB) is the main airport in Dubai. Although it has been expanded multiple times, it will eventually not have enough capacity to accommodate the projected aviation growth. Therefore an entirely new facility is being developed; Al Maktoum International Airport/Dubai World Central (DWC) is part of the strategic policy of the government of Dubai to secure a position as a leading center for international trade and logistics. The passenger terminal will eventually have a capacity of 240 million passengers making it the world's largest airport, with 3 terminals, 5 parallel runways on which 4 aircraft can land simultaneously. Eventually, Emirates will shift its entire operation to this new airport. The Qatari also developed an entirely new airport on 1,100 hectares of reclaimed land from the Arabian Gulf. It currently has a capacity of 30 million passengers, but there are plans to expand the airport to 50 million passengers. The 15 billion dollar project forms a key part of Qatar's national development strategy. In Abu Dhabi the current airport is expanded up to a capacity of 45 million passengers.

**Table 2.1 Large airport expansions are underway to accommodate projected traffic growth**

<b>Airport</b>	<b>Passengers in 2015 (mln)</b>	<b>Investment (bln US\$)</b>	<b>Projected capacity (mln)</b>
Dubai (expansion DXB)	78	7,8	90-118
Dubai (new airport DWC)	<1	32	240
Doha (new airport DOH)	30	15	50
Abu Dhabi (expansion AUH)	23	5	45

Source: Dubai Airports, 2016; Doha Hamad Airport, 2016; Abu Dhabi International Airport, 2016

### **Liberalization**

To develop their hub airports and allow their hub carriers to expand into new markets, the Gulf states are actively pursuing liberal air service agreements with other countries. It has been shown that the liberalization in the UAE leads to additional passenger volume, lower fares and increased welfare (Squalli, 2014; Sekkat, 2012; InterVISTAS, 2009). The UAE for instance signed open skies agreements with countries such as the United States, Singapore, Spain and Egypt. Many air service agreements however remain restrictive, with limits on capacity, designated airports and in some cases, approved airlines and pricing (InterVISTAS, 2009). Emirates for instance had to raise its business class fares by up to 20% on the Frankfurt-Johannesburg and Hamburg-Singapore routes as the bilateral air services agreement between the UAE and Germany do not permit carriers from the UAE to be price leaders (CAPA, 2009b).

### **Immigration laws**

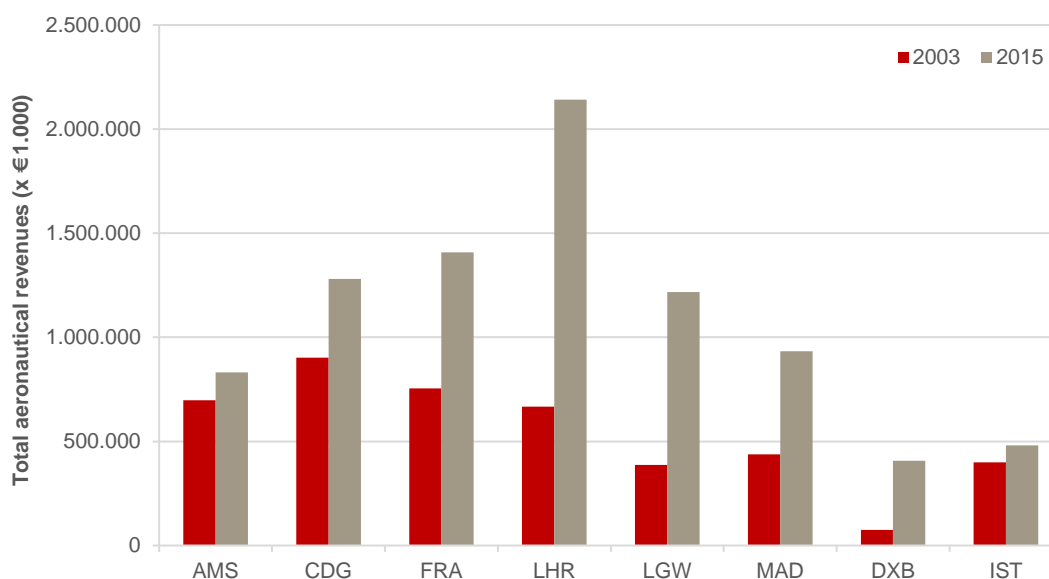
Where other countries apply restrictive and complicated transit regulation (Knorr and Eisenkopf, 2007), the Gulf states have relatively generous immigration laws. This provides the Gulf states with an additional competitive advantage as passengers do not need to clear immigration or require transit visa's in certain connecting markets.

### **Low airport charges**

Airport charges are kept relatively low at airports in the Gulf. Especially charges for connecting traffic are low to stimulate demand. Figure 2.3 shows that Dubai collects much less revenue than the large European hub airports for a similar set of aircraft movements and passengers. Visit costs at Dubai have however increased most rapidly of all the benchmarked airports between 2003 and 2015.

The Gulf hubs have also developed extensive duty-free facilities, the sales of which are used to cross-subsidize airport charges. Dubai International has been the world's leading (based on total sales) duty-free retailer for a couple of years now (Cheapflights.com, 2012).

Figure 2.3 Visit costs at Dubai and Istanbul are lower than at the large European hubs



Source: Zuidberg, 2016

Note: For a fair comparison a similar set of aircraft types and passenger volumes is assumed for each airport. The set of aircraft types and passenger traffic was representative for traffic at Amsterdam Airport Schiphol (AMS).

### Lower labor costs

The favorable tax regimes in the Gulf states also help to keep costs low. O'Connell (2011) showed that labor costs of Emirates are 64% lower than those of British Airways. This difference is attributable to low income taxes in the UAE, the absence of legacy costs and the use of a low-wage workforce from India, Pakistan and Bangladesh for labor intensive tasks as well as accounting and IT services. European competitors, such as British Airways, on the other hand operate out of the most expensive cities. Furthermore, a ban on strikes and labor unions in the Gulf states ensures continuous services, whereas European carriers occasionally need to cancel flights due to strikes.

## 2.3 Impacts on competition

The expansion of the Gulf carriers and the supportive policies of their national governments are seen as major threats by incumbent carriers (Lohmann et al., 2009; Ferris-Lay, 2011). It is a general concern that the Gulf carriers will take significant market share from European, Asian and US network carriers and upset the long-haul airline market in a way that low-cost carriers did for the short-haul markets (RBS, 2011).

### Protectionism

There have been numerous accusations of the Gulf carriers receiving unfair and hidden subsidies. The oldest accusation is that the Gulf carriers must get subsidized fuel because their government owners have large oil reserves. According to some (Lohmann et al., 2009; O'Connell, 2011) fuel is indeed slightly cheaper in the region due to the proximity to oil production and refining facilities. Others (The Economist, 2010) however state that the Gulf Carriers pay slightly more for fuel at their home bases than at some international airports they fly to, due to the lack of refining capacity

in the region. The profits of the Gulf carriers have been very sensitive to oil-price increases (Attwood, 2011), which makes the accusations of subsidized fuel less obvious.

Incumbent carriers lobbied with their national governments to restrict further market access to the Gulf carriers on the basis of unfair competition. These lobbying actions have been successful in some occasions. In 2010 Air Canada instance accused the Gulf carriers of dumping excess capacity into the Canadian market (Vancouver Sun, 2010). Consequently, the Canadian government denied a request from the United Arab Emirates for additional landing rights at Toronto on the premise that there was already sufficient service between the UAE and Canadian cities. Emirates however claimed that there was room for double daily connections to Toronto, Vancouver and Calgary (McGinley, 2010). The UAE retaliated with the closure of Camp Mirage, a secret military base located outside Dubai and used to supply Canadian troops in Afghanistan. In addition, Canadian citizens would no longer receive free visas (McGinley, 2011b).

In 2012 Lufthansa appealed to its government to restrain further liberalization on the basis that competition between Germany and the UAE had been severely imbalanced (O'Connell, 2011; McGinley, 2011a). Emirates had been pushing to get landing rights in Germany's capital Berlin as well as in Stuttgart, in addition to its existing German destinations Frankfurt, Dusseldorf, Munich and Hamburg. A new connection with Berlin would offer relatively attractive routings for long-haul traffic between Berlin and Asia, compared to Lufthansa routings which contain a circuitous backtrack through Frankfurt or Munich (RBS, 2011). According to Emirates, the routes to Berlin and Stuttgart were underserved and additional flights would benefit trade, investment, tourism and employment (McGinley, 2011a). The German federal government however supported Lufthansa's position that the economic benefits of Emirates' operations are lower than when provided by a German carrier.<sup>1</sup> Days after Emirates was refused extra landing rights in Berlin and Stuttgart, it announced extra flights to Frankfurt and an upgrade of its Munich services to an A380 (Bhoynul, 2012).

Arguing for the restriction of market access remains a delicate issue. It is widely recognized that market liberalization enhances welfare and the strategies of the legacy carriers have been and are highly reliant on airline liberalization (RBS, 2011). Partnerships with the Gulf carriers also make it more difficult for incumbents to lobby against the Gulf carriers and to limit market access. Furthermore, it can be questioned whether there is sufficient ground for such measures.

### **Effective competition appears limited**

The number of markets where the Gulf carriers enjoy a competitive advantage over their competitors due to the favorable locations of their hubs appears to be limited. They will therefore only gain market share in selected markets. According to RBS (2011), the Gulf carriers are therefore not the major destabilizing force on the network carriers that some fear. Grimme (2011) found that Emirates has stimulated passenger demand between Germany and Asia, while this did not lead to reduced transfer traffic at incumbent hubs. Furthermore, IATA concluded that the Middle East carriers did not divert premium traffic away from European and Asian carriers (CAPA, 2009a).

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<sup>1</sup> The estimation of the economic benefits was restricted to the number of jobs and related income, but did not take the welfare impacts on German consumers of lower fares into account. Squalli (2014) and Sekkat (2012) showed that the liberalization of air service agreements with the UAE would lead to welfare gains.

### Playing field

The playing field at which European and Gulf carriers compete is unlevel, but this is mainly due to comparative (dis)advantages (De Wit, 2014). The comparative advantages that the Gulf carriers enjoy consist of: (1) the geographic centrality of their hubs, (2) the operation of long-haul routes with a modern fleet of widebody aircraft, (3) the operation of routes where competition from low-cost carriers is largely absent and (4) supportive governmental policy to stimulate traffic growth. As mentioned above, this includes relatively low airport charges, favorable taxation and immigration laws, pursuing liberal air service agreements and governance model which ensures that sufficient airport capacity is available at all times. These comparative advantages are however not specific to the Gulf carriers; in many aviation markets some carriers enjoy natural benefits over other carriers.

While the Gulf states put in place supportive policies to stimulate their aviation industries, European policy generally has a negative impact on the competitive position of European carriers (De Wit, 2014). Examples are the higher airport charges at European airports, high taxation burden due to national and European aviation-related taxes<sup>2</sup> and increasing congestion at European hub airports which stifle the expansion of European hub carriers. Redondi and Gudmundsson (2016) showed that congestion at London Heathrow and Frankfurt mainly led to traffic spill to competing European hubs and to a lesser extent to Gulf hubs.

The interests of the European long-haul carriers would therefore be served by leveling the playing field through the adoption of more supportive aviation policies by the EU and its member states, instead of raising protectionist barriers (CAPA, 2016).

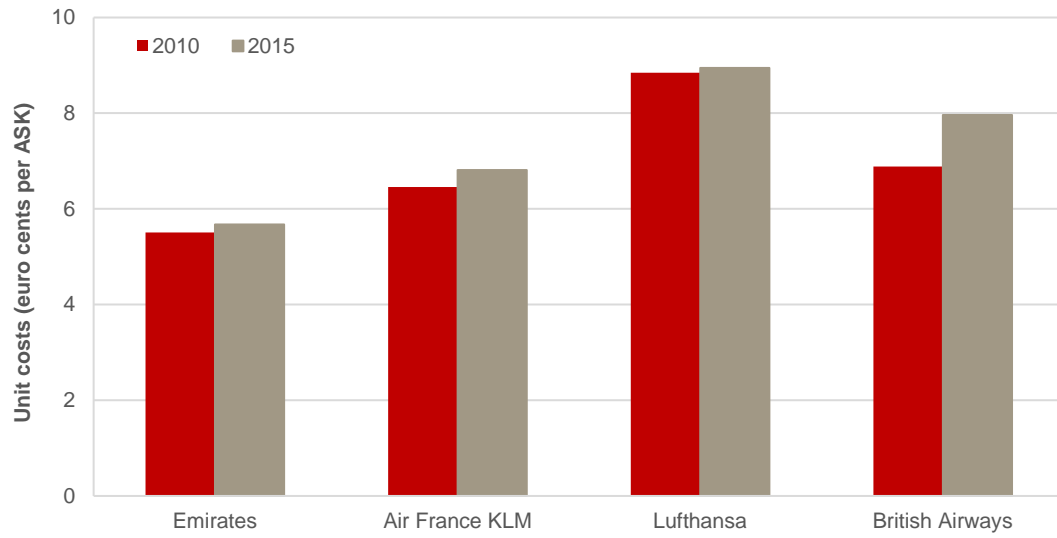
These comparative advantages give the Gulf carriers a cost advantage over their competitors (see Figure 2.4), which should allow them to offer lower fares. In addition, to place capacities, the Gulf carriers may need to adopt aggressive pricing strategies (Brützel, 2006). As mentioned above, various studies have found that the Gulf carriers did not divert traffic away from European carriers (Grimme, 2011; CAPA, 2009a). This might imply that the incumbents have had to reduce their fares to be able to withstand competition from the Gulf carriers and retain their market share.

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<sup>2</sup> The EU Emissions Trading Scheme (ETS) for instance applies to intra-European flights. In addition, national governments levy departure taxes.



Figure 2.4 Emirates operates against lower unit costs than the large European hub carriers



Source: Emirates, 2011 & 2016; Air France KLM, 2011 & 2016; Lufthansa, 2011 & 2016; British Airways, 2011 & 2016.

Note: Figures for Air France KLM exclude Transavia. Figures for Lufthansa include Germanwings and Eurowings

### 3 Literature review

*Although empirical evidence on the price impacts of low-cost carriers is abundant, few studies have looked into the price impacts of the Gulf carriers. The limited evidence that is available however does not have a European focus.*

Few empirical studies have analyzed the fare impacts of the Gulf carriers on incumbents. Grimme (2011) found that Emirates offered significantly lower fares than Lufthansa. Although Emirates had the longest travel times, it was rarely price leader. This indicates that the airline had already created a relatively strong brand position (Knorr and Eisenkopf, 2007). Hazledine (2010) studied trans-Tasman air markets and found that Emirates offered significantly lower fares than incumbent carriers Air New Zealand and Qantas, but did not exert much pricing pressure. Dresner et al. (2015) investigated the impacts of Gulf carrier entry on US carriers. They found that greater competition by the Gulf carriers has led to significant growth in the US-Middle East markets. For markets connecting the US with Africa, Asia, Australia and Europe, small but statistically significant traffic losses and fare reductions for US carriers were found. The authors expect the impacts on European and Asian carriers to be larger than on US carriers as the markets of European and Asian carriers are contested to a larger extent than those of US carriers.

Although the fare impacts of the Gulf carriers on incumbents is limited, there is abundant empirical evidence available on the price effects of low-cost carriers on incumbents. The majority of these studies focus on US air transport markets, due to availability of a public database on air fares: the Department of Transportation's DB1A/B database quarterly offers a 10% sample of the average ticket prices on US carriers. Early studies showed that fares declined by around 50 percent after the entry of Southwest Airlines (Windle and Dresner, 1995; Dresner et al., 1996; Morrison, 2001). For other low-cost carriers (Fisher and Kamerschen, 2003; Windle and Dresner, 1995, 1999; United States Government Accountability Office, 2006) and for low-cost competition from adjacent airports (Dresner et al., 1996; Morrison, 2001; Vowles, 2001) smaller fare impacts were found. Daraban and Fournier (2008) show that incumbents reduce fares both before and after low-cost carrier entry. The most significant fare reductions however occur after entry with fares reaching a new equilibrium one or two quarters after entry. The lower fares pre-entry may be explained by incumbents trying to win market share and strengthening their positions before the low-cost carrier enters. Murakami (2011) found that fares remained at a lower level after the entry of Southwest Airlines.

A more recent study (Brueckner et al., 2013) found a smaller fare impact of 33 percent for Southwest Airlines. This indicates that the fare impacts may decrease over time. Ben Abda et al. (2012) and Wu (2013) showed that the fare differences between low-cost and network carriers has narrowed over time. Maillebiau and Hansen (1995) found that the yield impact of liberalization may have diminished over time. One explanation for this is that network carriers responded to the low-cost carrier threat by restructuring, cutting costs and increasing productivity. Simultaneously low-cost carriers expanded their networks into more congested and smaller markets. This has led to a convergence in unit costs and fares between the two carrier types (Tsoukalas et al., 2008).

The fare impacts of low-cost carriers on European routes has been researched by Alderighi et al. (2012). They used monthly air fares from the Galileo reservation system that the entry of low-cost on city-pairs from Italy to three European countries (Germany, the UK and the Netherlands) reduced fares for both business and leisure passengers in a uniform way. Gillen and Hazelidine (2015) showed that low-cost carriers charge lower fares on regional routes. This has not led to a large price decline among the incumbents, although prices declined somewhat as a result of increased market competition.

## 4 Model and data

*Econometric models are specified for the OD- and connecting markets served by the Gulf carriers to determine whether they offer lower fares than incumbents in these markets. The models correct for competition level, direct and indirect travel, booking horizon, seasonality and route specifics.*

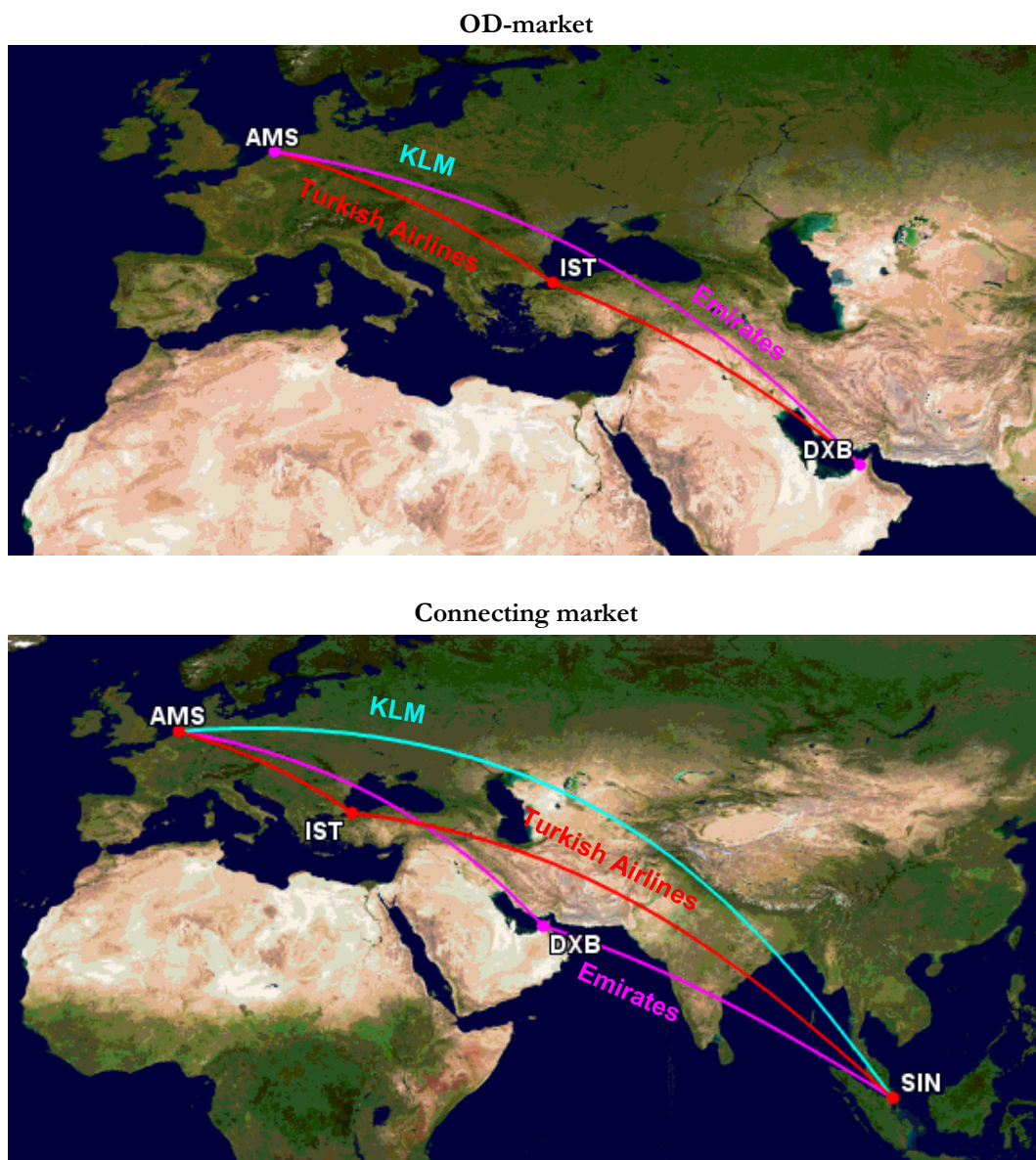
To determine whether the Gulf carriers charge lower fares than incumbent carriers, we test the following model:

$$\begin{aligned}
 \ln Price = & \alpha_0 + \alpha_1 \cdot \ln Comp + \sum_{i=1}^j \beta_i \cdot D_{Carrier\ type_i} \cdot D_{Direct/Indirect} \\
 & + \sum_{k=1}^l \gamma_k \cdot D_{BookingHorizon_k} + \sum_{m=1}^{12} \delta_m \cdot D_{Month_m} + \sum_{n=1}^o \varepsilon_n \cdot D_{Year_n} \\
 & + \sum_{p=1}^q \eta_p \cdot D_{Route_p}
 \end{aligned} \tag{1}$$

Depending on the market, the Gulf carriers either offer direct or indirect flights. In the OD-markets to and from their hubs, they compete head-to-head with direct flights of incumbents. An example is the Amsterdam-Dubai market which is directly operated by both KLM and Emirates (and also indirectly by other carriers, such as Turkish Airlines via Istanbul). Second, there are the markets connected by the Gulf-hubs. In these markets the Gulf carriers offer indirect flight alternatives, whereas incumbents may also offer direct flights alternatives. The Amsterdam-Singapore market for instance is directly operated by KLM and Singapore Airlines, whereas the Gulf carriers and numerous other carriers offer indirect travel alternatives. This is illustrated by Figure 4.1.

As mentioned above, indirect travel is less attractive due to a more circuitous flight and the inconvenience of an intermediate transfer. To compensate for the lesser attractiveness, tickets for indirect travel alternatives are generally priced lower than tickets for direct flights. This means that the Gulf carriers may charge higher fares in OD-markets where they offer a direct service and a competitor offers an indirect service. In the connecting markets they may offer lower fares than incumbents that compete with a direct service. To take this into account, we estimate separate models for OD- and connecting markets served by the Gulf carriers and distinguish between direct and indirect travel.

Figure 4.1 Illustration of OD- and connecting markets



Note: Maps made with Great Circle Mapper.

## 4.1 Dependent variable

The dependent variable ( $\ln Price$ ) is the logarithm of the return fare measured in US dollars. Contrary to the situation in the U.S., there is no public database on air fares available for tickets sold by European carriers. However, reliable data on offered fares can be gathered relatively easy from the internet. Because fares for each route were collected at various times before departure, the data allow us to correct for inter-temporal pricing patterns. This is not possible with DoT or MIDT data as these data sources only provide average booked fares.

Economy class fare data was collected for around 150 routes between February and June 2010 and again between March 2014 and February 2015 from Expedia.com and Orbitz.com using webscraping technology. The set of routes is a combination of routes operated directly (OD-markets) and indirectly (Connecting markets) by the Gulf carriers. For each route fares were collected on a weekly basis for 10 different departure dates on Mondays and Thursdays with a 6 to 7 day layover. These departure dates were 1 week to 10 months away.

The downside of using offered fares, is that it not known how much tickets have actually been booked against a certain fare. In case a carrier offers various flight alternatives at a booking date for a specific departure date, we take the alternative with the least stops, as this is generally the preferred alternative. Furthermore, when a carrier also offers multiple alternatives with equal stops, but for instance at different times, we take the lowest fare.

Offered fares generally show a large range. This is due to various reasons. First, offered fares often include fares from carriers that are not natural competitors in a certain market. Such carriers offer connections with long circuitries which are not only very unattractive in terms of travel time, but are sometimes also priced relatively high due to the long flight legs. We therefore exclude fares that are more than twice as expensive as the lowest priced fare on a certain booking date for a certain departure date. Second, offered fares include fares for interline connections between non-partnering carriers. Such connections require the purchase of separate tickets for both flight legs which makes them much more expensive than connections offered by a single hub carrier or by two partnering carriers. We therefore exclude interline connections as well.

## 4.2 Independent variables

The following dependent variables are included in the model:

### Carrier type dummies

As we are interested in the fare differences between the Gulf carriers and their European counterparts, we include a dummy for carrier type  $i$  ( $D_{Carrier\ type_i}$ ), whereby a distinction is made between the Gulf carriers (Emirates, Etihad and Qatar), Turkish Airlines as an important other competitor in the markets contested by the Gulf carriers and other carriers.

### Direct connection dummy

Indirect travel alternatives are less attractive than direct alternatives, due to additional travel time<sup>3</sup> and the inconvenience of transferring at an intermediate hub airport. Carriers compensate passengers for this by pricing indirect alternatives lower than direct alternatives. We therefore cross the carrier type dummies with a dummy for direct and indirect flight connections ( $D_{Direct/Indirect}$ ).<sup>4</sup>

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<sup>3</sup> Grimme (2011) for instance showed that in markets between Germany and Asia, the travel times via Dubai are longer compared to one-stop connections via Frankfurt or Munich. This is partly attributable to more circuitous flight paths via Dubai, but also due to longer transfer times at the Gulf hub. Lufthansa and its STAR alliance partners feed their hubs with highly frequent services which allows for short transfers. Emirates on the other hand operates large widebody aircraft with lower frequencies, which lead to larger schedule delays.

<sup>4</sup> For short-haul routes, the costs of an additional stop are relatively high due to additional fuel burn and the cost of visiting an intermediate airport. Therefore indirect travel alternatives may still be priced higher than direct alternatives over short distances.

### **Competing airline groups ( $\ln$ )**

The level of competition is an important determinant of air fares. We use the logarithm of the number of competing carriers ( $\ln Comp$ ) in each airport-pair market as a proxy for competition. It is assumed that no effective competition takes place between carriers belonging to the same alliance. These carriers are therefore considered as one competing entity.

### **Booking horizon dummies**

The travel plans of leisure passengers with a relatively low willingness-to-pay are generally known well in advance, whereas the travel plans for business passengers with a high willingness-to-pay are often only known a few weeks or even days before departure. Airlines take advantage of these different booking patterns and willingness-to-pay by applying inter-temporal price discrimination, i.e. charging lower fares for tickets booked well in advance of the departure date and higher fares for tickets booked close to departure. To capture this inter-temporal price discrimination, we use dummies ( $D_{BookingHorizon_i}$ ) for bookings made 0-7 days, 1-2 weeks, 2-4 weeks, 4-8 weeks, 8-16 weeks and more than 16 weeks before departure.

### **Month and year dummies**

To capture seasonality effects we include dummies for the month  $m$  ( $D_{Month_m}$ ) and year  $n$  ( $D_{Year_n}$ ) of departure.

### **Route dummies**

There may also be other route specific factors that are difficult to capture by generic variables. Examples are the level of market liberalization on a route or differences in airport and ATC charges. To capture route specific factors, we include dummies ( $D_{Route_p}$ ) for each airport-pair  $p$  in the sample. An important determinant of air fares is the flight distance. The route dummies capture the impact of distance; therefore distance is not included in the model as a separate independent variable.

## 5 Results

*In the OD-markets the Gulf carriers and incumbents charge similar fares for direct flights. In connecting markets where both the Gulf carriers and the incumbents offer indirect flight, the Gulf carriers offer lower fares. The price difference has decreased since 2010. Turkish Airlines offers lower fares for indirect alternatives in both the OD- and connecting markets and therefore seems a larger threat than the Gulf carriers.*

### 5.1 OD-markets

The model results for the OD-markets are presented in Table 5.1. In the model based on the 2010 data, the dummies for direct flights offered by the Gulf carriers and Turkish Airlines are not statistically significant, which implies that the fares charges by these carriers for direct flights are similar to those of the incumbents.

As mentioned above, it is expected that indirect travel alternatives are priced lower than direct alternatives to compensate for the more circuitous travel and the inconvenience involved with an intermediate transfer. This however only seems to be the case for Turkish Airlines, which charges almost 20% lower fares on indirect flights to the Gulf hubs, compared to the direct and indirect alternatives offered by the incumbents and also compared to Turkish Airlines' own direct flights.

In the model based on the 2014-2015 data, the dummy for direct flights offered by the Gulf carriers remains statistically insignificant. The Gulf carriers therefore still offer similar fares on direct flights as the incumbents. The dummies for indirect travel alternatives are now all statistically different from zero. Turkish Airlines still offers the lowest fares for indirect alternatives; their indirect flights are priced 12% lower than the direct flights of the incumbents and the Gulf carriers. The Gulf carriers and incumbents have however significantly closed the price gap with Turkish Airlines as they respectively charge 5% and 7% lower fares than on direct flights. This also means that the indirect offerings of the incumbents are priced slightly more attractive than those of the Gulf carriers.

The coefficients for the number of competing airline groups are significant, but do not have the expected signs. As more competing airlines would imply more competition and lower fares, we would expect the signs to be negative. The positive signs indicate that the number of competing airline groups is not a good proxy for competition. Instead it might be a proxy for the size of the market, where fares are higher in markets with higher demand.

The booking horizon dummies are mostly significant and have the expected signs. Tickets become more expensive when booked closer to the departure date. In 2010 tickets were least expensive when booked 4-8 weeks before departure. In 2014-2015 fares were lowest when booked around 8-16 weeks before departure. Fares appeared higher for tickets booked more in advance. Tickets bought close to departure are generally booked by business passengers who cannot postpone their travels and with a high willingness-to-pay. Leisure passengers often believe that purchasing tickets



early always guarantees them the best deal. Airlines take advantage of this misbelief by charging higher fares for tickets bought well in advance.

**Table 5.1 Regression results for OD-markets**

Dependent variable Return fare (ln) in USD Dataset	Models	
	2010	2014-2015
<b>Constant</b>	6.5463 ***	7.3449 ***
<b>Competing airline groups (ln)</b>	0.3786 ***	0.1364 ***
<b>Carrier dummies (reference: other carriers direct)</b>		
Gulf carriers (direct)	0.0027	-0.0228
Gulf carriers (indirect) <sup>▲</sup>	-0.0683	-0.0540 *
Turkish Airlines (direct)	-0.1632	
Turkish Airlines (indirect)	-0.1963 **	-0.1227 ***
Other carriers (indirect)	0.0575	-0.0715 ***
<b>Booking horizon dummies (reference: bookings made 0-7 days before departure)</b>		
> 16 weeks before departure	-0.0533	-0.0256 *
8-16 weeks before departure	-0.1031 ***	-0.1410 ***
4-8 weeks before departure	-0.1191 ***	-0.1360 ***
2-4 weeks before departure	-0.1040 ***	-0.1039 ***
1-2 weeks before departure	-0.0927 **	-0.0855 ***
<b>Month dummies (reference is March in 2010 and January in 2014-2015)</b>		
February		0.0147 **
March		0.0291 ***
April	-0.0051	0.0171
May	-0.1139 **	-0.0274 *
June	-0.1324 **	0.0291
July	-0.0813	0.0929 ***
August	-0.1363 ***	0.1367 ***
September	-0.2198 ***	-0.1143 ***
October	-0.2229 ***	-0.1362 ***
November	-0.1716 **	-0.2154 ***
December	-0.1424 *	-0.026
<b>Year dummies (reference is 2014)</b>		
2015		-0.2895 ***
<b>Route dummies (suppressed)</b>		
Observations	17,942	171,646
R <sup>2</sup>	0.7489	0.7343

Legend: \* p<0.05; \*\* p<0.01; \*\*\* p<0.001

<sup>▲</sup> The Gulf carriers may offer indirect alternatives to each other's hubs. In the Amsterdam-Dubai market, for instance, Qatar Airways may offer an alternative via its hub in Doha.

The monthly dummies show that economy class fares are most expensive early in the year and in the summer months when many people celebrate their summer holidays. Finally, the yearly dummies for 2015 indicate that economy and business class fares were significantly cheaper in 2015 than in 2014. This may be attributable to the fact that the price of aviation fuel has significantly declined between 2014 and 2015.

## 5.2 Connecting markets

In the connecting markets, the Gulf carriers compete with indirect flights. Therefore the dummy for their direct flights is omitted from the model. The same holds for the dummy for direct flights by Turkish Airlines as no connecting markets are included in which Turkish Airlines offers a direct flight alternative.

The regression results on the 2010 data show that the Gulf carriers charged their indirect flights around 8% lower than direct flights of the incumbents. This can be regarded as a compensation for the more circuitous flight and inconvenience involved with an intermediate transfer. What is more interesting is whether the Gulf carriers also charge lower fares in the connecting markets in which they compete with incumbents on an equal basis, i.e. in markets where incumbents also offer indirect travel alternatives. This indeed seems to be the case. Surprisingly the incumbents priced their indirect flights higher than their direct flights. Also Turkish Airlines charges higher fares than the fares for direct flights of incumbents. This might be caused by the competition variable not picking up the entire competition effect. When Turkish Airlines operates in less competitive markets than its competitors, part of the competition effects ends up in the carrier dummy.

The results based on the 2014-2015 fare data show that the fares of the Gulf carriers in the connecting markets are still significantly lower than those of direct flights offered by the incumbents. In fact, the price difference has increased from 8% to almost 12%. The dummy for indirect flights of the incumbents is no longer statistically significant, which means that the indirect offerings of these carriers are priced similarly as their direct offerings. The sign of the dummy for Turkish Airlines has become negative. This implies that the carrier now also offers lower fares on its indirect flights than the incumbents on their direct and indirect flights. The fare difference is almost 15 percent, which means that Turkish Airlines offers lower fares on indirect travel alternatives than the Gulf carriers.

Also in the connecting markets, fares are lower for bookings made up to 16 weeks before the departure date as well as early in the year and during the summer season. Here we also witness lower fares for departures in 2015 compared to 2014.

Table 5.2 Regression results for connecting markets

Dependent variable Return fare (ln) in USD Dataset	Models	
	2010	2014-2015
<b>Constant</b>	7.1191 ***	7.3051 ***
<b>Competing airline groups (ln)</b>	0.2648 ***	0.1056 ***
<b>Carrier dummies (reference: other carriers direct)</b>		
Gulf carriers (direct)		
Gulf carriers (indirect)	-0.0776 ***	-0.1171 ***
Turkish Airlines (direct)		
Turkish Airlines (indirect)	0.0578 *	-0.1465 ***
Other carriers (indirect)	0.0701 ***	-0.0399
<b>Booking horizon dummies (reference: bookings made 0-7 days before departure)</b>		
> 16 weeks before departure	-0.1095 ***	-0.0402 **
8-16 weeks before departure	-0.1516 ***	-0.1133 ***
4-8 weeks before departure	-0.1398 ***	-0.1007 ***
2-4 weeks before departure	-0.1101 ***	-0.0791 ***
1-2 weeks before departure	-0.0797 ***	-0.0485 ***
<b>Month dummies (reference is March in 2010 and January in 2014-2015)</b>		
February		0.0468 ***
March		-0.0212 **
April	0.0084	-0.0127
May	-0.0829 ***	-0.0927 ***
June	-0.0650 ***	-0.0823 ***
July	0.0562 **	0.1058 ***
August	0.0569 **	0.0878 ***
September	-0.1296 ***	-0.1509 ***
October	-0.1759 ***	-0.1540 ***
November	-0.1994 ***	-0.2492 ***
December	-0.1275 ***	-0.1179 ***
<b>Year dummies (reference is 2014)</b>		
2015		-0.3170 ***
<b>Route dummies (suppressed)</b>		
Observations	158305	89367
R <sup>2</sup>	0.6229	0.6267

Legend: \* p<0.05; \*\* p<0.01; \*\*\* p<0.001

## 6 Conclusions

*The incumbents are able to compete with the Gulf carriers on price in the OD-markets. In the connecting markets where the incumbents compete with the Gulf carriers on an equal basis, i.e. with indirect flights, the incumbents have become more competitive since 2010.*

The Gulf states are developing their aviation industries as part of broader strategies to reduce their economic dependence on oil. Governments have set up their own national hub carriers and put in place favorable policies to support the development of their aviation industries. The hub carriers capitalize on the geographic centrality of their hub airports from which they can connect any two points in the world with long-range aircraft. This allows these carriers to engage in route development in every hemisphere and operate at lower unit costs than their European rivals. The cost advantage should allow them to offer lower fares than their competitors.

In this paper we investigated whether incumbent carriers are able to compete on price with the three main Gulf carriers, Emirates, Etihad and Qatar Airways. Econometric models were formulated for the OD- and connecting markets served by these carriers to determine whether they offer lower fares than incumbents in these markets. The models correct for competition level, direct and indirect travel, booking horizon, seasonality and route specifics.

In the OD-markets the Gulf carriers and the incumbents offer similar fares for direct flights. Indirect alternatives offered by incumbents are priced lower than those of the Gulf carriers. In the connecting markets the fares of indirect alternatives offered by the Gulf carriers are lower than the fares of direct alternatives of the incumbents, which can be seen as a compensation for the additional travel time involved and the inconvenience of transferring. The fare difference has widened between 2010 and 2014-2015. The fare difference in markets in which both carrier types compete with indirect alternatives has however narrowed. In both the OD- and connecting markets Turkish Airlines offers lower fares for indirect flight alternatives than the incumbents and the Gulf carriers. The Turkish carrier therefore seems to be a larger threat to the incumbents than the Gulf carriers.

These results show that the incumbents are able to compete with the Gulf carriers on price in the OD-markets. In the connecting markets where the incumbents compete with the Gulf carriers on an equal basis, i.e. with indirect flights, the incumbents have become more competitive since 2010. Whether the incumbents responded by cutting costs and increasing productivity, similar to their response to the low-cost carrier threat, or simply by reducing their profit margin requires additional research. Further research is also required to determine the fare differences between the incumbents and the individual Gulf carriers.

The econometric models can be improved by including a better competition measure as well as a measure for the size of each market. The recently acquired MIDT database allows for the calculation of market shares based on passenger booking data as well as to determine the size of each OD- and connecting market.

## 7 Literature

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