Impact of Middle East Emerging Carriers on US and EU Legacy Airlines

by

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Abstract

Airlines in the Middle East have captured significant attention from governments, media and consumers over the past decade. By building large networks that facilitate international connections at their hubs, Middle East carriers are able to compete in a wide range of origin destination markets around the globe. Three of these carriers stand out with their recent expansion to European, US and Asian destinations: Emirates, Etihad Airways and Qatar Airways, also known as the ME3 carriers.

From a capacity perspective, ME3 airlines have grown very rapidly on routes where they compete with US and European airlines. Over the 2010-2015 period, from Europe to the ME, ME3 airlines increased their seat capacity by 97% against a 1% reduction by European legacy carriers. At the same time, ME3 carriers increased the number of seats from the US by 181% while, as of 2017, US carriers have cut all flights to the Middle East, with the exception of Israel. In addition, ME3 capacity to Asia, and in particular to India, grew significantly.

From a traffic perspective, ME3 carriers have had a significant impact in markets beyond the Middle East. Passenger traffic in the EU-India and US-India markets grew by 14% and 26% respectively since 2010. Most of the growth was driven by ME3 carriers, allowing them to reach 26% and 37% market share in these markets in 2015. The ME3 capacity growth likely stimulated the overall demand in markets to India but has also caused some diversion of traffic away from nonME3 carriers. In a two-way fixed effect econometric model, we estimated that the presence of ME3 carriers in average EU-India and US-India markets diverted, respectively, 20% and 32% of nonME3 traffic to ME3 carriers.

The growing influence of ME3 carriers has led to significant controversy over claims of subsidies and unfair competition from both US and ME3 airlines. Based on a brief review of the various claims, we found that both sides have received government backing. It is difficult to determine whether either of the parties have violated established competition rules while benefiting from this support. Nonetheless, the dispute is likely to continue, if not for legal purposes at least for public relations and political purposes.

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Chapter 1 Introduction

1.1 Situation of the Global Airline Industry

Commercial aviation has grown to become one of the largest modes of transportation by passenger mile in the world. In 2015, the International Air Transportation Association (IATA) reported over 3.5 billion passenger segments. To put this figure into perspective, the World Bank reported in 2015 a global population of 7.34 billion[1].

Aviation reached such high levels of traffic through very rapid growth. There were 240 million more passenger segments in 2015 than 2014, the equivalent of more than the entire Brazilian population. Over the years, growth has come from different countries. Initially commercial aviation was largely focused on developed economies such as North America and Europe but quickly markets with high demands in Asia showed significant potential. Vast countries with large populations such as China or India were able to quickly grow their air traffic. More recently, the strategic positioning of certain countries such as the UAE or Qatar has allowed them to grow through connecting traffic, independently of local demand.
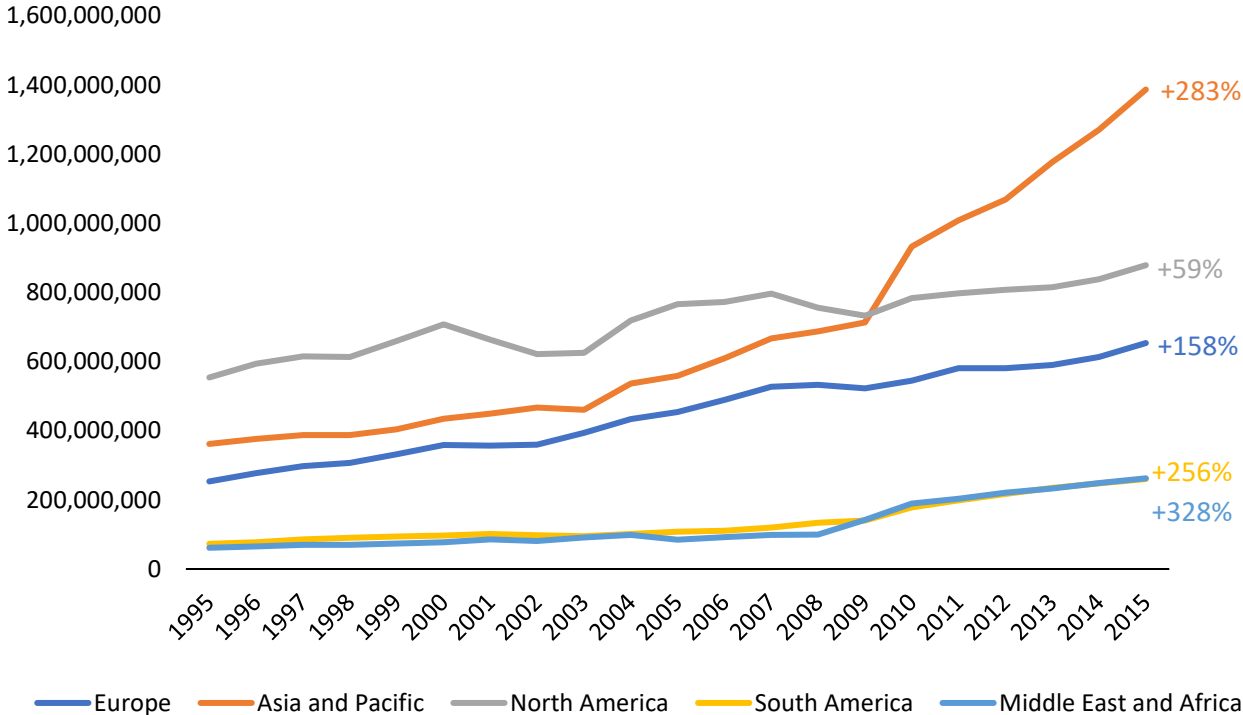
Figure 1.1: Yearly passengers by world region between 1995 and 2015[2]

Figure 1.1 describes the number of air passengers annually by region. Air passengers carried include both domestic and international passengers of air carriers registered in the region. The graph shows that traffic on air carriers from all five regions has grown significantly over the past twenty years. As discussed, the more recent growth has come mostly from Emerging economies in Asia and then in the Middle East and Africa. Since 1995, these regions combined have generated over 57% of the growth in global air traffic.

Africa and the Middle East particularly grew between 2008 and 2015. Over these years, this region, that represented just 4% passenger share in 2008, generated over 13% of the total growth in passengers.

Table 1.1: Evolution in global commercial aviation capacity between 2004 and 2015[3]

	2004	2015	% Change
# of Airlines	721	744	+3.2%
Destinations	17,140	23,214	+35.4%
Seats	3.0bn	4.7bn	+56.7%
Flights	26.4m	33.4m	+26.5%
Seats/flight	114	140	+22.8%

Table 1.1 shows that the growth in passengers was accommodated by a combination of increased flights and aircraft sizes. The total number of airlines has not evolved much, although the nature of the competitive landscape did change significantly, as will be seen later. New flights have allowed the number of destinations to increase very significantly by distributing flights over much larger networks. In just 11 years, the number of cities served by commercial aviation increased by over a third.

In addition, several factors have led to increasing aircraft sizes. Among others, jet fuel price and competitive concerns have driven larger aircraft capacities, so reduced costs per seat mile. From increasing sizes of short to medium haul aircraft such as the A320 (Neo program), the 737 (the Next generation program) to launching larger aircraft models for medium to long haul routes such as the A350 Extra Wide Body, the 787 Dreamliner or the super jumbo A380, aircraft manufacturers have provided airlines with planes that increase seats per flight for all stage lengths. As a result, more passengers were given access to air transportation.

Forecasts indicate that these growth trends will continue in the next twenty years. IATA believes the Asia-Pacific region will maintain its dominance with 1.8 billion additional passengers per year in 2035, equivalent to an average yearly growth rate of 4.7%, second highest after the Middle East. The Middle East is expected to grow on average at 4.8% per year to reach 414 million passengers in 2035. At the same time, N. America and Europe are also expected to grow but to a much lesser extent, with 2.8% and 2.5% average annual growth. This will keep them in second and third position but with a lower share than what they enjoy today[4].

1.2 Profitability of the Airline Industry

In May 2013 Warren Buffet famously said the airline industry "has been a death trap for investors". Yet in 2016 Berkshire Hathaway, Buffet's fund, acquired $1bn worth of shares in American Airlines, and $300m in both Delta and United[5]. This change in position is representative of the periodicity of airline industry economics.

In 2015 airline net profits worldwide accumulated to $35.3 billion. The profits however were not distributed evenly. North American airlines received $22.9 billion in profits while European and Asia-Pacific carriers received around $7.5 billion each. On the other hand, Middle East and African airlines were expected to face losses of $1.6bn and $500m respectively. The reason for these differences is tightly linked to the oil price evolutions. With lower oil prices in 2015 the cost competitiveness of Middle East and African airlines was dampened and the strength of their local economy was significantly impacted.

Overall this corresponds to a net profit margin of 5.6%. This is quite low relative to tech companies like Apple or Facebook with around 20% or 30% net margin but compared to large industrials such as BP or Exxon, with 3% profit margin, or compared to the industry's past this appears as attractive returns.
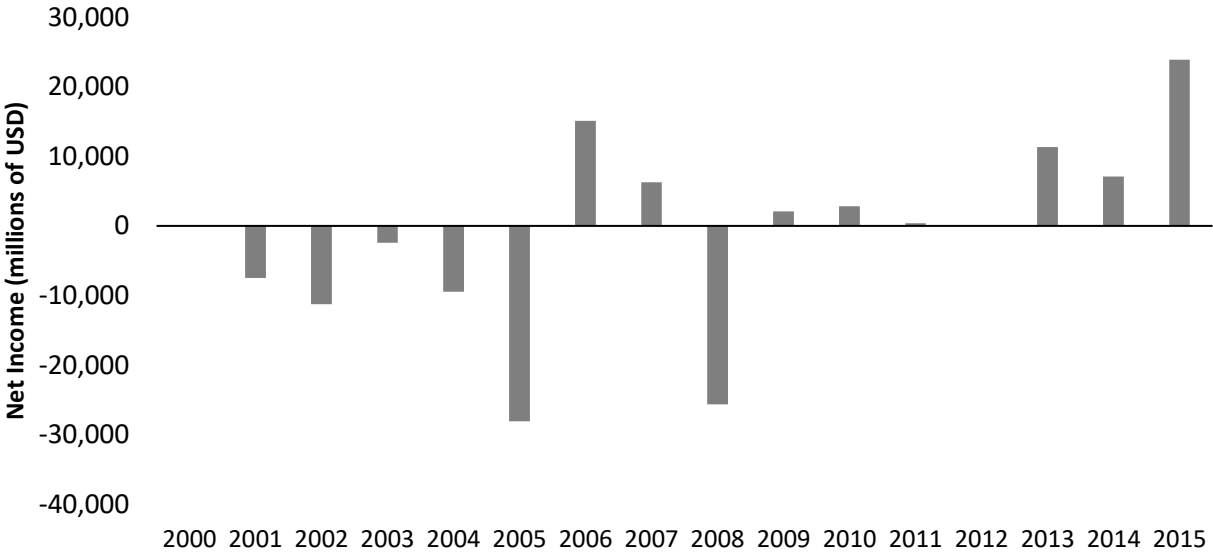
Figure 1.2: US Airlines Net Income in millions of USD [6]

Figure 1.2 clearly shows the irregular financial performance of airlines. With between 20 to 33% of their costs associated with fuel, the variability of oil prices has direct consequences on airline financial performance. In order to deal with this uncertainty airlines have often tried to hedge their positions on fuel in the past. This protection against peak prices benefitted carriers like Southwest when prices rose in 2008-2009: Southwest was the only profitable US airline in 2008[6]. However, when fuel prices dropped this strategy costs billions of dollars to the industry. Southwest for instance admitted to losing over $254m from oil hedging in 2015[7].

1.3 Recent Industry trends

In 1978, the deregulation of US airlines was the first step towards liberalizing the air transportation industry. From then onwards airlines in many countries were free to set their fares, select their markets: essentially, to run as businesses. The deregulation immediately created competition and led to new objectives for airline managers. In this environment, airlines could compete by differentiating themselves on 1 – Frequency of flights 2 – Ticket price and 3 – Quality of service. Profitability, yield, load factor became the key metrics to judge an airline's performance.

Empirical studies have shown frequency share on a route has an S curve relationship with market share: at levels of frequency share above 50%, market share is higher than frequency share. As a consequence, at frequency shares below 50%, market share is below frequency share. Airlines therefore fought for frequency in order to gain market share. This resulted in rapidly increasing number of flights.

Then in order to grow their capacities and profits, airlines also grew their networks to include more destinations. For years the US carriers focused on increasing network size and frequency share on each route. The hub and spoke model is a clear consequence of these efforts. Fewer planes give access to a

larger network while offering higher leg frequencies than a point to point model. With just one additional city, hundreds of new OD markets are added to the airline's hub network.

While the frequency share model encouraged unstoppable capacity growth, the second factor differentiating airlines started playing an increasingly important role: Ticket price. As US legacy players kept on growing with only a focus on frequency, Southwest offered an entirely new value proposition: offer point to point service at much cheaper prices and simpler fare structures. The same way Ford had decided to mass produce the Ford T, Southwest wanted to mass produce air transportation. Targeted customers weren't business passengers with tight schedules anymore but leisure passengers less sensitive to frequency. This was the beginning of Low Cost Carriers (LCCs).

In the US and Europe many other airlines such as EasyJet and Ryanair followed Southwest's business model. As newer carriers, these airlines offering point to point services, maximized their operational efficiency and benefitted from significantly lower costs. Their newer planes required lower maintenance, consumed less and had shorter turnaround times. Also, younger staff had lower salaries and less pension plans to finance. Finally, leisure passengers were fine with lower quality of service and preferred the simpler fare structures with less restrictions. Overall this allowed the LCCs to price their tickets cheaper and take market share away from the expanding legacy airlines.

Table 1.2: US legacy airlines main bankruptcies

Code	Airline Name	File 11	Date Filed
DL	Delta Airlines	YES	9/14/2005
AA	American Airlines	YES	11/29/2011
UA	United Airlines	YES	12/9/2002

As LCCs grew the legacy players faced decreasing market share and eventually, in many cases, bankruptcy (Chapter 11 in the US) as shown in Table 1.2. The US airlines used the advantages conferred under Chapter 11 to restructure themselves to reduce costs and improve operational efficiency, with the objective of adapting to LCC competition. The fare structures implemented by LCCs were also copied by legacy airlines. Despite improving the financial performance of the companies this often wasn't enough to fully recover from the LCC competition. The next step for the three airlines listed above; the last three US legacy players; was consolidation. Delta merged with Northwest (2008), American with US Airways (2013) and United with Continental (2010). Across the Atlantic, European carriers also needed restructuring, Air France and KLM merged in 2004, Lufthansa acquired Swissair in 2008 and British Airways acquired Iberia in 2010. These consolidations were critical for these groups to maintain profitability or at least limit their losses.

Prior to these consolidations, legacy airlines had joined alliances with airlines from abroad. Many of the advantages from consolidations were already in alliances: generate higher revenues from a larger customer base and network, and reduce costs through economies of scale. In addition to these, alliances were popular as they allowed to expand the network abroad with far fewer risks. Today three main global alliances exist: SkyTeam (Delta, Air France-KLM), Star Alliance (United, Lufthansa) and OneWorld (American, British Airways). These alliances were launched between 1996 and 1999 and each has at least 15 partners spread around the globe. The most common way to operate these partnerships is through code sharing: airlines share capacity on a given flight.

Despite the economies of scale from alliances and consolidations, in the US, legacy carriers still faced significant challenges. Not only had LCCs grown and oil prices peaked in 2008, but demand also reduced due the economic crisis. Figure 1.1 shows a significant dip around 2008 in number of passengers traveling in North America. Only 2001, following the 9-11 attacks, had seen a similar decrease. Legacy carriers responded through "capacity discipline". Between 2007 and 2010, flight and seat departures reduced, as expected given the recession. After 2010, once oil prices had dropped and the US economy started rebounding, growth in departures was very low or negative. Airlines focused more on their revenue management strategies than on their network expansions and frequency shares, which had been the key metrics for years. The priority became to increase load factors again, and fill seats with higher fare passengers. This strategy increases LF and yield simultaneously. Frequencies were reduced, as well as capacities for leisure passengers, and some airports lost service.

As legacy carriers, consciously reduced capacity for leisure passengers, LCCs could serve this base more easily. However, due to the aging of their staff and aircraft, new entrants penetrated and took advantage of the environment: Ultra Low Cost Carriers. The advantages of ULCCs when they entered were very similar to those of LCCs. In fact, some LCCs have become ULCCs (e.g. Ryanair) while some new ULCCs just recently entered the market (e.g. WOW Air). The way ULCCs differentiate themselves is through increasing the importance of ancillary revenue, serving remote airports and, as LCCs, relying on newer aircraft and younger staff. These lower costs allowed ULCCs to offer capacity at prices affordable for leisure passengers ignored by legacy carriers.

The different economic and legal constraints in Europe prevented legacy airlines from benefiting from Chapter 11 clauses. Instead the legacy airlines have had to respond by launching their own in-house LCCs (e.g. Eurowings, Transavia, Vueling). These airlines compete head to head with European LCCs and ULCCs such as Easyjet and Ryanair.

The threats from ULCCs and LCCs are mostly concentrated on short to medium haul flights. For many years, international long hauls appeared as the markets with least competition for legacy airlines. Airline yields were therefore significantly higher in these markets. However, a new type of competition appeared in these markets, with a very different model to that of LCCs but with similar consequences for the legacy carriers: the Middle East Emerging Airlines.

ME Emerging Airlines rely on their strategic positioning to offer long haul flights heavily based on a hub and spoke model. In this thesis, the airlines referred to as ME Emerging Airlines/carriers or ME3 airlines/carriers will be the three Middle East airlines Emirates, Etihad and Qatar. Within a 10h flight range these cities reach over 80% of the world population[8]. Therefore, by connecting passengers through their hubs they can compete with US and European legacy carriers in almost all their long haul international OD markets. With government ownership and public funding supporting them, these airlines currently see no limit to their growth. In less than 15 years they have become among the world's largest, in capacity and seats. In Figure 1.1 we can see very clearly their impact on the growth of traffic from the Middle East, region with the highest growth since 1995 and with the highest predicted growth until 2035.

Thus, over the past twenty years, legacy airlines from Europe and the United States have suffered domestically from LCC competition and more recently internationally from ME Emerging airlines. The response to the domestic LCC competition has been to copy their models, either with the help of Chapter 11 clauses or by launching in-house LCC airlines, hence copying the LCC model. For the international competition, the response has been very different. Legacy airlines have expressed the desire to limit the

presence of these airlines in markets originating or terminating in the USA or Europe by reducing their authorized flights in and out of the USA and Europe. These regulations depend on agreements between nations.

1.4 Bilateral Issues

The 1944 Chicago Convention defined the first five freedoms of the air (now there are 9). These freedoms express the rights that an airline from a country can enjoy in other countries. Between 1992 and 2015 the US Department of State has granted all nine freedoms to over 100 countries. This type of agreement is known as an "Open Skies Agreement". In 2002 the United States signed these agreements with the UAE and Qatar, home of the ME Emerging airlines. Since then, Qatari and UAE airlines are free to fly to and from the US without any particular approval from anyone. In Europe, the current air traffic agreements with the UAE and Qatar have been signed at a country level. France and Germany for example each have a determined number of flights for UAE and Qatar airlines in and out of the country.

US vs ME3 Carriers

Since signing the Open Skies agreements with Qatar (2002) and the UAE (2002), these two states have seen significant growth from their flag carriers Emirates (EK), Etihad (EY) and Qatar Airways (QR) to the United States. The rising capacities from these three airlines have significantly impacted the competitive environments they serve. This competition has particularly affected the US carriers who in response accused the ME3 of unfair competition from state subsidies. In January 2015, the three US legacy carriers published a Whitepaper to convince the Obama administration to review the Open Skies agreement with the ME Emerging carriers' home nations.

In response, the ME3 airlines addressed the subsidy points made in the White Paper to disprove them and showed areas where US carriers themselves benefited from government subsidies. They extensively demonstrate the benefits of Open Skies agreements to the US. The main aspect they defend is the expansion of the network they have provided to American consumers. They believe they have stimulated the market, not only on their planes but also on American flag carriers' planes through passengers flying to the US with an ME3 and then flying within the US on a flag carrier; passengers who without the ME3 would never have come to the US[9].

EU vs ME3 Carriers

Given that the agreements with the UAE and Qatar are held at a national level, European legacy carriers initially attacked the ME3 carriers via their own national media channels. They accused the ME Emerging airlines of state subsidies and unfair competition. However, in June 2014 the CEOs of Air France-KLM and Lufthansa wrote a common letter to the European Commission asking for the development of clear and fair rules for the ME Emerging airlines. At the time, they were particularly preoccupied by Etihad's investments in European airlines and wanted to guarantee these actions were compatible with European rules[10].

In June 2016, the European Commission finally adopted mandates allowing the Commission to begin negotiating with Qatar and the UAE on an EU level aviation agreement. The objective is to improve market access while guaranteeing fair competition.

1.5 Thesis Objective

The principal objective of this thesis is to evaluate the impact of the growth of ME Emerging carriers Emirates, Etihad Airways and Qatar Airways on the European and US legacy airlines. Two sets of data will be used to quantify these effects. The first is airline schedule data which records capacities on all flights from nearly every airline in the world. The second is passenger data estimated by Amadeus in their Travel Intelligence package. The ultimate aim will be to determine with a quantitative approach whether the presence of ME3 airlines has stimulated or diverted demand from other carriers.

1.6 Thesis Structure

The next Chapter will describe the ME Emerging carriers. For each of the three airlines, their history, networks, fleets, alliances and other characteristics will be presented. Chapter 3 will focus on the evolution of capacities by region. Analyzing the changes in capacity from the European, US and ME Emerging carriers in each region impacted by the ME3 airlines will be a first step in understanding the growth of Emirates, Etihad, and Qatar and the response of their competitors. Capacities on routes between the US and the ME as well as between Europe and the ME will be analyzed. Given the importance of the ME Emerging airlines in OD connecting traffic originating in Europe and the US with destinations beyond the ME, capacities on routes to SE Asia and the Indian Subcontinent will also be reviewed. Chapter 4 will then turn to actual passenger data estimated by Amadeus. This Chapter will review the impact of growing ME Emerging airlines on the US-India and Europe-India OD traffic. India was selected as it is the Asian country most targeted by the ME Emerging carriers' growth. Chapter 5 will specifically quantify through an econometric model whether the presence of ME3 carriers has stimulated or diverted traffic from nonME3 airlines in the US-India and Europe-India markets. Finally, Chapter 6 will look into the policy debate surrounding ME Emerging airlines, mostly from the US perspective. We will briefly review the subsidy claims made by both US and ME3 airlines.

Chapter 2 Middle East Emerging Carriers

2.1 Introduction

Over the past decade, the 3 Middle East airlines Emirates, Etihad Airways and Qatar Airways have grown to become major players in global air transportation. The three airlines are commonly referred to as the "Middle East Emerging Carriers" or "ME3". The thesis will follow the same nomenclature to identify them. The "Emerging Carrier" expression reflects their very recent growth. All three airlines were founded 30 years ago, or less, and have shown over 10% annual ASM growth over the past ten years. They are now all part of the top 20 airlines worldwide by traffic and are forecast to keep similar growth rates, making Emirates the largest airline globally by traffic in 2020. The three airlines are also all positioned in the Middle East, which offers them a unique positioning to reach most of the world's population. As a result of these characteristics, the three players have captured significant attention from the industry, the media and governments. Table 2.1 below gives a sense of the very recent impact of these three airlines.

Table 2.1: ME Emerging carriers information [11]

	Emirates	ETIHAD AIRWAYS	QATAR AIRWAYS
Country	UAE	UAE	Qatar
Founded	1985	2003	1993
ASM CAGR 2006-16	12.2%	17.7%	15.7%
Passengers in 2015	51.9m	17.6m	26.7m

The aim of this Chapter will be to present the environment in which the ME3 airlines emerged and grew. We will first go through the shared history which led to their creation. Then we will study each of the three airlines independently to understand what differentiates them from each other. We will also review the competition they face in the ME region, both from expanding low cost and legacy carriers. Finally, we will describe the differences the ME3 airlines have with their largest competitor, sometimes also included in the expression "Emerging Carriers": Turkish Airlines. From this Chapter it should become clear why we have grouped these three airlines' separately from any other carrier.

2.2 Background

Up until the launch of the ME3 airlines, Gulf Air was the major Middle Eastern airline. Born in the 1950s as a taxi route from Bahrain to Doha and Dhahran, Gulf Air quickly developed into the main carrier of most Middle Eastern countries, including the UAE and Qatar. In 1973, the airline became the official flag carrier of Abu Dhabi, Bahrain, Oman and Qatar as the four countries jointly bought 55.5% of the airline from the British Overseas Airway Corporation (BOAC).

Gulf Air used Abu Dhabi as its entry point to the UAE. The Prime Minister of the UAE, also ruler of Dubai, had a vision of making Dubai an international hub. By focusing on Abu Dhabi, Gulf Air ignored international service to Dubai. In response, in 1985 the Dubai government launched Gulf Air's first main competitor in the region: Emirates. Emirates grew very rapidly and inspired surrounding nations. In 1993 Qatar and Oman started their own flag carriers Qatar Airways and Oman Air. All four airlines competed directly but due to the 1973 agreement Qatar and Oman still had to fund Gulf Air. It wasn't until 2002 and 2007 that Qatar and Oman respectively withdrew from Gulf Air and focused on their own airlines. With fewer and fewer partners the advantages Gulf Air offered to Abu Dhabi reduced, so in 2003 the ruler of the UAE

launched Etihad Airways, based in Abu Dhabi. Three years later the UAE pulled out of Gulf Air. In just twenty years, Bahrain's partners withdrew from the agreement and created Gulf Air's largest competitors.

Not only was Gulf Air severely impacted due to the increased competition, but it also lost most of its local passengers: Bahrain has the smallest population of all the nations in the 1973 agreement. The airline also lost significant talent to its new competitors. The previous CEO of Gulf Air now serves as CEO of Etihad in the same role, and the CEO of Emirates previously worked for Gulf Air.

2.3 ME3 Growth

Since their launch, the ME3 airlines have grown to become dominant actors in regional and international origin destination markets. These airlines have used their strategic positioning to compete in the widest range of markets possible. With just one connection in their hubs they can connect almost any two destinations on the globe.

Furthermore, the region within 2000 miles of the ME3 hubs is one of the most populated, with relatively little airline competition. Rising populations in India, the Middle East and Africa are growing demand for air travel in a market with few major players. This environment is very different to that faced in Europe or the US where the constant pressure of LCCs and now ULCCs has limited the growth potential of legacy airlines.
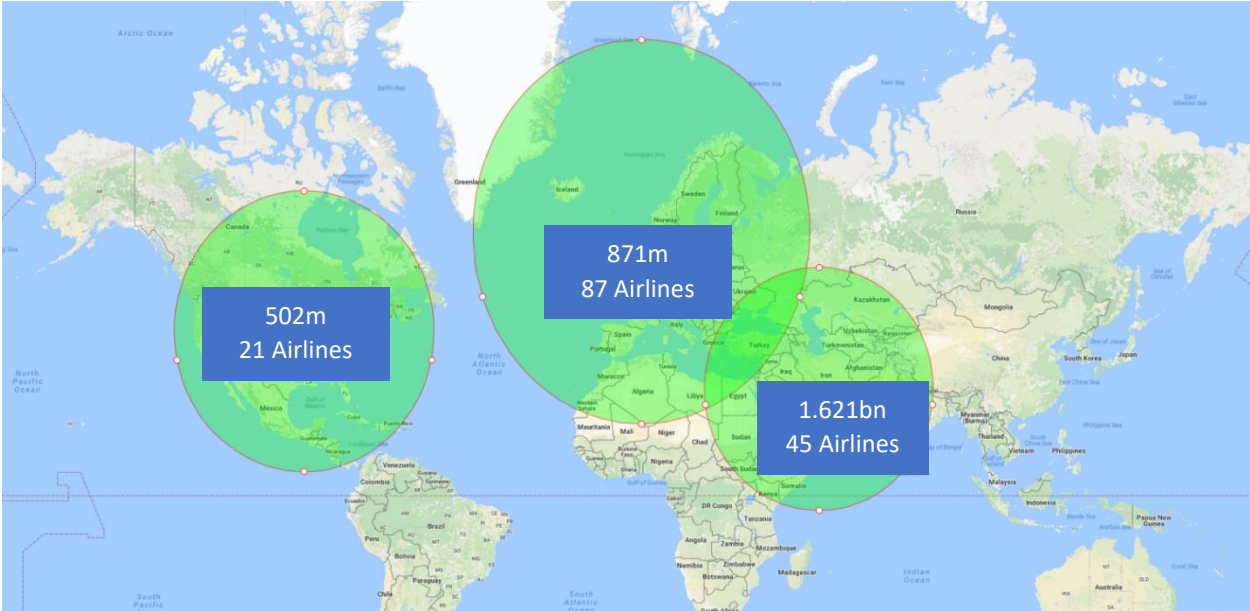
Figure 2.1: Catchment area around hub location for EU, US and ME3 carriers - IATA Member Airlines – R=2000 miles

In Figure 2.1 we can see that the population the ME3 carriers can reach within 2000 miles (~4h flights) is twice that from main EU hubs and three times that from main US hubs. Of course, the GDP per capita in these countries is also lower, so the demand not necessarily two to three times higher, but their economies are also growing much faster. In fact, as shown in Table 2.2 below, it is the region with highest GDP growth.

Table 2.2: Average of 2014/15 GDP growths for countries included in the regions circled in Figure 2.1[12]

Middle East Region	European Region	North American Region
3.36%	2.09%	2.31%

With growing local economies and strong demand from international connecting passengers, the ME Emerging carriers quickly increased their capacities. In Figure 2.2, the ME3 carriers distinguish themselves from all the largest airlines in 2015. American, Lufthansa, Qantas all showed very little growth while China Southern, airline in the fastest growing economy with the largest population, has still grown notably slower than the ME3 airlines since 2010.
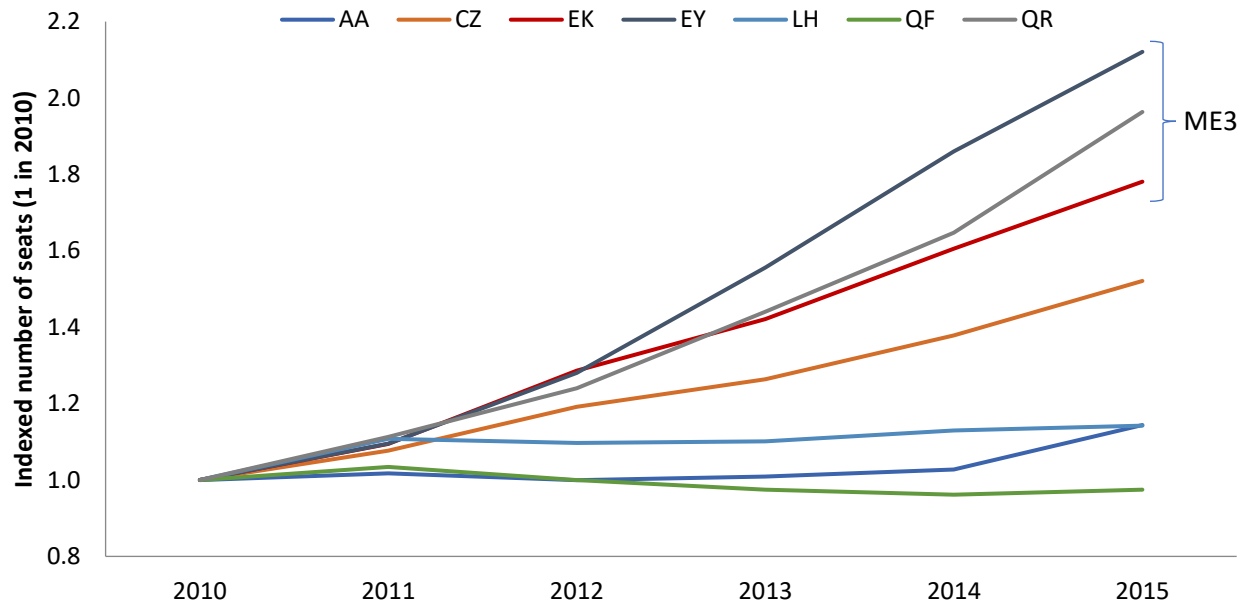
Figure 2.2: Seat growth for ME3 carriers and each first airline by region according to RPKs

Such high growth rates have made these airlines among the largest in the world in terms of capacity. The challenge for them has been to fill up their aircraft. The Flight Global Annual Report 2015 ranked the airlines according to their ASKs: Available Seat Kilometers, RPKs: Revenue Passenger Kilometers and revenues.

The 2015 ranking clearly shows that the ME3 carriers' capacity growth from above was accompanied by high passenger growth. In less than thirty years, Emirates became the fourth global airline in traffic. Similarly, in just a decade Qatar Airways and Etihad Airways made it to the top 20 airlines in traffic. In addition, the ranking positions of EK, QR and EY for ASKs and RPKs in 2015 are almost identical. Emirates came in 4th in both cases, Qatar Airways 13th and 14th respectively, and Etihad Airways 19th and 20th. Then, in Table 2.3 we compare the ranking of RPKs (or ASKs) against the ranking of Load Factors, measured as RPKs over ASKs.

Table 2.3: 2015 Global Airline ranking by traffic (left) and ranking of these 25 airlines by LF (right) [11]

#	Airline	Country	Pax Traffic (RPK) Million		#	Airline	Country	Load Factor
1	American Airl.	USA	358,823		1	Ryanair	Ireland	92.8%
2	Delta	USA	337,264		2	EasyJet	UK	92.6%
3	United	USA	335,728		3	Cathay Pacific	Hong Kg	86.6%
4	Emirates	UAE	255,176		4	KLM	Netherlds	86.4%
5	Southwest Airl.	USA	189,057		5	Delta	USA	84.9%
6	Lufthansa	Germany	162,173		6	JetBlue Air.	USA	84.7%
7	China South.	China	153,749		7	Air Canada	Canada	84.4%
8	China Eastern	China	146,291		8	Air France	France	84.1%
9	British Airways	UK	142,016		9	Southwest Airl.	USA	83.6%
10	Air France	France	141,207		10	United	USA	83.4%
11	Ryanair	Ireland	130,588		11	American Airl.	USA	83.0%
12	Air China	China	124,805		12	British Airways	UK	81.5%
13	Turkish Airlines	Turkey	119,372		13	China South.	China	81.5%
14	Qatar Airways	Qatar	114,464		14	China Eastern	China	80.5%
15	Cathay Pacific	Hong Kg	108,894		15	Lufthansa	Germany	80.2%
16	Air Canada	Canada	100,167		16	Air China	China	79.8%
17	Singapore Airl.	Singapore	94,267		17	Singapore Airl.	Singapore	79.6%
18	KLM	Netherlds	93,228		18	Etihad Airways	UAE	79.4%
19	Etihad Airways	UAE	83,200		19	Aeroflot	Russia	79.3%
20	All Nippon Air	Japan	79,093		20	Qantas Group	Australia	78.7%
21	EasyJet	UK	77,619		21	Turkish Airlines	Turkey	77.9%
22	Qantas Group	Australia	75,479		22	Korean Air	South K.	76.9%
23	Aeroflot	Russia	74,116		23	Emirates	UAE	76.5%
24	Korean Air	South K.	71,647		24	Qatar Airways	Qatar	75.3%
25	JetBlue Air.	USA	67,112		25	All Nippon Air	Japan	69.3%

Interestingly, ranking the airlines according to their load factor (RPK/ASK) shows a significant reshuffle in the results. The rankings of the ME Emerging carriers are very significantly impacted by this change of metric. With between 75% and 79% load factors they appear much lower in the ranking than airlines ranked similarly in RPKs. Emirates for example had RPKs close to the level of United and Delta, which show load factors of 83 and 85% respectively. Similarly, Qatar had RPKs comparable to Cathay Pacific or Air Canada which show load factor levels of 87 and 84%. Finally, Etihad is similar to KLM in RPKs yet the Dutch airline has an 86% load factor. Due to these differences the ME Emerging carriers rank among the lowest of the top 25 airlines by RPK when it comes to load factor. Emirates, the fourth largest airline by RPK and ASK is 23rd of the group of 25 when it comes to LF.

These low ratios bring us to wonder how these airlines perform financially. Given that these airlines are state-owned it is difficult to obtain reliable data on their profits. However, the Flight Global Annual Report also ranked airlines by total revenue. Comparing this ranking to the one from RPKs above would at least

indicate if these airlines are able to generate revenues, relative to the amount of kilometers they are flying passengers for.

Table 2.4: Global ranking of commercial airlines by revenue in 2015 [11]

Rank	Airline	Country	Revenues ($ millions)
1	American Airlines	USA	40,990
2	Delta	USA	40,704
3	United	USA	37,864
4	Lufthansa Group	Germany	36,351
5	Air France-KLM	France	28,741
6	Emirates	UAE	26,292
7	IAG	UK	25,207
8	Southwest Airlines	USA	19,820
9	China Southern Air	China	17,754
10	Air China	China	17,500
11	China Eastern	China	16,780
12	ANA Group	Japan	14,914
13	Cathay Pacific	Hong Kong	13,202
14	Qantas Group	Australia	13,017
15	Japan Airlines	Japan	11,129
16	Singapore Airlines	Singapore	10,986
17	Turkish Airlines	Turkey	10,766
18	Air Canada	Canada	10,747
19	LATAM	Chile	10,126
20	Korean Air	South Korea	9,957
21	Qatar Airways	Qatar	9,787
22	Etihad Airways	UAE	9,020
23	EasyJet	UK	7,219
24	Ryanair	Ireland	7,202
25	Aeroflot	Russia	6,698

Comparing Table 2.4 with the RPK ranking in Table 2.3 shows non-negligible changes for the ME3 airlines. All three carriers appear lower in revenues than in traffic. Qatar is especially impacted, dropping from 14th to 21st. These much lower results in terms of revenues indicate a potential for lower yields for the ME3 airlines. This can't be confirmed with certainty with this data as the revenues included by the Flight Global Report are total revenues, not just passenger related revenues.

2.4 Emirates (EK)

Launched in 1985 by Tim Clark, and Sheikh Ahmed bin Saeed Al Maktoum, Emirates started with just $10 million of operating capital for its first five months. Pakistan International Airlines wet-leased two aircraft to the new airline and Sheikh Mohammed bin Rashid Al Maktoum, responsible for Dubai's Civil Aviation at the time and now Prime Minister of the UAE, offered two Boeing 727s. The first destinations from Dubai

were Karachi, New Delhi and Bombay. Thirty years later Emirates generated $26 billion in revenue, counted 129 destinations, 207 aircraft, and was ranked fourth largest airline by traffic.
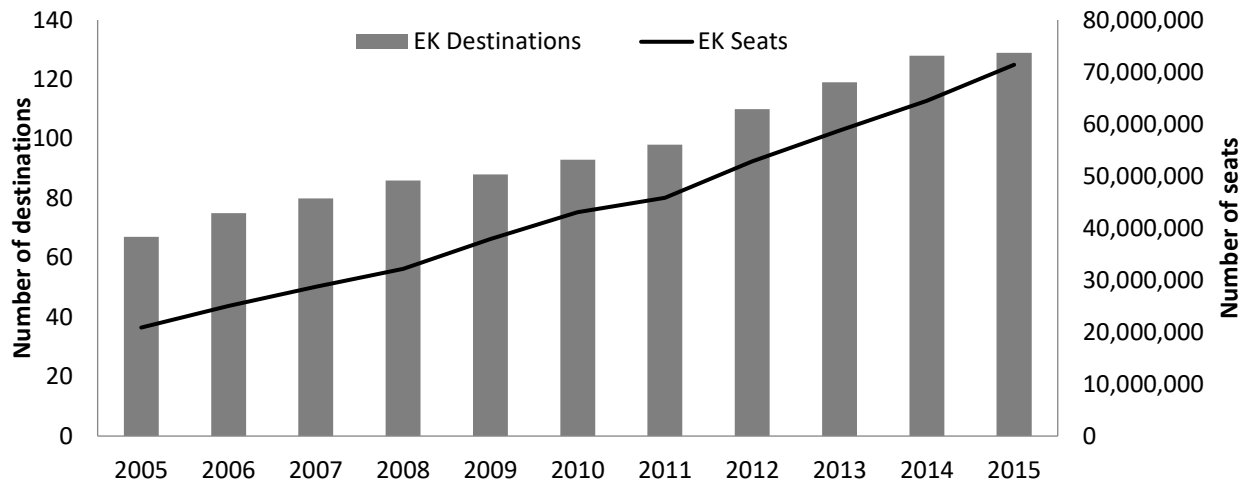
Figure 2.3: Emirates number of seats and destinations since 2005

Figure 2.3 shows Emirates has increased its capacity by 242% in just ten years, equivalent to an average annual growth of 13.1%. To put this growth into perspective, the growth from 2014 to 2015 is equivalent to over 18,900 additional seats every day on the Emirates network. This capacity has been used to increase the number of destinations served by almost 100%.
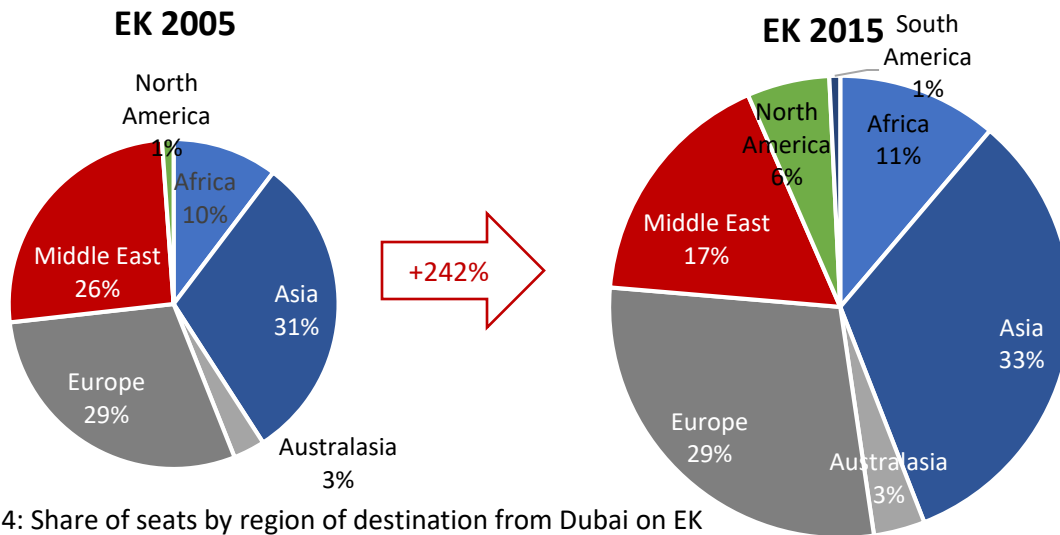
Figure 2.4: Share of seats by region of destination from Dubai on EK

With this increasing capacity, Emirates had to allocate seats to selected routes. Figure 2.4 shows how the distribution of destinations from Dubai in number of seats has evolved since 2005. Destinations in Europe, Asia, Africa and Australasia kept relatively constant seat share, which means the growth in seats to these regions has been around 242%. At the same time the share of destinations in North America went from 1% to 6%. This very recent growth to North America has been focused on the US given the constraining bilateral agreements the UAE has with Canada. These observations will be analyzed much more specifically in Chapter 3. With the growth in share to North America, destinations within the Middle East

have dropped in share from 26 to 17%. This means that in 2015 only 1 in 6 seats from Dubai on Emirates is on a regional route; 5 in 6 are on medium to long haul international routes. This is one of the major characteristics of Emirates, also reflected in its fleet in Table 2.5.

Table 2.5: Emirates fleet and orders [13],[14],[15]

	Fleet	Orders
A380	92	50
Boeing 777	115	174
Total	**207**	**224**

As an airline heavily focused on international routes to Asia, Europe and North America, Emirates has a fleet only composed of wide-body aircraft. The airline also focused on very specific models from each of the two wide body aircraft manufacturers. The focus on the A380 for example makes it the primary customer of Airbus for this aircraft. Emirates operates almost half of the A380s currently operating, and has made almost half of the orders.

Finally, unlike most of the top airlines from the Flight Global Annual Report rankings, Emirates has refused to take part in any multi-airline alliances. Instead, the Dubai carrier developed bilateral agreements independently with different partner airlines. In 2013 for instance, Emirates announced an alliance with Qantas. Emirates hopes to increase its market base through these partnerships and the partner airlines rely on Emirates to access a much larger network. Qantas offered 5 one-stop codeshare destinations into Europe prior to this partnership, now it offers over 32 with average journey times to the top 10 European destinations cut by two hours[16]. In total Emirates has 15 partners spread across the 5 continents.

2.5 Etihad Airways (EY)

Etihad was launched in 2003 by Sheikh Khalifa bin Zayed Al Nahyan as the main carrier for Abu Dhabi. The airline quickly made orders for five Boeing and twenty-four Airbus aircraft, worth $8 billion. Slightly more than a decade later, Etihad now serves 92 destinations with 121 aircraft. It is among the 20 largest airlines worldwide by traffic.
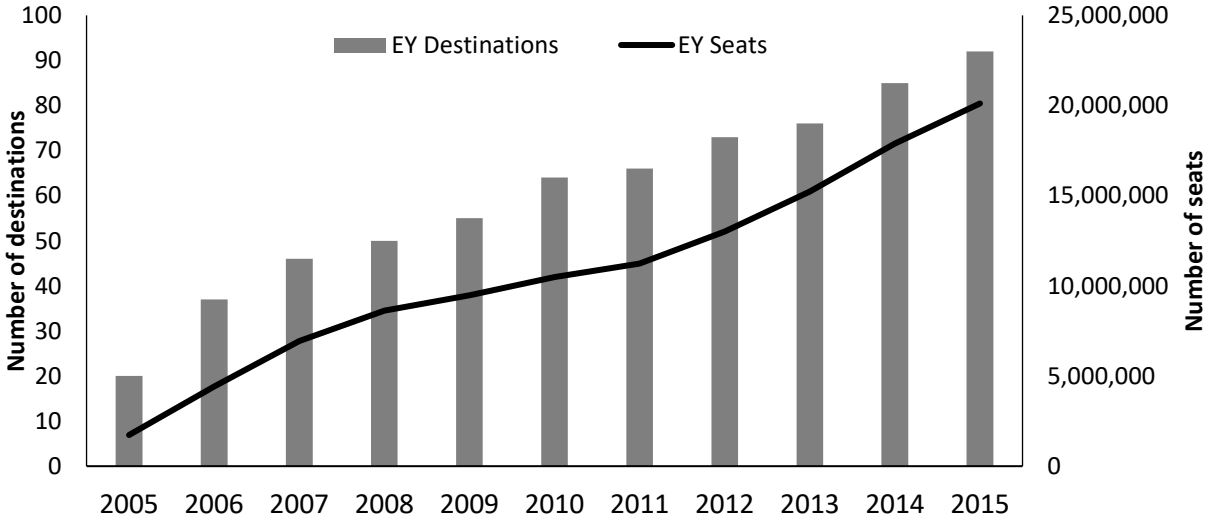
Figure 2.5: Etihad Airways number of seats and destinations since 2005

Figure 2.5 shows the tremendous growth of Etihad since 2005. As a much more recently launched airline than Emirates it has seen much higher growth rates: Etihad multiplied its destinations by almost 5 and its seats by almost 12 over this 10-year period. In absolute numbers the growth in seats in recent years is still significantly lower than that of Emirates. The growth from 2014 to 2015 for example was equivalent to over 6,000 new seats per day on average, relative to the 18,900 of Emirates.
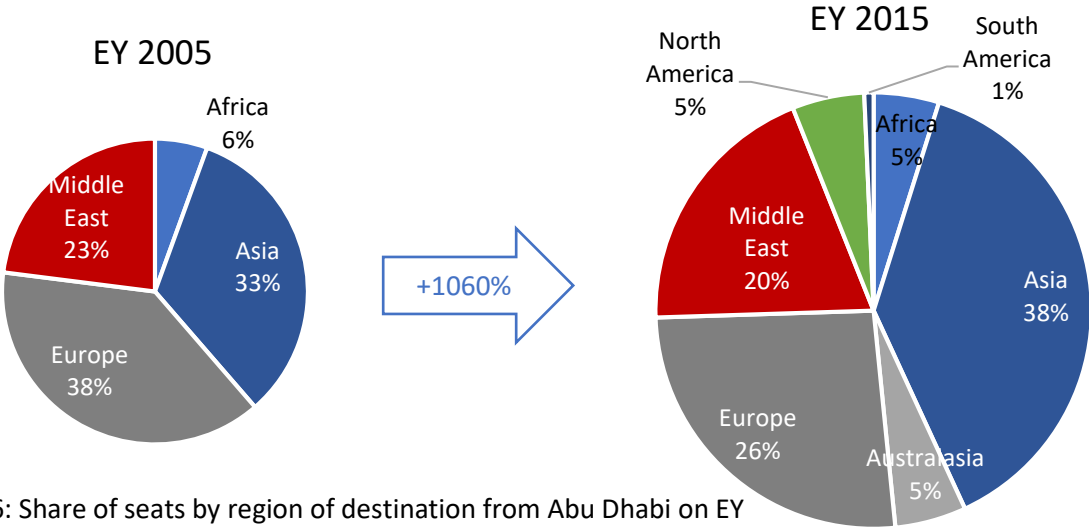
Figure 2.6: Share of seats by region of destination from Abu Dhabi on EY

As Emirates, Etihad started with a large focus on Europe, Asia and Africa as its international destinations (Figure 2.6). Over the past ten years the destination shares have changed quite significantly, with North American and Asian shares increasing at the expense of European destinations. Keep in mind that given the total immense increase of the pie all these destinations have ended up seeing very large increases in capacity from Abu Dhabi. Part of the reason for the reduction in seat share from Europe may come from the strategy Etihad has developed there. Etihad, unlike other ME Emerging airlines, has taken stakes in a large variety of airlines which serve as partners in its network today. These acquisitions mainly occurred since 2011.

Table 2.6: Etihad's airline acquisitions

	Country	Date	Stake
Air Berlin	Germany	2011	29%
Air Seychelles	Seychelles	2012	40%
Virgin Australia	Australia	2012	20%
Jet Airways	India	2013	24%
Air Serbia	Serbia	2014	49%
Alitalia	Italy	2014	49%
Niki	Austria	2016	49%

Table 2.6 shows the numerous airlines Etihad has taken stakes in. The 49% stakes are explained by the fact that at least 51% of a European airline's voting stock must be owned by a European group in order for the airline to be established in an EU member state. Through these acquisitions, Etihad was able to

develop partnerships with each of these airlines and therefore code-share flights as airlines in a regular alliance do. This has expanded the airline's network beyond the 92 destinations it operates service to.

Table 2.7: Etihad fleet and orders [17],[14],[15]

Aircraft	Fleet	Orders
A320	35	0
A330	29	1
A340	10	0
A350	0	62
A380	8	2
777	30	26
787	9	61
Total	**121**	**152**

In contrast to Emirates' fleet in Table 2.5, Table 2.7 shows Etihad's diverse set of aircraft. The Abu Dhabi based carrier works almost equally with both aircraft providers Airbus (54% of its aircraft including orders) and Boeing (46%). As expected from Figure 2.6 the airline predominantly flies medium to long haul wide body aircraft (71% of current fleet). Looking forward this trend is expected to increase as there are not any narrow body orders remaining as of early 2017.

2.6 Qatar Airways (QR)

Founded in 1993, Qatar Airways' first flight departed in January 1994 on a Boeing 767 wet-leased from Kuwait Airways. Initially the airline operated as a regional carrier serving just a few routes with four aircraft. In 1997 Sheikh Hamad bin Khalifa Al Thani developed a plan to turn Qatar Airways into a leading international carrier. 18 years later the Qatari airline served 135 destinations using 169 aircraft, making it the world's 14th largest airline by traffic.
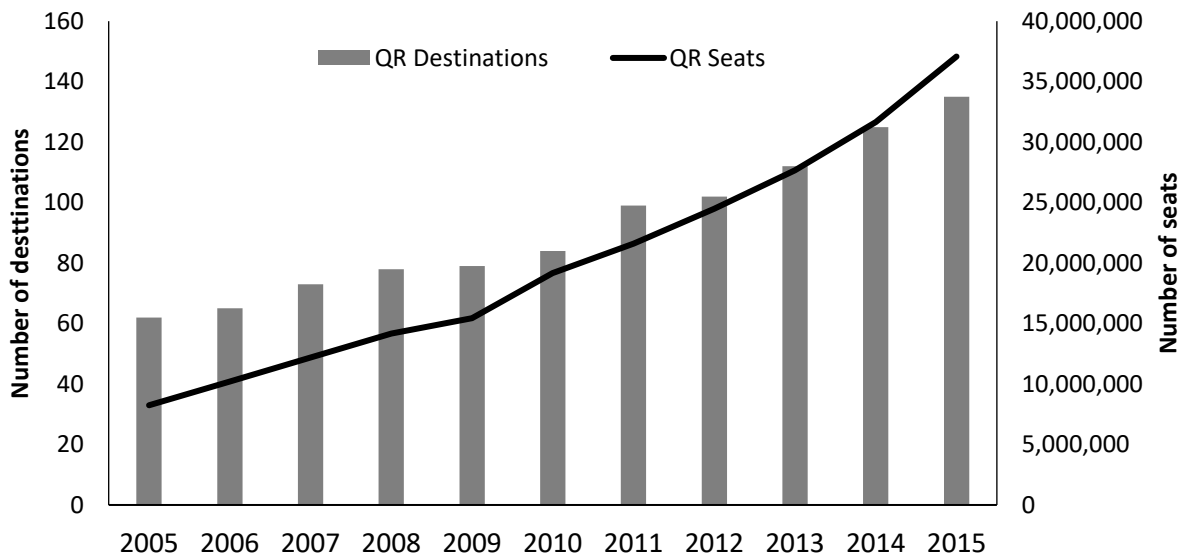
Figure 2.7: Qatar Airways number of seats and destinations since 2005

Figure 2.7 shows that Qatar Airways grew its seat capacity by over 342% in only ten years, equivalent to an average annual 16% growth. From 2014 to 2015 this growth was equivalent to 14,800 extra seats per day. Added to the figures from Emirates and Etihad this means there were 40,000 additional seats per day from or to the UAE and Qatar (just from the ME3 airlines). This is equivalent to almost 70 A380 flights every day.
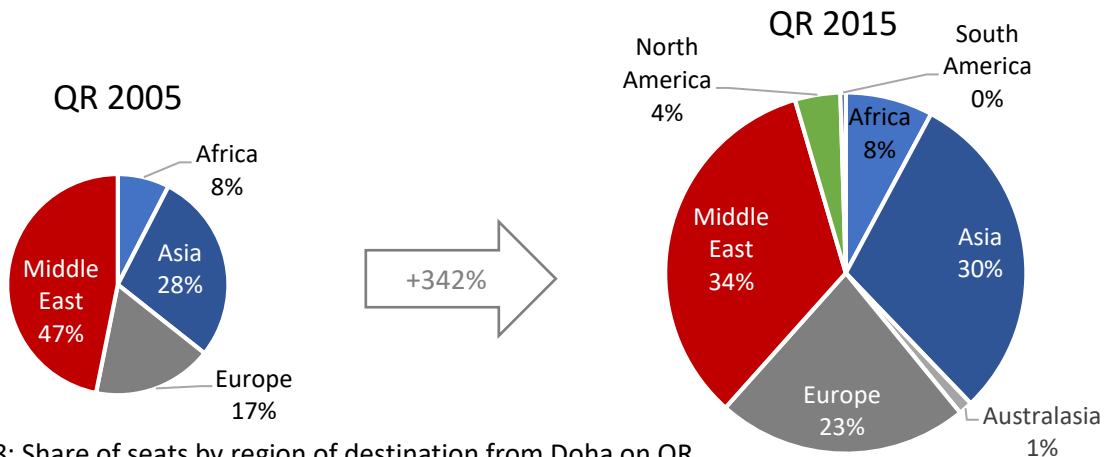
Figure 2.8: Share of seats by region of destination from Doha on QR

Figure 2.8 shows that Qatar Airways had a larger focus on regional routes than Emirates and Etihad. In 2005 seats to regional destinations covered almost 50% of the airline's capacity. Although Qatar expanded its share of international routes over the past ten years, in 2015 the airline still had 34% of its capacity from Doha flown to destinations in the ME, far ahead of the 17% and 20% from Dubai (on EK) and Abu Dhabi (on EY). In terms of international service QR followed similar trends as EK and EY. The airline focused on Europe, Asia and Africa initially but recently shifted some focus towards North America.

Table 2.8: Qatar Airways fleet and orders [18]

Aircraft	Fleet	Orders
A320	49	79
A330	26	0
A340	4	0
A350	13	68
A380	6	7
777	43	115
787	30	30
Total	171	299

From the distribution of destinations in Figure 2.8 we could expect a more homogeneous distribution of aircraft sizes than what has been observed with Etihad and Emirates. In fact, Table 2.8 shows that short to medium haul narrow body aircraft represent over 28% of both the current and future fleet. Overall the Qatari carrier seems to split its orders relatively fairly between the American and European manufacturer. Note that out of the three ME Emerging airlines, Qatar is by far the one with the largest orders.

Finally, Qatar has also chosen a more conventional path than Emirates and Etihad when it comes to alliances. The airline joined the OneWorld alliance in 2013. With this alliance, Qatar Airways can code-

share flights with 15 airlines spread across the globe. Among these are American Airlines, British Airways, and LATAM. An example of direct benefit of this alliance for Qatar Airways is with American Airlines in the US. Thanks to this partnership Qatar Airways has access to passengers from all around the US with its DOH-PHI flight. Passengers can fly AA to Philadelphia and from there board the QR flight to Doha. In addition to OneWorld, QR has three bilateral alliances with smaller airlines in Africa (Royal Air Maroc), South America (GOL) and the Middle East (MEA). These 18 airlines allow Qatar to expand its customer base to far more than the 135 destinations it operates service to.

2.7 Other Major ME Airlines

The ME3 carriers are not the only actors in the ME. Given the economic growth of the region, several other countries launched their own airline in the recent past. The market is composed of legacy airlines and low cost carriers. In 2015 the ME3 airlines completed the podium of largest airlines in the ME by total ASMs. Table 2.9 shows that Saudia followed Etihad relatively closely, but then there was a big gap between Saudia and flyDubai.

Table 2.9: Total ASMs by ME carrier in 2005 (left) and 2015 (right)

Rank	Airline	ASMs 2005	Rank	Airline	ASMs 2015
1	Emirates	49,074,329,964	1	Emirates	207,751,184,826
2	Saudia	18,700,993,226	2	Qatar Airways	88,007,106,984
3	Gulf Air	15,355,855,338	3	Etihad Airways	59,153,759,114
4	Qatar Airways	14,853,086,090	4	Saudia	43,756,656,919
5	El Al	11,832,025,719	5	flydubai	14,765,380,200
6	Kuwait Airways	6,358,730,475	6	El Al	14,687,359,882
7	Iran Air	5,332,521,703	7	Oman Air	12,311,685,653
8	Royal Jordanian	4,611,125,780	8	Air Arabia	11,245,347,612
9	Etihad Airways	3,570,922,454	9	Gulf Air	7,851,123,741
10	Yemen Airways	2,644,526,387	10	Kuwait Airways	7,045,408,158

The ME3 carriers have not been the only causes of the changes in the ME airline competitive environment. New players have grown to join the top 8 at the expense of legacy carriers Gulf Air, Kuwait Airways, Iran Air and Royal Jordanian. In 2015 the largest competitors of the ME3 airlines in the ME appeared to be Saudia, flydubai, Oman Air and Air Arabia. El Al is ignored in this analysis as it is Israel's flag carrier and the ME3 airlines do not serve Israel. Table 2.10 describes the main characteristics of these airlines, as those shown for ME3 carriers in Table 2.1.

Table 2.10: Characteristics of the ME3 airlines' main regional competitors

	Founded	Country	ASM CAGR 2005-15	Seats 2015	Positioning
Air Arabia	2003	UAE	22%	9,285,030	LCC
Flydubai	2008	UAE	NA	14,170,995	LCC
Oman Air	1993	Oman	24%	8,959,626	Legacy
Saudia	1945	Saudi Arabia	9%	34,493,396	Legacy

Low Cost Carriers

Air Arabia was launched as the first low cost carrier in the region. It has developed numerous joint ventures with the ME (Air Arabia Egypt, Air Arabia Jordan) and Africa (Air Arabia Maroc). Unlike all the other airlines considered here, Air Arabia has been traded publicly since 2007.

Flydubai was launched by the government of Dubai as the second UAE LCC. The carrier has been owned by the Dubai State ever since. As the airline shared owners with Emirates, it initially benefitted from the experience of Emirates' senior management switching to flydubai.

Air Arabia 2015

- Africa 8%
- Asia 43%
- Europe 3%
- Middle East 46%

flydubai 2015

- Africa 7%
- Asia 31%
- Europe 9%
- Middle East 53%
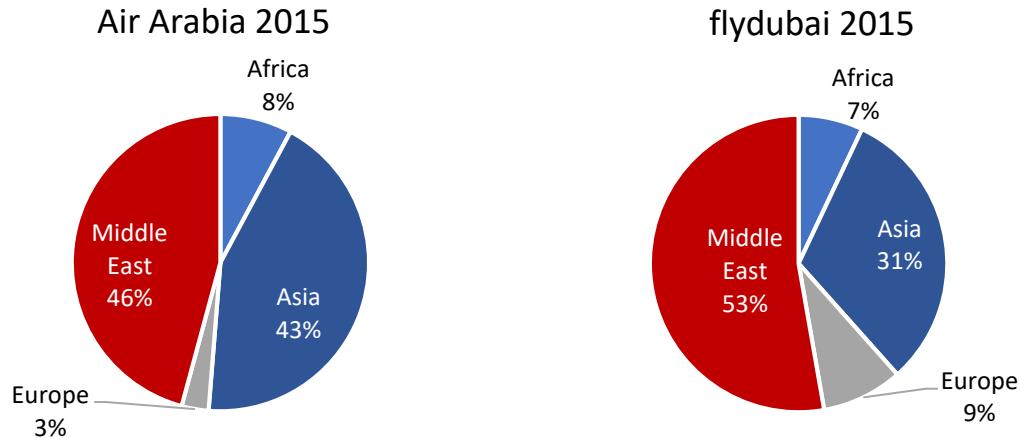
Figure 2.9: Seat share by region of destination and carrier from the UAE

Figure 2.9 shows that the regions targeted by the low cost carriers are very different to those targeted by the ME3 airlines. Half of Air Arabia and flydubai's seats are on routes within the ME, and only very few are to Europe and Africa. The competitive risk they represent to ME3 carriers is therefore limited. On routes where there is overlap within the ME, the ME Emerging airlines can differentiate themselves on network and frequency as well as quality of service, which allows them to target the higher fare passengers while flydubai and Air Arabia target more leisure passengers. On routes to Asia, ME3 carriers offer OD service originating in Europe and the US, which these LCCs can't compete with. As for OD service to Asia originating in the ME, the ME Emerging carriers can again differentiate themselves on quality of service and network size (56 destinations in Asia with ME3 airlines vs 47 with Air Arabia or flydubai).

Legacy Carriers

Saudia was the first international ME airline. It is based in Jeddah, Saudi Arabia, and currently stands as the fourth largest ME airline in revenue and ASMs, behind the ME3 airlines. As many of its regional competitors the airline is government owned. Table 2.10 shows that relative to most other local airlines the Saudi carrier has shown limited capacity growth over the past decade. As the largest ME airline just twenty years ago, it has had to adapt to the emerging competition from the ME3 carriers, the LCCs and Oman Air.

Oman Air is also a government owned airline. It is based in Muscat, Oman, and stands as the seventh largest ME airline in revenues and ASMs in 2015. Table 2.10 shows that over the past ten years the airline has grown its ASMs faster than any of the ME3 carriers, at 24% annually. To reach such a high rate Oman Air flew longer distances (increasing the average stage length from 820 to 1374 miles) and acquired more and larger aircraft (average aircraft size went from 130 to 155 seats). The Omani carrier hasn't joined any

of the large alliances but has signed codeshare agreements with Emirates, Ethiopian Airlines, Royal Jordanian, Turkish Airlines, Sri Lankan Airlines, KLM, Garuda Airlines, Thai Airways and Saudia.
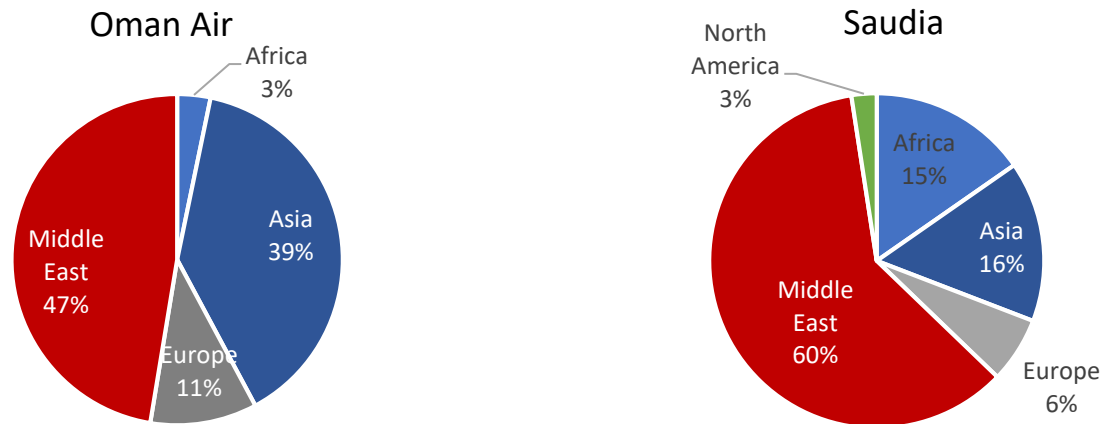
Figure 2.10: Seat share by region of destination and carrier in 2015 from Muscat (left) and Jeddah (right)

Figure 2.10 shows that the two legacy competitors of the ME3 carriers have a similar proportion of seats serving destinations outside the ME than the LCC did in Figure 2.9. As a result, the percentage of seats within the ME is significantly higher than it is for the ME Emerging carriers. The routes with most competition between these carriers and the ME3 airlines are likely to be within the ME and to Asia. Oman Air is particularly present in Asia, with over 25 destinations in 2015. As was the case with LCCs, ME3 airlines aren't significantly affected by the ME legacy carriers for OD traffic originating in Europe or North America. For the traffic originating in the ME, the ME3 airlines differentiate themselves more on network size (56 destinations in Asia) and frequency than quality of service as these two legacy airlines have also been recognized for particularly high levels of service.

2.8 Turkish Airlines (TK)

Turkish Airlines is also often referred to as an emerging airline. Born in the 1930s the Turkish flag carrier has shown significant growth in the last twenty years. Many of the strategic advantages of the ME3 airlines are also valid for TK. Its main hub in Istanbul gives the airline access to 1.2 billion people within just 2,000 miles. However, its proximity to Europe, its positioning right on the route to India and the very large size of its domestic market differentiates the airline from the ME3 carriers. In addition, the airline is only 49% government owned, the remaining 51% being publicly traded[19]. As a result of these differences the airline's model is slightly different to that of the three ME Emerging airlines considered in this thesis. In addition, the recent terror events combined with the political instability in the country seriously threaten the growth of the airline.
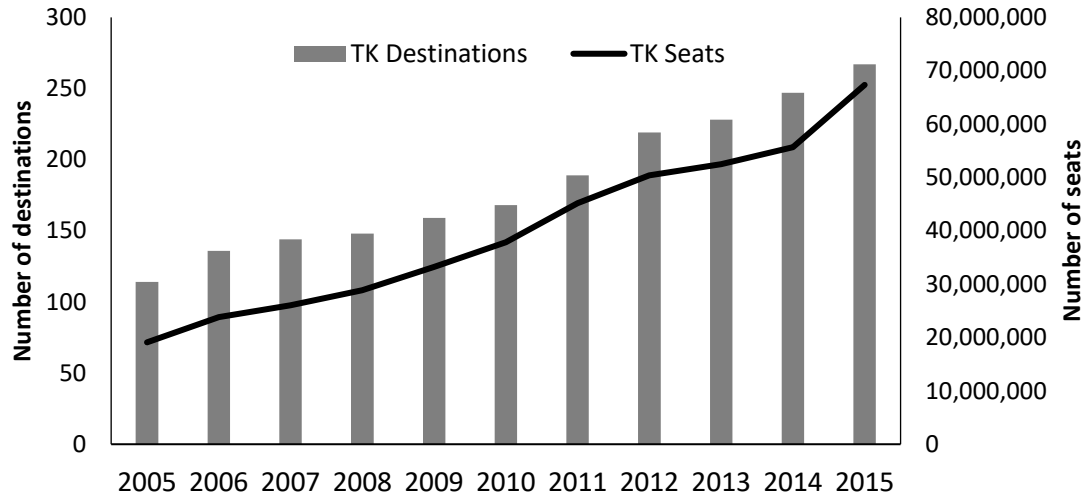
Figure 2.11: Turkish Airlines number of seats and destinations since 2005

The growth of Turkish Airlines in Figure 2.11 follows a similar trend to that observed for the ME3 carriers. The airline grew its seat capacity by 253% in just ten years to reach 67m annual seats. This is very close to the 242% capacity growth and 71m seats observed earlier with Emirates. At the same time the airline has grown its network to 267 destinations. This on the other hand is far more than Emirates' 129 destinations. As part of StarAlliance, Turkish Airlines has access to an even larger network.
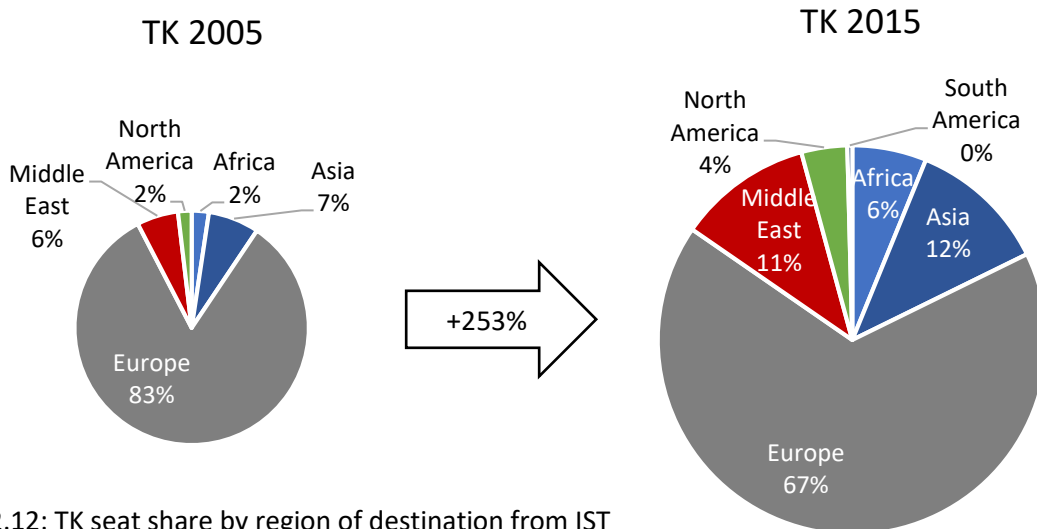
Figure 2.12: TK seat share by region of destination from IST

In Figure 2.12 we can see that the proximity of Turkish Airlines to Europe clearly affects its distribution of seats by destination. Turkey is also considered as part of Europe so domestic flights from Istanbul partly explain the very high share of seats to Europe. Since 2005 seat share to Europe has reduced, but they still represented over 2 out of 3 seats in 2015. Despite the doubling of the seat share to Asia, North America and the ME-Africa, the importance of these international long haul flights is still much less than it was for the ME3 airlines.

Table 2.11: TK Fleet and orders [14],[15]

Aircraft	Fleet	Orders
A310	2	0
A320	109	94
A330	60	1
A340	5	0
727	10	0
737	104	75
777	29	3
Total	319	173

Table 2.11 reflects the importance of short to medium haul routes to Europe for Turkish Airlines. With 67% of the current fleet and 77% of the future fleet as A320s or 737s, Turkish clearly relies much more on short to medium haul aircraft than ME3 carriers. The 67% on the current fleet is perfectly in line with the 67% of seats with destinations in Europe from Figure 2.12. In addition, where the ME3 carriers have heavily focused on growth of medium to long haul traffic, Turkish has shown no sign of expansion of its medium to long haul fleet, with only 4 aircraft ordered. This striking difference may result from the market potential of the region centered around Istanbul and within the range of an A320 or 737, as well as from the political uncertainty in Turkey which has limited incentives to acquire larger more expensive aircraft.

2.9 Conclusion

Chapter 2 has showed how the ME3 airlines' growth model differentiates them from any regional competition. Born thirty years ago (or less) the three carriers have grown to become major players in the air transportation industry. With over 242% seat growth in ten years, they are the only ME airlines in the top 20 by traffic in 2015. They served over 80 billion RPKs, far more than the fourth ME airline by traffic, Saudia with 49 billion RPKs[11]. This major difference is the result of a combination of seat growth and network expansion: the ME Emerging airlines offer fewer flights within the ME than their local competitors. Figure 2.13 below illustrates this significant strategic difference.
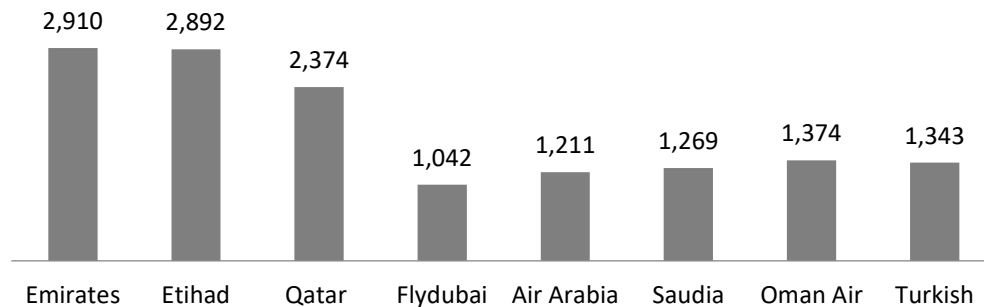
Figure 2.13: Average Stage Length by airline in 2015 (miles)

Figure 2.13 also explains one of the major differences between the ME3 airlines and their closest competitor in terms of development and positioning: Turkish Airlines. TK has grown its seats by 253% in the last ten years, served 61.2 million passenger segments in 2015 (more than EK) and 119 billion RPKs.

However, as was the case with the ME competition, Turkish Airlines focuses much more on regional flights rather than long haul intercontinental flights. This is clearly reflected in the average stage lengths, where TK is much more comparable to Oman Air or Saudia. Turkish Airlines also differentiates itself by being publicly traded. The airline consequently has less support from government, meaning less growth guarantees and less controversy over unfair competition. Furthermore, Turkish Airlines' immediate growth prospects are seriously threatened by security concerns and political instability in the country.

As a result of Chapter 2's analysis it appears clear that the airlines most critical in an analysis of the impact of emerging carriers on European and US legacy carriers are the three ME Emerging airlines Emirates, Etihad and Qatar. Their recent growth, high levels of capacity, and very global network differentiates them from any other carrier.

Chapter 3 Evolution of Airline Capacities to/from the Middle East

3.1 Introduction

The first step in evaluating the impact of the ME3 carriers on European and US airlines is to measure their respective capacities and growth trends. The most readily available data to quantify airline growth is schedule data. This data records number of seats, operating airline, marketing airline, aircraft type, stage lengths along with other details for each scheduled flight. The data is provided at a route level. In the context of a capacity analysis of the growth of ME3 carriers and their impact on European and US airlines, the first routes which will be reviewed are from Europe to the Middle East and the US to the Middle East.

In order to fully address the impact of ME3 carriers on traffic flows, one must also consider origin destination (OD) markets originating in Europe or the US and with destinations beyond the Middle East. Given that schedule data tracks flights rather than passengers, it is difficult to reach conclusions on the impact of these carriers on other airlines in these OD markets. Instead, the data offers an insight on the strategies (network structures, sizes) implemented by the various carriers. The focus in the second part of this Chapter will therefore be on routes from Europe and the Middle East to the main destinations beyond the ME: the Indian Subcontinent and Southeast Asia. Once these capacity trends are understood then we will shift our attention to actual passenger traffic data in Chapter 4.

The data used in this section is from Diio Mi Market Intelligence portal. Diio uses Innovata LLC's Schedule Reference Service to collect weekly flight schedules from airlines across the globe[20]. In this research we exported data from 2010 and 2015 for the following sets of routes: EU-ME, North America-ME, EU-Southeast Asia, EU-Indian Subcontinent, ME-Southeast Asia, ME-Indian Subcontinent. The data was collected on flights in both directions (bidirectional). For instance, the data on EU-ME routes included both seats to Europe from the ME and to the ME from Europe.

3.2 Routes to the ME

In the context of this thesis, the "Middle East" will be defined by the nations of the Arabian Gulf (Iran, Iraq, Kuwait, Saudi Arabia, Bahrain, Qatar, United Arab Emirates, Oman and Yemen), and the Levant (Jordan, Lebanon, Syria, Palestine and Israel).

In the following two sections, the capacity trends on Europe-ME and North America-ME routes will be analyzed. For each set of routes, we will first provide a high-level analysis of the capacity trends on these routes, then we will focus on the capacities from the major EU, US or ME airlines on these routes, and finally we will look at the effects ME3 carriers have had on European and US airports.

Europe - Middle East

Over the past five years capacities between Europe and the Middle East have grown extremely rapidly. The size of the network offered and the providers of service have not changed significantly but the number of flights along with a slight increase in aircraft size has allowed for far more seats between Europe and the Middle East.

Table 3.1: Trends on EU-ME nonstop routes

	2010	2015	% Change
Number of Airlines	107	97	**-9%**
EU Airlines	66	65	**-1.5%**
ME Airlines	23	25	**+8.7%**
Other Airlines	18	7	**-61%**
ME Cities	32	36	**+13%**
EU Cities	122	115	**-3%**
Flights	215,351	325,869	**+51%**
ASMs (Bn)	108.07	180.14	**+67%**
Seats (Mn)	45.6	75.8	**+66%**
Seats/Aircraft	212	232	**+10%**

Table 3.1 shows that despite a concentration of capacities among fewer airlines (-9%) the number of seats offered between Europe and the ME grew by 66% in just five years. The reduction in airlines was mostly caused by airlines from neither Europe nor the ME which stopped operating on these routes. The growth is a combination of a growth in flights, 51%, and in the sizes of the aircraft on these flights, 10%. ASMs have grown as much as seats which indicates that the average stage lengths of these flights has not changed. The relatively small percentage changes observed in the cities served in the Middle East and Europe hide actual large changes in networks. Nonstop service to Europe stopped in 4 ME cities and started in 8 other ones. Nonstop service to the ME stopped in 35 European cities and started in 28 others.

Having reviewed the macro level changes on the routes between Europe and the Middle East the next step was to understand the strategies from the different players on these routes. First, we classified the airlines on these routes in five categories:

- **ME3 carriers** (Emerging carriers)
- **ME carriers excluding Emerging:** All ME carriers excluding the ME3 airlines
- **EU carriers:** All EU carriers (excluding those from Turkey)
- **Turkish Carriers** (Turkish carriers are serving routes from Turkey to the Middle East)

- **Other**
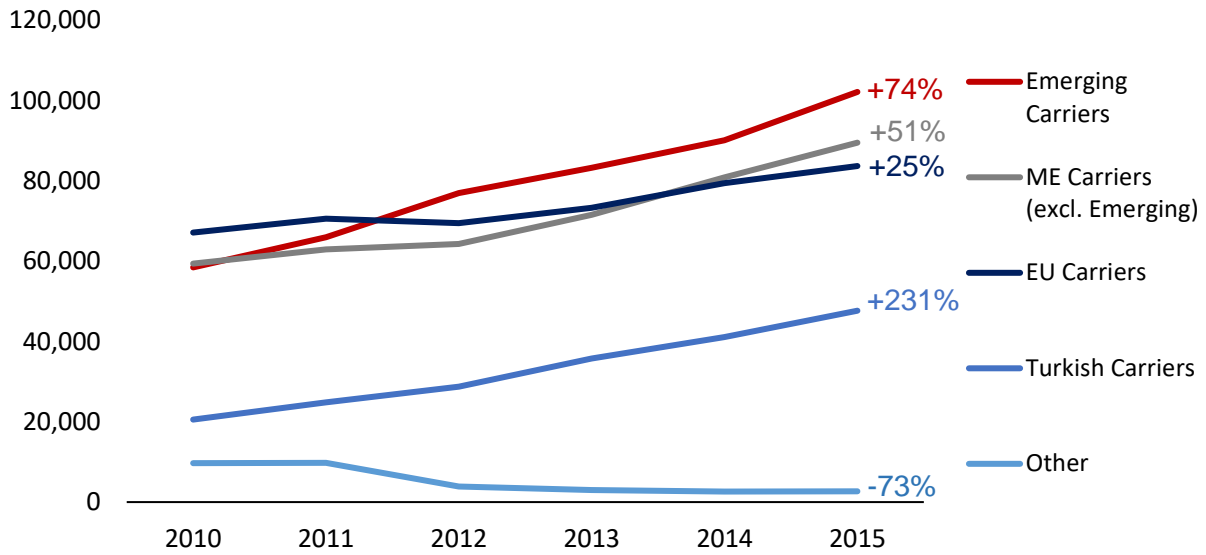
Figure 3.1: Number of flights between Europe and the ME between 2010 and 2015 by carrier type

As shown in Figure 3.1, carriers from the Middle East (ME3 and ME excluding Emerging) have grown the most since 2010. Combined, they represent over 63% of the total positive growth in number of flights. The ME3 airlines alone represent 37% of the growth in flights. Turkish airlines show particularly high growth rates due to their small number of flights in 2010, but their absolute growth is still far stronger than that of their European competitors. The European carriers kept on increasing their number of flights, but to a much smaller extent, they grew their flights by just half the amount the ME carriers excluding Emerging did. As expected from Table 3.1, the other carriers have been decreasing capacities very significantly. Overall, despite the differences in changes in capacities operated by the various groups of airlines over the past five years, the top 3 groups remain the same, within a relatively close range.
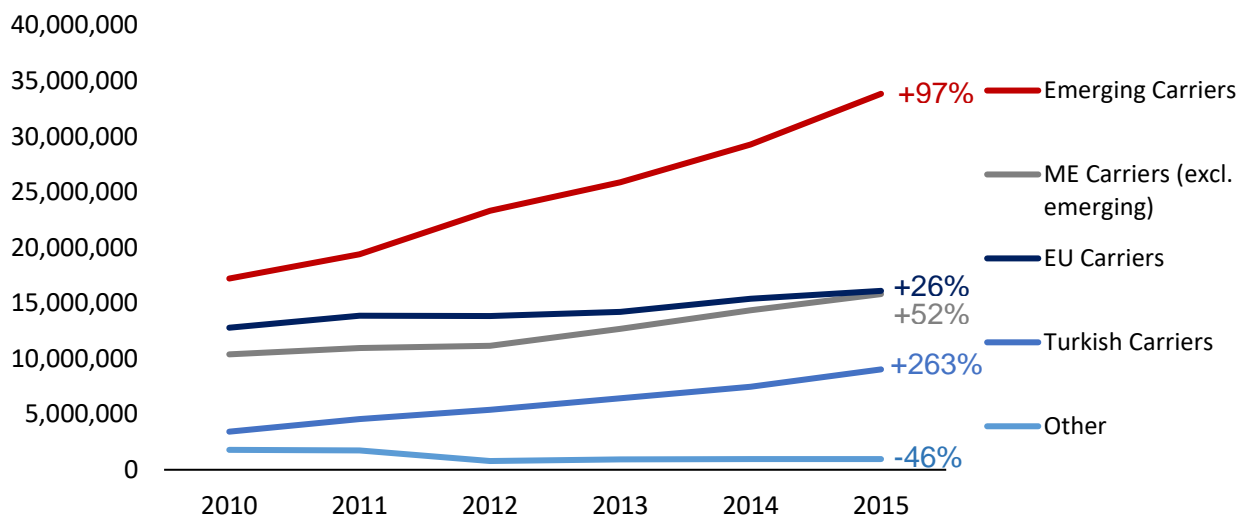
Figure 3.2: Number of seats on flights between Europe and the ME between 2010 and 2015 by carrier type

In Figure 3.2 the ME3 and Turkish carriers show the highest growth rates in seats between Europe and the ME. Combined they represent over 71% of the total positive growth. ME3 carriers alone represent 54% of the positive growth. The explanation for this rise in impact of the ME3 carriers is that while the flight and seat growth rates are very similar for the European and Middle Eastern airlines, the ME3 and Turkish carriers are seeing seat growth rates far above those observed in flights. This is directly due to the growth of aircraft sizes used by the ME3 airlines and, to a lesser extent, by the Turkish airlines.
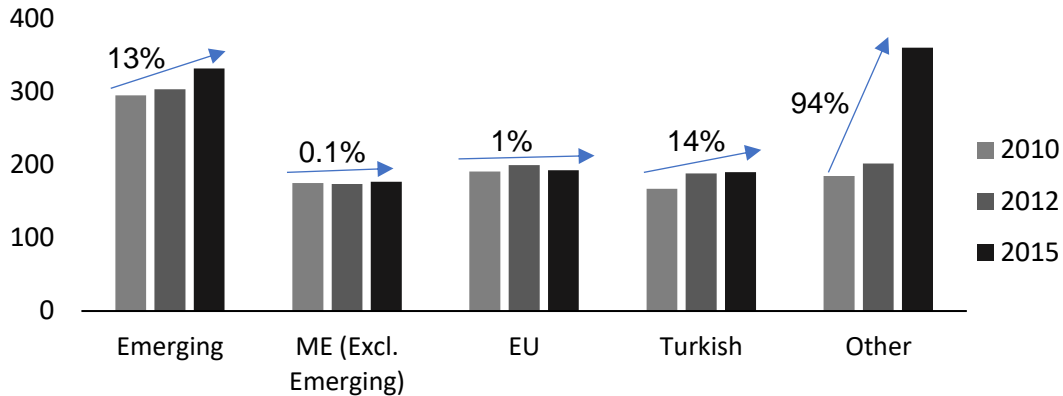
Figure 3.3: Evolution of number of seats per flight by carrier type

The ME3 airlines have distanced themselves from their competitors by increasing frequencies but also by flying larger aircraft. Figure 3.3 shows that in 2015 their aircraft were 72% larger than European aircraft and 87% larger than aircraft from other ME carriers on these same routes. During this five year period the European and other ME airlines have not changed their aircraft sizes.
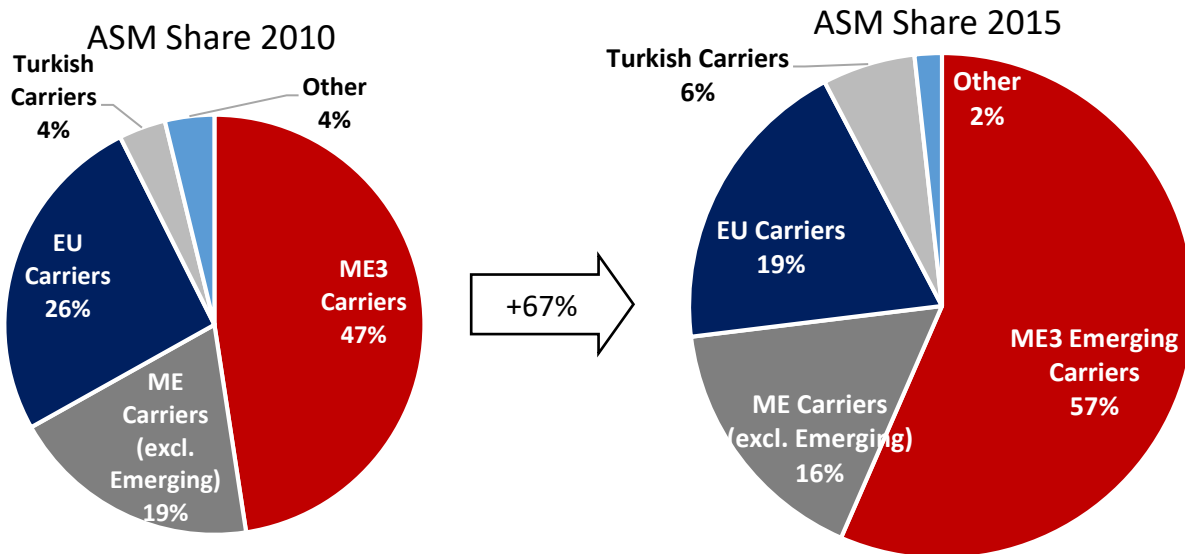
Figure 3.4: Changes in ASM share between 2010 and 2015

As shown in Figure 3.4, the overall growth in seats is associated with a similar growth in ASMs. The changes in flights and aircraft sizes led to significant shifts in ASM shares among the different carriers. With most of the growth achieved by ME3 carriers flying more and larger aircraft, these carriers saw a ten percentage

point gain in ASM share in just five years. This comes at the expense of EU and ME (excluding emerging) carriers who despite increasing their flights between the ME and Europe, lost 7 and 3 percentage points respectively. Similarly, Turkish carriers significantly increased their presence on these routes, with now 6% of the ASM shares.

European vs ME3 carriers

The first step in comparing the capacity growth of the ME3 airlines with EU carriers was to identify the dominating actors from the EU airline industry. One would expect the usual legacy carriers to have a strong role. In our research we measured their importance by ranking all EU airlines serving routes between EU and the ME in terms of seats.
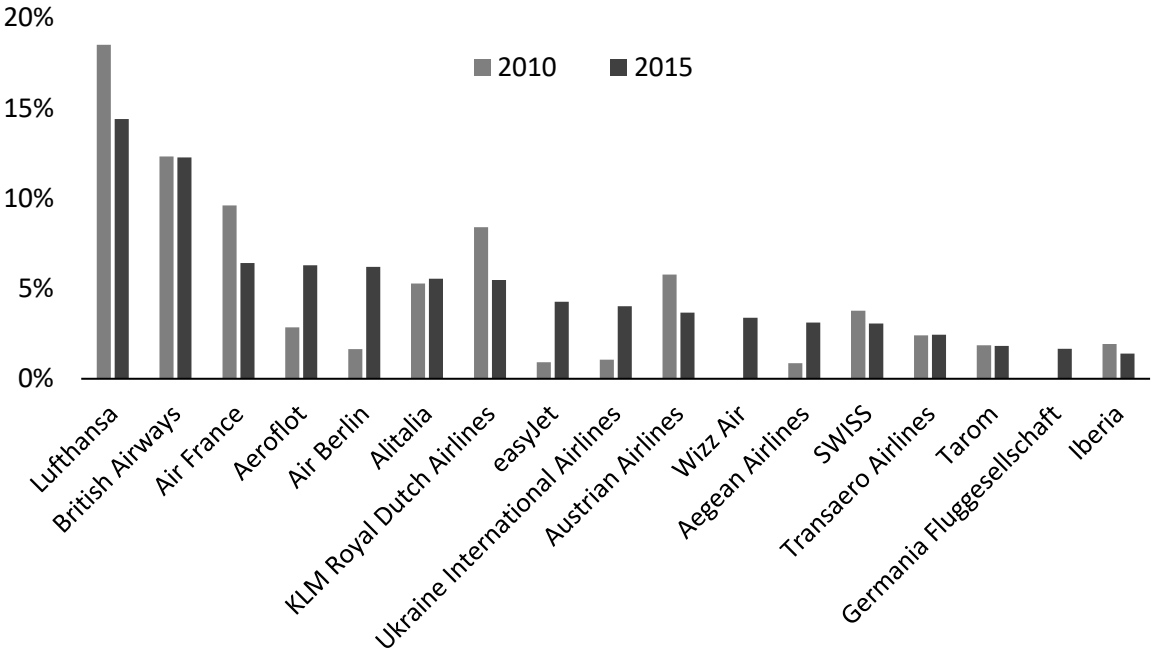
Figure 3.5: Seat share amongst EU Carriers on EU-ME routes

Figure 3.5 shows that in 2015, of the top 7 European carriers serving the Middle East, 5 were the usual legacy airlines: Air France, Alitalia, British Airways, KLM and Lufthansa. In addition to these, Aeroflot and Air Berlin also appeared as strong players on these routes.

Since 2010 the seat growth among European players on these routes has been negative for the previously dominant legacy carriers. Lufthansa, Air France-KLM reduced their seat share significantly while British Airways and Alitalia remained stable. On the other hand, Air Berlin and Aeroflot, small actors in 2010, have increased their seat share very rapidly, almost fourfold and three fold respectively for each. In 2015 they almost exceeded Air France in terms of seats to the Middle East. The previously dominant airlines such as Austrian Airlines or SWISS have seen reduced seat share, whereas newer LCCs such as EasyJet, Wizz Air or Aegean Airlines have increased their seats.

ME Emerging carriers   **On selected EU carriers**
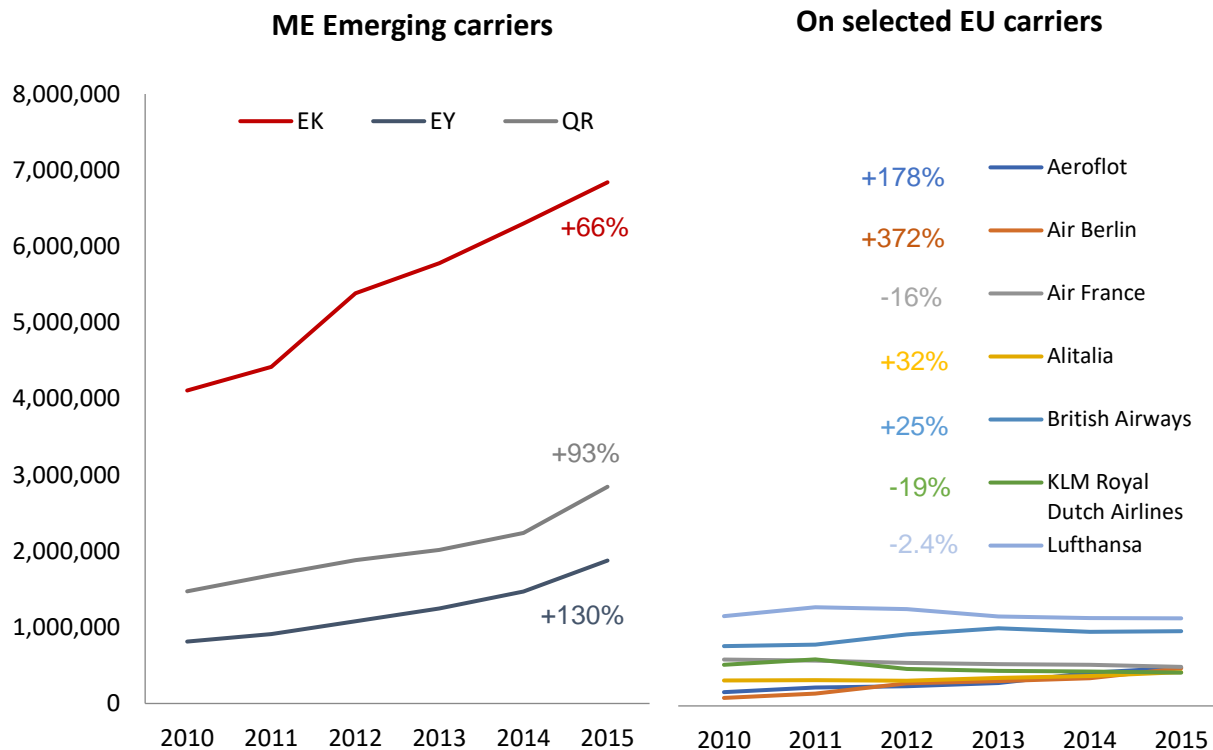
Figure 3.6: Number of seats on flights from selected European countries to the ME

In order to conduct a more direct comparison between the ME Emerging carriers' and selected EU carriers' capacities, only the flights of the ME Emerging airlines to Russia, Germany, France, Italy, the UK and the Netherlands are included in the numbers of the graph on the left of Figure 3.6 These are countries from which the EU airlines represented on the right come from.

The first striking point from Figure 3.6 is the large difference in absolute values that exists between the seats of ME3 carriers and that of the largest EU airlines. In 2015, Emirates on its own offered 50% more seats on these routes than the top 7 EU airlines combined. By adding Etihad and Qatar capacities, this figure increased to 153%.

ME3 airlines grew their seats by 81% between 2010 and 2015 whereas these selected European carriers grew by just 21%. Looking more specifically at the growth of the individual European carriers shows strong differences. Of the seven, three have actually seen decreasing number of seats: Air France, KLM and Lufthansa. The Air France-KLM loss in seat share observed in Figure 3.5 is partly explained by the strong reductions in seats: -16% and -19% respectively. Similarly, Lufthansa reduced its seats to the Middle East by 2.4%.

On the other hand, Aeroflot, Air Berlin, Alitalia and British Airways increased their seats between Europe and the ME. Most of Aeroflot's growth was on routes to Israel. Capacity to Israel for Aeroflot represented 68% of the total seats to the ME in 2015 versus just 15% in 2010. This is one of the few routes on which ME3 carriers do not compete as they do not offer service to Israel. Air Berlin and Alitalia benefited from

their alliances with Etihad. As mentioned in Chapter 2, Etihad bought 29% of Air Berlin in 2012 and 49% of Alitalia in 2014. These partnerships allowed for increased capacity to the ME for these airlines.

Capacity to specific destinations

The routes to the ME from Europe can be further decomposed: first the hub to hub routes and then the routes to surrounding ME destinations. Hub to hub routes connect the hub of the EU airline to the hub of the ME Emerging carrier. As an example, for Air France these routes would be CDG or ORL to DXB, DOH or AUH. Hubs for Air France are CDG and ORL. The hub for BA is LHR. The Lufthansa hubs are DUS, FRA and MUC, and the KLM hub is AMS. Figure 3.7 shows the changes in seats by carrier type on these specific routes.
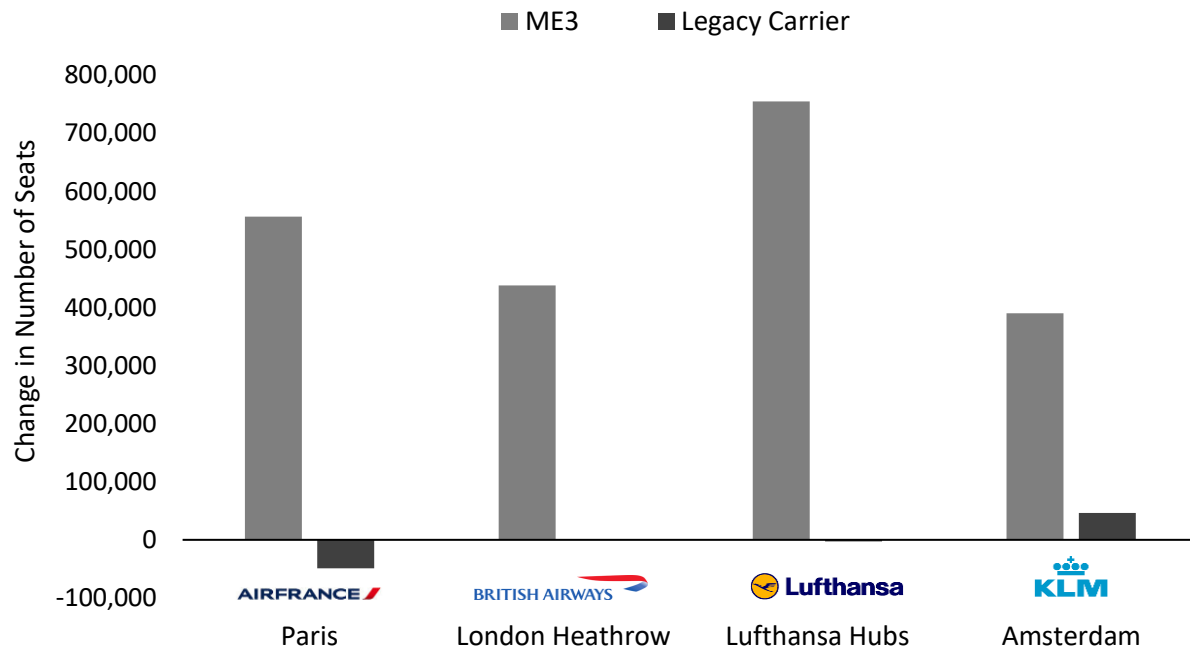
Figure 3.7: Changes in seats to ME3 hubs by route and carrier between 2010 and 2015

None of the EU legacy carriers grew on the hub to hub routes. KLM saw small increases but this was balanced by the Air France losses. Figure 3.7 shows that ME3 carriers increased their capacities by between 0.4m and 0.8m over the entire 2010-2015 period at each of these airports. This is an indication of the potential impact these three airlines have had on destinations beyond the ME. It is unlikely that local demand to just these three cities could have generated such an increase in capacity from Europe's largest hubs, when the European legacy carriers which could also serve the local market have decided not to follow.

The next step in the capacity analysis between Europe and the ME was to look at destinations within the ME which were served nonstop from Europe but could face competition from 1 connect itineraries through ME3 hubs. The hypothesis was that seat supply may have shifted from the nonstop EU legacy carrier to ME3 airlines offering a one connect itinerary. This would explain part of the sudden growth of capacities to ME3 hubs in Figure 3.7. The ME destinations which could be concerned by such a shift were selected according to two criteria: distance to ME3 hubs and service from ME3 airlines. The cities selected

were Dammam, Jeddah, and Riyadh in Saudi Arabia as well as Kuwait and Bahrain. Figure 3.8 shows the changes in capacities by EU carriers to these destinations.
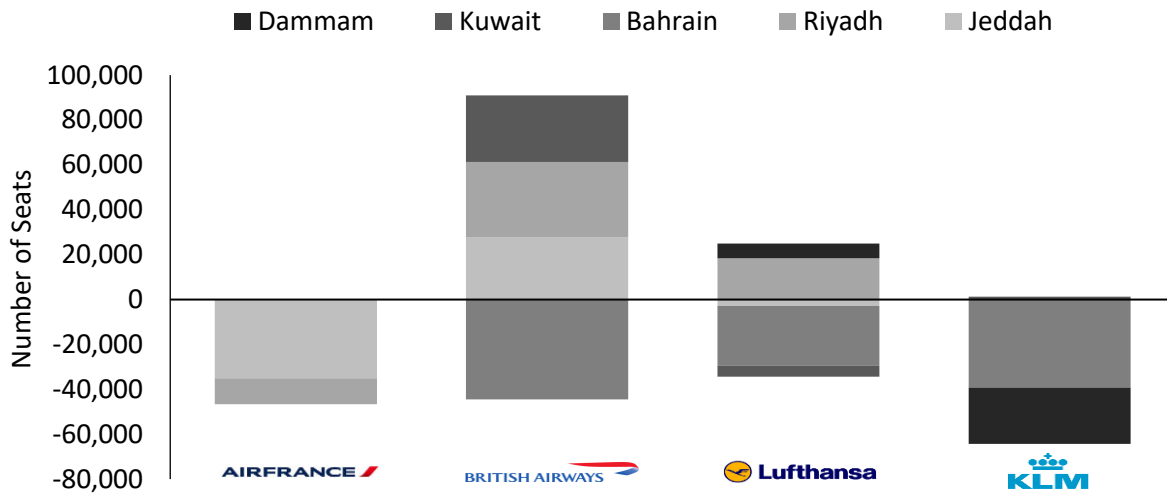
Figure 3.8: Capacity changes to ME secondary hubs between 2010 and 2015 by EU legacy carrier

For three of the four airlines there has been an overall drop in capacities to these destinations. In order to assess whether ME3 carriers may have had any impact on the trends observed in Figure 3.8, we also looked at the growth from the ME3 hubs to these destinations, as represented in Figure 3.9.
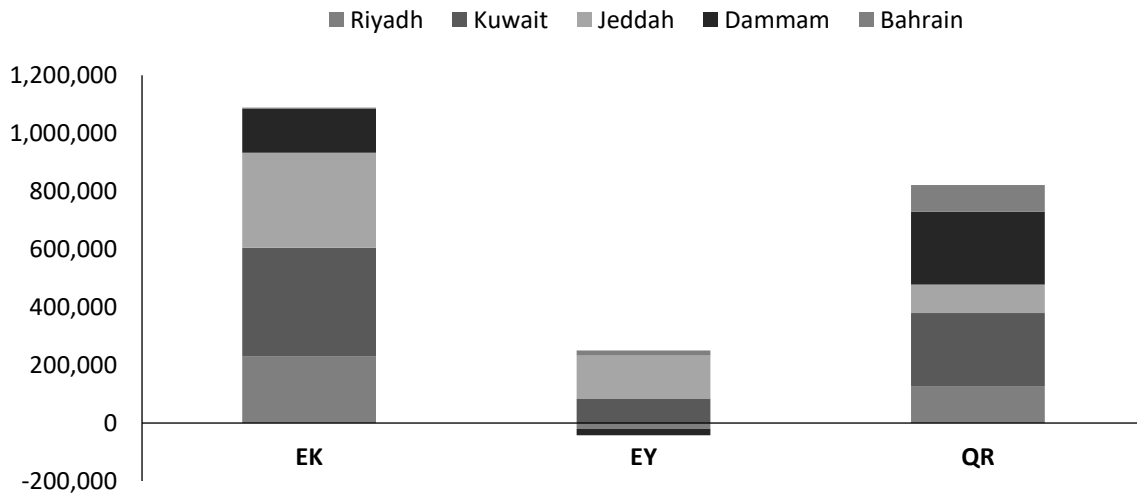
Figure 3.9: Capacity changes to ME secondary hubs between 2010 and 2015 by ME3 legacy carrier

KLM has significantly reduced its seats to Dammam whereas LH slightly increased. At the same time EK and QR both increased their seats, about twenty times more than the sum of the change from KLM and LH. Jeddah shows similar characteristics: strong losses from AF, slight increase from BA while the ME Emerging carriers grew by over half a million seats. On the other hand, Kuwait and Riyadh saw a net increase in EU legacy service thanks to strong growth from BA. In both cases EK, EY and QR all exceeded this growth very significantly. For all these destinations, the increase in seats from the ME3 carriers are orders of magnitude higher than any slight increase or reduction observed in EU legacy airlines.

Finally, all the EU legacy airlines serving Bahrain in 2010 cut capacity since, totaling 110,000 seats lost. Combined Emirates, Etihad and Qatar increased their own capacity by the equivalent amount: 113,000 seats. Hence, the changes in seats to destinations surrounding the ME indicate the potential for a shift of supply from nonstop seats to these destinations to one connect seats through AUH, DXB or DOH. These results along with the strong growth of ME Emerging airlines on hub to hub routes from Europe in Figure 3.7 show the potential impact of the ME3 carriers on European airlines on routes beyond the Qatar and UAE. The purpose of Chapter 4 will be to go into these OD effects.

Airport effects

In addition to impacting European airlines, the ME3 airlines have also had a significant effect on European airports. The large hubs such as LHR or CDG saw some of their capacity shift towards ME3 carriers but secondary airports were those that faced the largest effects. An extra A380 from EK at LHR may increase capacity from Heathrow to the ME by a few percentage points, but the first EK A380 at Manchester increased capacity from MAN to the ME by double digits. Some airports which only had short haul service started offering long-haul service on wide body or double decker aircraft.
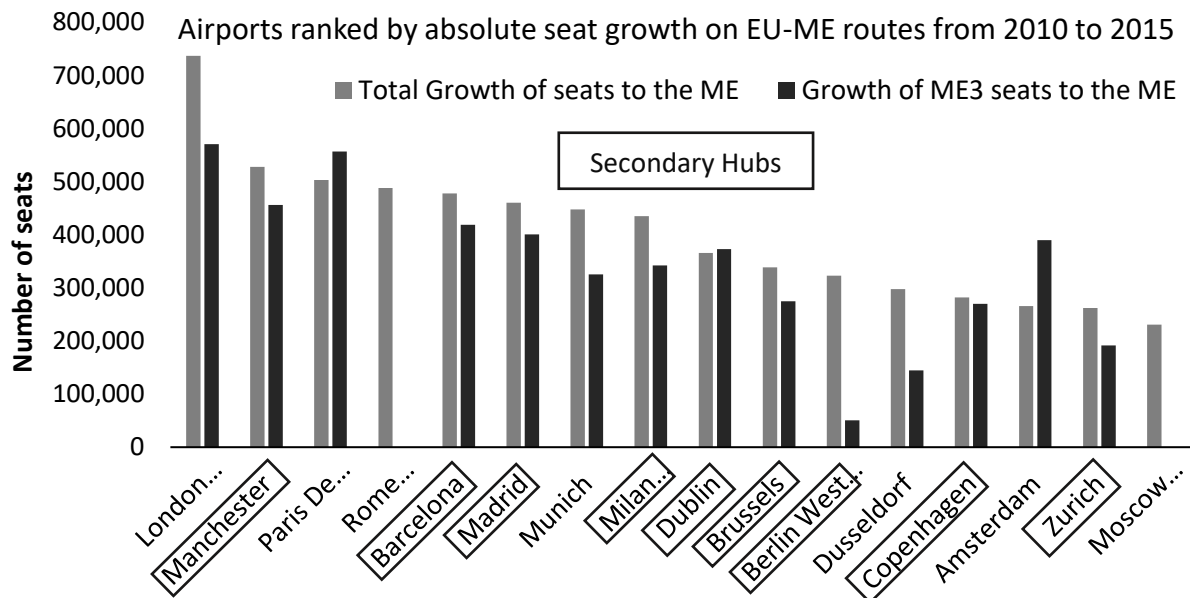
Figure 3.10: Absolute seat growth on EU-ME routes from 2010 to 2015 by departure airport

In Figure 3.10, the growth of ME3 seats from the top 25 European airports (by number of seats to the ME) accounted for over 72% of the total growth from these airports to the ME. Half of the top 16 airports represented above are secondary airports, for which the percentage growth is much higher, as shown in Table 3.2.

Table 3.2: Growth rates of seats to the ME by European airport (2010-2015)

LHR	MAN	CDG	FCO	BCN	MAD	MUC
3.6%	14.8%	4.6%	8.4%	31.7%	17.1%	9.9%

MXP	DUB	BRU	TXL	DUS	CPH	AMS
10.8%	31.9%	21.4%	30.9%	13.4%	34.7%	5.6%

As growth rate of ME3 seats appears as one of the main differentiators between secondary and primary airports, we then differentiated secondary from primary airports by ranking in one case the airports according to their absolute growth in seats (Table 3.3) and in the other according to their CAGR in seats (Table 3.4) on routes between Europe and the ME from 2010 to 2015. The role of the ME3 carriers in the growth of these airports was measured by looking at four dimensions: 1 – whether the first airline by seat capacity is an ME3 2 – whether the second airline by seat capacity is an ME3 3 – whether the airline with the highest growth in seat capacity is an ME3 4 – whether the airline with second highest growth in seat capacity is an ME3.

Table 3.3 shows the very significant role of ME3 carriers in the growth of capacity from European hubs to the ME. Among the top 8:

- o 7 have an ME3 airline as their first airline by capacity on these routes
- o 6 have ME Emerging airlines as their top two airlines by capacity on these routes
- o The ME3 carriers alone generated 57% of the capacity from these airports to the ME

Among the top 17:

- o 14 have an ME3 carrier as their first airline by capacity on these routes
- o 12 have ME Emerging airlines as their top two airlines by capacity on these routes
- o The ME3 airlines alone generated 56% of the capacity from these airports to the ME

Out of the top 25 only one airport isn't served by the ME3 airlines. In 13 of the top 25 airports, local legacy carriers are either negligible or absent in the growth of capacity to the ME.

Table 3.4 shows the very strong role of ME3 carriers in the development of routes to the ME from secondary airports. Airports such as Lyon, Stuttgart, and Lisbon have shown CAGRs in seats to the ME of over 40% in recent years, with over 70% of their flights to this region now served by Emirates, Etihad or Qatar. In fact, Emirates is the only airline to serve the ME (excluding Israel) nonstop from these three airports. This is true in total for 8 of the top 25 airports by CAGR. Overall, fourteen of the top 25 secondary airports have ME Emerging airlines as their top two airlines by capacity on routes to the ME.

Hence, ME3 carriers have been expanding their networks by targeting both European primary and secondary airports. At secondary airports this growth was often synonym of a new nonstop route to the ME. Passengers from these secondary areas are not required to connect via a European hub anymore. At primary airports as well this growth has made the ME3 airlines dominant players, as could be expected from the aggregate analysis carried out for the legacy carriers.

Table 3.3: Role of ME3 at primary airports in 2015 by seat capacities to the ME

Airports	Seat Capacity Δ	First Airline by seat capacity is an Emerging Carrier?	Second airline by seat capacity is an Emerging carrier?	Airline with highest growth in seat capacity is an Emerging carrier?	Second Airline with highest growth in seat capacity is an Emerging carrier?
London Heathrow	≥ 400 000	✗	✓	✓	✓
Manchester	≥ 400 000	✓	✓✓	✓	✓
Paris De Gaulle	≥ 400 000	✓	✓	✓	✗
Rome Leonardo DV[1]	≥ 400 000	✓	✓✓	✗	✗
Barcelona	≥ 400 000	✓	✓✓	✓	✓
Madrid	≥ 400 000	✓	✓✓	✓	✓
Munich	≥ 400 000	✓	✓	✗	✗
Milan Malpensa[1]	≥ 400 000	✓✓	✓	✓	✗
Dublin	≥ 230 000	✓✓	✓✓✓	✓	✓
Brussels	≥ 230 000	✓	✓✓	✓	✗
Berlin West Tegel	≥ 230 000	✓✓	✓✓	✗	✗
Dusseldorf	≥ 230 000	✓	✓✓	✗	✗
Copenhagen	≥ 230 000	✓	✓✓✓	✗	✓
Amsterdam	≥ 230 000	✗	✓✓	✓	✓
Zurich	≥ 230 000	✓	✗	✓	✗
Moscow Sheremetyevo	≥ 230 000	✗	✗	✗	✗
Oslo	≥ 230 000	✓✓	✓✓✓	✓	✓
Stockholm Arlanda	≥ 166 000	✓	✓✓✓	✓	✗
Moscow Vnukovo	≥ 166 000	✗	✗	✗	✗
Belgrade	≥ 166 000	✓✓	✓	✗	✓
Geneva	≥ 166 000	✓	✓✓	✗	✗
Prague	≥ 166 000	✓	✗	✓	✓
Vienna	≥ 166 000	✗	✓✓✓	✓	✓
Frankfurt	≥ 166 000	✗	✓✓✓	✓	✗
Kiev Borispol	≥ 166 000	✗	✗	✗	✗

Legend — First Airline by seat capacity:
- ✓ The ME3 carrier has <50% of seats from that airport
- ✓✓ The ME3 carrier has >50% of seats from that airport
- ✓✓✓ The ME3 carrier has >70% of seats from that airport

Legend — Second airline by seat capacity:
- ✓ The ME3 carrier has <20% of seats from that airport
- ✓✓ The ME3 carrier has >20% of seats from that airport
- ✓✓✓ The ME3 carrier has >30% of seats from that airport

- ✓ The airline is an ME3 carrier
- ✗ The airline is not an ME3 carrier

1) Alitalia was counted as Etihad due to the strong stake taken by the UAE carrier (49%)

48

Table 3.4: Role of ME3 at secondary airports in 2015 by seat capacities to the ME

Seat Capacity CAGR	Airports	First Airline by seat capacity is an Emerging Carrier?	Second airline by seat capacity is an Emerging carrier?	Airline with highest growth in seat capacity is an Emerging carrier?	Second Airline with highest growth in seat capacity is an Emerging carrier?
≥40%	Lyon	✓✓✓	✗	✓	✗
≥40%	Stuttgart[1]	✓✓	✗	✗	✗
≥40%	Lisbon	✓✓✓	✗	✓	✗
≥40%	Belgrade[1]	✓✓	✓✓	✗	✓
≥40%	Oslo	✓	✓✓✓	✓	✓
≥40%	Moscow Vnukovo	✗	✗	✗	✗
≥40%	Zagreb	✓	✗	✗	✓
≥40%	Helsinki	✗	✗	✗	✗
≥20%	Copenhagen	✓	✓✓✓	✓	✓
≥20%	Dublin	✓✓	✓✓✓	✓	✓
≥20%	Barcelona	✓	✓✓	✓	✓
≥20%	Berlin West Tegel	✓✓	✓✓	✗	✗
≥20%	Sofia	✗	✓✓	✓	✗
≥20%	Kiev	✗	✗	✗	✗
≥20%	Warsaw	✓	✓✓	✓	✓
≥20%	Venice	✓✓	✓✓	✓	✓
≥20%	Brussels	✓	✓	✓	✗
≥13%	Stockholm Arlanda	✓	✓✓✓	✓	✗
≥13%	East Berlin	✗	✗	✗	✗
≥13%	Madrid	✓	✓✓	✓	✓
≥13%	Moscow Sheremetyevo	✗	✗	✗	✗
≥13%	Glasgow	✓✓✓	✓✓✓	✓	✓
≥13%	Manchester	✓	✓✓	✓	✓
≥13%	St. Petersburg	✓✓	✗	✓	✗
≥13%	Dusseldorf	✓	✓✓	✓	✗

Legend — First Airline by seat capacity is an Emerging Carrier?
✓ The ME3 carrier has <50% of seats from that airport
✓✓ The ME3 carrier has >50% of seats from that airport
✓✓✓ The ME3 carrier has >70% of seats from that airport
✗ The airline is not an Emerging carrier

Legend — Second airline by seat capacity is an Emerging carrier?
✓ The ME3 carrier has <20% of seats from that airport
✓✓ The ME3 carrier has >20% of seats from that airport
✓✓✓ The ME3 carrier has >30% of seats from that airport
✗ The airline is not an Emerging carrier

Legend — Airline with highest growth in seat capacity is an Emerging carrier?
✓ The airline is an ME3 carrier
✗ The airline is not an ME3 carrier

1) Air Serbia and Air Berlin counted as Etihad due to the strong stake taken by the UAE carrier (49% and 29%)

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The study of the evolution in capacity between Europe and the Middle East has shown that most of the growth has come from ME Emerging airlines. The ME3 carriers grew their capacity by increasing the number of flights by over 74% and by increasing the size of their aircraft by over 13%. Relative to this growth, the changes in capacity from European legacy carriers has been close to negligible. Air France, KLM and Lufthansa have reduced their seats while BA increased its capacity. The differences in capacities from these carriers on hub to hub routes or on routes to surrounding destinations are orders of magnitudes lower than the increases from the ME Emerging carriers.

The growth of the ME3 airlines consisted of a mix of secondary and primary airports. In the former this allowed for network expansion and in the latter this led to strong seat share changes with ME3 carriers taking the forefront of the service on EU-ME routes.

North America - Middle East

In addition to growing capacity to Europe, the ME Emerging carriers also focused significant efforts on growing capacity to North America, and more specifically to the US. The purpose of this section will be to analyze the growth of capacity on routes between North America and the Middle East and compare to the trends observed from Europe. North America is composed of the United States and Canada. Air Canada is the only non-US airline from North America flying to the ME.

Over the past five years, capacities between North America and the Middle East have grown extremely rapidly. Table 3.5 shows the macro trends on the routes between these two regions.

Table 3.5: Trends on the N. America - ME nonstop routes

	2010	2015	% Change
Number of Airlines	14	12	**-14.3%**
US Airlines	3	3	**0%**
ME Airlines	9	7	**-22.2%**
Other Airlines	2	1	**-50%**
ME Cities	8	9	**12.5%**
US Cities	13	17	**30.8%**
Flights	19,825	31,000	**56.4%**
ASMs (Bn)	39.9	73.784	**85.0%**
Seats (Mn)	5.950	10.544	**77.2%**
Seats/Aircraft	300	340	**13.3%**

Overall, the N. America to ME routes were served by fewer airlines than Europe to ME routes. This is potentially due to the longer average stage length on routes from N. America, requiring larger aircraft which fewer airlines possess. Despite this difference, in both cases the number of airlines has reduced since 2010 and the total capacity has increased.

Capacity increased from larger aircraft and increasing number of flights, as in Europe. However, in this case the larger number of flights has significantly expanded the route network from the US to the ME: large cities such as Miami, Seattle or Boston gained new nonstop service to the region. Finally, the growth in network has also impacted the average stage length, with new cities such as Seattle or Dallas, further from the ME. This can be seen from the 85% growth in ASMs versus the 77% growth in seats.

As in the EU-ME analysis, the players on these routes were split into different geographical categories:

- ME3 carriers (Emerging carriers)
- ME carriers excluding Emerging
- US carriers
- Canadian airlines
- Other
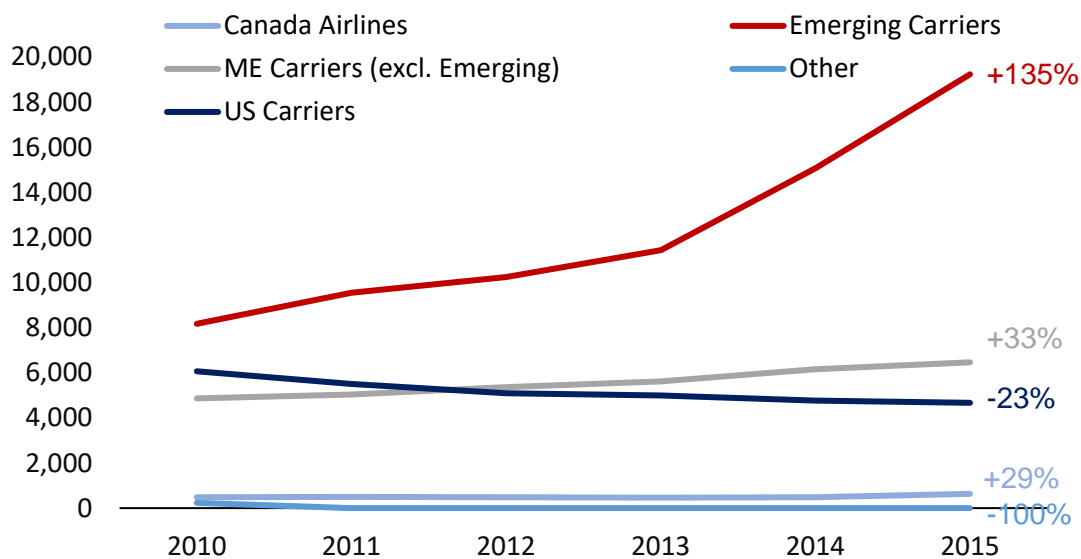
Figure 3.11: Number of flights on North America - ME routes (bidirectional) from 2010 to 2015

In Figure 3.11 the split by carrier type shows ME Emerging carriers have contributed significantly to the capacity growth between the two regions. However, in this case the role of the ME3 airlines is much stronger than it was from Europe. They have been responsible for 78% of the positive flight growth since 2010. When combined with the other Middle East carriers this figure climbs to 90%. From Europe, these figures were notably lower: 37% and 63%. Clearly the other ME carriers played a much larger role from Europe as more airlines could offer nonstop capacity between these two regions.

The other major difference with the previous analysis concerns the strategy of the US carriers. Unlike in Europe where EU carriers still grew on aggregate, US carriers have reduced flights sharply; down 23% in just five years. All 3 legacy airlines were still operating on these routes in 2015 but as will be seen later they concentrated their flights to specific destinations with no ME3 competition. As a result, the only

North American airline that increased their flights are actually Canadian, specifically Air Canada. The growth rate is relatively high but the absolute number of flights is negligible.
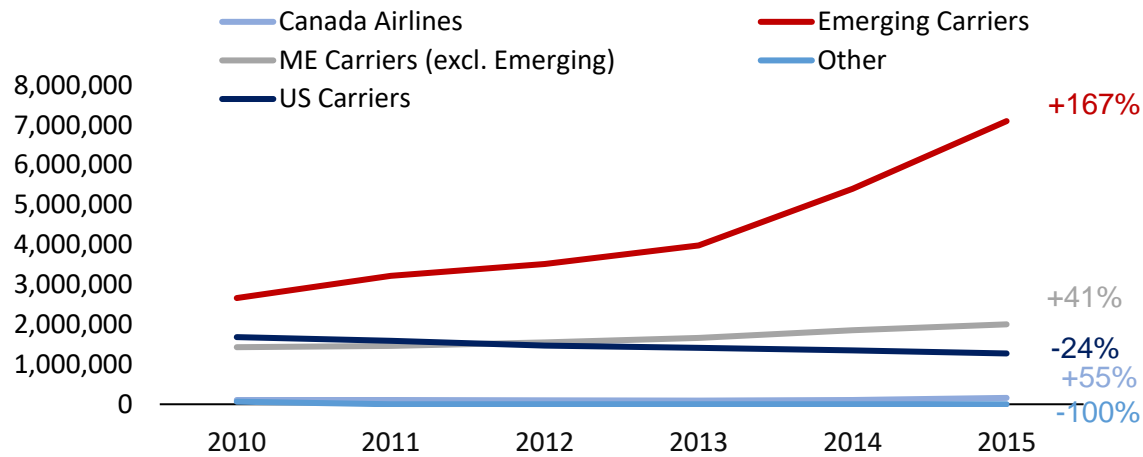
Figure 3.12: Number of seats on North America - ME routes (bidirectional) from 2010 to 2015

In Figure 3.12, similar observations can be made for seat capacity: the impact of ME3 carriers appears much stronger on routes to the US than on routes to Europe. The ME3 alone have generated over 88% of the positive growth in seat capacity to the US against the 54% observed to Europe. While EU airlines still contributed to the overall capacity growth on the EU-ME routes, here the US carriers with a 24% decrease in seats have led to over 86% of the losses.
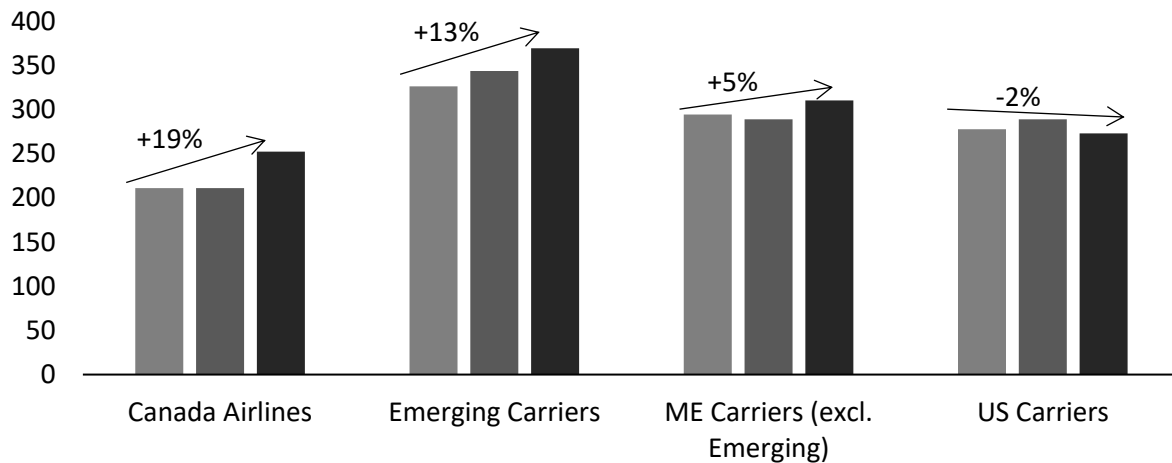
Figure 3.13: Evolution of number of seats by aircraft type

As from Europe, Figure 3.13 shows ME Emerging carriers have seen growing aircraft sizes, from about 320 seats to 360. This comes mainly from their most recent orders of ultra-wide bodies or the increasing use of the A380 by Emirates. In 2015 the super jumbo flew to Houston and San Francisco on Emirates and New York on both Etihad and Emirates. At the same time, US carriers barely changed their aircraft sizes on the selected routes.
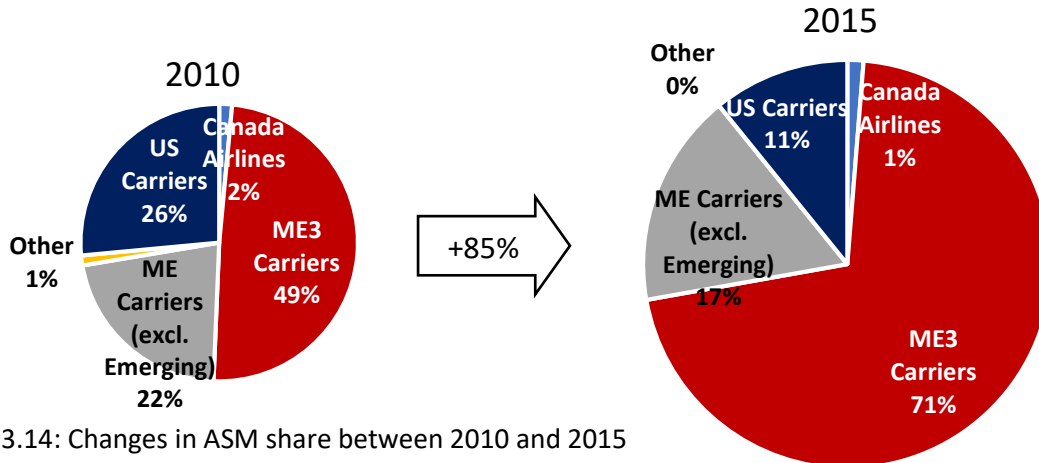
Figure 3.14: Changes in ASM share between 2010 and 2015

In Figure 3.14 we can see that the much stronger role of ME3 carriers in the growth of capacity between North America and the ME has led to an 18 percentage point higher growth in total ASMs than on Europe to ME routes. The ME3 airlines reached 71% of ASMs on these routes, against less than 60% on routes to Europe. As a result of this tremendous increase, all the other carrier categories saw reduced ASM share. By reducing capacity US carriers suffered the most, decreasing to just 11% of ASMs share, despite being the country with the largest population and economy out of all the countries involved on the N. America-Middle East routes. On routes to Europe, EU carriers had managed to maintain almost the double, 19% ASM share.

US carriers vs ME3

With this very striking impact of ME3 carriers on routes to North America at a macro level, we wanted to understand specifically the effect on the top US airlines. Given the previous observations we expected even larger effects than what was seen with EU legacy airlines. The study turned to the US specifically as over 90% of seats from N. America to the Middle East originate in the US (Table 3.6).

Table 3.6: Share of seats to the ME from North America by country

	USA	Canada
2010	92%	8%
2015	93%	7%

Far less diversified than on EU-ME routes, Figure 3.15 shows that capacities by US airlines to the ME are offered by only three airlines: the three legacy carriers (AA, UA and DL). Since 2010, United has been the largest provider of seats to the ME with over 54% of the seat share in 2015. American has far fewer seats, with just around 10-14% seat share over the same period.
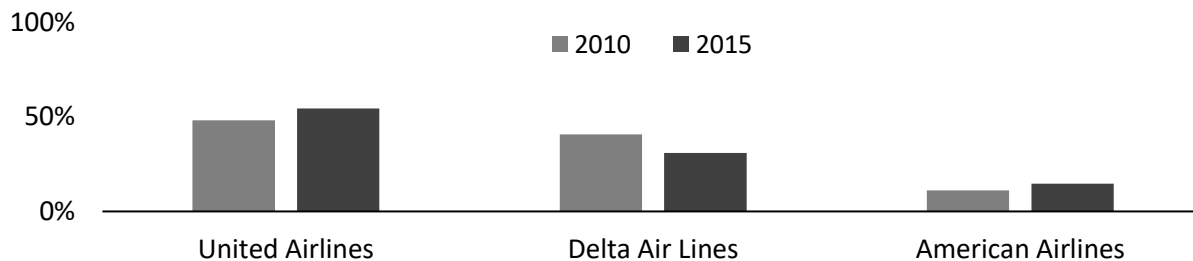
Figure 3.15: Seat Share amongst US carriers on US-ME routes
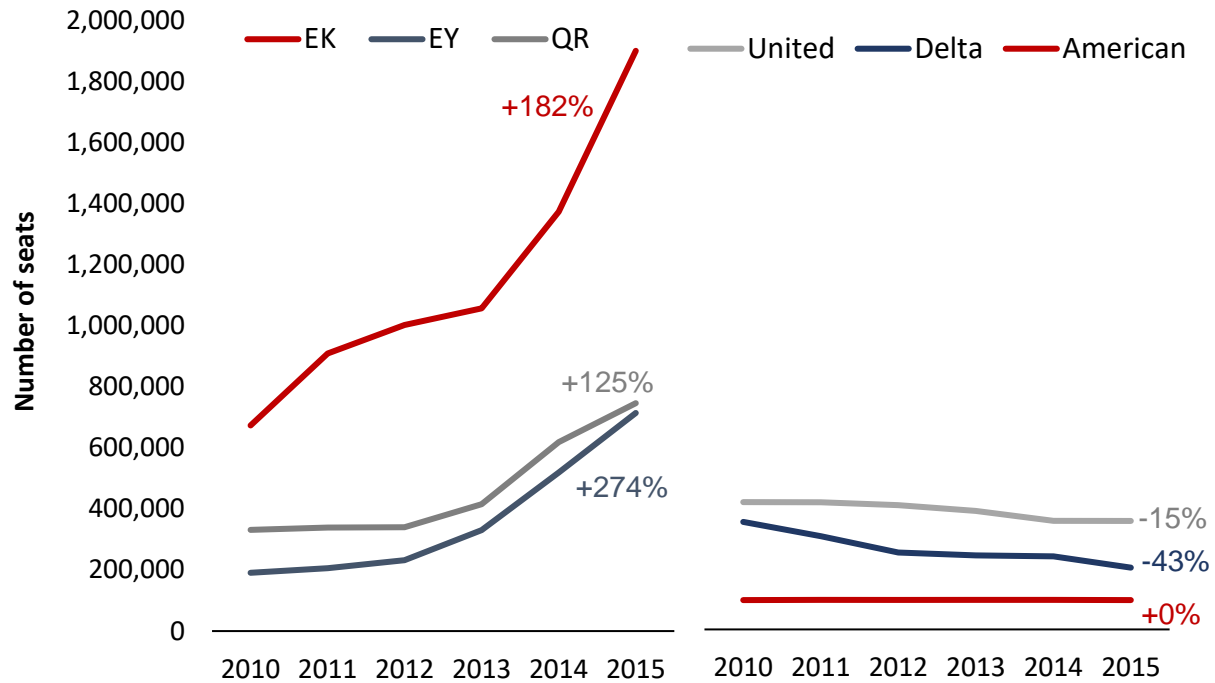
Figure 3.16: Number of seats on flights from the US to the ME (directional) between 2010 and 2015

The graphs from Figure 3.16 show the very strong difference in seat capacity between US legacy and ME3 carriers. The trends are much stronger than what was observed from Europe. From the US, ME Emerging carriers in 2015 offered more than five times more seats than all three US airlines combined. From Europe, they offered 2.1 times more than all EU airlines. While EU legacy carriers showed mixed reactions, the US carriers have shown clear negative growth: the two largest seat providers United and Delta reduced their seats by 27% on aggregate.
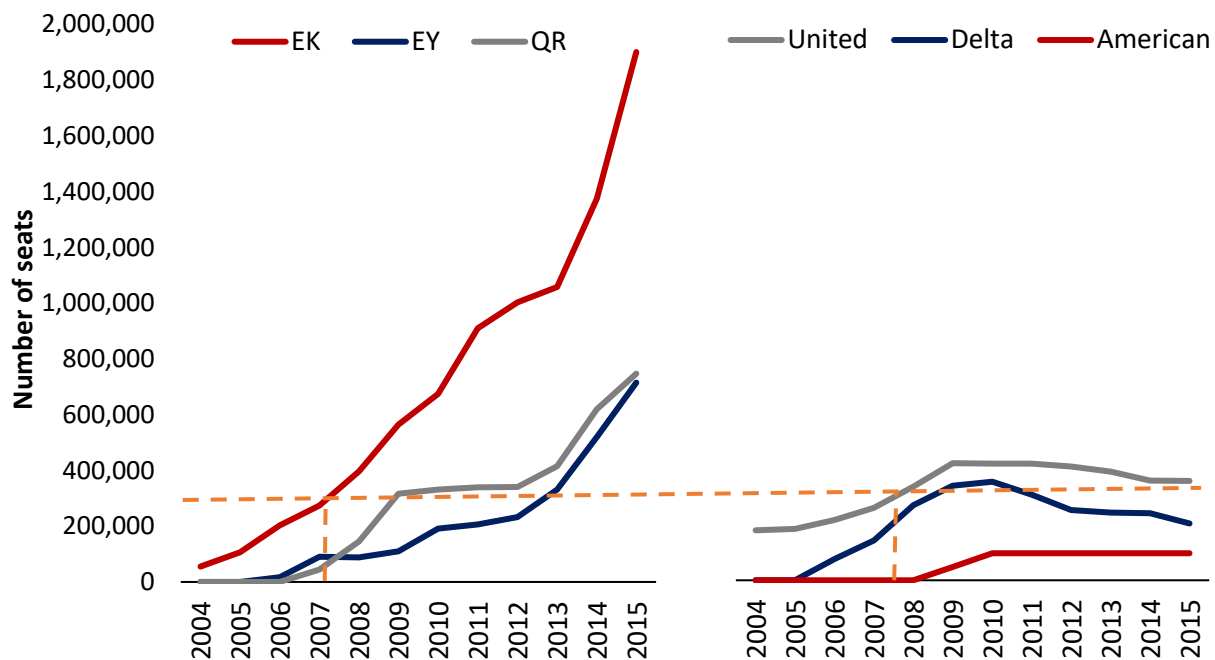
Figure 3.17: Number of seats on flights from the US to the ME (directional) between 2004 and 2015

Figure 3.17 shows how recent the growth of ME3 carriers has been: EY and QR entered only in 2005 while EK had capacities below United until 2006. In 2008 the two sets of airlines offered almost the same amount of seats (7% difference). However, the same year, at the peak of the economic downturn in the United States, Delta and United began cutting frequencies and destinations. Since then they have continuously reduced their capacities. At the same time the ME3 carriers kept on growing at increasingly higher rates. This was a major turning point in the competitive environment of the US-ME market.

Capacities to specific destinations

US carriers cut frequencies and stopped several routes during the same period. Table 3.7 shows the changes in destinations served between 2010 and 2015 as well as the expected situation in 2017.

Table 3.7: Changes in service by US airlines to the ME

Airline	Origin	Destination	% Change in seats 10/15	Jan 2017
American Airlines	Philadelphia	Tel Aviv	0.0%	✗
DELTA	Atlanta	Dubai	-8.7%	✗
	Atlanta	**Tel Aviv**	**-100.0%**	✗
	New York	**Amman**	**-100.0%**	✗
	New York	**Tel Aviv**	**-11.5%**	✓
UNITED	New York	Tel Aviv	-6.2%	✓
	Washington	Dubai	-1.9%	✗
	Washington	**Kuwait**	**-44.9%**	✗
	San Francisco	**Tel Aviv**	**-**	✓

Table 3.7 shows very significant cuts on all routes except the newest San Francisco to Tel Aviv. There were 8 non-stop flights to the ME in 2010, only four were left in 2015 and only 3 are left in 2017. American Airlines will be completely stopping its service to Tel Aviv. The three remaining are to Tel Aviv, Israel, which ME3 carriers do not serve. Additionally, they actually represent just two routes as two of them are JFK-TLV and EWR-TLV.

Given the very high frequencies of ME Emerging carriers to the ME the drop of US airlines' capacities on routes to DXB, DOH or AUH is not surprising. However, the US airlines also cut frequency to surrounding destinations in the ME.
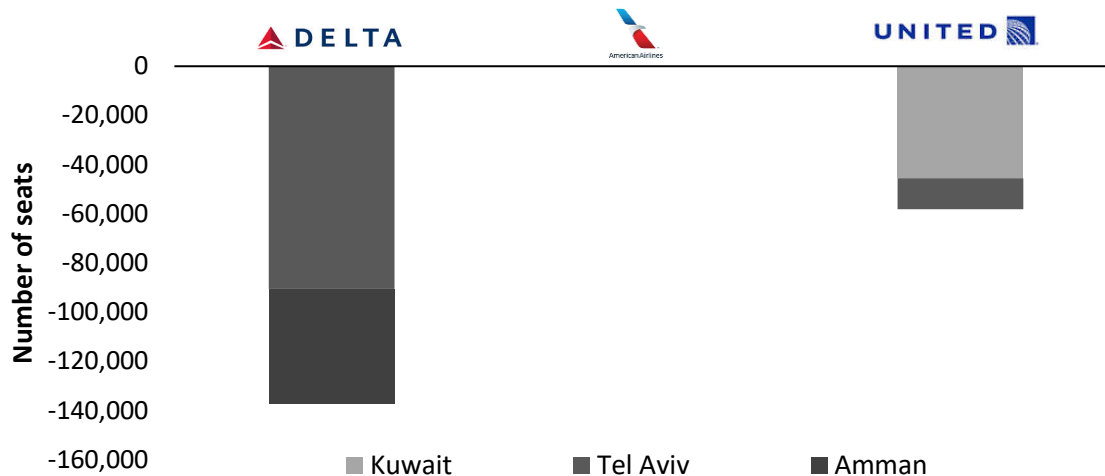
Figure 3.18: Change in service by US airlines to ME destinations between 2010 and 2015

Figure 3.18 shows US airlines have stopped flying to Kuwait and Amman, two destinations which are still served by the ME3 airlines. Similarly to what we saw from Europe, this may be an indication of OD traffic shifting from nonstop on US airlines to one connect on ME3 carriers. Figure 3.9 showed how much the ME3 carriers were growing to these surrounding destinations, far more than the local markets would require. Tel Aviv on the other hand is not served by ME3 carriers so the losses there are due to other dynamics.

Airport Effects

ME3 carriers have grown their capacity to the United States by expanding their network to a large variety of airports across the country. The network is far less diversified than what was observed in Europe. As shown in Figure 3.19, in 2015 only 13 airports from the US had flights to ME3 hubs and all of these airports are primary airports. The ME3 airlines use their partnerships with some US carriers (e.g. JetBlue or American) feeding passengers from secondary airports to primary airports such as BOS. In Europe there were 68 airports with nonstop service to ME3 hubs in 2015, many of which are secondary airports, and appeared as targets for ME3 airlines.
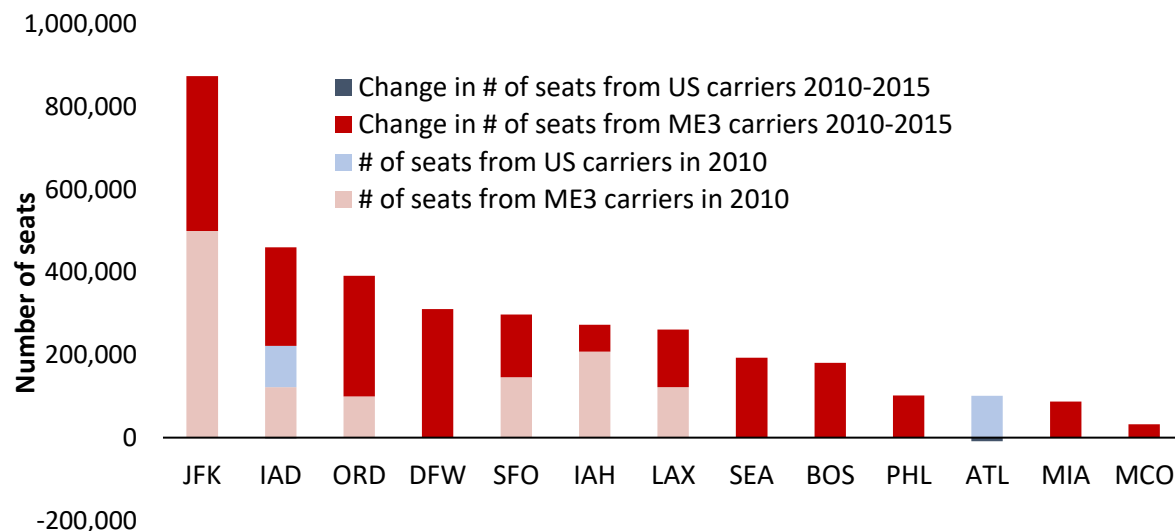
Figure 3.19: Decomposition of seats to ME3 hubs by US airport in 2015

Since 2015 both ATL and IAD have cut their routes to ME3 hubs on US carriers. This means that 100% of nonstop capacities to ME3 hubs from the United States are now offered by the ME Emerging airlines.

Impact on US vs EU carriers

The two previous sections clearly showed that both US and European airlines have had to face very strong growth of ME competition. The responses on both continents appear to have been quite different, as shown in Table 3.8.

Table 3.8: Comparison of impact on EU and US airlines

Routes	EU-ME ME3	US-ME ME3	EU-ME EU Legacy	US-ME US Legacy
Growth in flights	74%	142%	+3%	-23%
Growth in seats	97%	181%	-1%	-24%
Δ in ASM share	10%	22%	-6%	-15%

The main difference is that the EU carriers maintained or slightly increased their capacity despite the ME3's growth. The growth of ME3 airlines was less than 100% over the past five years and the change in ASM share less than 10 percentage points. On the other hand, in the US, the legacy airlines decided to cut capacity. At the same time the ME Emerging carriers grew far faster than in Europe, with growth rates above 140% and 22 percentage point increase in ASM share. Hence the impact on US carriers is much more significant than on EU carriers.

3.3 Beyond the Middle East

As discussed earlier in this Chapter, in order to fully address the impact of ME3 carriers on European and US airlines, their role on OD markets originating in Europe or the US with destinations in Southeast Asia or the Indian Subcontinent should be evaluated. The following two sections will serve this purpose by analyzing the capacity trends on routes from Europe and the ME to the Indian Subcontinent first and then to Southeast Asia.

Indian Subcontinent

The first part of this analysis beyond the Middle East will focus on the Indian Subcontinent. The Indian Subcontinent is composed of Afghanistan, Bangladesh, India, Maldives, Nepal, Pakistan and Sri Lanka.

Middle East

Legend: Asian, ME3, Indian, ME (excl. ME3), Other

+60%
+51%
+61%
+33%

Europe

Legend: Asian, China, Europe, Indian, US

+15%
+12%
-35%
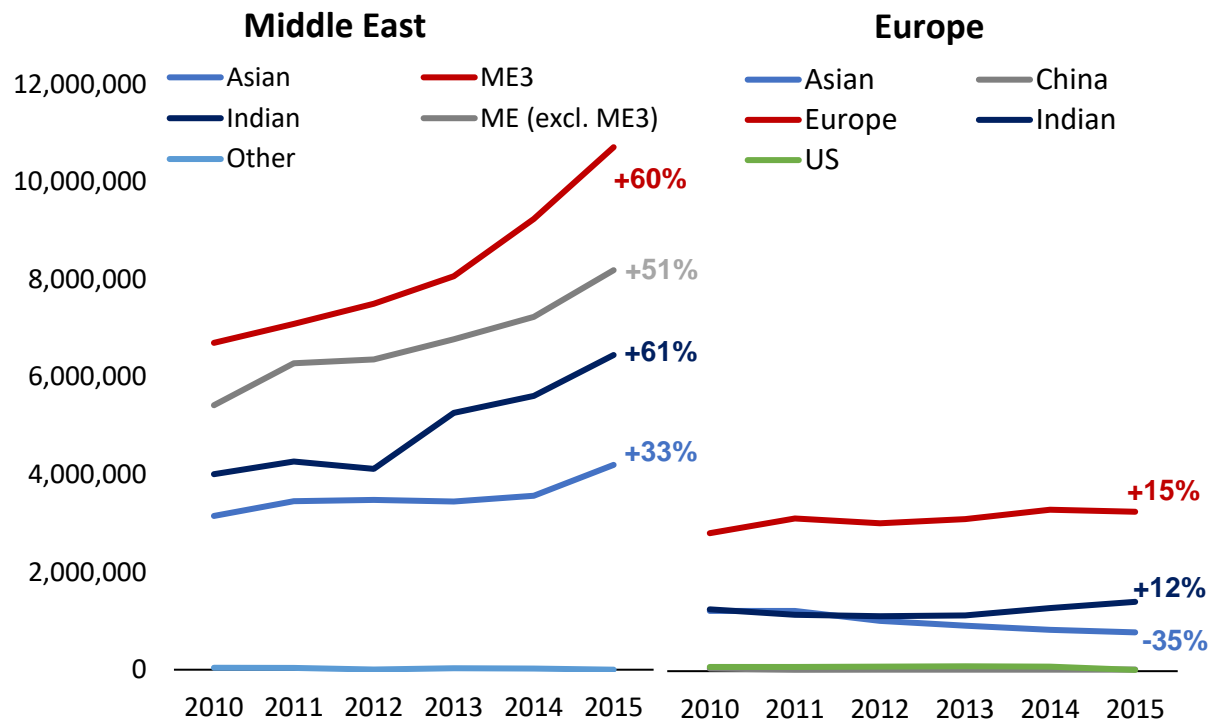
Figure 3.20: Number of seats to and from the Indian Subcontinent by region of origin/destination and carrier type

Figure 3.20 shows the immense difference in capacity and growth on ME-Indian Subcontinent and EU-Indian Subcontinent routes. For every seat from Europe to the Indian Subcontinent, there were 5.6 seats from the Middle East in 2015. In 2010 this figure was 3.5, and in 2004 2.4. Although these regions have different levels of demand such a strong difference between the two origin regions, increasing so rapidly, is intriguing.

While almost all the airlines on ME-Indian Subcontinent routes have been growing capacity above 30% over the five year period, airlines on Europe-Indian Subcontinent routes gained no more than 15% capacity. For example, the Asian airlines reduced seats to the Indian Subcontinent by 35% from Europe while they increased by 33% from the Middle East. The Indian airlines from the ME raised capacity by fifteen times the amount they did from Europe. These striking differences motivated the research to compare the evolution of capacities between Europe and the Indian Subcontinent with those between the ME and the Indian Subcontinent.

From Europe

Europe corresponds to the European continent, including Turkey. "Other" airlines are composed of US (Delta) and non-Indian Asian airlines.

Table 3.9: Trends on EU - Indian Subcontinent nonstop routes

	2010	2015	% Change
Number of Airlines	34	24	**-29%**

EU Airlines	20	16	**-20%**
Indian Airlines	2	2	**0%**
Other Airlines	12	6	**-50%**
EU Cities	30	22	**-28%**
Ind. Subcont. Cities	18	17	**-5.6%**
Flights	39,629	39,462	**-0.4%**
ASMs (Bn)	45.2	44.4	**-1.7%**
Seats (Mn)	10.9	11.0	**+0.9%**
Seats/Aircraft	275	279	**+1.4%**

The macro trends on EU-Indian Subcontinent routes described in Table 3.9 reflect the very limited growth observed in Figure 3.20. There have been significant reductions in network size and airlines served. Looking more specifically at the routes that were abandoned to the Indian Subcontinent, 4 Indian cities stopped nonstop service to the ME and 3 cities from Bangladesh, Afghanistan and Nepal began nonstop service to the ME. This indicates a move out of Indian cities. In Europe on the other hand, 9 cities lost nonstop service, and just one, from Aeroflot, gained service. 76% of the lost capacity were from cities in countries home of large legacy carriers: UK (BA), Germany (LH) and the Netherlands (KLM).

Overall the number of seats has remained relatively constant. Unlike what has been observed on the US-ME and EU-ME routes earlier, the EU-India nonstop aircraft have not grown notably so the flat growth in flights has led to similar effects on seats. Of the airlines still operating on these routes we focused on those with the highest influence on the capacities between the two regions. These were selected based on their seat share in 2010 and 2015.
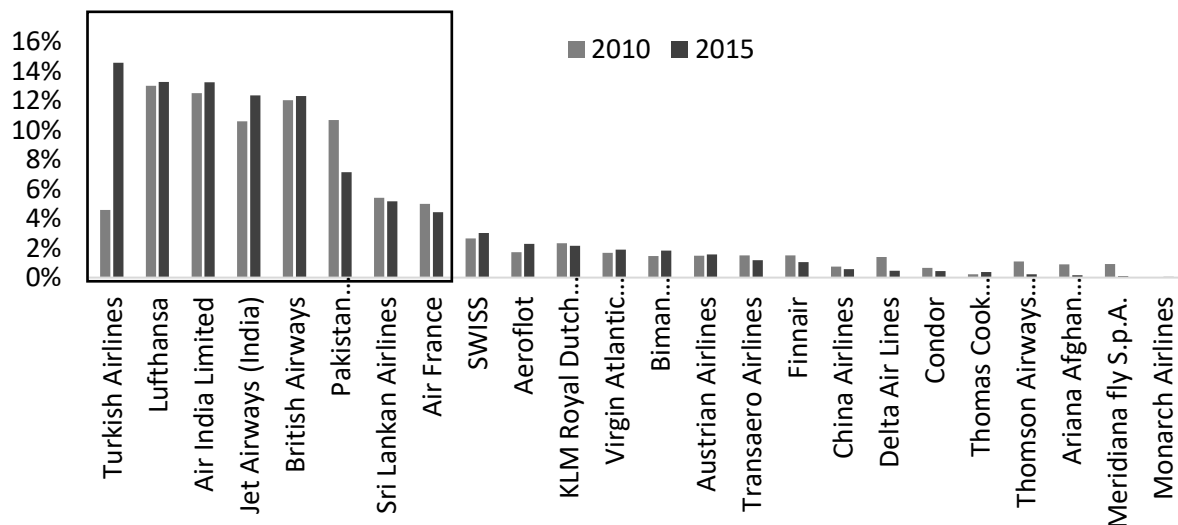
Figure 3.21: Airlines ranked by seat share on routes between Europe and India in 2010 and 2015

Figure 3.21 shows Europe to Indian Subcontinent routes have 8 dominating nonstop players: 3 European legacy, 1 Turkish, 2 Indian, 1 Pakistani and 1 from Sri Lanka. It is worth noting the significant rise of Turkish from 4% to 14% in just five years whereas all the other carriers apart from Pakistan Airlines have remained stable. Below Air France, airlines have much less influence, with around 0-2% seat share.
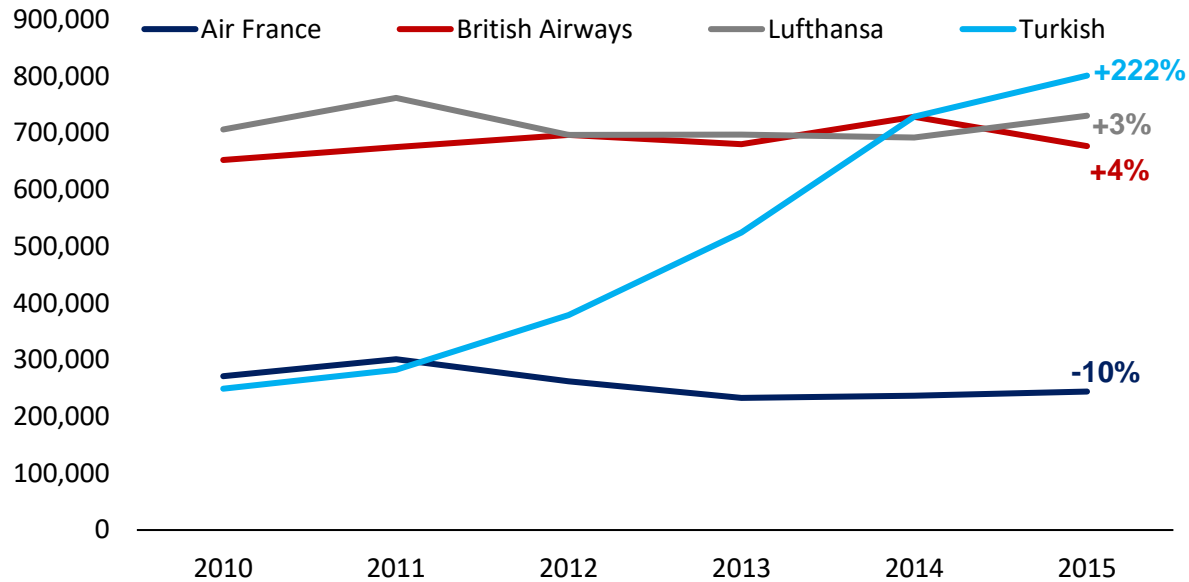
Figure 3.22: Number of seats by European carrier between 2010 and 2015

Among the top European airlines, two trends stand out significantly from Figure 3.22. First, Turkish capacity has been growing much faster than any other carrier on these routes. It started fourth in 2010 and is now first. Secondly, the three legacy airlines have either kept relatively stable capacities, or in the Air France case reduced capacity.
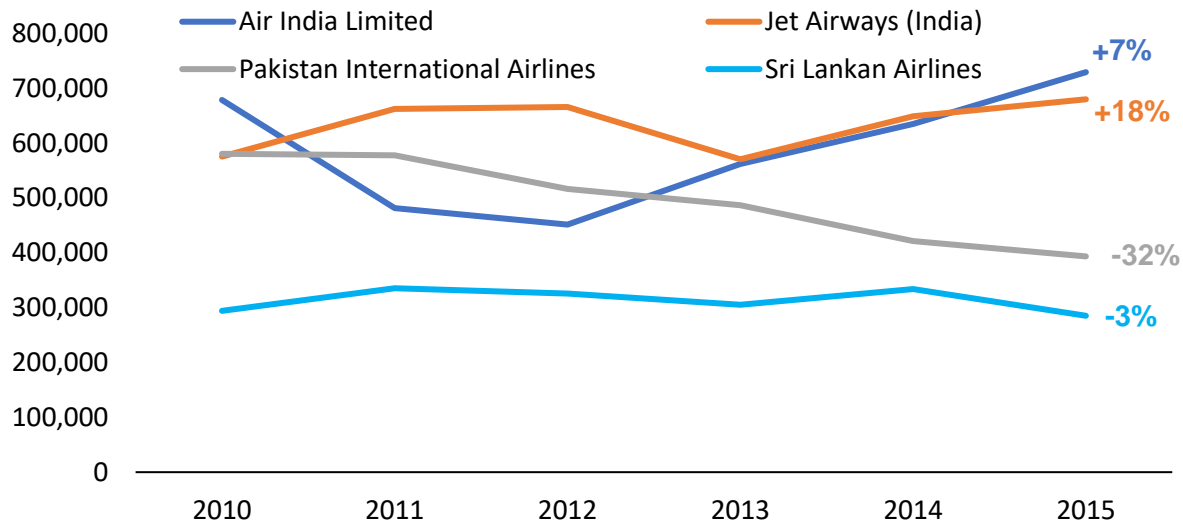
Figure 3.23: Number of seats by Asian carrier between 2010 and 2015

Among the Asian carriers, Figure 3.23 shows various trends by nation. The two Indian airlines behaved in opposite ways until 2013. The increasing capacity from Jet Airways seemed to be balanced by the

reduction from Air India and vice-versa. However, in 2013 with the acquisition of 24% of Jet Airways by Etihad, both carriers since then compete to increase their seats. Sri Lankan Airlines has been relatively stable. Pakistan Airlines is actually the only one that has significantly changed, with a 32% reduction in seats.

Thus, with the exception of Turkish Airlines, major airlines serving EU-Indian Subcontinent routes have shown small to moderate changes in capacity in the past five years. The changes that occurred were mostly between the airlines (e.g. AI and 9W).

<u>From the Middle East</u>

The analysis of the changes in capacities between the ME and Indian Subcontinent from Table 3.10 indicates stark differences to the observations made on routes between the Indian Subcontinent and EU. The only common phenomena are the significant concentration of airlines and the small growth in aircraft sizes.

Table 3.10: Trends on ME - Indian Subcontinent nonstop routes

	2010	2015	% Change
Number of Airlines	45	36	**-20%**
ME Airlines	20	17	**-15%**
Indian Airlines	4	5	**-20%**
Other Airlines	21	14	**-33%**
ME Cities	22	22	**+0%**
Ind. Subcont. Cities	42	43	**+2.4%**
Flights	94,503	139,636	**+48%**
ASMs (Bn)	32.5	48.9	**+50%**
Seats (Mn)	19.4	29.5	**+52%**
Seats/Aircraft	205	211	**+3%**

From Europe the network size significantly reduced (-28% in the number of EU cities with nonstop service to the Indian Subcontinent and -5.6% in the number of cities of the Indian Subcontinent with nonstop to Europe) while from the ME we can see few changes (0% in the ME and +2.4% in the Indian Subcontinent). Also, the number of seats to the Indian subcontinent from the ME has increased tremendously, over 50%, while from Europe capacities have been very stable (+0.9%).
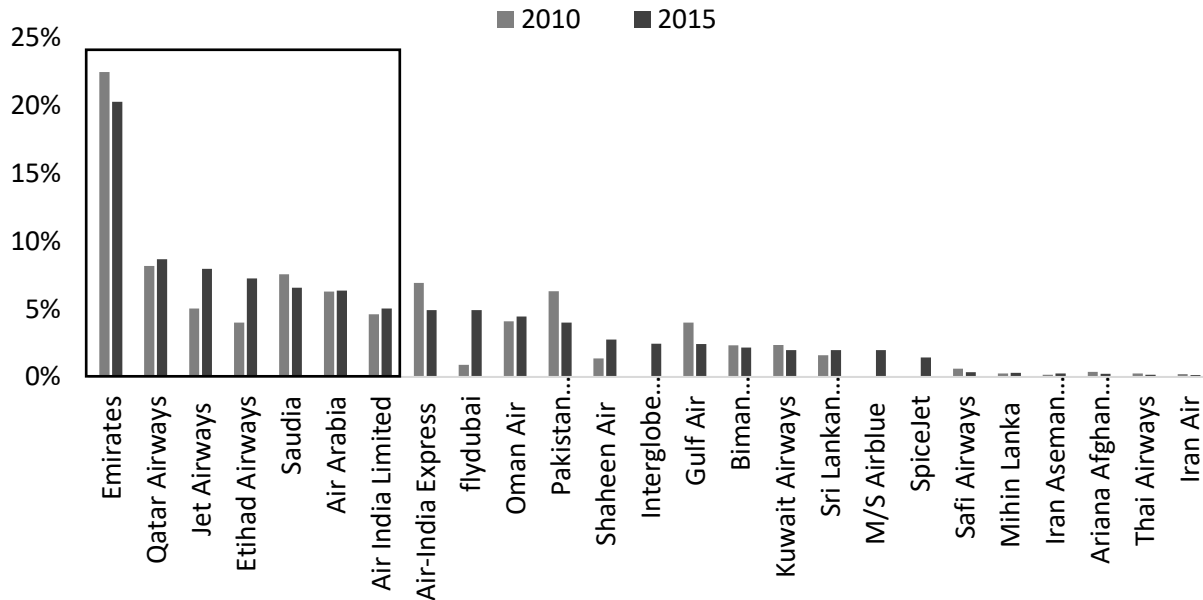
Figure 3.24: Seat share by carrier on ME – Indian Subcontinent routes

Of all the carriers serving the ME-Indian Subcontinent routes, from Figure 3.24 seven emerge as dominant. The distribution of seat share from the ME among the airlines is very different to that seen from Europe. There is a much stronger domination from the top airline, Emirates, with its 20% seat share, twice more than its closest competitor in seats. From Europe the top 5 airlines had very similar share levels. Behind Emirates the differences are much less clear, and setting the limit for top airlines at 7 is somewhat arbitrary; whereas from Europe there was a clear seat share difference between the 8th and 9th airline.
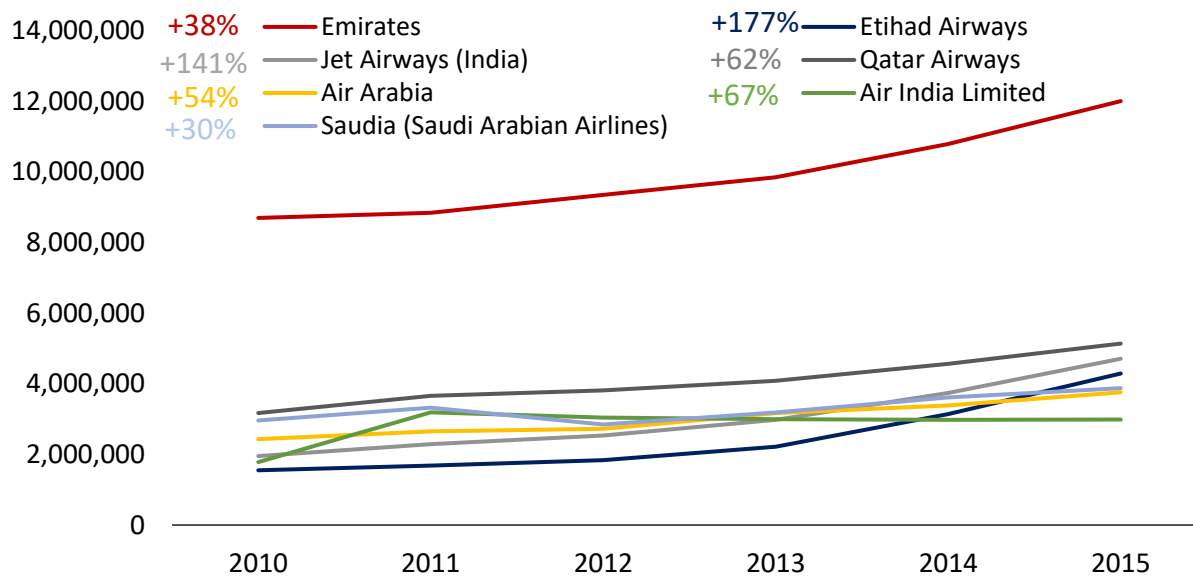
Figure 3.25: Number of seats for top seven airlines on ME-Indian Subcontinent routes by number of seats

Figure 3.25 shows that from the ME all the top airlines have grown in seats. Seat shares have changed due to the differences in growth rates. The strong airlines in 2010 seem to have kept relatively moderate growth rates: Emirates and Saudia, first and second in 2010, grew by around 30%. The third to seventh airlines in 2010 have grown faster: Qatar, Air India and Air Arabia (third to fifth in 2010) grew by about 60%. Finally, Etihad and Jet Airways, last in 2010, are those that grew the most, over 140% since 2010. This growth shows the intention of these two airlines to take over significant seat share, especially following their partnership in 2014.

Unlike the routes from Europe in Figure 3.23, in Figure 3.25 all airlines participate in the growth in capacity; albeit different levels of growth. The Indian carriers are clearly offering more capacity to the ME over capacity to Europe.

Case Studies

The analysis of capacities from Europe and the Middle East to the Indian Subcontinent revealed stark contrasts in the strategy of Asian carriers serving both routes. In all cases they grew much more from the ME than from Europe, despite the stronger economies, larger populations, and touristic appeal of Europe. In order to examine this better, we focused our attention on two case studies, looking at more specific sets of routes to the Indian Subcontinent.
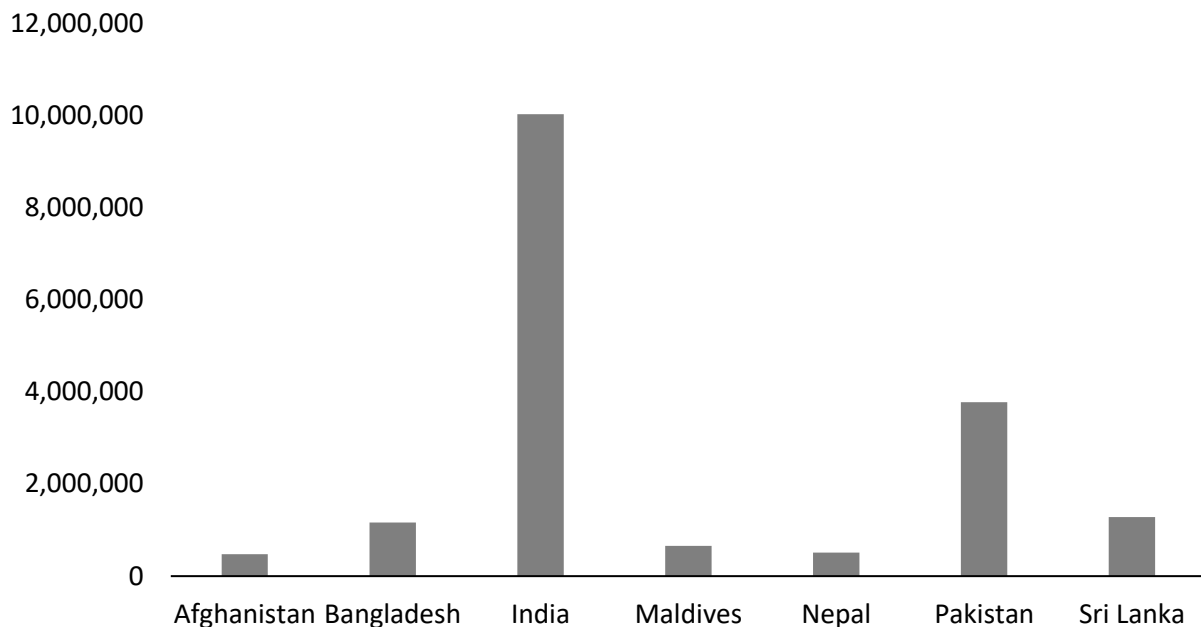
Figure 3.26: Number of seats from ME3 hubs in 2015

Figure 3.26 clearly points to two sets of dominating routes for ME3 carriers in the Indian Subcontinent: India, by far, followed by Pakistan. The two case studies selected are therefore India and Pakistan. The objective of these case studies will be to evaluate the impact of ME3 carriers specifically on capacities from Europe to these two destinations.

India Case Study

As one the largest destinations to the Indian Subcontinent from the ME, India has seen increasing seats from the west over the past five years. This growth has been mostly provided by the ME3 carriers.
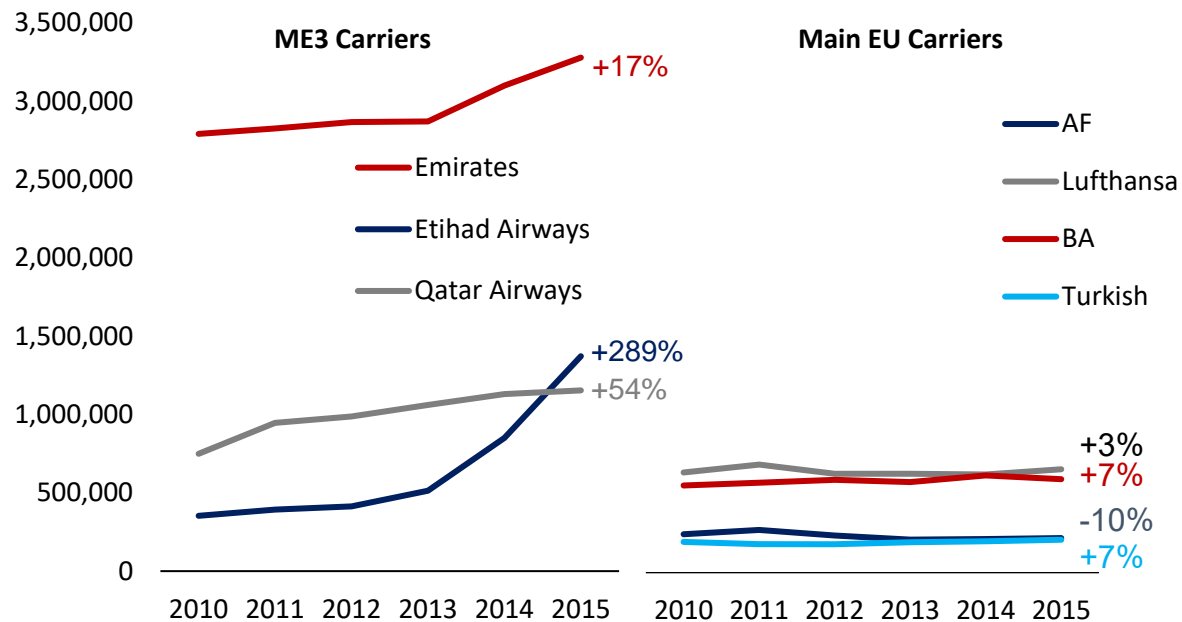
Figure 3.27: Number of seats to India

Figure 3.27 shows that EU and ME3 carriers have adopted opposite strategies on routes to India. ME Emerging airlines have grown by over 1.9m seats whereas the EU carriers grew by just 55k, so just 2.9% of the ME3 capacity growth. Capacities to India are now 3.1 times higher on ME3 carriers than EU carriers. The question is then whether Indian carriers instead of EU carriers grew their capacities from Europe. Figure 3.23 shows Air India and Jet Airways grew by just 7% and 18%, i.e. 155k seats, so just 8.2% of the ME3 capacity growth. At the same time the local population in the regions of origin is around 11m for the ME3 vs 275m for the Europeans.

Note that Turkish, which had the highest seat share to the Indian Subcontinent among all the European airlines, has the lowest among the top four of Figure 3.27. Seats increased by just 7% while they rose by 22% when looking at the entire Indian Subcontinent region. This is due to bilateral agreements between India and Turkey, which prevent Turkish from flying more to India [21].

In order to understand the ME3 carriers' strategy in India the logical next step was to look at the network they served. The goal here was to compare what destinations could be served nonstop from European legacy airlines to the destinations served nonstop from ME3 hubs. In Figure 3.28 the histograms show the number of seats served per destination from ME3 carriers on the left and from main EU or Indian carriers on the right. For both categories, the 2010 and 2015 situation are represented. The main EU carriers presented are Air France, Lufthansa, British Airways, and Turkish Airlines and the main Indian carriers are Air India and Jet Airways.

ME3 carriers

Main EU-Indian carriers from Europe
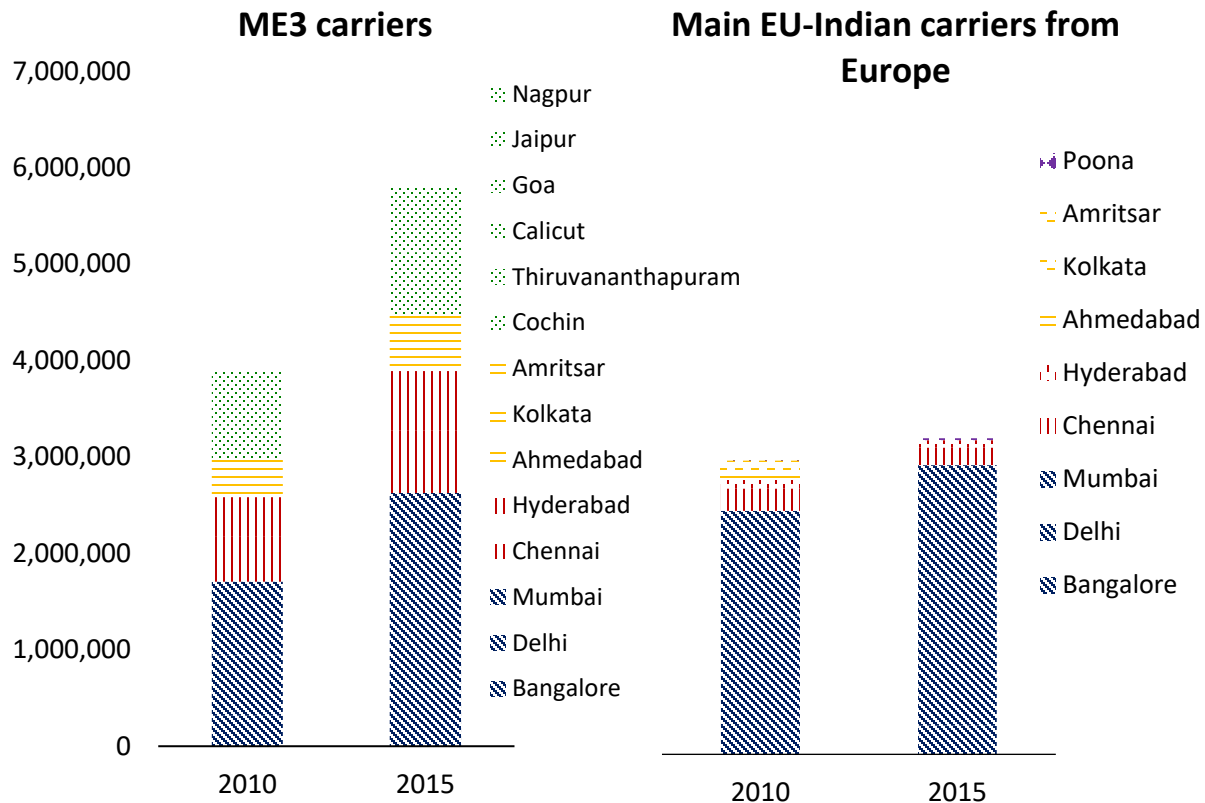
Figure 3.28: Seats per Indian Destination by carrier type and year

The patterns in Figure 3.28 refer to the change in service from the selected European carriers to India between 2010 and 2015:

- Blue diagonal stripes mean nonstop capacity from Europe to these destinations increased
- Red vertical stripes mean nonstop capacity from Europe to these destinations reduced
- Yellow horizontal stripes mean Europe nonstop capacity to these destinations was eliminated
- Green dots mean these destinations were never served nonstop from Europe
- Purple diamonds mean ME3 carriers never served these destinations

From this split very significant trends appear. First of all, EU-Indian carriers have only been increasing capacities to Mumbai, Delhi and Bangalore: their three largest routes by capacity in 2010. The strategy appears as concentrating nonstop flights on high demand routes. Other primary airports such as Chennai or Hyderabad saw reduced capacity and slightly smaller airports like Kolkata or Amritsar have been removed from the network.

Secondly, ME3 carriers have matched and exceeded the growth of the EU-Indian top players to their three largest nonstop destinations by capacity. In fact their growth to these cities is twice as much as the growth from EU-Indian carriers. In addition, the ME3 carriers have grown capacity to every destination European carriers either reduced capacity to (primary airports such as Hyderabad or Chennai) or eliminated from their network (e.g. Kolkata or Amritsar). On top of this growth, the ME3 airlines have increased their capacity to a large variety of destinations which EU-Indian airlines have not served at all in the past five

years. Cities like Nagpur, Jaipur, Goa, Cochin are seeing increased nonstop capacity from ME Emerging airlines.

This analysis shows that the ME3 carriers are giving access to a wider network in India: in 2015 ME3 carriers served 14 destinations vs 6 for EU top carriers. Note that "smaller" airports are still very large markets. Nagpur for instance has over 2 million residents, Kolkata over 4 million and Chennai over 4 million as well. Despite the lower GDP per capita, these cities would be considered very large markets in Europe. In comparison, Paris has 2 million residents and Munich 1.4 million.

Finally, keep in mind US carriers rely on alliances with Air France, Lufthansa, BA, and Air India to transport passengers to India. Therefore, any US passenger traveling from any of the 13 major airports of Figure 3.19 to cities other than Mumbai, Delhi or Bangalore will have to connect twice if he travels on an US-EU/India alliance whereas he will have to connect just once if he travels on an ME3 carrier.
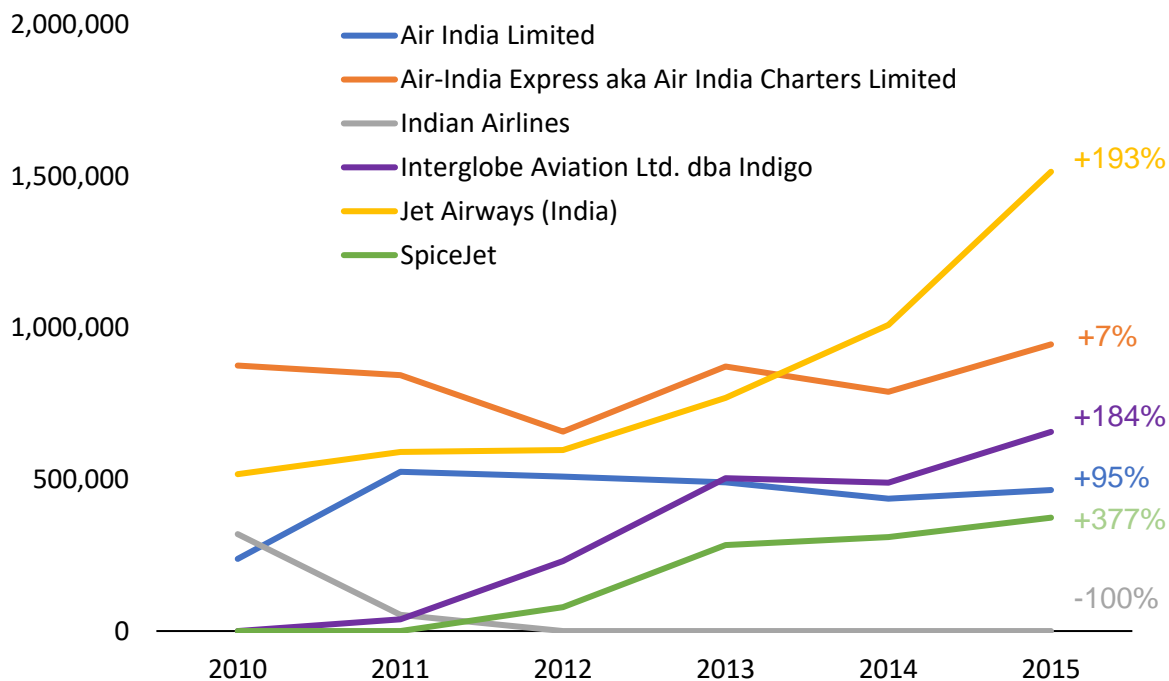
Figure 3.29: Number of seats by Indian carriers from ME3 hubs

While from Europe the Indian carriers did not increase their capacities to India significantly, Figure 3.29 shows that from the ME3 hubs their strategy has been very different. Indian carriers have been growing their capacity to the ME3 hubs between 7% and 377% since 2010. The only negative growth from Indian Airlines is explained by its acquisition by Air India, which grew. The rates are very high, especially when compared to the growth Indian carriers implemented on routes EU to India. ME3 carriers may have played a role in this expansion through strategic partnerships such as Etihad – Jet Airways. Jet Airways is now offering capacity not just to local traffic on the UAE and Qatar-India routes, but also providing second legs to passengers from Europe or North America traveling on Etihad for their first leg. As a result, Jet Airways is the largest Indian provider of seats on these routes, with tremendous growth since the 2013 acquisition.

In addition to the growth directly related to the ME3 carriers, LCC carriers Spice Jet and Indigo unrelated to the ME3 have also shown remarkable growth. Unlike from Europe, stage lengths to the UAE and Qatar allow them to compete with the ME3 and Indian legacy airlines.

Pakistan Case Study

The Pakistan case study is quite different as out of the four selected EU airlines, Turkish is the only one to offer service to the country. Unlike India, bilateral agreements between Turkey and Pakistan have allowed significant traffic growth from Turkish Airlines.
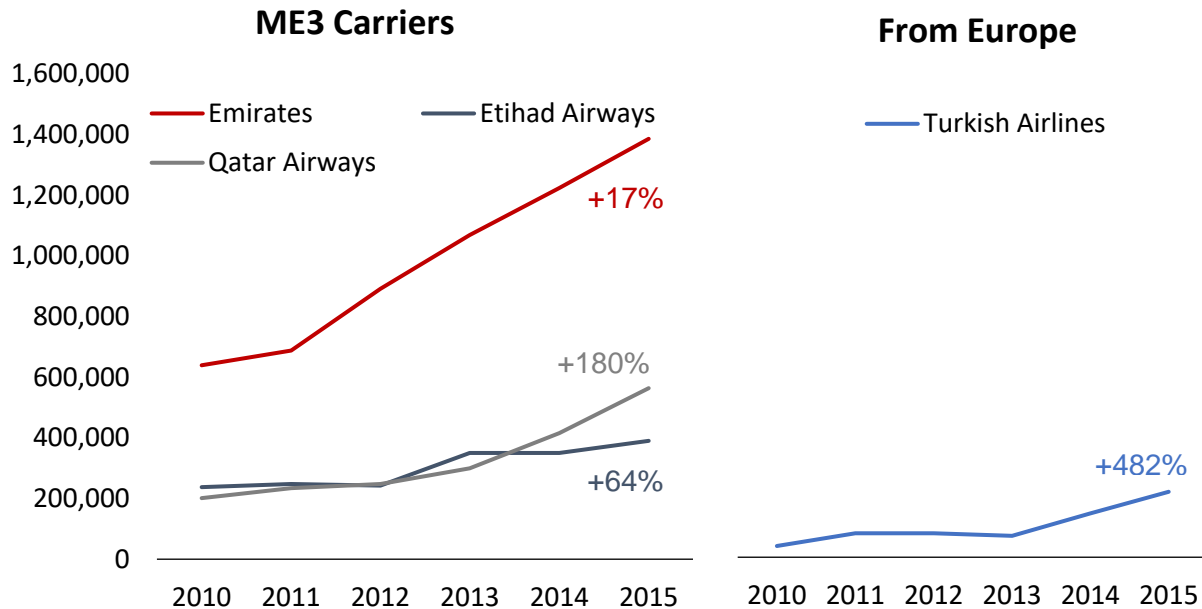
Figure 3.30: Number of seats to Pakistan by carrier

Figure 3.30 shows ME Emerging carriers and Turkish Airlines have all grown their traffic to Pakistan over the 2010-2015 period. Turkish grew mostly since 2013 with the opening of its route to Lahore, Pakistan's second largest city.
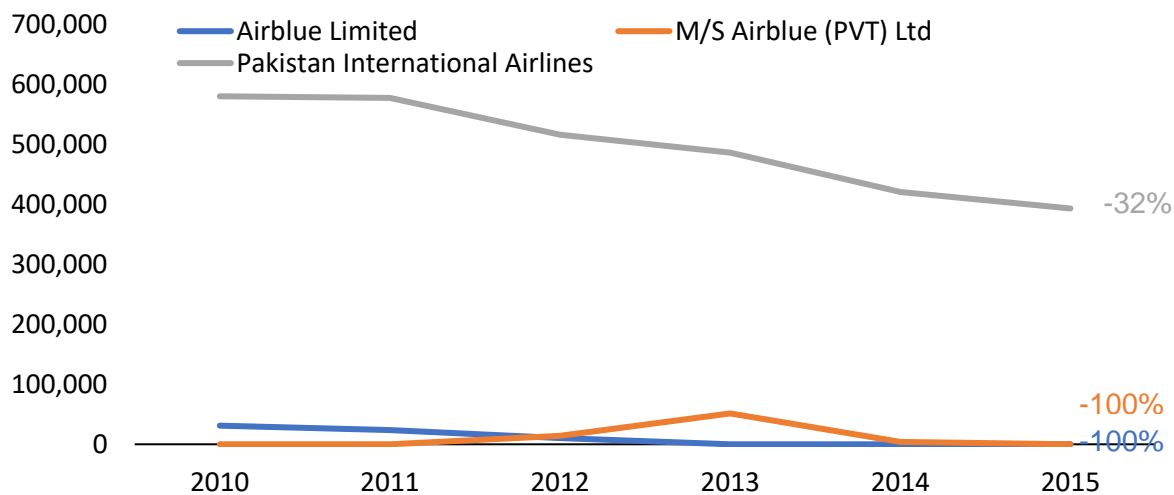
Figure 3.31: Number of seats on Pakistani airlines from Europe to Pakistan

While Turkish increased capacity from Europe, Figure 3.31 shows Pakistani airlines dropped their seats very significantly. In total the main carrier Pakistani International Airlines reduced capacity by 187k seats and Turkish increased by 158k. This clear shift of seat share becomes obvious when looking at origin cities.
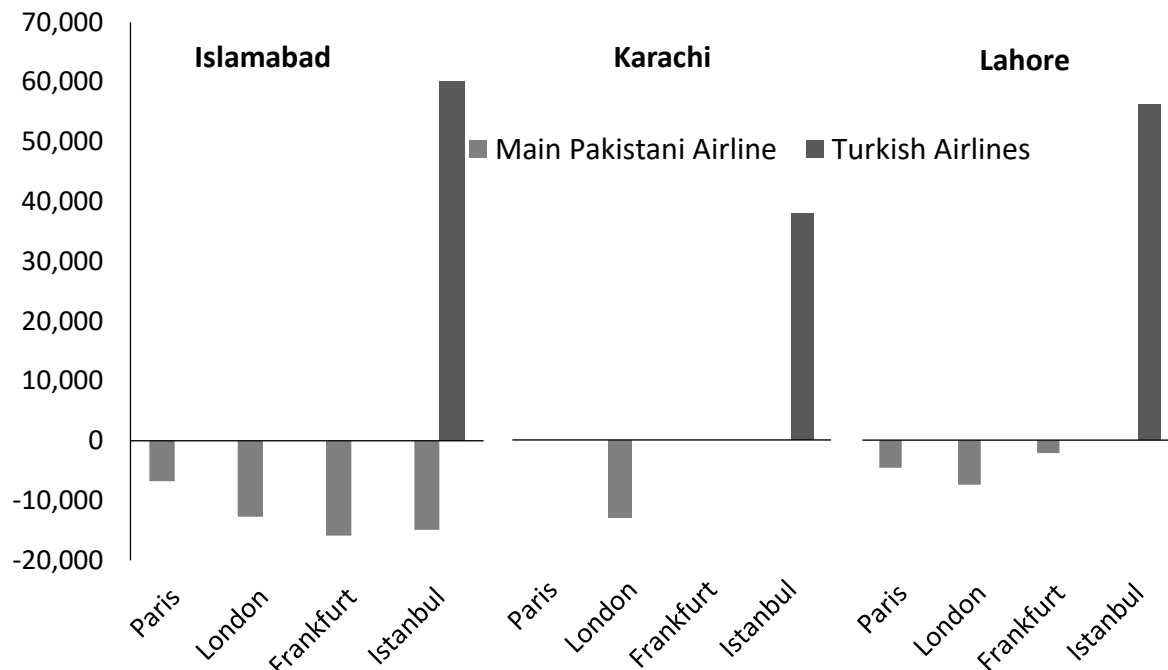
Figure 3.32: Change in seats between 2015 and 2010 by carrier type and destination from European cities to Pakistan

The changes in capacities in Figure 3.32 by European city and Pakistani destination clearly show how Turkish airlines replaced the seat capacity decreases by Pakistan International Airlines. The absence of restrictive bilateral agreements with Turkey led to a shift of seat capacity to TK as well as an overall increase in capacity from Europe. The network however did not seem to be significantly improved by these shifts. Comparing to the network of ME3 carriers will allow determining if the ME3 airlines' strong growth is a result of network concentration (as TK did) or network expansion (as in India).
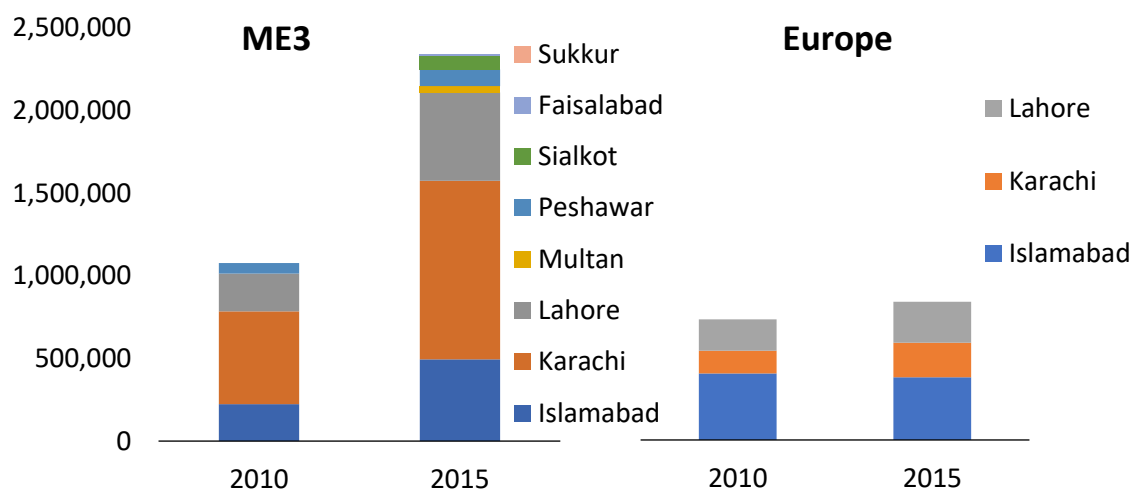
Figure 3.33: Network comparison to Pakistan from ME3 (left) and from Europe

Figure 3.33 compares the network provided by the ME3 and by Europe's top airlines to Pakistan: Turkish Airlines, Pakistani Airline and Airblue. As in India, the ME3 airlines offered a much more diversified set of destinations: 8 vs 3. Of the 8 only four were served in 2010 which shows a significant expansion. In addition, their capacities are much higher on the three destinations in common.

Finally, the growth of the Pakistani airlines to the ME was analyzed. Given the strong growth of the ME3 carriers one could expect Pakistani airlines tried to benefit from potentially increasing demands. As observed in the India case study, Figure 3.34 shows that some local airlines have grown capacity along with the ME3 carriers.
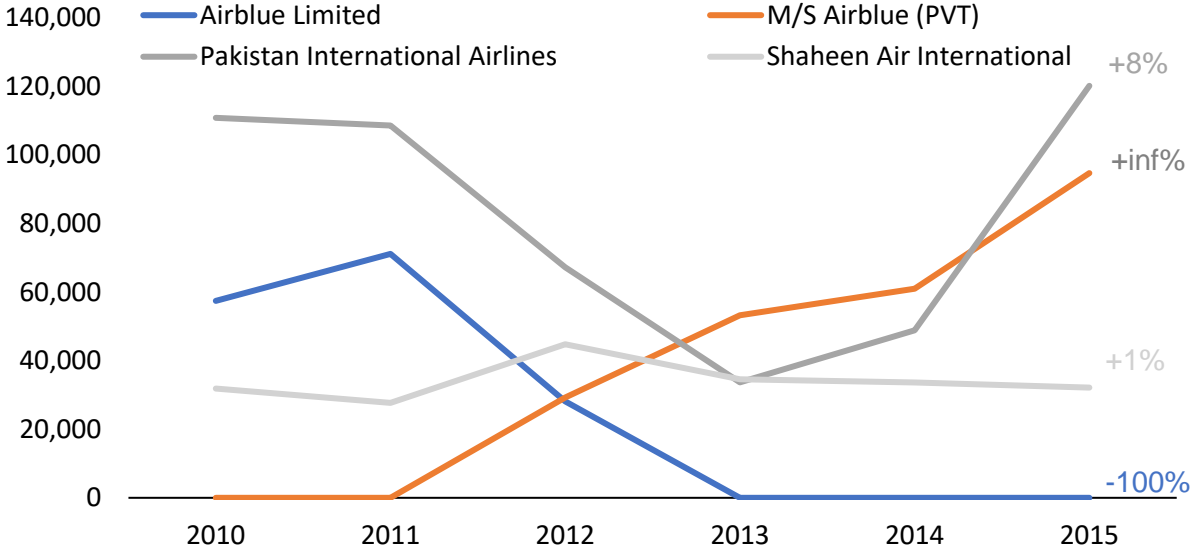
Figure 3.34: Number of seats on Pakistani airlines to the ME

The India and Pakistan case studies both showed very interesting differences in growth strategies from legacy carriers vs ME Emerging carriers. From Europe the three legacy airlines have focused their attention on the top three routes by capacity in India, abandoning or reducing nonstop capacities on all other routes. From the ME, ME3 carriers have kept on growing to a large variety of destinations across the region, both in India and Pakistan. This has resulted in an expansion of the network facilitating access to non-primary Indian or Pakistani cities from the US, the ME and in some cases Europe. Indian and Pakistani carriers have decided to follow the ME Emerging airlines' development by growing rapidly from the ME rather than from Europe. Part of this growth came from benefitting from agreements with Etihad.

Southeast Asia

Southeast Asia is within a few hours reach of the ME3 hubs so represents another region of expansion for the ME Emerging carriers. In this analysis, Southeast Asia is defined as Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam.
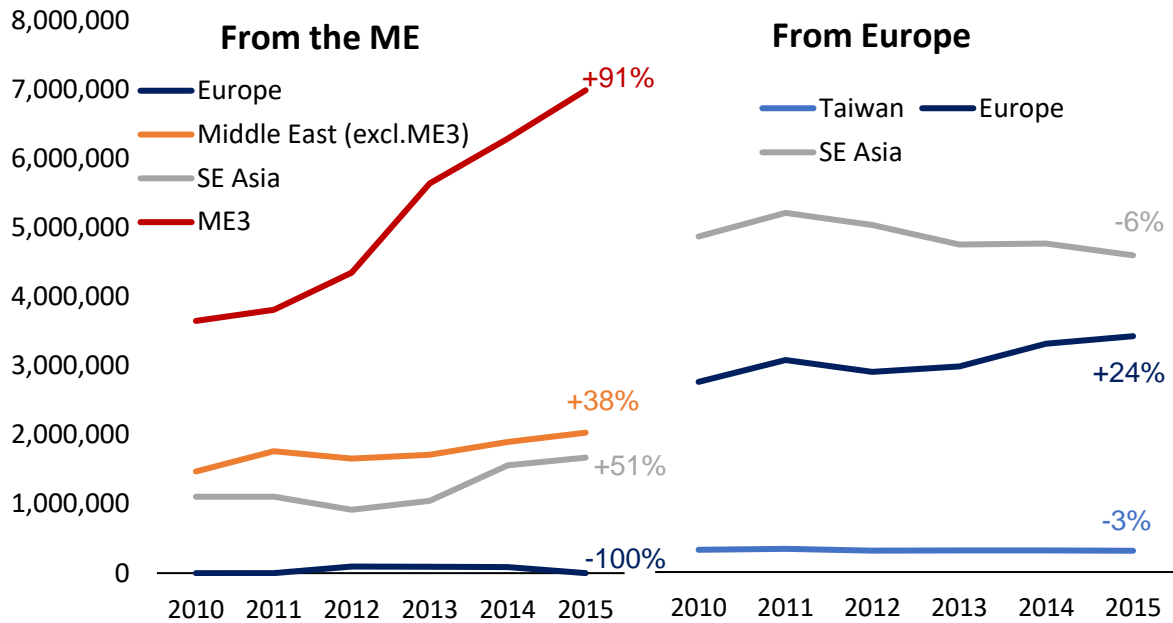
Figure 3.35: Number of seats to Southeast Asia by region of origin and airline type

From Figure 3.35 we can see that the difference in capacities between ME3 carriers and European airlines to Southeast Asia from their respective regions is less significant than what was observed with the Indian Subcontinent. In 2015 for every European carrier seat nonstop to SE Asia, ME3 airlines had two seats nonstop from the ME. However, this difference is likely to increase and reach levels similar to those observed in the Indian Subcontinent. Europe has been growing, but far slower. In total the growth from these European airlines has been six times less than the growth from the ME3 airlines. Additionally, the potential alliance partners flying nonstop from Europe on Southeast Asian airlines have reduced their capacities by 6% during the same period. These striking differences motivated the research to compare the capacity trends on EU-Southeast Asia and ME-Southeast Asia routes.

From Europe

Table 3.11: Trends on EU-SE Asia nonstop routes

	2010	2015	% Change
Number of Airlines	26	24	**-7.7%**
EU Airlines	17	16	**-5.9%**
SE Asian Airlines	7	6	**-14%**
Other Airlines	2	2	**+0%**
EU Cities	26	32	**+23%**
SE Asian Cities	11	11	**+0%**

Flights	46,493	48,760	**+4.9%**
ASMs (Bn)	92.0bn	95.8bn	**+4.1%**
Seats (Mn)	15.5m	16.3m	**+5.0%**
Seats/Aircraft	334	334	**+0.1%**

Table 3.11 shows that at a macro level the Europe-SE Asia routes have not evolved much in terms of airlines and capacities. In fact the total capacities have barely increased, and no effort was made to increase aircraft sizes. The only changes have been at the network level, with access to SE Asia from a larger range of EU cities. The 23% increase hides an even larger change in the actual cities: 11 EU airports started nonstop routes and 5 stopped. Secondary airports such as Barcelona or Brussels have launched nonstop routes to SE Asia, while routes from Manchester and Dusseldorf were abandoned.
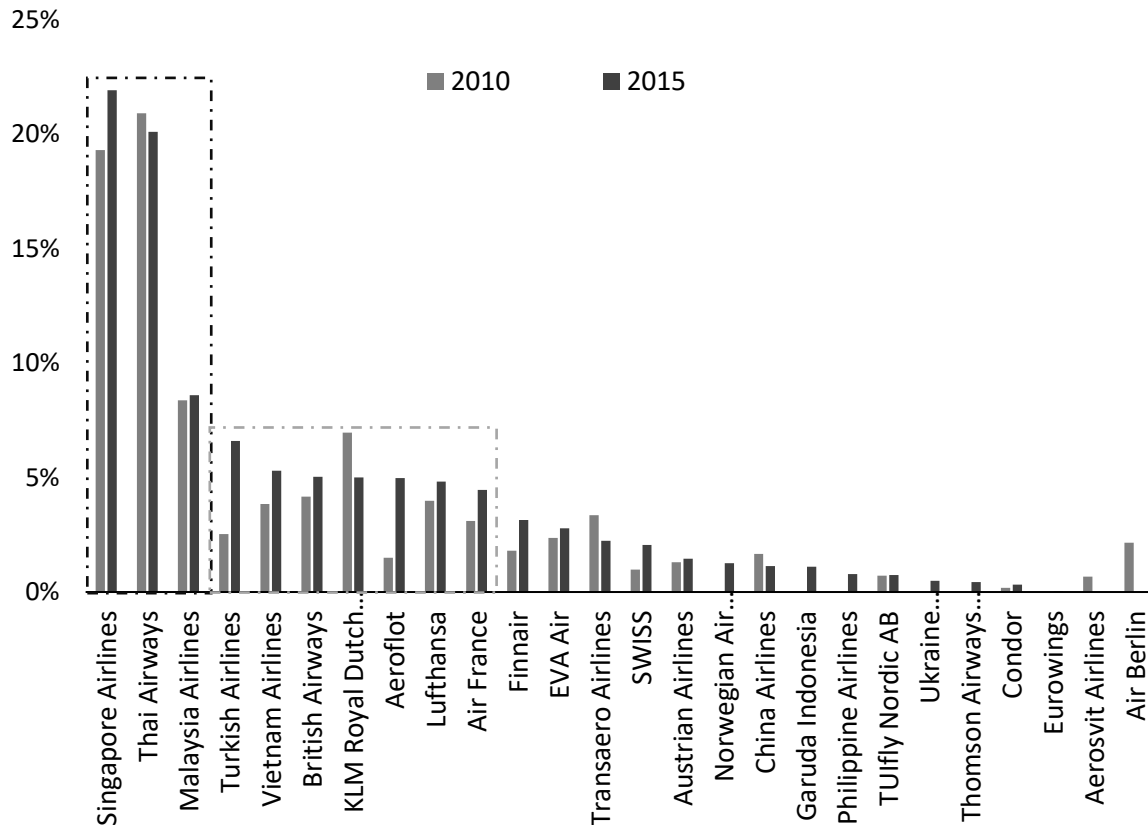
Figure 3.36: Seat share by airline on EU - SE Asia nonstop routes

Figure 3.36 shows that SE Asia players are the dominating actors on the nonstop Europe-SE Asia routes. Singapore Airlines, Thai Airways and Malaysia Airlines covered 51% of the seat share from Europe in 2015. The three are followed by the top EU airlines, far more segmented. Therefore here the legacy players who are likely to be more impacted by the growth of ME3 airlines are three Asian legacy airlines. This is the first main difference observed compared to the analysis conducted for the Indian Subcontinent.

European Carriers   **SE Asian Carriers**
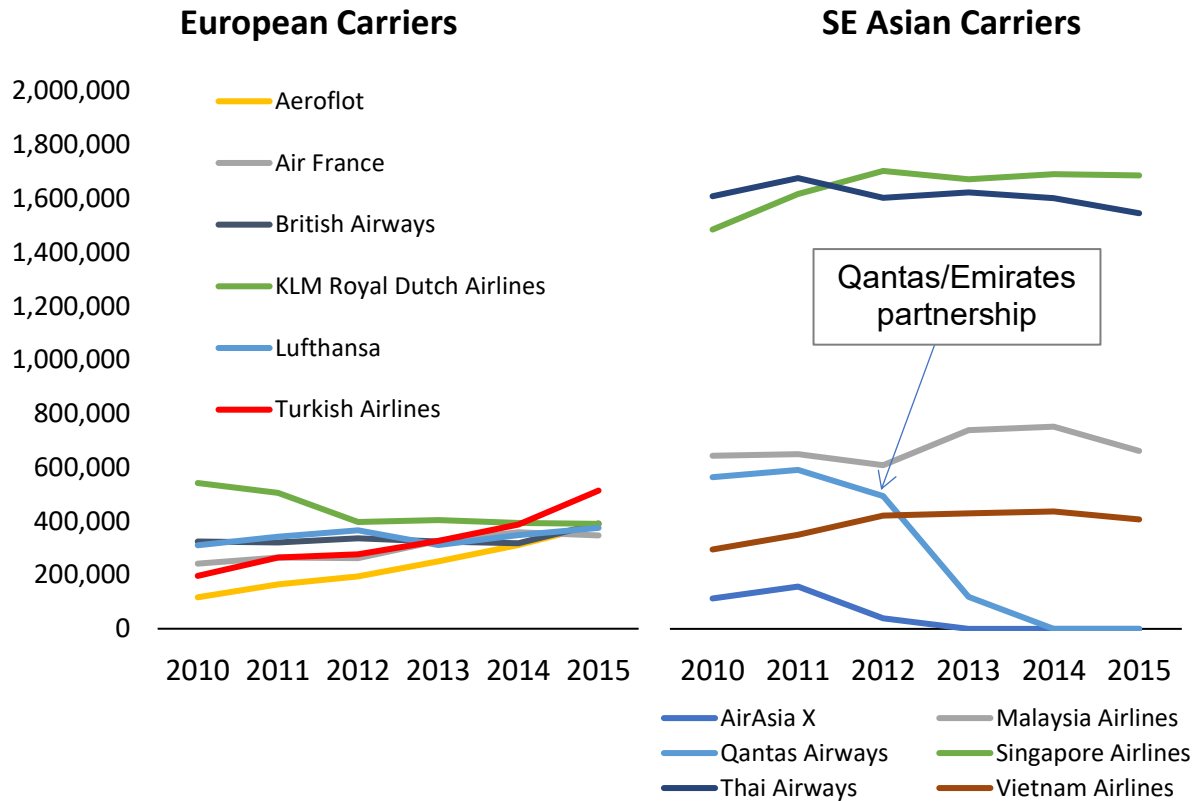
Figure 3.37: Number of seats from Europe to SE Asia by carrier

Figure 3.37 shows the clear difference in seats between the EU and SE Asian carriers and the stability of this split. The alliances of Malaysia in One World, and Singapore and Thai Airways in Star Alliance allow airlines such as Lufthansa, British Airways and Turkish Airlines to rely on these partners. In addition to the partnership, Turkish Airlines is the only EU airline significantly increasing its capacity to the region. SkyTeam on the other hand, of which Air France KLM and Aeroflot take part of, does not have any major partner in the region. This may explain why Aeroflot has been showing the highest growth rate, over 200%.

The local carriers from SE Asia have kept capacities stable except for Qantas which eventually eliminated all capacity to Europe by partnering with Emirates in 2012. The overall behavior of the nonstop airlines is similar to what was observed on Europe-Indian subcontinent routes.

From the Middle East

Table 3.12: Trends on ME - SE Asia nonstop routes

	2010	2015	% Change
Number of Airlines	22	28	**+27%**
ME Airlines	13	16	**+23%**
SE Asian Airlines	8	12	**+50%**

Other Airlines	1	0	-100%
ME Cities	16	15	-6.3%
SE Asian Cities	11	14	+27%
Flights	38,428	61,642	+60%
ASMs (Bn)	47.7	82.5	+73%
Seats (Mn)	12.4	21.4	+73%
Seats/Aircraft	323	347	+7.4%

Table 3.12 shows opposite trends to those observed from Europe in Table 3.11. The total capacity in seats has grown tremendously, from a combination of increasing airlines, flights and aircraft sizes. The aircraft have grown more than from Europe and also more than on ME-Indian Subcontinent routes. The latter is mostly likely due to longer stage lengths requiring larger aircraft. On ME-Southeast Asia routes the average stage length was 3,857 miles in 2015 whereas the same year on ME-Indian Subcontinent routes the average was 1,659 miles.
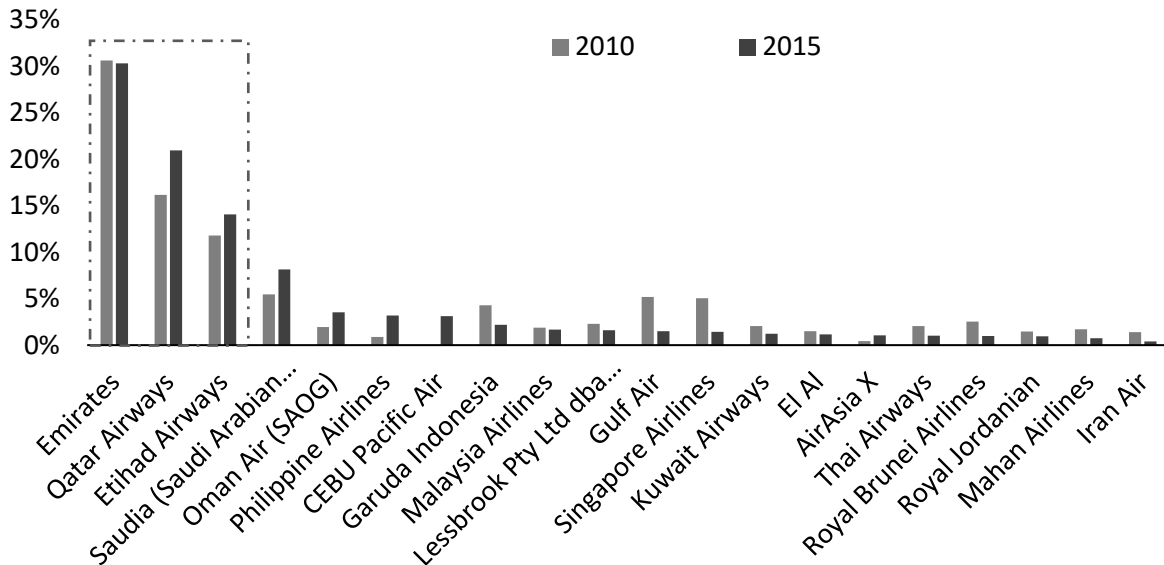
Figure 3.38: Seat share by airline on ME - SE Asia nonstop routes

Figure 3.38 indicates that from the ME the dominating carriers in seats are the ME3, with over 65% of the seat share. Behind them the distribution of seats is extremely fragmented. Unlike from Europe, local Southeast Asian airlines have very little seat share. Singapore, Malaysia and Thai are all below 2%. Their strategy in terms of capacity to this region is obviously very different to that to Europe.

ME3 Carriers

3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0

Emirates   +70%
Etihad Airways
Qatar Airways   +122%
+105%

2010 2011 2012 2013 2014 2015

SE Asian Carriers

+50% — Malaysia Airlines
-52% — Singapore Airlines
+309% — AirAsia X
-15% — Thai Airways
+521% — Philippine Airlines
+inf — CEBU Pacific Air
-12% — Garuda Indonesia

2010 2011 2012 2013 2014 2015
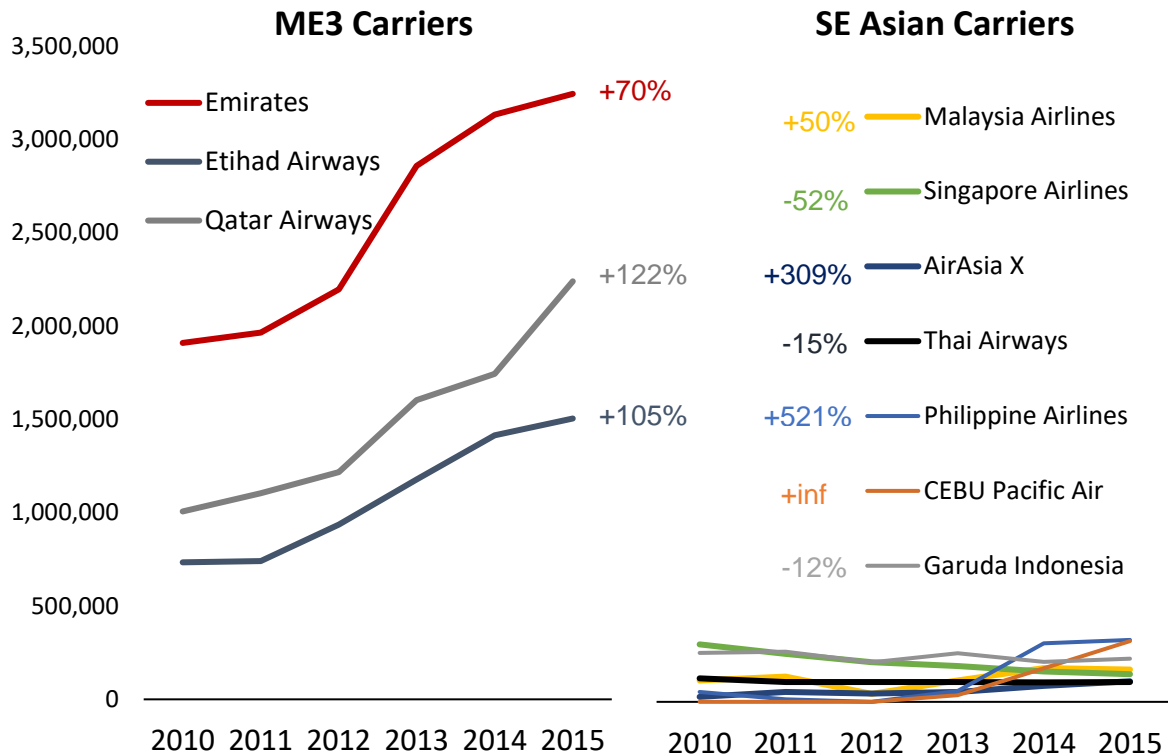
Figure 3.39: Number of seats from the ME to SE Asia by carrier between 2010 and 2015

Figure 3.39 shows that since 2010 capacity growth on Southeast Asia-ME routes has been almost entirely driven by ME3 carriers. Malaysia and AirAsia have increased capacity but from very low levels, and they are still relatively insignificant in seats compared to the ME3. In fact, in 2010 the routes were already highly dominated by the ME3. Since then their growth has allowed to expand the gap while the SE Asian airlines have shown no serious intent to grow. The fastest growing airline, Philippine Airlines, actually benefitted from a partnership in 2014 with Etihad. As in the Indian Subcontinent case, this raises questions about the strength of the local market on these routes. Growth of the ME Emerging airlines through OD markets originating in EU and the US may be the source of this growth.

Unlike in the Indian Subcontinent region, only ME3 carriers seem to be really growing from the ME. Legacy SE Asian airlines are focusing their efforts on nonstop routes from Europe to SE Asia where they have stronger presence than the Indian carriers did between the EU and the Indian Subcontinent (Figure 3.36 vs Figure 3.21).

Network Comparison
Given that the network to Southeast Asia is significantly smaller than it was to the Indian Subcontinent region, the networks provided by the ME3 carriers and by the local airlines in the EU or SE Asia will be compared at the regional level rather than through a specific case study.
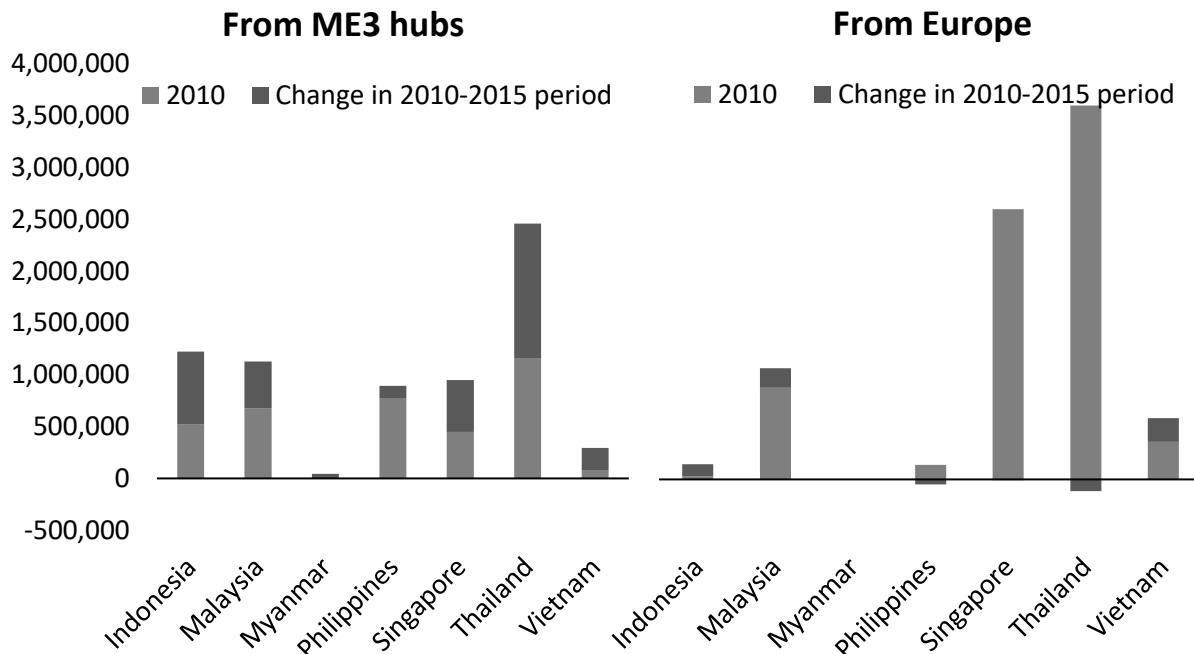
Figure 3.40: Decomposition of seats to SE Asia from Europe and the ME3 hubs

Figure 3.40 has three main conclusions:

- From Europe nonstop capacities to SE Asia have been stable in each country
- ME3 carriers grew in all their destinations (in aggregate +70%)
- ME3 carriers grew by
  - Increasing capacities to secondary SE Asian destinations to levels far above those provided from Europe (Indonesia, Philippines)
  - Aiming to match or exceed capacities from Europe to primary destinations Thailand and Singapore

At a country level (Figure 3.40) there doesn't seem to be a strong difference in the size of the network offered from European and ME3 airlines. Myanmar is the only destination served from an ME3 hub and not from Europe. However, the capacity there has been minimal.

The patterns in Figure 3.41 below were chosen according to the following legend:

- Red Horizontal stripes mean the EU-SE Asian Carriers increased capacity to these destinations
- Blue diagonal stripes mean EU- SE Asian Carriers reduced capacity to these destinations
- Green diamonds mean EU- SE Asian carriers never served these destinations
- Purple vertical stripes mean ME3 carriers never served these destinations

From Europe

9,000,000 — Cam Ranh
8,000,000 — Denpasar-Bali
7,000,000 — Manila
— Krabi
6,000,000 — Jakarta Soekarno-Hatta
— Hanoi
5,000,000
— Ho Chi Minh City
4,000,000
— Phuket
3,000,000
— Kuala Lumpur
2,000,000
— Singapore
1,000,000
— Bangkok
0

2010   2015

From ME3 hubs

Luzon Island Clark Field
Cebu
Yangon
— Denpasar-Bali
— Manila
— Jakarta Soekarno-Hatta
— Ho Chi Minh City
— Phuket
— Kuala Lumpur
Singapore
Bangkok

2010   2015
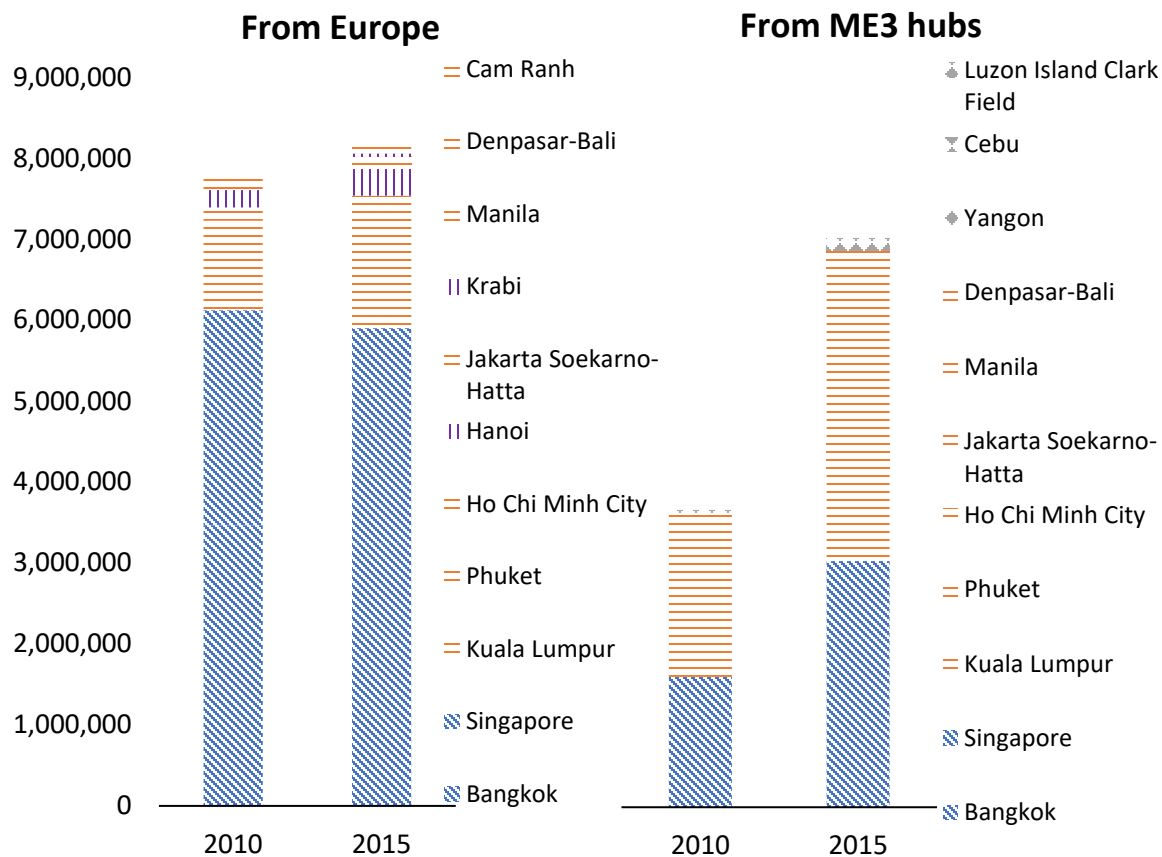
Figure 3.41: Network comparison from Europe and from ME3 hubs

Figure 3.41 analyzes the networks at a city level, as was done for the Indian and Pakistan case studies in Figures 3.28 and 3.33. Unlike these previous cases, ME3 airlines in the SE Asian region did not grow by offering a wider network than that provided from Europe. In fact, there are less seats on destinations served by ME3 carriers not served from Europe than on destinations served from Europe not served by ME3 carriers (diamonds vs vertical stripes). In addition, from Europe, no destination has been taken off the network, and just two sets of routes reduced capacities: Europe-Singapore and Europe-Bangkok; the two routes with most capacity from Europe. This is the exact opposite of what was seen in India where the three routes with highest capacity from Europe were the only ones growing and the secondary routes were reduced or eliminated.

The only indication that ME3 carriers may focus on a broader network is not in terms of destinations but seat per destination. ME3 hubs have a more distributed network, with about 43% of their seats to SE Asia on their largest routes ME-Singapore and ME-Bangkok vs 57% to the secondary destinations in the region. On the other hand, from Europe the two largest routes by capacity, Singapore and Bangkok still represent 72% of the seats. This difference is most likely due to the importance of SE Asian carriers on flights from Europe (Figure 3.37). Each SE Asian airline flies from its own hub so naturally the significant presence of a varied group of SE Asian airlines to EU means there is a wide variety of destinations served nonstop in SE Asia.

Hence, the capacity domination of SE Asian airlines on the Europe-SE Asia routes prevented the ME3 carriers from differentiating themselves through an increased network size. Instead the ME3s grew by flying larger planes more often.

3.4 Conclusion

The analysis of schedule data in this Chapter has shown very high growth rates from ME3 carriers on all their routes that potentially compete with EU and US airlines. The routes analyzed comprised both nonstop routes to the hubs of the ME Emerging carriers from Europe and North America as well as routes beyond the ME to the Indian Subcontinent and Southeast Asia. The study has shown that the ME3 carriers have developed capacity levels allowing them to play a major role on both these sets of routes.

The growth of capacity by ME3 airlines to the US has been especially high, 181% on aggregate. US carriers reduced their capacities to the ME during the same period by cutting all flights to destinations in the ME also served by ME3 carriers. Six of the eight nonstop routes to the ME served by US airlines were discontinued since 2010. As a result, only Israel is served nonstop in the ME by a US carrier. The expansion of the ME3 has been achieved through growth in 13 US primary airports. Emirates or Qatar can also feed traffic from secondary airports in the US through alliances with JetBlue and American Airlines respectively. The former feeds the Boston flight to Dubai while the latter feeds the Philadelphia flight to Doha, for example.

From Europe, the ME3 carriers' growth in capacity has also been very high, but to a notably lower extent than from the US. EU airlines' capacity grew by 26% on aggregate but focusing on the main players the trends have been different. Of the top seven EU airlines by number of seats on EU-ME routes, two grew due to partnerships with Etihad (Alitalia and Air Berlin) and one grew capacity only to Israel (Aeroflot) therefore only the four remaining, the major EU legacy airlines, are directly competing with the ME3 airlines. Of the four, three have seen decreased capacity to the ME: AF, LH and KLM while BA has grown. Therefore the overall growth from EU airlines is driven either by indirect growth of the ME3 themselves or growth to destinations they do not serve. Focusing on the routes where they do compete by including selected surrounding ME destinations shows decreased capacities by the EU airlines against tremendous growth from the ME3 carriers. The ME Emerging airlines expanded their capacity by growing both to primary and secondary EU airports. At the primary airports they grew to become the largest provider of service to the ME. At secondary airports they are often the only providers of nonstop service to the ME (e.g. Lyon or Stuttgart).

Beyond the ME, India appeared as a key region for the ME3 airlines. Their capacity to the country grew by 50% in the past five years. Indian airlines followed this trend by growing their capacities in parallel, through the Jet Airways – Etihad alliance, but also with low cost carriers capable of serving these short-haul routes. At the same time nonstop capacities from Europe have been stable both for EU and Indian carriers. The ME3 carriers have generated this growth by providing access to many more destinations than nonstop players from Europe. While the airlines flying in from Europe concentrated their efforts on the top destinations by number of seats, ME3 carriers grew partially on these routes, but also significantly grew to secondary Indian airports. This difference in strategy may have direct consequences on airline choice for passengers from EU or the US traveling to secondary Indian airports. The analysis of OD effects in Chapter Four will allow us to measure whether the ME3 benefited from this move, and if so whether it was at the expense of EU or US airlines.

In Southeast Asia the EU carriers' presence is much lower. Nonstop capacities are provided by SE Asian players. Both from Europe and from the ME these carriers have kept relatively stable capacities, while the ME3 grew extremely rapidly. The domination of SE Asian airlines on the EU-SE Asia nonstop routes made it more difficult for ME3 carriers to differentiate themselves based on the network offered. Instead the ME Emerging carriers increased aircraft sizes and frequencies to build their seat share to the region.

The ME3 carriers' growth in capacity from the US and Europe to the Middle East, and then from the Middle East to the Indian Subcontinent or Southeast Asia, has shown to be much higher than the growth of the local carriers on each of these nonstop routes. As mentioned through various observations in this Chapter, these results indicate the very important role OD connecting traffic may have in the growth strategies of the ME3 airlines. The consequences for the US and EU carriers would therefore have to be evaluated at an OD level. The purpose of Chapter Four will be to build on the preliminary observations from Chapter Three to understand how these airline strategies have affected OD traffic.

Chapter 4 Impact of ME3 Capacity Growth on OD Traffic to India

4.1 Introduction

The capacity analysis in Chapter 3 showed that ME3 carriers have grown seats on routes to the US, Europe, the Indian Subcontinent and Southeast Asia at rates far above any other airline. The purpose of Chapters 4 and 5 will now be to link this capacity analysis to actual passenger traffic. We will explore whether ME Emerging airlines became major players in markets concerned by these four sets of routes by stimulating new demand or diverting demand from other carriers. Ultimately, traffic is the most relevant indicator to measure the impact of ME3 airlines on US and European carriers.

As discussed in the introduction of Chapter 3, capacity is measured at a leg level, so the effect of connecting traffic in OD markets is not captured. Chapter 2 showed the immense potential of ME3 carriers to promote connecting itineraries given the positioning of their hubs. Being able to follow the flows of passengers connecting is consequently critical to fully evaluate the impact of ME Emerging carriers on passenger traffic flows. As an example, Figure 4.1 shows the importance of connecting traffic to ME3 airlines. With 3 hubs covering 11.5m inhabitants, these airlines offer over 3.3 times more capacity to the Indian Subcontinent than the 22 EU airports covering 600m inhabitants in Europe.
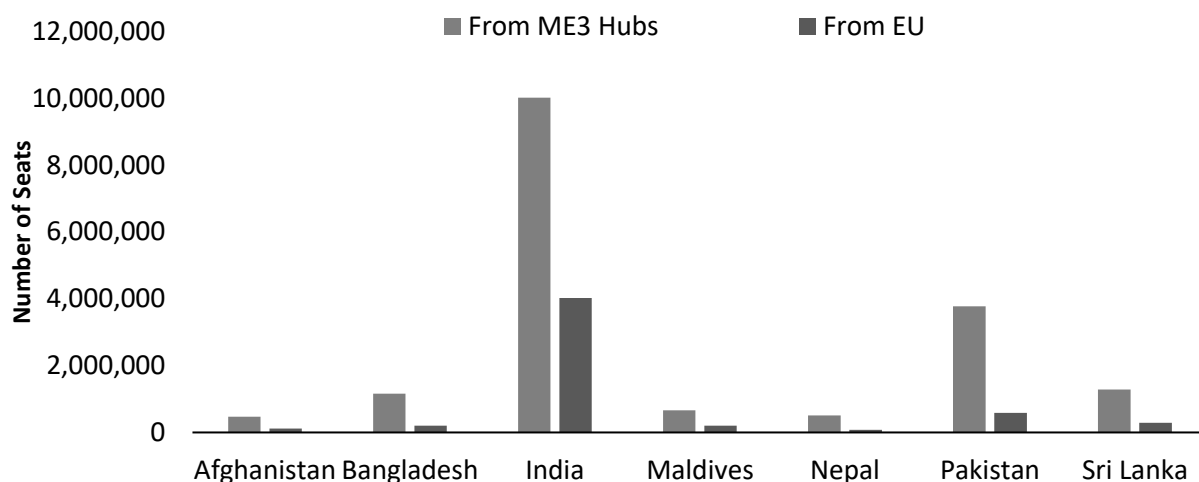
Figure 4.1: Number of seats from European airports and ME3 hubs to the selected destinations in 2015

Figure 4.1 also shows the very significant focus of both European airlines and the ME3 carriers in markets to India. India alone represents over 56% of the ME3 seats to the Indian Subcontinent and over 73% of the seats from Europe. The only other significant country targeted by ME3 airlines is Pakistan. However, due to security concerns, European and US airlines have decided not to serve Pakistan. As a result, given the objective of the thesis is to measure the ME3 impact on EU and US airlines, in this Chapter we will focus exclusively in OD markets from Europe to India and the US to India.

The Chapter will first review the data provided by Amadeus' travel intelligence platform[22]. We will briefly describe how the data is estimated and we will discuss the outputs of the model that have been used to construct the analysis. Then we will analyze the impact of ME3 carriers in EU to India OD markets at an aggregate level, and by looking at effects by origin airport in Europe. A similar analysis of US to India

OD markets will follow. Finally, we will analyze the traffic by OD market in order to evaluate the effects of each ME3 carrier by market type.

Note the difference between "Nonstop" and "direct" itineraries in this Chapter. Nonstop itineraries refer to itineraries from point A to point B without a stop. Direct itineraries mean itineraries going from point A to point B without requiring a connection, but may have gone through a stop. This difference is due to the discrepancy between schedule data which records nonstop flights only and passenger data which records direct itineraries, one connect itineraries and two connect itineraries. The number of direct itineraries with a stop recorded by Amadeus is small so the discrepancy is limited.

4.2 Amadeus Travel Intelligence Traffic Estimation

Amadeus Travel Intelligence estimates passenger flows for each OD market worldwide. The estimates are calculated through an optimization model integrating a large number of sources. The primary source is schedule data (similar to that used for the analysis in Chapter 3). In addition, the model relies on public data. All these sources are used as constraints to the model's estimates. The types of constraints are passenger volumes per leg (airport or city level), passenger volumes between two countries, load factors. Consequently, the precision of the results depends highly on the public statistics available in the OD market region.

The estimates are then calculated through an optimization model which computes estimated traffic flows and iterates in order to reduce the errors. The errors are measured as differences between the traffic flow estimate and the constraints. Capacity levels from schedule data for instance serve as an upper bound limit for traffic on each flight. As an example, an estimation of the traffic on the itinerary MIA-JFK-CDG for the MIA-CDG OD market, has to satisfy the condition that the sum of all estimates for all itineraries using the JFK-CDG leg (e.g. ORD-JFK-CDG, BOS-JFK-CDG, JFK-CDG-MAD…) match the public data available for JFK-CDG and do not exceed the capacity constraint.

The model then outputs data which can be immediately used for analysis either in excel or other data processing tools such as R. Specifically the output information which we could use was the following:

- Departure Airport, City, Country
- Arrival Airport, City, Country
- Number of connections
- 1st connect Airport, City, Country
- 2nd connect Airport, City, Country
- Year
- Passenger volume

As part of the analysis conducted below, data between 2010 and 2015 was assembled. We collected traffic from February to December of 2010, 2011, 2012, 2013, 2014 and 2015. January was ignored as the Amadeus Travel Intelligence model did not compute data for the beginning of January 2010.

4.3 Aggregate Traffic Flows to India from Europe and the USA

From Europe

Chapter 3 showed that capacities from Europe to the Middle East and then from the Middle East to the Indian Subcontinent grew extremely rapidly over the past five years. Given the limited local demand from the Middle East, and in particular from the UAE and Qatar – two countries concentrating most of the Middle East capacities – we suggested that some of this growing capacity was aimed at serving OD markets beyond the Middle East. By choosing India as the destination of the traffic flows from Europe we would then expect significant growth in connect traffic in Europe to India OD markets. Figure 4.2 shows the growth in traffic in these OD markets by itinerary type.

Figure 4.2: Traffic from Europe to India by itinerary type and year
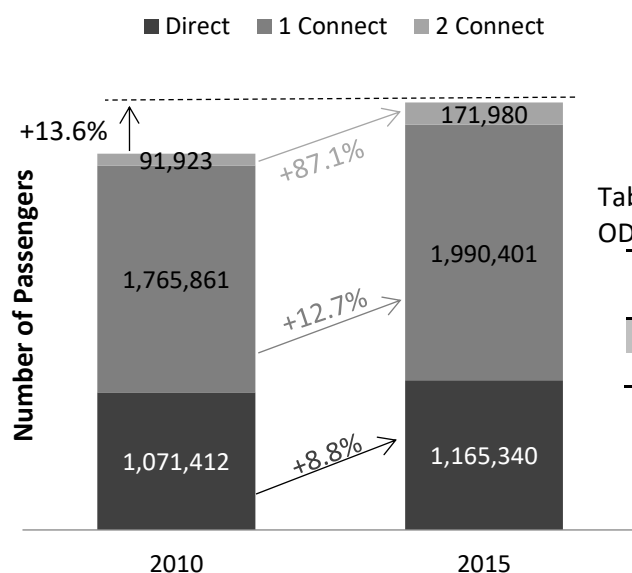
Table 4.1: Traffic Growth by itinerary type in EU-India OD markets

	Direct	1 Connect	2 Connect
Change	93,928	224,540	80,057
Share of Net Change	23.6%	56.3%	20.1%

Overall OD traffic from Europe to India grew by almost 14%, 76% of which came from traffic growth on connecting itineraries. Despite the very significant growth from connecting itineraries, direct routes still saw increasing passenger volumes, although at a lower rate. Overall the distribution of passengers by itinerary did not change significantly. Two connect itineraries saw their share of passengers increase from 3 to 5% at the expense of direct itineraries.

From our hypothesis on capacities through the UAE and Qatar we would expect the ME3 airlines to play a significant role in the connecting passenger growth. In order to evaluate this, we separated the growth according to the connecting airports for one and two connect itineraries. When a connecting airport was either DXB, AUH or DOH we concluded an ME3 carrier had transported the passenger. When the connecting airport(s) did not include any of the ME3 hubs then we concluded a nonME3 carrier had transported the passenger. Direct routes were considered as operated by nonME3 carriers given that no ME Emerging airline offered direct service between Europe and India (as of 2017). Figure 4.3 shows the results of this split.
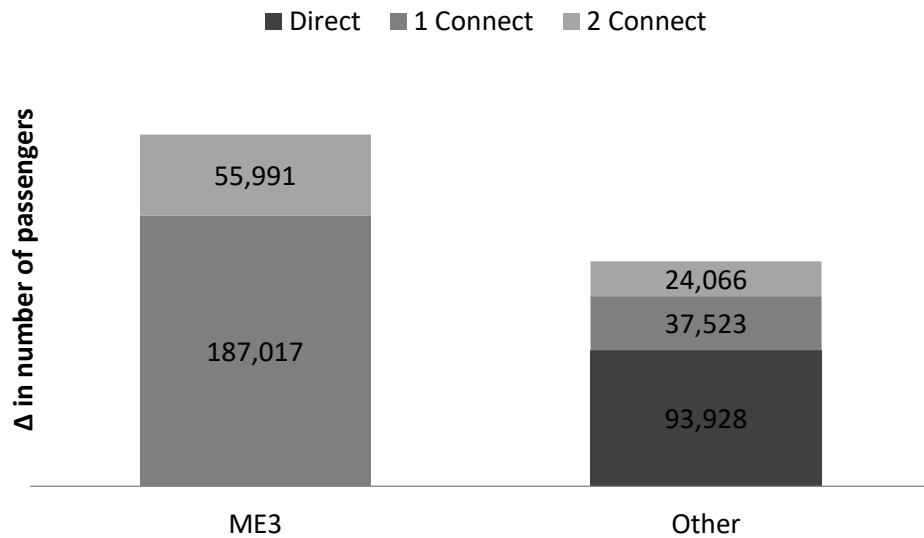
Figure 4.3: Growth in traffic by carrier type in EU-India OD markets from 2010 to 2015

Figure 4.3 confirms our expectations from the capacity analysis. Of the 14% growth in total traffic from Figure 4.2, over 60% is associated with ME3 airlines. Growth in one connect traffic has been particularly strong for the ME emerging carriers. Over the five-year period, they were responsible for 83% of the growth of 1 connect itineraries. The 243,008 passenger growth for ME3 carriers represents a 38% increase since 2010. This 38% traffic growth follows closely the 50% capacity increase by ME3 carriers between the ME and India. Despite this very high growth rate, the European and Indian legacy airlines grew their traffic by only 7% overall. This figure is also very close to the 6.8% increase in capacity from EU and Indian legacy carriers combined on Europe to India nonstop routes observed in Chapter 3.
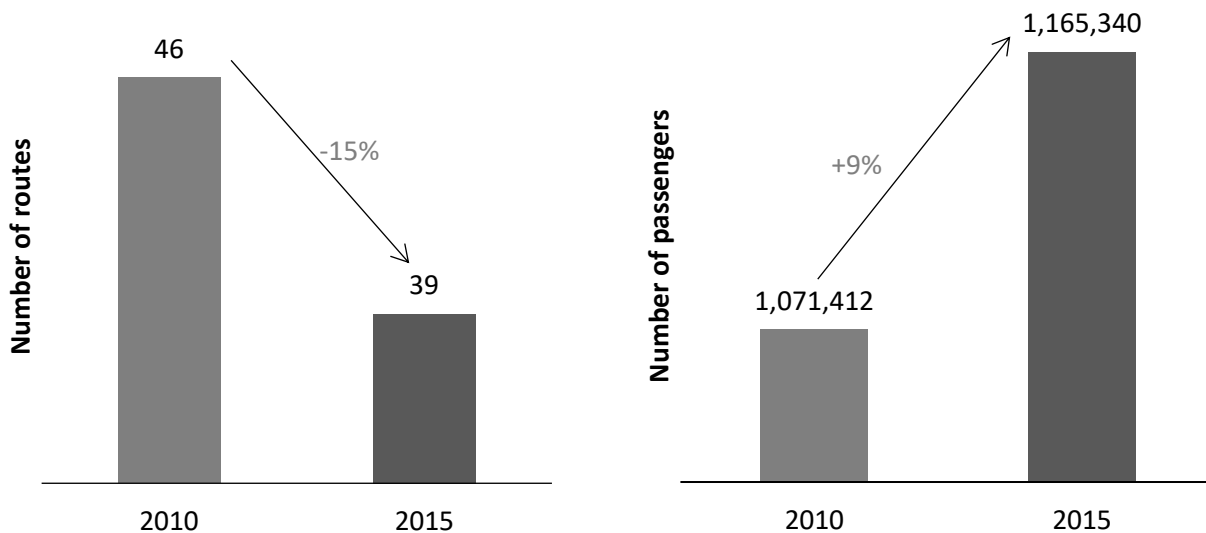
Figure 4.4: Direct number of routes (left) and passengers (right) in EU-India OD markets

Figure 4.4 looks at how the EU and Indian legacy carriers have grown their direct traffic. In just five years these airlines concentrated in fewer OD markets but still increased traffic. This observation is in line with the observations made in Chapter 3 where we had seen the network from EU and Indian legacy carriers to India concentrate on only the largest Indian cities, abandoning routes to secondary cities. Figure 4.4 shows that this strategy has allowed the legacy airlines to grow passenger traffic on the core routes. However, this has let airlines competing with connect itineraries increase market share in all the abandoned direct or nonstop markets.
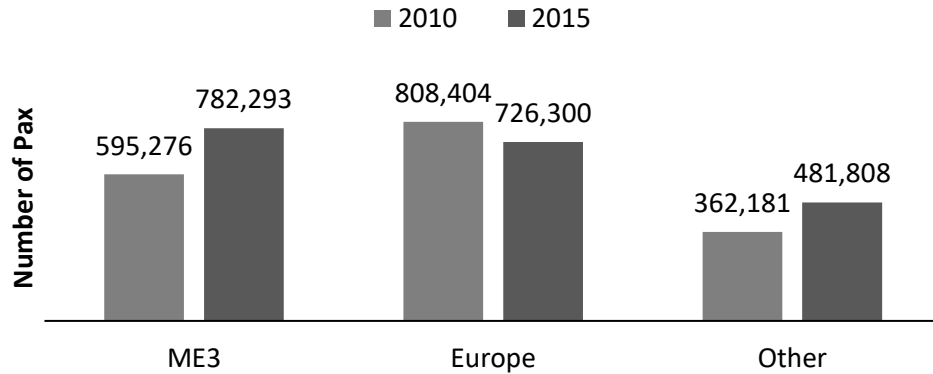
Figure 4.5: One-connect passengers by connecting airport region

With less competition from nonstop or direct routes and with an increasing network size, both in Europe and India, ME3 airlines were able to grow their one connect traffic by 31% between 2010 and 2015. In fact, Figure 4.5 shows that in 2015 more one connect passengers on Europe to India trips connected through ME3 hubs than European airports. Despite the overall growth in one connect itineraries from Figure 4.2, European airports saw reduced one connect traffic. As a result of these differences, the share shift of one connect passengers by connect airport region significantly changed over the last five years. European airports went from connecting almost half of the one connect passengers from Europe to India in 2010, to just 1 in 3 in 2015.
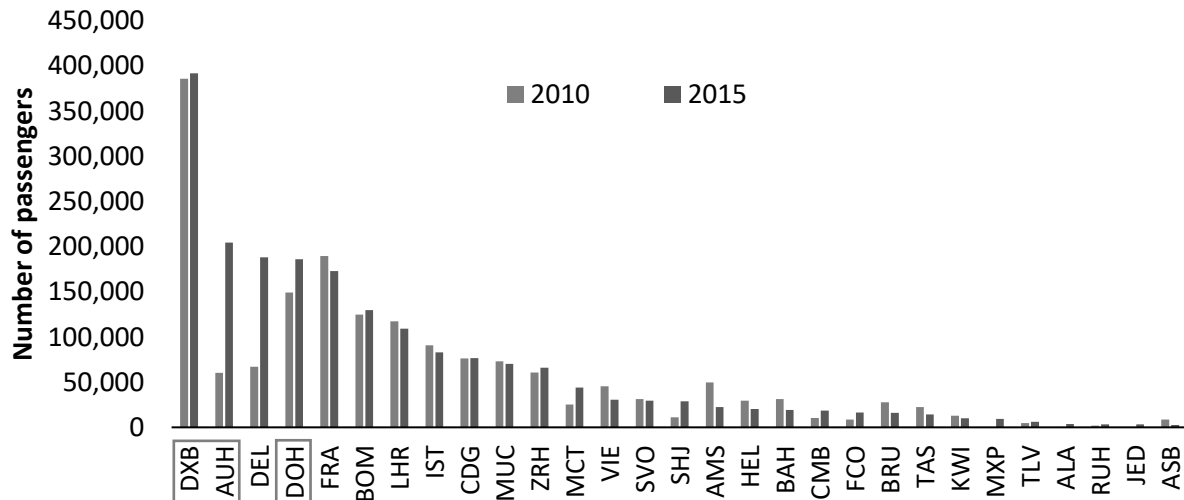
Figure 4.6: Total one connect traffic from EU to India by connect airport

Looking more specifically at the changes in traffic by connect airport shows that Etihad and Qatar have been driving most of the growth for ME3 carriers since 2010. As described in Chapter 2 both of these airlines are younger than Emirates so their more recent growth is expected. Also, AUH has seen by far the highest increase. With its recent purchase of large stakes of European based airlines, the Abu Dhabi flag carrier was able to generate large amounts of traffic from Europe to India through its hub. On the other hand, major European hubs FRA, LHR, IST, CDG, AMS have all seen slight reductions. Combined these have led to the drop in connecting traffic through European airports.
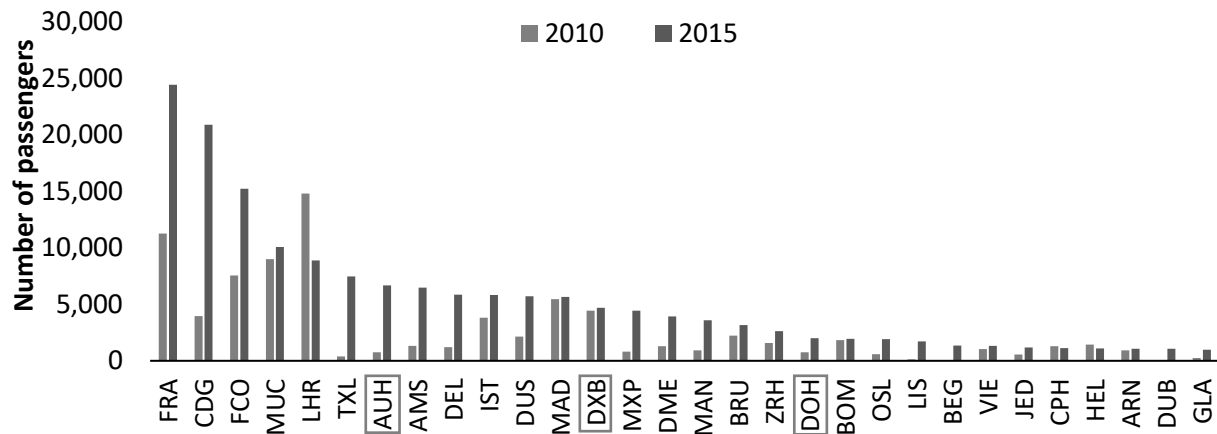
Figure 4.7: Traffic by first connect airport of two connect itineraries

Analyzing traffic flows through first connect airports of two connect itineraries in Figure 4.7 shows very interesting differences. EU hubs FRA and CDG are now showing the highest gains while DXB and DOH saw very small changes. This is due to the reduction in network size from EU Carriers which requires to connect in India in addition to connecting in Europe. Many passengers from secondary airports in Europe previously could reach their final destination after one connection in an EU airport, but now need to connect again in India (or potentially the Middle East). On the other hand, there are very few passengers flying on ME Emerging carriers that need another connection after the ME3 hub, given that the ME3 hubs serve a very vast network in India. For this reason they are ranked much lower here than in Figure 4.6. AUH is ranked higher due to its large gain since 2010. This change was most likely caused by the alliance with Jet Airways which led to more connection possibilities within India.
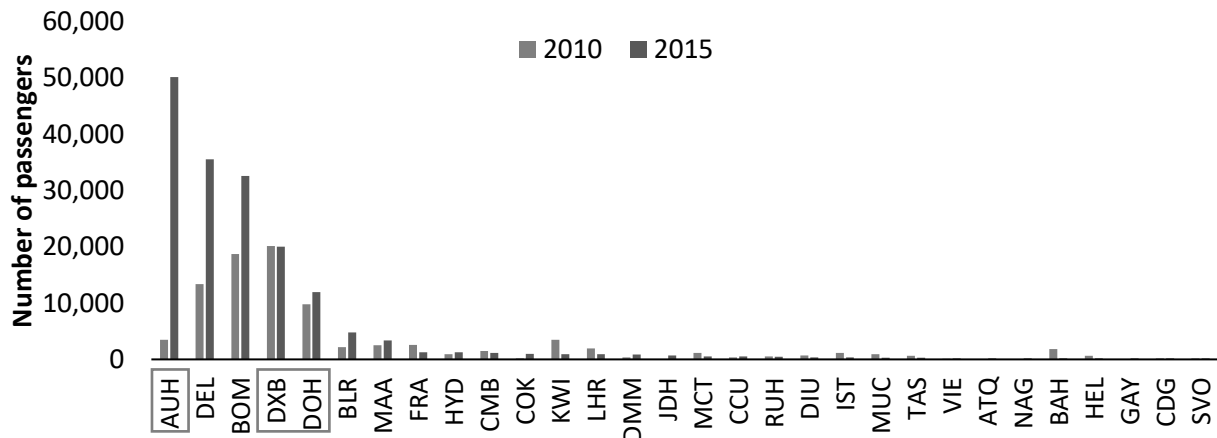
Figure 4.8: Traffic by second connect airport of two connect itineraries

Figure 4.8 confirms the hypothesis made about Figure 4.7's data. The largest second connect airports by traffic are the ME3 hubs and Indian major airports DEL and BOM; all served direct from Europe's main hubs (FRA, CDG, AMS…). Also, there are only 5 airports accounting for over 87% of the 2 connect traffic. With 47% of the two connect traffic, ME3 hubs are clearly key platforms to reach secondary Indian destinations.
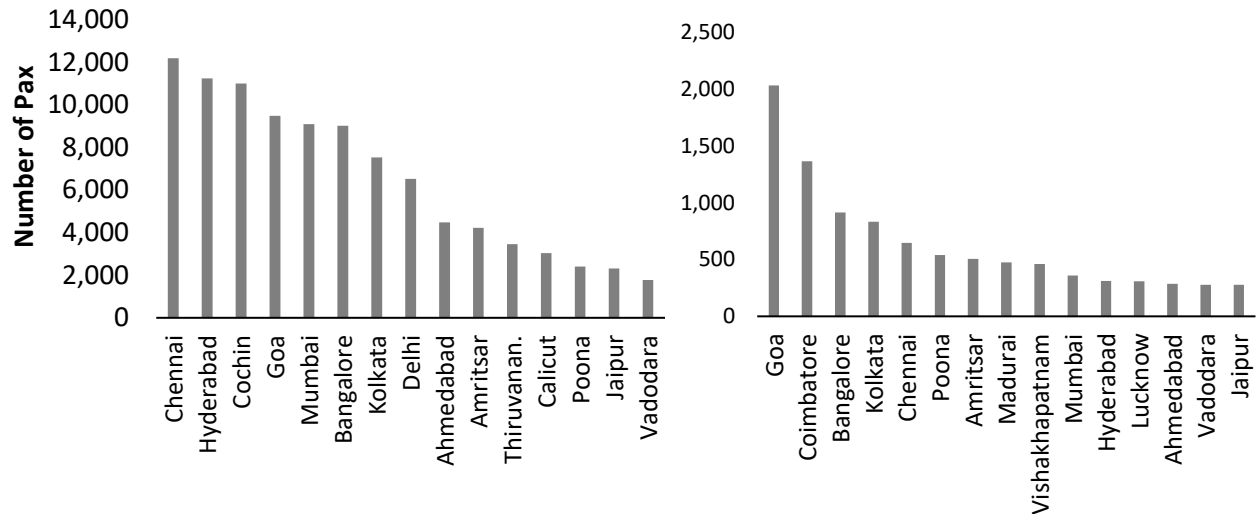
Figure 4.9: Final destinations of 2 connect pax first connecting in Europe (left) and ME3 (right) in 2015

Figure 4.9 reflects the ME3's broader network by looking at the final destinations served from ME3 and EU hubs when they are the first connect airport of two connect itineraries. Not only is the scale much smaller on the right (as already observed in Figure 4.7) but the destinations reached on the right graph are far smaller than those on the left. In fact all but two of the destinations on the left graph are served nonstop from ME3 hubs so would not require a second connection if the passenger had flown through an ME3 hub first. Figure 4.10 shows that similar conclusions can be made by including one connect traffic in the comparison.
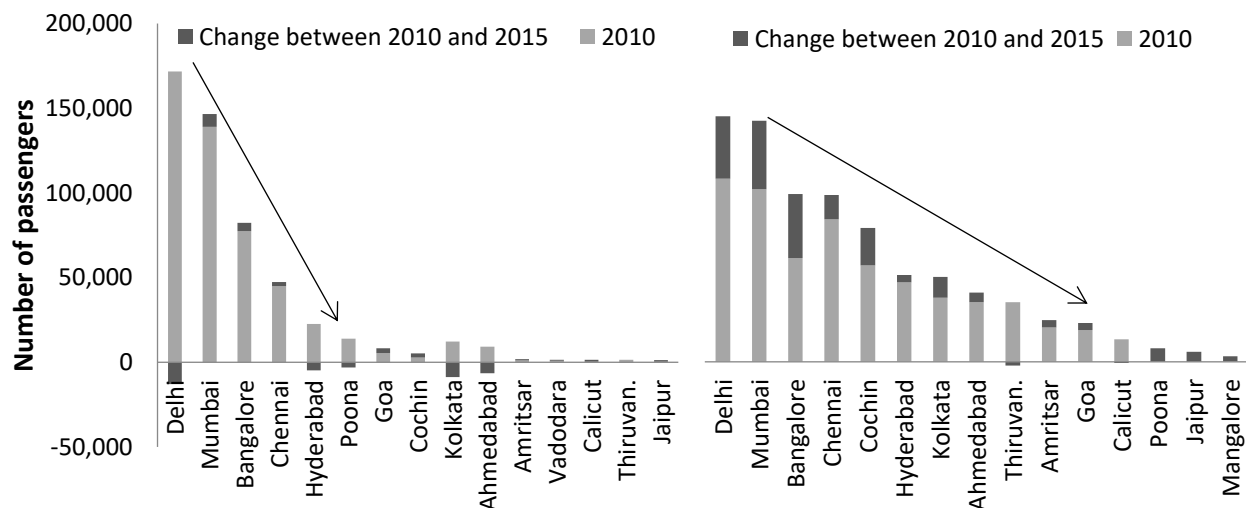
Figure 4.10: Traffic by destination for different first connect airports: LHR, FRA, CDG, IST (left) and ME3 hubs (right)

By including one connect traffic as well we can see the effect of the ME3's larger network on a much wider range of passengers. When the connection occurs in Europe the final destinations are very concentrated in top Indian destinations Delhi, Mumbai, Bangalore and Chennai. On the other hand, when the connection occurs at an ME3 hub the final destinations are far more diverse. Secondary cities such as Cochin, Hyderabad, or Kolkata are reached by far more passengers traveling on ME Emerging airlines than on EU or Indian legacy carriers. Given the increasing traffic to all these cities from ME3 hubs since 2010 we can only expect the difference with legacy airlines to grow.
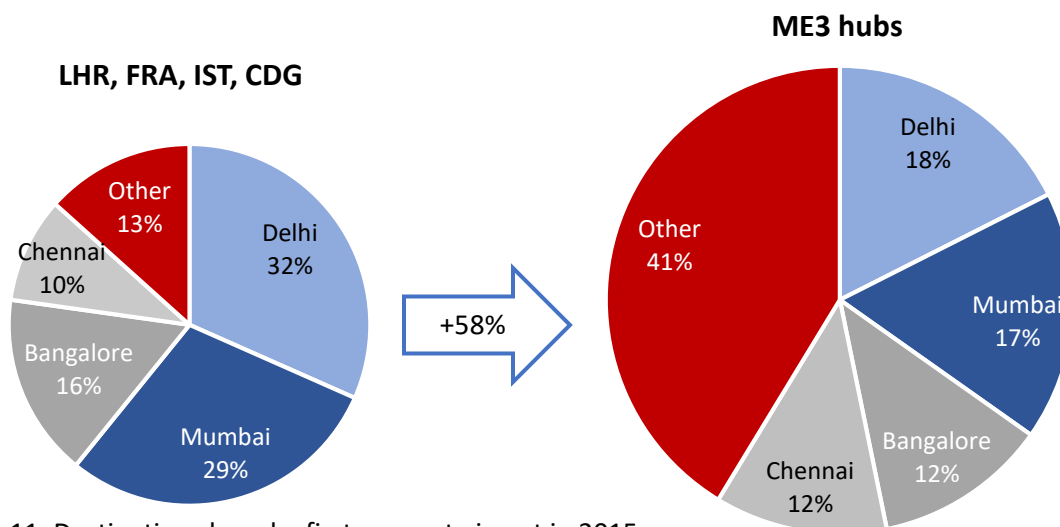
Figure 4.11: Destination share by first connect airport in 2015

Figure 4.11 shows how passengers flying through ME3 hubs reach a much broader network than those flying through EU hubs. 41% of passengers flying on ME3 airlines to go to India from Europe are going to secondary cities. This percentage contrasts very significantly with the 13% from EU's largest hubs. If we included the direct itineraries from Europe the 13% figure would shrink even lower given that direct service only exists to major Indian destinations.

Finally, the growth of ME Emerging airlines has had a significant impact at an origin airport level. By opening routes to ME3 hubs from Europe some airports suddenly were given access to EU-India service via the Middle East instead of going direct or via European and/or Indian airports. Given the magnitude with which ME3 carriers increased their capacities to Europe and to India over the past five years, the effect at European origin airports is clear. In some cases the new service just added traffic to that already served by other carriers. In other instances it shifted traffic from other carriers to ME3 carriers.
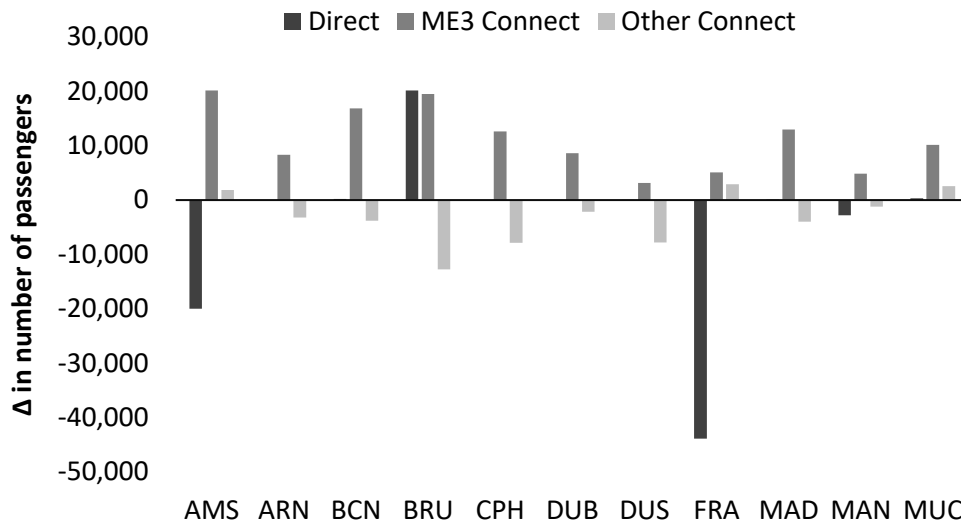
Figure 4.12: Change in traffic to India by carrier type for 11 of the top 22 EU origin airports by traffic to India (2010-2015)

By splitting the traffic changes between Direct, ME3 traffic and other connecting traffic we can evaluate potential shifts in traffic from one category to the other. Figure 4.12 shows that at 11 of the top 22 EU origin airports (by traffic to India), the growth of ME3 traffic has been accompanied by losses for other carriers. At only one of these airports did carriers other than the ME3 notably grow their traffic to India – either through nonstop or connecting itineraries. If we look more specifically, at 7 of the 11 origin airports shown, the ME3 growth exceeds the losses from other airlines by far. This suggests that in those cases the ME3 airlines have gained market share more by stimulating traffic than by other airlines seeing their traffic reduce. These seven airports are ARN, BCN, CPH, DUB, MAD, MAN and MUC, all of which are European secondary airports. As we discussed in Chapter 3 these are airports ME3 airlines heavily targeted through their growth to Europe. At the other 4 airports, we can see that the ME3 growth led to a similar or greater loss from other airlines. This indicates that ME3 carriers gained market share by transporting passengers previously flying on the other carriers. These four airports are AMS, DUS, BRU, and FRA, all of which are major EU hubs.

Figure 4.13 confirms the intuition from Figure 4.12. At these 6 origin airports, ME3 airlines accompanied the growth of other airlines in OD markets to India. From none of these airports did the other airlines reduce their traffic. Of the 6, FCO, HEL, MXP, VIE, and ZRH are secondary European airports. CDG is the only major European hub which did not see any losses on direct routes or connecting routes on other airlines.
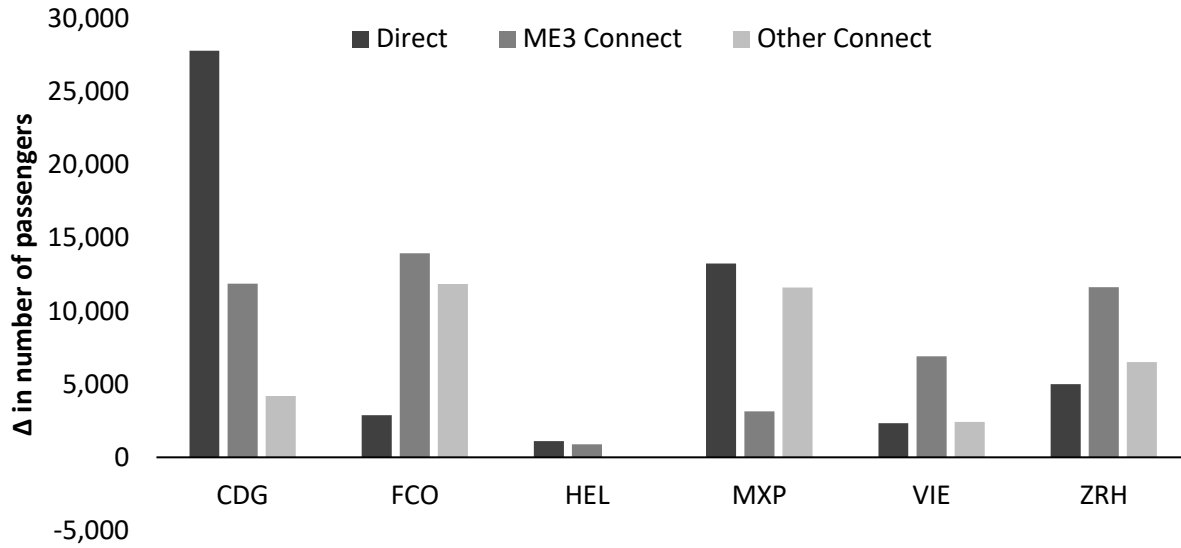
Figure 4.13: Change in traffic to India by carrier type for 6 of the top 22 EU origin airports by traffic to India (2010-2015)

These observations suggest that ME3 airlines have grown their market share in OD markets to India from secondary European airports through stimulating new traffic additional to the traffic changes from other carriers. This contrasts directly with the effect in OD markets to India from primary EU airports where ME3 carriers grew their market shares by seeing other carriers reduce traffic by similar amounts.

From the United States

Chapter 3 showed very high levels of growth in capacities from the ME Emerging airlines between the USA and the ME3 hubs – in addition to the growth from the ME3 hubs to India. Comparing the analysis with the one done between Europe and the ME showed that the ME3 expanded much faster to the USA and the impact on US legacy carriers had been much stronger. US legacy capacities to the ME excluding Israel have completely disappeared. We would therefore expect in the following analysis similar trends to what has been described in OD markets between Europe and India but with higher impact.
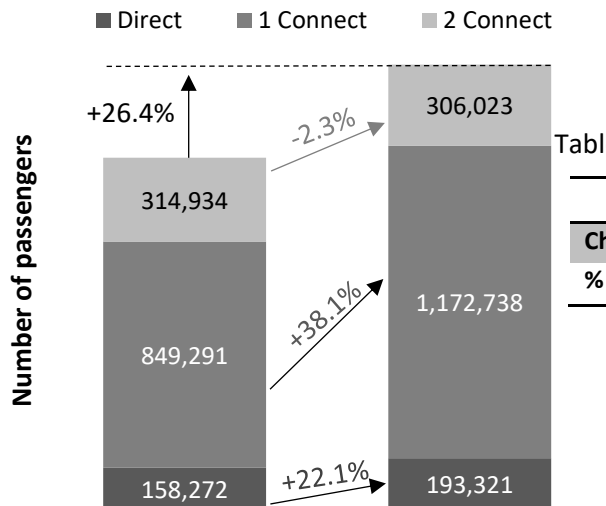
Table 4.2: Traffic Growth by itinerary in US-India markets

	Direct	1 Connect	2 Connect
Change	35,049	323,447	-8,911
% of Positive Change	9.8%	90.2%	n.a.

Figure 4.14: OD Traffic volumes from the US to India by itinerary type

Figure 4.14 shows the significant net growth in OD traffic between the US and India. The 26% growth is twice as high as the growth observed from Europe to India over the same period. Again, one connect itineraries dominate most of the OD traffic and have driven most of the growth. These trends are much stronger than from Europe: one connect growth here represents over 90% of the positive growth and in 2015 one connect itineraries were responsible for 70% of the traffic from the US to India. This grew from 60% in 2010 whereas in Europe one connect traffic share remained stable at 60% over the same period. At the same time, direct traffic has grown by 22%, so it kept a stable traffic share of 12%. Two connect traffic is the most impacted by the growth in one connect. With losses in absolute traffic, its traffic share has dropped from 24 to 18%.
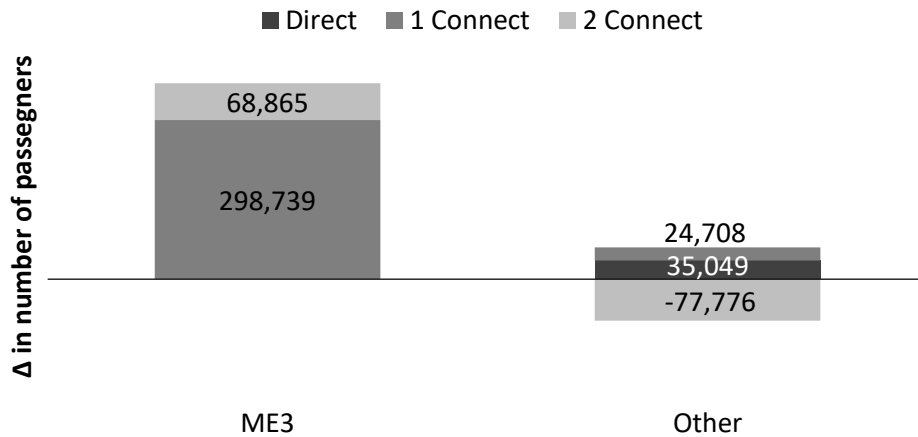
Figure 4.15: Change in traffic by carrier type in US-India markets between 2015

The higher impact of ME3 growth on US legacy airlines than on EU carriers becomes very clear when comparing Figure 4.15 to Figure 4.3 from the previous section. In aggregate, nonME3 carriers serving the US-India OD market have actually seen negative growth since 2015 – despite the overall OD market growth of 26%. This comes entirely from significant losses in two connect itineraries, taken over either by one or two connect itineraries involving the ME Emerging airlines. Traffic on ME3 carriers between the US and India climbed by 142% over these five years. This figure is very close to the 135% capacity growth between North America and the ME from 2010 to 2015 observed in Chapter 3. These growths are far above the ME3 growth levels from Europe. The previous section observed 38% traffic growth over the same five-year period: as expected, the same way European airlines were less impacted in capacities, they are less impacted in terms of traffic. Focusing on changes for each itinerary type will confirm this observation.
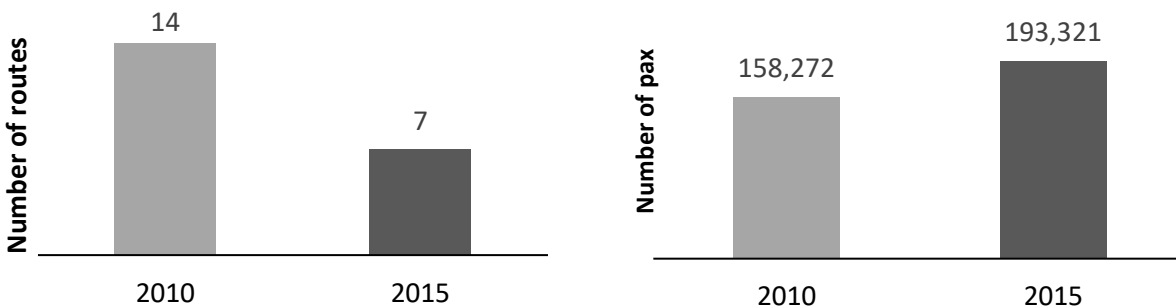
Figure 4.16: Direct number of routes (left) and passengers (right) in US-India OD markets

In Figure 4.16 we can see that US-India OD markets saw a sharp decline in markets served with direct itineraries (-50%). At the same time, direct traffic rose by 22%. This concentration of direct traffic in specific OD markets is very similar to that observed previously from Europe, but again with stronger trends. In Europe the number of OD markets had been cut by just 15% and traffic had grown by 9%. The larger ME3 growth to the US potentially caused more significant reactions by US legacy airlines serving India with direct flights.
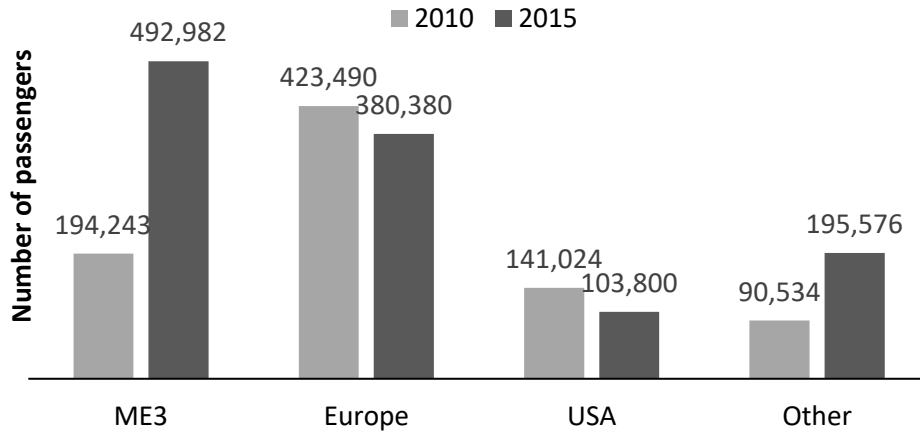
Figure 4.17: One connect traffic by region of connect airport and year

From the US, connecting airports on routes to India used to be heavily dominated by European hubs. In 2010 they connected 50% of the one connect traffic between the US and India. Figure 4.17 shows how in just five years ME3 hubs have replaced European airports as the main connecting points. Not only did the ME3 airports see their traffic grow but at the same time the traffic through EU hubs decreased. One connect traffic connecting in the US also reduced. These reductions occurred despite the overall growth of one connect from Figure 4.14 and show the very significant impact of ME3 carriers on the US and EU/Indian airlines transporting passengers from the US to India.
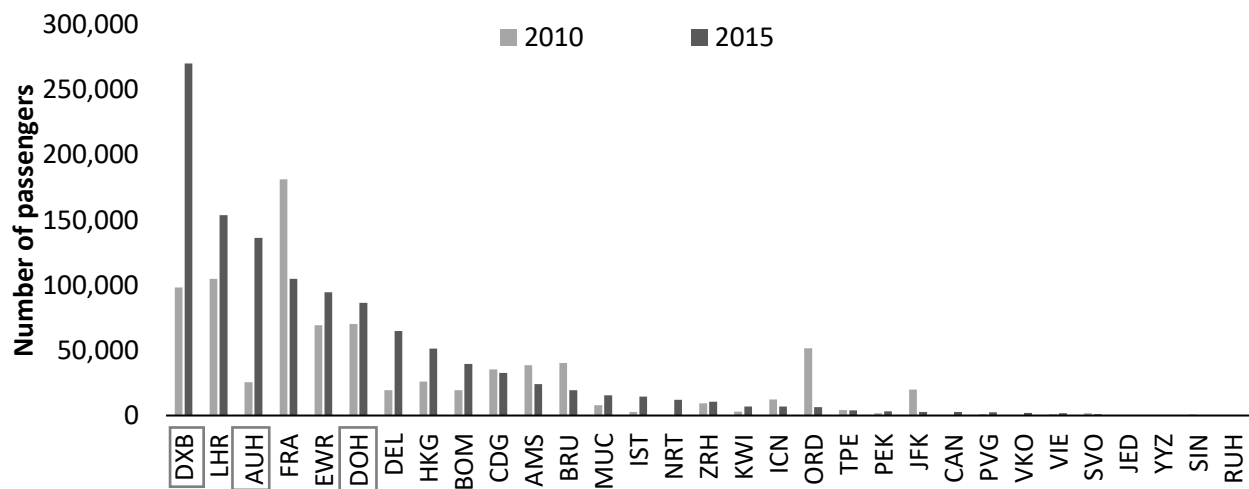
Figure 4.18: One connect traffic by first connect airport in US to India OD markets

Looking at the changes by first connect airport in Figure 4.18 shows a more recent growth from ME3 airlines in US-India OD markets than in EU-India OD markets. Here all three airlines have seen large traffic growth through their hubs, whereas from Europe Emirates had not grown. This is due to the much more recent and significant capacity growth between the ME3 hubs and the US. Figure 4.18 also shows more specifically which EU airports were most affected by the growing traffic through ME3 hubs. All major EU hubs lost one connect traffic from the US to India, except LHR. Again, this is expected from the capacity analysis where BA was the European airline with highest nonstop growth to India. Therefore, passengers flying AA saw increased capacity to India from LHR. On the other hand, the strong capacity reduction from AF-KLM to India clearly led to reduced traffic flow through CDG and AMS in Figure 4.18. LH showed slightly positive growth in capacities but still faces traffic losses from FRA.
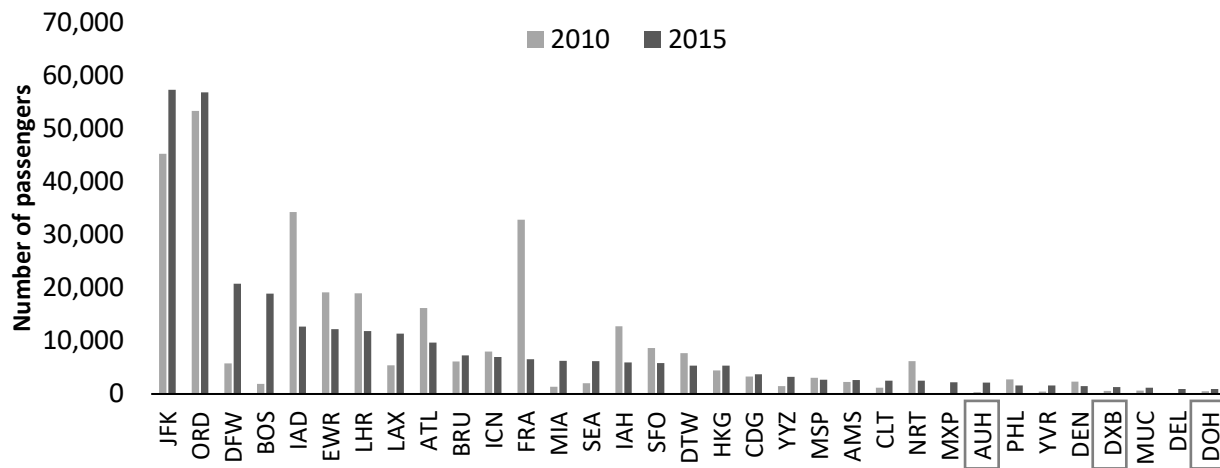
Figure 4.19: 2 connect traffic in US to India OD markets by first connect airport

Switching to traffic changes at first connect airports on two connect itineraries in Figure 4.19 shows similar results to those observed in EU-India OD markets: the ME3 hubs don't serve as first connect airports on two connect itineraries in these markets either. The vast network available from ME3 hubs allows them to take passengers to their final destinations without an extra connection.
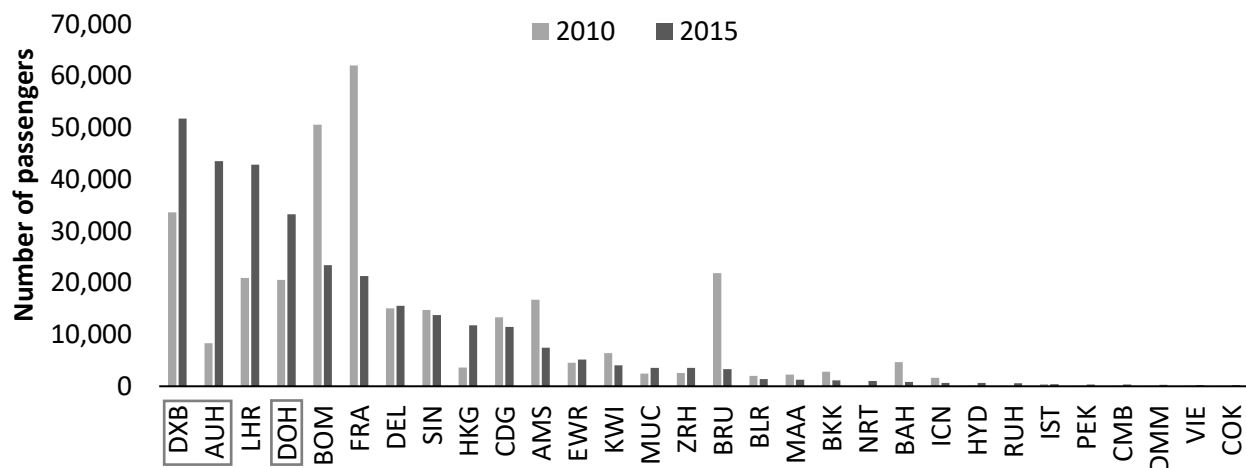
Figure 4.20: Two connect traffic in US to India OD markets by second connect airport

Analyzing traffic changes at second connect airports for two connect itineraries in Figure 4.20 shows the same trends as at connecting airports of one connect itineraries. ME3 hubs grew very rapidly while all major EU hubs except LHR lost traffic. Interestingly, BOM also lost high levels of two connect traffic. This is also mostly due to the large network of ME3 carriers. Rather than having to connect a second time in BOM, US passengers can now just go through ME3 hubs and access their final destinations with one connect instead of two (when they originate in a primary US airport) or with two connect instead of three (when they originate in a secondary US airport). Given the very low volumes of two connect traffic through ME3 hubs we will not analyze the destinations of two connect passengers with first connection at ME3 hubs vs 2 connect passengers with first connection at top US/EU airports. Instead we will look at final destinations for all connecting passengers (one and two connect).
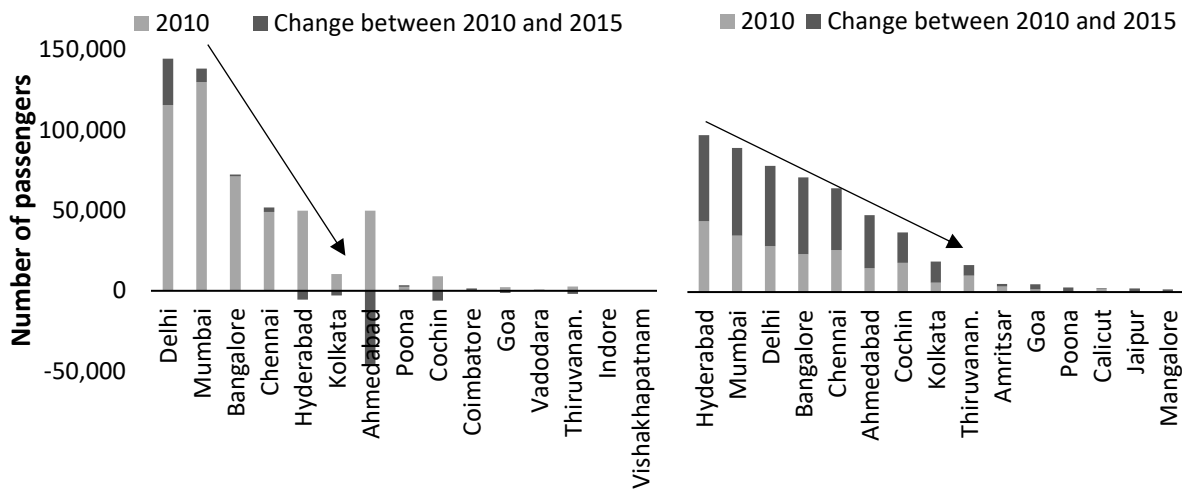
Figure 4.21: Traffic by destination for different first connect airports: LHR, EWR, HKG, FRA, CDG (left) and ME3 hubs (right)

Figure 4.21 shows that the ME3 airlines have grown their traffic homogeneously throughout their vast network in India: passengers traveling with ME3 carriers are mostly distributed across 7 Indian cities. In contrast, one or two connect passengers flying on US/EU/India partner airlines terminate in just five cities. Over the past five years these trends have accentuated themselves, with OD traffic to secondary cities such as Ahmedabad or Cochin on US carriers almost entirely disappearing while they grew substantially with ME3 carriers.
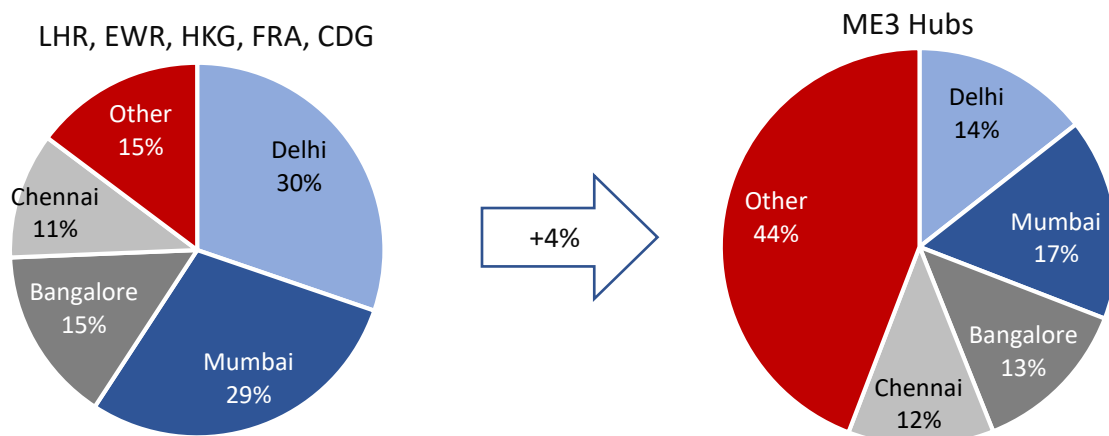
Figure 4.22: Destination share by first connect airport in 2015

Figure 4.22 clearly shows how the ME3 network allows passengers to reach a broader range of destinations. With a much wider network they are again able distribute the passengers across a much broader geography. The differences in destinations are very similar to those observed from Europe, with less than one in six passengers connecting in LHR, EWR, HKG, FRA or CDG ending at a destination other than India's top four destinations. One major difference with Europe is the concentration of connecting traffic from nonME3 carriers at these five airports. From Europe, the four airports selected in Figures 4.10 and 4.11 covered 40% of the connecting traffic whereas from the US the five airports cover 56%. This explains why the difference in volume between the connecting traffic through the selected airports vs the ME3 hubs in the European case was much larger than it is here (+58% vs +4%).

Finally, as was observed from Europe, the growth in traffic on itineraries through ME3 hubs has had direct impacts at the origin airport level. The impact was particularly noticeable at the US primary airports described in Chapter 3 where ME3 carriers focused their growth. The ME3 airlines in some cases stimulated the market, while in others they captured traffic previously held by US or US partnered airlines.
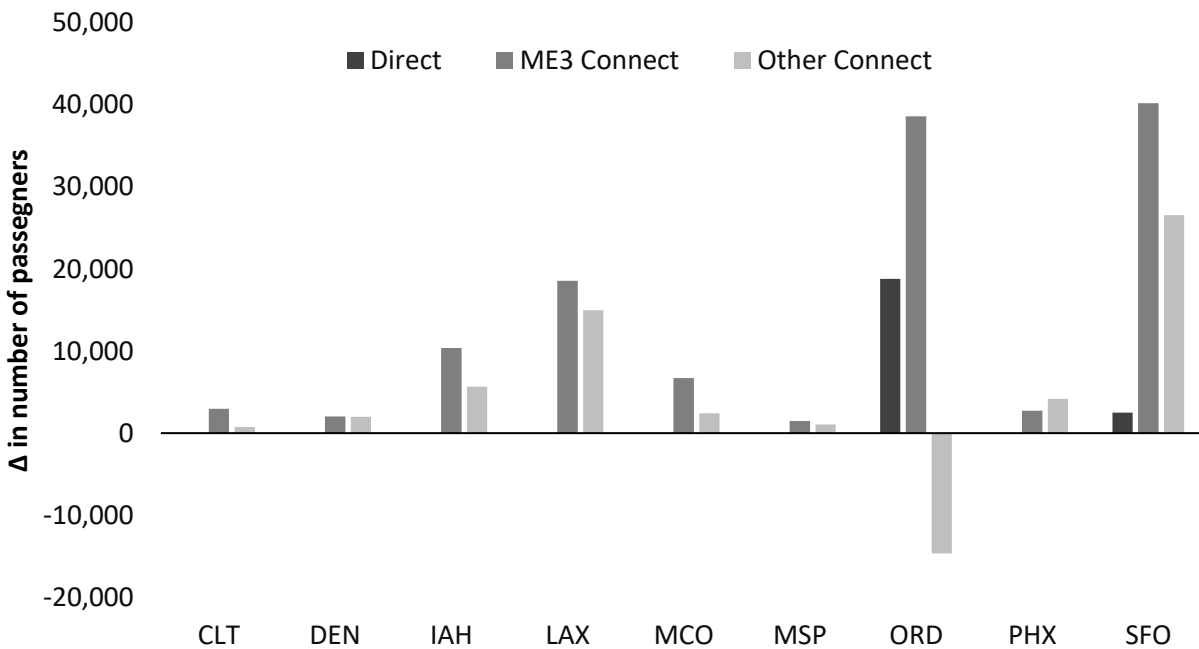
Figure 4.23: Change in traffic to India by carrier type for 9 of the top 20 US origin airports by traffic to India (2010-2015)

Figure 4.23 suggests that at 9 primary US airports the growth of traffic on ME3 carriers has stimulated traffic to India. Growth on ME3 airlines is accompanied by growth on other carriers. Major airports such as IAH, LAX, SFO or ORD have witnessed very high levels of growth from both ME3 and nonME3 carriers.
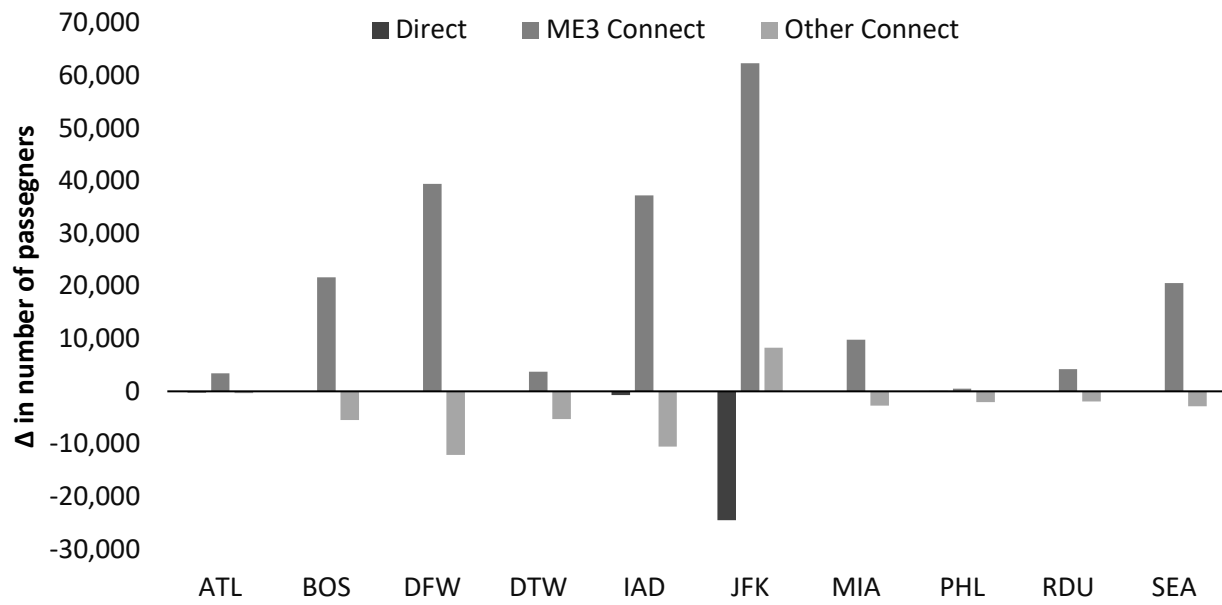
Figure 4.24: Change in traffic to India by carrier type for 10 of the top 20 US origin airports by traffic to India (2010-2015)

In contrast to Figure 4.23, Figure 4.24 suggests that at 10 primary airports ME3 carriers have grown their market share by capturing traffic from US or US partner airlines. Again, major airports are concerned: DFW, IAD, JFK and BOS. The strategy from ME3 carriers by origin airport is less clear than in Europe. There is no obvious difference between the airports where they grew through mostly stimulation and those where they grew mostly through shifting market share.

In order to better understand these effects of stimulation and market shift the next section of this Chapter will look at traffic at an OD level. This section has confirmed at an aggregate level, and then by airport, the effects of growing ME3 capacities from Europe and the US on OD traffic beyond the Middle East. Most changes in capacity had direct consequences on traffic levels. The higher impact on routes from the US than from Europe was also evident. With faster and more recent capacity growth, the traffic from the US to India has switched to ME3 airlines faster than traffic from Europe to India. Looking at an OD level we will now try to directly compare the growth of ME3 traffic and the growth of US and European carriers' traffic.

4.4 Traffic flows by OD market from Europe and the United States to India

From Europe

Looking at specific OD markets rather than aggregate airport level or national level data will help determine the impact of ME3 carriers on other airlines serving the same OD market. First the distribution of traffic among the OD markets and the difference in itineraries for these OD markets has to be understood. This will explain the type of OD markets where connecting itineraries are important, so where ME3 carriers may have highest impact.
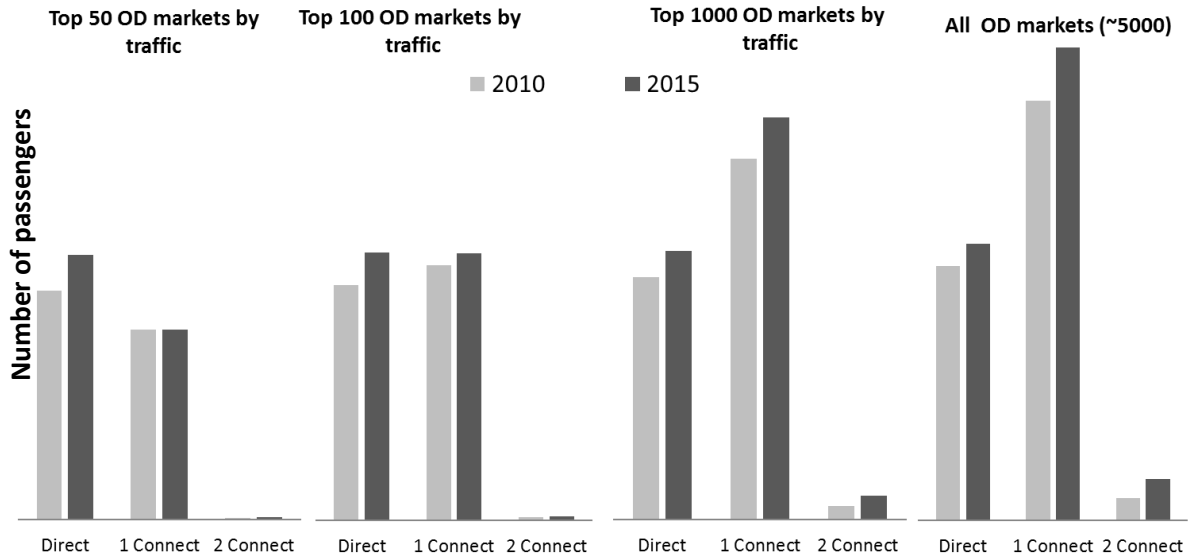
Figure 4.25: Number of passengers from Europe to India by itinerary in selected OD market subsets

By splitting the analysis in subset of OD markets in Figure 4.25, we can already see in what type of OD markets connecting itineraries have brought the most growth in the past five years. In the Top 100 OD markets by traffic size most of the growth came from direct flights, typically European or Indian legacy airlines. In the 100th to 1000th OD market by traffic, the growth almost exclusively came from one connect traffic. We could therefore expect that those markets are those where ME3 carriers may have focused their growth on the most.
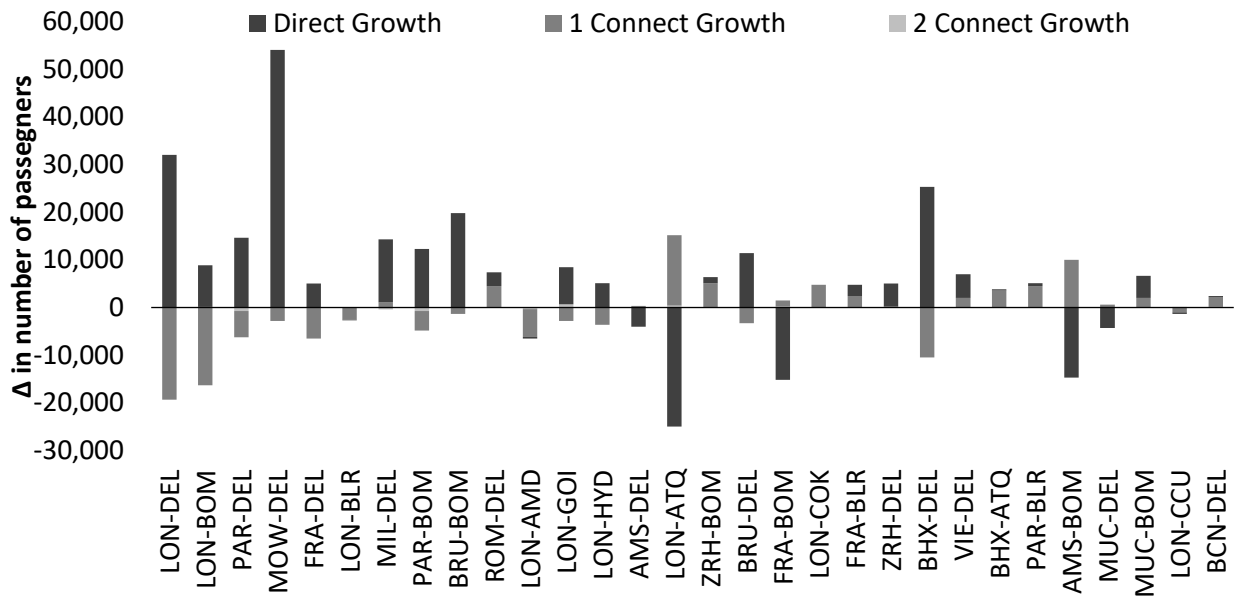
Figure 4.26: Change in traffic by itinerary type in top 30 OD markets from Europe to India (2010-2015)

Figure 4.26 clearly shows that in the top 30 OD markets most of the growth was generated through direct traffic. In the sample, in most cases one connect itineraries saw reduced traffic at the expense of direct traffic. In just two OD markets was direct traffic replaced by one connect traffic: LON-ATQ and AMS-BOM.
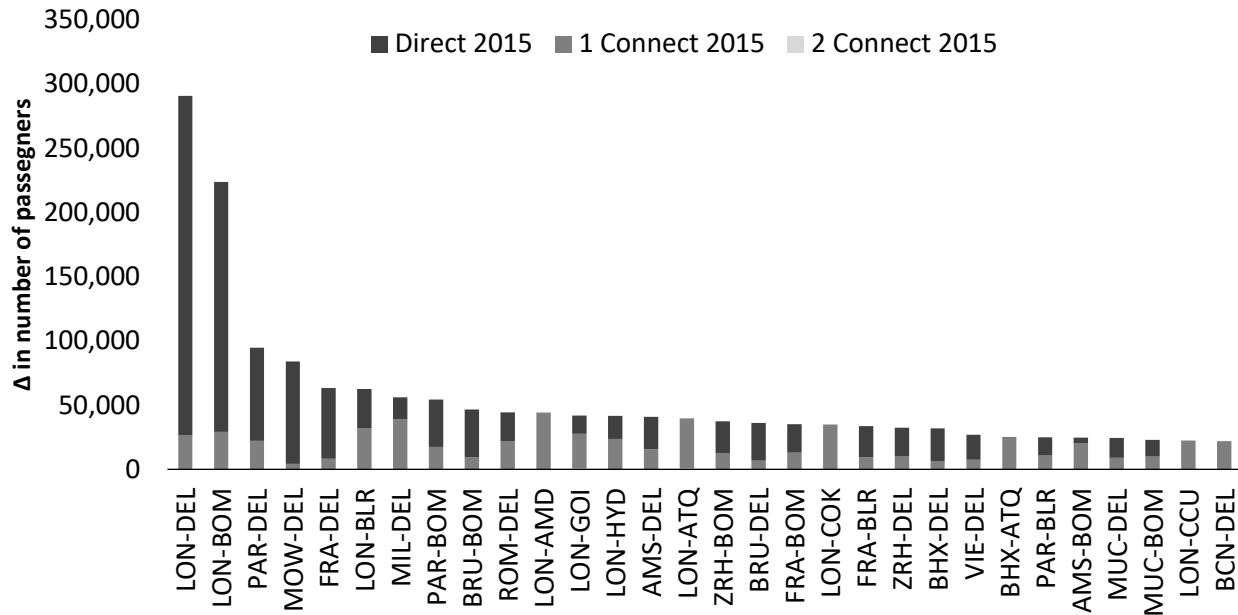
Figure 4.27: Traffic by itinerary type in the top 30 OD markets from Europe to India in 2015

As a result of the direct traffic growth, connect itineraries only represented 35% of the traffic from Europe to India in 2015 in the top 30 OD markets (Figure 4.27). Most of the traffic from direct itineraries is actually focused in the three to five top OD markets from Europe to India, as was expected from the focus of EU and Indian airlines on top Indian cities. Since the top 30 OD markets represent 50% of the total market and there has been very little one connect growth in these markets, then the ME3 carriers' traffic growth observed in the previous section has been focused on the remaining 50% of the market. By analyzing changes in these remaining OD markets, we would therefore expect high growth from one connects, and especially from ME3 airlines.
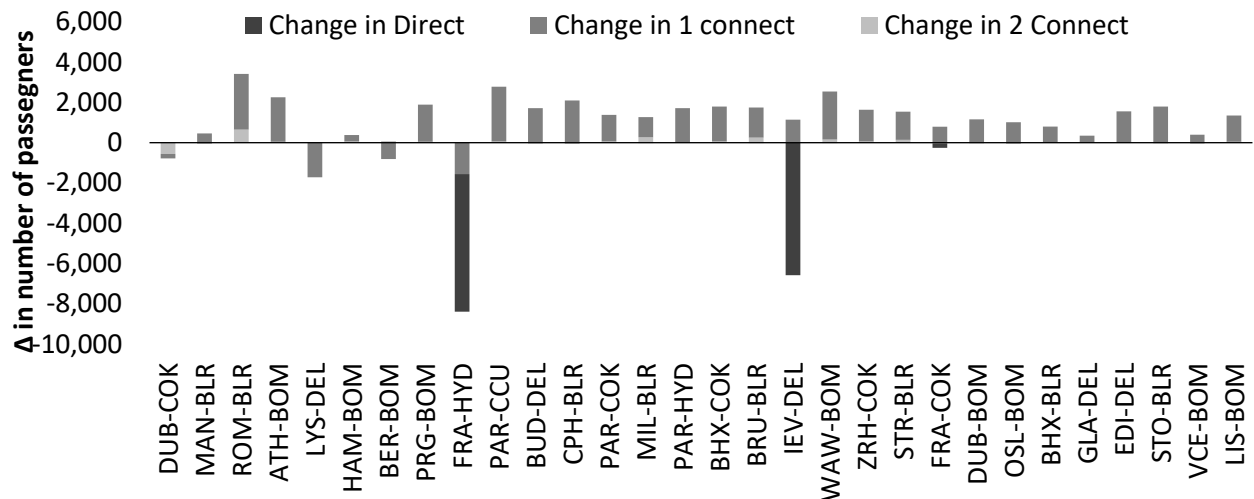
Figure 4.28: Change in traffic by itinerary type in the 71st to 100th OD markets from the US to India (2010-2015)

Comparing Figures 4.28 to Figure 4.26 shows how one connect itineraries have grown traffic in small OD markets instead of the very large ones. In 26 of the 30 OD markets selected one connect traffic grew more than any other itinerary type. The one connect growth is homogeneously distributed among the secondary OD markets. With these levels of growth distributed across a very long tail of OD markets, one connect traffic was able to reach the aggregate levels of growth observed in the previous section.
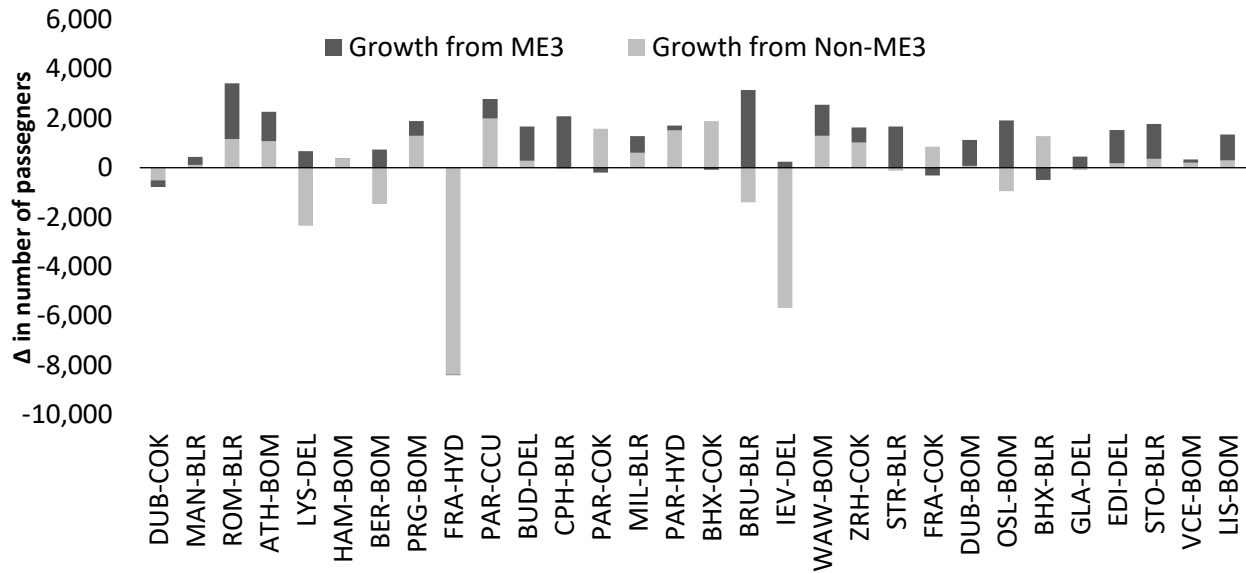
Figure 4.29: Growth in traffic in the 71st to 100th OD market by carrier type (2010-2015)

Figure 4.29 shows that the growth in one connect traffic observed from Figure 4.28 is mostly provided by ME3 airlines. In only 5 of the 30 OD markets selected did the ME3 airlines reduce traffic. With a hub and spoke model, their network growth strategy in India and at European secondary airports described in Chapter 3 allowed them to grow in a very large number of secondary markets ignored by direct flights from legacy EU and Indian airlines. Looking at the growth by subset of OD markets will show the increasing impact of ME3 carriers with increased number of OD markets.
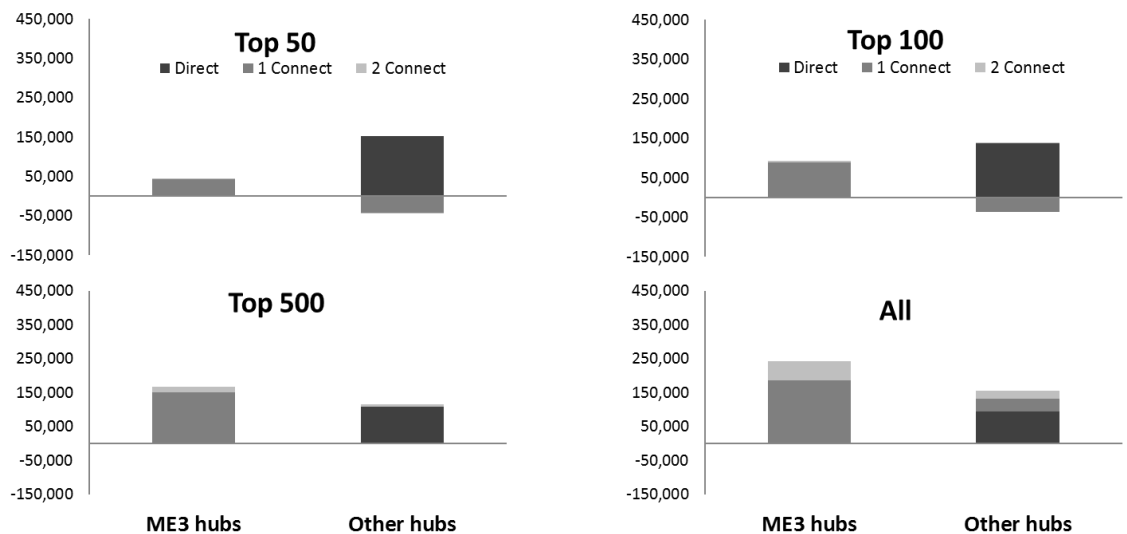
Figure 4.30: Change in traffic between 2010 and 2015 by itinerary type, carrier, and OD market subgroup

Figure 4.30 shows the clear split in strategy between ME3 and EU-Indian carriers. The legacy airlines focused their growth on direct traffic in top OD markets and reduced direct service in the remaining OD markets. At the same time ME3 airlines developed their network from Europe to India in all these remaining markets. By offering more and more capacity in such a large number of markets the ME3 airlines actually drove over 61% of the total traffic growth between Europe and India. Looking more specifically at the data reveals the effects on nonME3 carriers. The changes from Figure 4.30 translate into direct changes in market share for the ME Emerging airlines and the legacy carriers.

Table 4.3: Traffic growth between 2010 and 2015 by carrier type and itinerary for selected group of OD markets

Ignoring the markets offering direct service

Top 30 OD markets

Total Growth		140,511	
Nonstop Growth		167,342	
1 Connect Growth	ME3	12,233	9.5%
	Non-ME3	-38,592	
2 Connect Growth	ME3	1,173	
	Non-ME3	-1,645	

2010 ME3 MS	13.1%	2015 ME3 MS	12.8%

Top 100 OD markets

Total Growth		194,222	
Nonstop Growth		136,801	
1 Connect Growth	ME3	88,058	48%
	Non-ME3	-36,056	
2 Connect Growth	ME3	4,210	
	Non-ME3	1,209	

2010 ME3 MS	16.7%	2015 ME3 MS	19.3%
2010 ME3 MS	30.2%	2015 ME3 MS	40.0%

Top 1000 OD markets

Total Growth		324,156	
Nonstop Growth		107,455	
1 Connect Growth	ME3	159,403	59%
	Non-ME3	14,714	
2 Connect Growth	ME3	31,251	
	Non-ME3	11,333	

2010 ME3 MS	19.6%	2015 ME3 MS	23.9%
2010 ME3 MS	30.7%	2015 ME3 MS	40.3%

All OD markets

Total Growth		398,525	
Nonstop Growth		93,928	
1 Connect Growth	ME3	187,017	61%
	Non-ME3	37,523	
2 Connect Growth	ME3	55,991	
	Non-ME3	24,065	

2010 ME3 MS	21.7%	2015 ME3 MS	26.4%
2010 ME3 MS	32.7%	2015 ME3 MS	41.7%

Table 4.3 measures the role of the ME3 carriers in the growth of traffic from Europe to India between 2010 and 2015. The percentages on the right of each table represents the percentage of total growth coming from ME3 carriers. As expected, the role of ME3 airlines increases as we include the smaller OD markets. In the top 30 OD markets, they represent only 9.5% of the growth but when all the markets are included they are responsible for 61%. Similarly, their market share doubles from just 13% in the top 30 OD markets to 26% in all the OD markets. Furthermore, in the top 30 OD markets their market share actually reduced over the past five years as those are the markets with direct service. As soon as smaller markets without direct service are included then the market share actually grew. Finally, excluding these markets with direct service confirms that the focus of ME3 airlines has been in OD markets without direct service competing with them: in those markets their market share has climbed from 33 to 42%.

From the United States

As in the European case, analyzing the change in traffic through the lens of OD markets will allow us to measure the impact of ME Emerging airlines on US and EU legacy airlines. The aggregate analysis of OD

traffic from the US to India showed us significant shifts from direct to one connect itineraries which had a strong impact at US primary airports, but it wasn't sufficient to identify what type of OD markets ME3 airlines targeted and what the consequences were for other carriers. From the observations made in Chapter 3 and the first section of Chapter 4 we would expect similar trends as OD markets from Europe but with larger effects. One major difference between the Europe-India OD markets and the US-India OD markets is the smaller importance of direct flights in the latter.
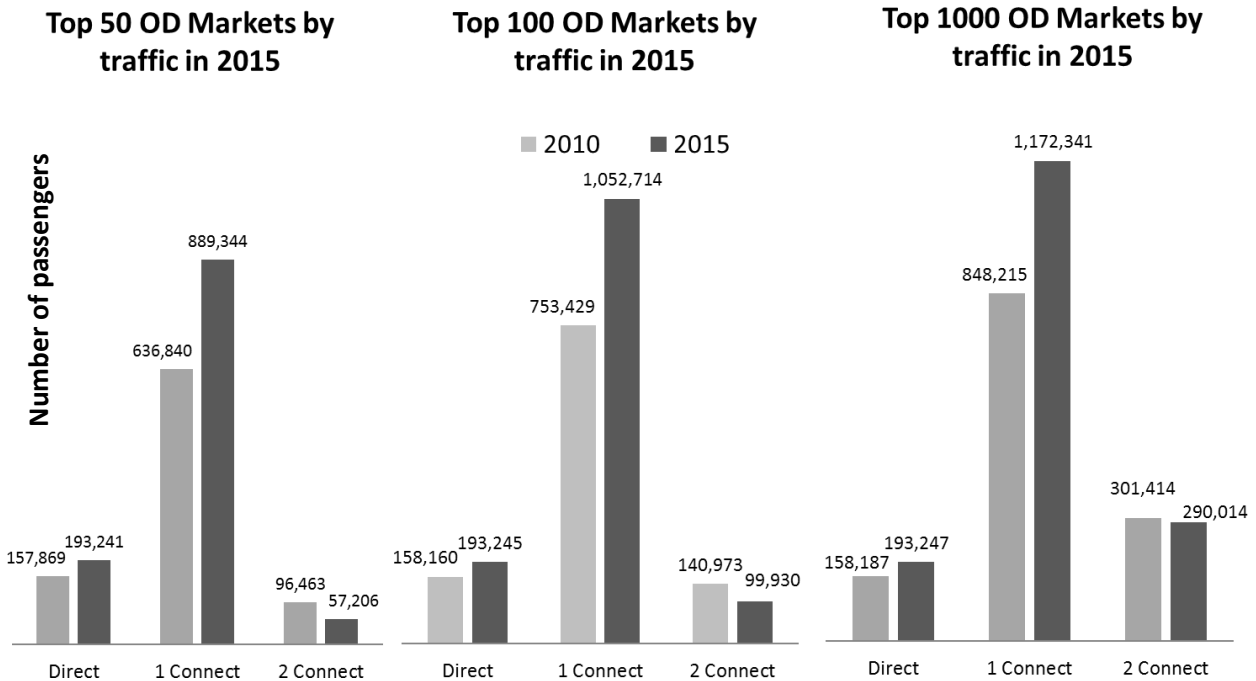
Figure 4.31: Number of passengers from the US to India by itinerary type and OD market subgroup

Figure 4.31 shows the much smaller role of direct service for passengers traveling from the US to India. On all types of OD markets one connect traffic is by far the most dominant. It is also by far the one that generated the most growth. Direct and two connect traffic have been relatively constant. The absence of significant direct traffic from the US to India may be one of the reasons why ME3 airlines grew much faster to the US than to Europe. With less competition offering direct service ME Emerging airlines did not have the competitive disadvantage of requiring a connection; even in some of the largest OD markets between the two countries. Remember from the previous section that in Europe ME3 carriers focused in smaller OD markets to distribute their growth as the top 30 to 50 OD markets were largely dominated by direct flights.

Table 4.4: Nonstop OD markets from the US to India

Nonstop Market	Airline 2010	Daily Frequency 2010	Airlines 2015	Daily Frequency 2015
NYC-BOM	[Air India]	1	[Air India] [UNITED]	1 1
NYC-DEL	[Air India] [Continental Airlines]	1 1	[Air India] [UNITED]	1 1
SFO-DEL*	-	-	[Air India]	0.5
CHI-DEL**	[Air India] [American Airlines]	1 1	[Air India]	1

* Introduced in December 2015
** AI service introduced in December 2010

Table 4.4 shows that there were just 4 OD markets with nonstop flights to India in 2015, up from 3 in 2010. In addition, the daily frequencies of these nonstop flights are quite low (maximum of 2 per OD market). This is very small relative to the 32 nonstop markets from Europe. As a result of the limited nonstop competition, the increase in one connect itinerary is visible even in the largest OD markets between the US and India.
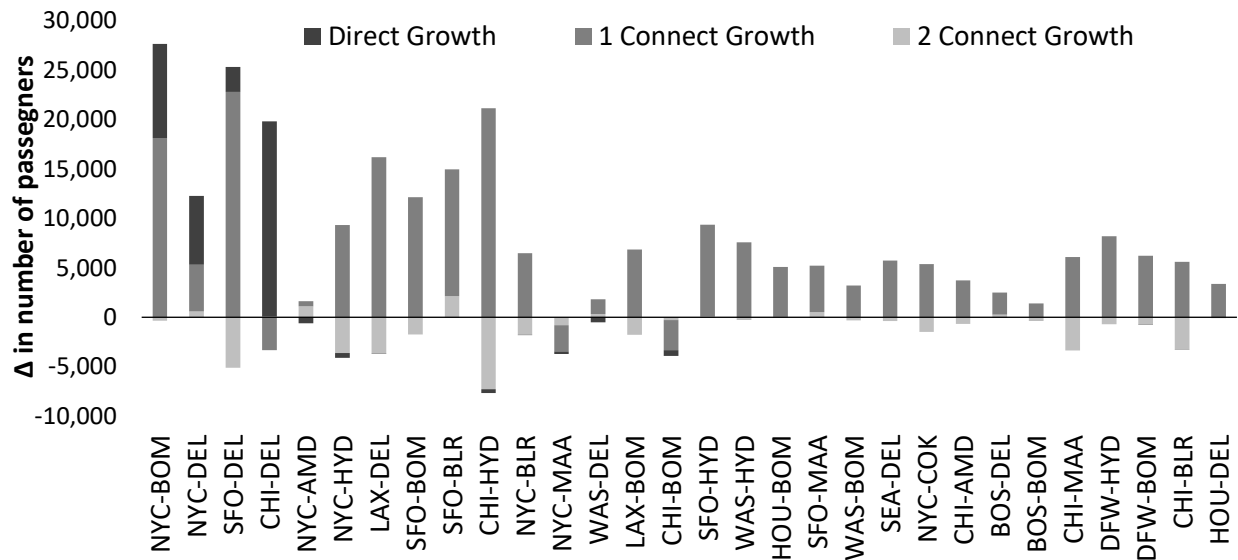
Figure 4.32: Growth by itinerary type in the top 30 OD markets between the US and India (2010-2015)

Figure 4.32 shows that connect itineraries grew not only in the OD markets without direct service, but also in OD markets with direct service. The two largest OD markets by traffic, NYC-BOM and NYC-DEL, both saw a mix of increased direct and one connect traffic. Only CHI-DEL saw increased direct traffic at the expense of one connect traffic. This is very different to what was observed from Europe where one connect traffic only grew in markets without direct service and often when there was a gain in direct traffic we could also see a reduction in one connect. In these top 30 OD markets representing 58% of the traffic from the US to India in 2015, only two connect itineraries seem to be negatively impacted by the growth in one connect.
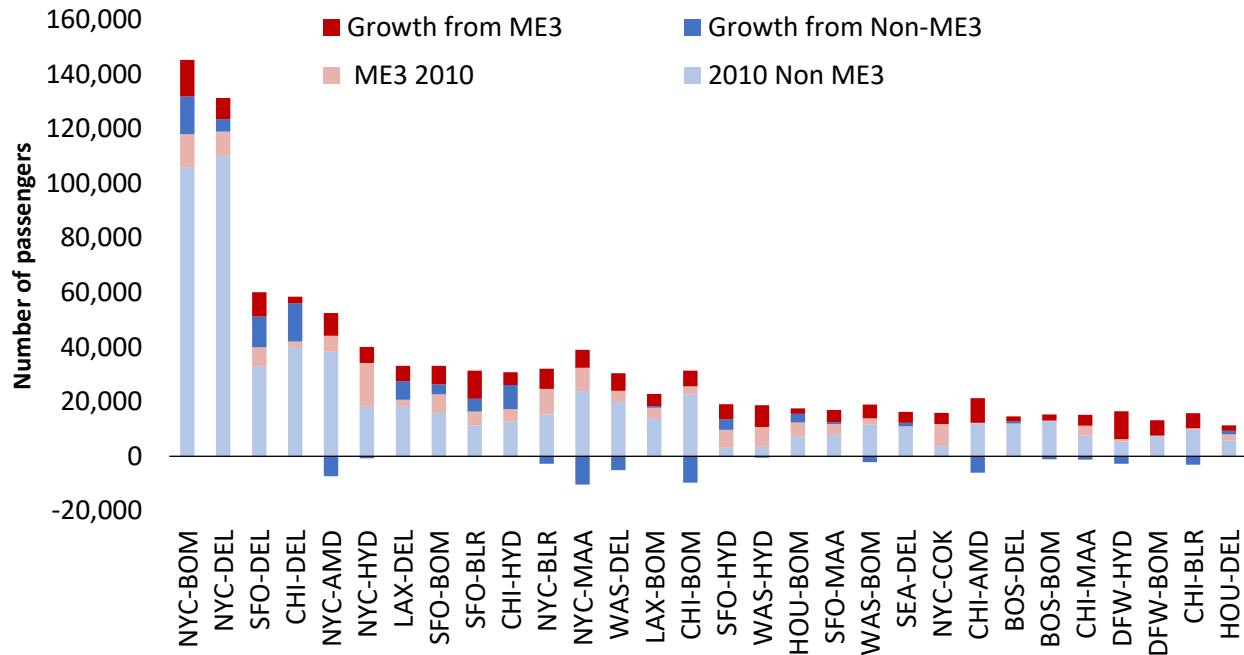
Figure 4.33: 2015 Passenger traffic from the US to India decomposed by carrier type and growth since 2010

Figure 4.33 reveals that despite their high growth spread across all OD markets, ME3 airlines still represent small market shares in the OD markets with competing nonstop service. On the other hand, in the top 26 OD markets without nonstop service the market share of ME3 airlines is significant. As was seen from Europe, market share of ME Emerging carriers increases as we consider smaller OD markets. To the right of the x axis we can see OD markets with ME3 airlines reaching above 50% market share against 30 to 40% for OD markets without nonstop competition to the left of the x axis. We would therefore expect that by including larger samples of OD markets the impact of ME3 carriers would grow.
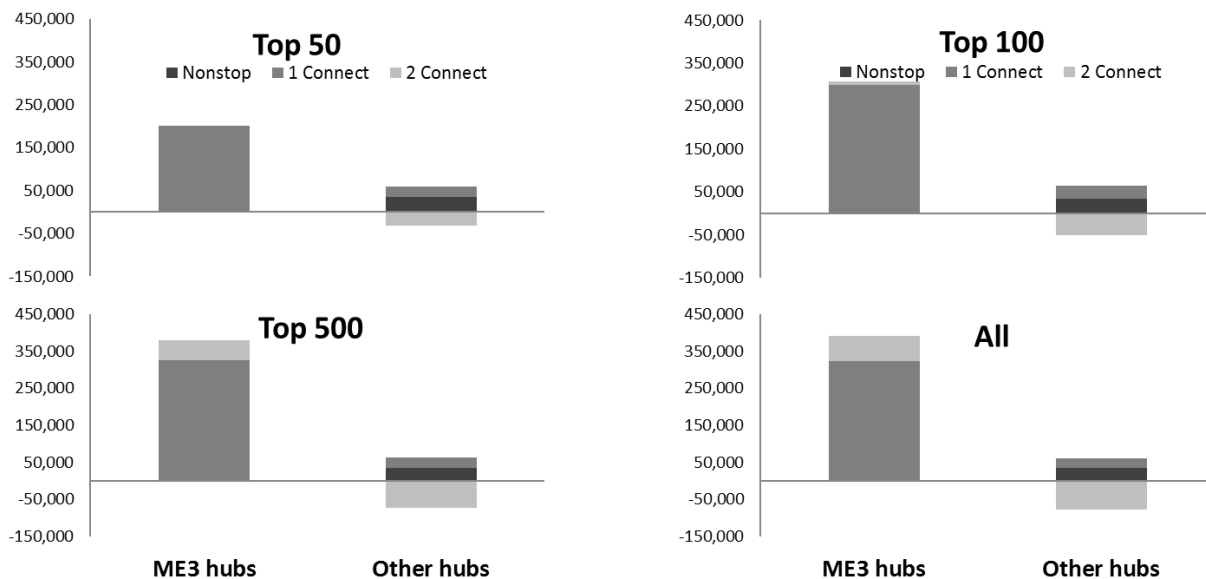
Figure 4.34: Change in traffic between 2015 and 2010 by carrier type, itinerary and OD market subgroup

Figure 4.34 shows that once again the effect of ME Emerging airlines in the US-India OD market followed similar trends as in Europe but with a higher impact. As observed in Figure 4.30 the growth in traffic from ME3 airlines increases as smaller markets are included while the gains from other carriers reduce. The impact is higher than from Europe as within the Top 50 OD markets from the US to India, ME Emerging airline managed to capture 87% of the total growth. From Europe, on the Top 50 markets to India the ME3 airlines had only contributed 9.5% of the growth. From the US, when including all OD markets, nonME3 carriers faced an overall loss while ME3 airlines gained 367,000 passengers. From Europe the other carriers managed to grow traffic by 154,000 against 244,000 for the ME3 carriers. These major differences become evident when analyzing the percentage contribution of ME3 airlines in the overall growth of traffic to India.

Table 4.5: Traffic growth between 2010 and 2015 by carrier type and itinerary for selected group of OD markets

Ignoring the markets offering direct service

Top 30 OD markets

Total Growth		204,469
Nonstop Growth		35,903
1 Connect Growth	ME3	178,724
	Non-ME3	22,618
2 Connect Growth	ME3	-257
	Non-ME3	-32,519

87%

2010 ME3 MS	18.6%	2015 ME3 MS	33.1%
2010 ME3 MS	24.3%	2015 ME3 MS	45.2%

Top 100 OD markets

Total Growth		293,327
Nonstop Growth		35,085
1 Connect Growth	ME3	268,983
	Non-ME3	30,302
2 Connect Growth	ME3	8,527
	Non-ME3	-49,570

95%

2010 ME3 MS	19.7%	2015 ME3 MS	36.0%
2010 ME3 MS	24.2%	2015 ME3 MS	44.4%

Top 1000 OD markets

Total Growth		347,835
Nonstop Growth		35,060
1 Connect Growth	ME3	298,674
	Non-ME3	25,452
2 Connect Growth	ME3	64,524
	Non-ME3	-75,875

104%

2010 ME3 MS	19.6%	2015 ME3 MS	37.4%
2010 ME3 MS	22.9%	2015 ME3 MS	44.2%

All OD markets

Total Growth		350,908
Nonstop Growth		35,124
1 Connect Growth	ME3	298,739
	Non-ME3	24,740
2 Connect Growth	ME3	69,033
	Non-ME3	-76,728

105%

2010 ME3 MS	19.5%	2015 ME3 MS	37.4%
2010 ME3 MS	22.8%	2015 ME3 MS	44.1%

Table 4.5 measures the effect of the growth of ME3 carriers in the US-India OD market. With negative growths by nonME3 carriers, the ME3 contribution to the increasing traffic exceeds 100% of the total growth. In other words, ME carriers saw both increased traffic on their aircraft, and reduced traffic from their competitors, which drastically increased their market share. In just five years they have gone from transporting less than 1 in 5 passengers from the US to India, to over 1 in 3. This change summarizes the difference with the European case: both situations showed increased market share for ME3 airlines, but from the US the markets share doubled from 19 to 37% while in Europe it gained just 4 percentage points from 22 to 26%. In addition, the effect of nonstop routes being less strong than from Europe, when

ignoring the nonstop routes we see seven percentage point gains in overall market share, against the fifteen percentage point gain in overall market share gain from Europe.

4.5 Conclusion

The aggregate traffic flow analysis in Chapter Four confirmed the hypothesis emerging from Chapter Three: growing capacities to the Middle East from Europe and the United States has allowed ME3 airlines to grow traffic to destinations beyond the ME. Analyzing traffic to India has shown ME3 capacity growth from the US to the Middle East matched closely ME3 traffic growth to India from the US. The higher capacity growth rates from ME3 carriers to the US than to Europe observed in Chapter Three were also reflected in the traffic flows.

Overall, EU-India OD traffic grew by 14% between 2010 and 2015. Over 76% of this growth came from connecting passengers, mostly one connect. 60% of the growth was associated to ME3 carriers who consequently grew their market share from 22% to 26% over the period. At the same time US-India OD traffic grew by over 26% with 90% of the positive growth coming from 1 connect passengers. In total the ME3 carriers were associated with 86% of the positive growth. This has allowed them to grow their market share in these OD markets from 19.5% to 37.4% in just five years. Therefore the impact of ME3 carriers on US airlines is much greater both in terms of capacities and traffic than on European carriers.

The network size observations made in Chapter Three were also evident in the traffic analysis. From Europe, passengers flying through Abu Dhabi, Dubai or Doha reach a much wider set of destinations. Of passengers originating in Europe and flying with ME3 carriers, 41% end up in cities other than Mumbai, Bangalore, Chennai and Delhi against 13% of those flying on other airlines and connecting in top EU airports LHR, FRA, IST and CDG. Similarly, 45% of passengers from the US flying to India with ME3 carriers end up in other cities than this top five whereas only 15% of those flying through LHR, FRA, EWR, HKG or CDG end up in such cities.

The analysis of the US-India and Europe-India markets at an OD level offered an explanation as to why the impact from the US has been much higher than from Europe. From the Europe analysis we were able to understand ME3 carriers grew most of their traffic in markets without nonstop competition, so smaller OD markets. When they do not face this competitive disadvantage, they grow their market share at the expense of the legacy players competing in the same market. From secondary EU airports, where nonME3 airlines only offer connecting itineraries to India, ME3 airlines have grown by stimulating the market more than diverting traffic from other carriers. From the US we noticed the much smaller number of OD markets served nonstop as well as the low frequencies of these nonstop flights. As a result, the ME3 carriers could target large OD markets as well. Due to this difference in service type from Europe and the US in 2010, we saw that ME3 airlines had much higher effects on capacities between the US and the ME and on traffic from the US to India than on capacities between Europe and the ME and traffic from Europe to India.

Chapter 5 Quantifying Diversion versus Stimulation of NonME3 Carrier Traffic

5.1 Introduction

Chapter 4 showed the significant impact of ME3 carriers on traffic flows to destinations beyond the Middle East. In just five years these carriers went from 22% to 26% market share in EU-India OD markets and from 19.5% to 37.4% market share in US-India OD markets. Following these changes there has been some debate on the type of traffic ME3 airlines are relying on to build their market share. US and European airlines believe the ME Emerging carriers have grown by diverting traffic away from them. ME3 airlines on the other hand believe they are stimulating new demand by transporting passengers that would not have flown otherwise. The purpose of this Chapter will be to develop a model which will describe quantitatively whether the ME3 carriers have diverted traffic or stimulated traffic for legacy airlines. In order to answer this question, we will define diversion and stimulation of traffic from the perspective of nonME3 carriers.

Consider the difference between the observed nonME3 traffic in the presence of ME3 carriers and the expected nonME3 traffic in the absence of ME3 carriers. If the difference is positive, then the ME3 airlines have stimulated traffic, even on nonME3 carriers. If the difference is negative, then the ME3 airlines have diverted traffic from nonME3 carriers. If the difference is 0, then the ME3 airlines had no effect on nonME3 traffic. This definition does not look at the change in total market size. In fact we expect to see overall market stimulation in most cases, but this may occur with stimulation of nonME3 carriers, with diversion of traffic away from nonME3 carriers, or without any effect on nonME3 carriers. Figure 5.1 below represents these potential outcomes under overall market stimulation. Table 5.1 then shows numerically how we can interpret this.
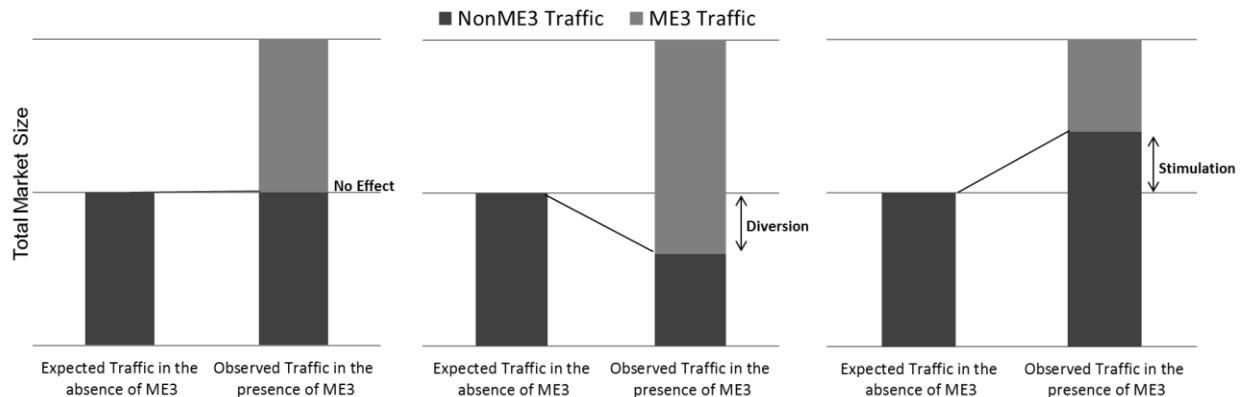
Figure 5.1: Graphical explanation of diversion and stimulation of nonME3 traffic

Table 5.1: Numerical example of stimulation and diversion of nonME3 traffic

Expected nonME3 traffic (w/o ME3 carriers)	Observed Total Traffic (with ME3 carriers)	Observed nonME3 traffic (with ME3 carriers)	Difference in nonME3 traffic	Effect on nonME3 traffic
1000	2000	800	-200	20% Diversion
1000	2000	1200	+200	20% Stimulation
1000	2000	1000	0	No effect

Of course, the main challenge with this definition is to compute the expected nonME3 traffic in the absence of ME3 carriers. The purpose of the model will therefore be to estimate this value by controlling for each market's particular attributes that would have led to changes in traffic regardless of the presence of ME3 carriers. In order to answer the question of stimulation and diversion, the model will estimate the percentage stimulation or diversion of nonME3 traffic observed in the presence of ME3 carriers.

5.2 The Model

Our model is composed of 3 two way fixed effects econometric regressions identifying the effect of the presence of ME3 carriers on nonME3 traffic. The data used in the model is at an OD market-year level. The dependent variable in all three regressions is the natural logarithm of the nonME3 traffic in the given OD market during the given year. The independent variables common across the 3 regressions are the control variables and the fixed effects.

One set of control variables used is the values of the GDP in the regions of origin of each OD market. GDP from destinations were also included as control variables in initial regressions. The poor quality of the data collected from Indian regions led to statistically insignificant results. Including the destination GDP variable in the model had very negligible effects on the results from the overall regressions. We consequently decided to exclude the destination GDP in the final versions of our model.

The second control variable is a dummy controlling for the presence of a nonstop flight in the given OD market. The dummy variable takes the value 1 if there is a nonstop and 0 if there is not. As the OD markets in this sample are only EU to India and US to India, any nonstop flight would be operated by a nonME3 carrier.

The last set of control variables used were the fixed effects. Fixed effects were used as we are analyzing the impact of variables across markets over time, and each market has its own individual characteristics which influence traffic. The fixed effect variables capture the individual characteristics of each market and each year. The market fixed effects are dummy variables for each OD market. The time fixed effects are dummy variables for each year. By absorbing the heterogeneities between markets, we can estimate the pure effect of the treatment – in this case ME3 presence.

The treatment effects vary in each of the three regressions. In the first regression, the treatment effect is the presence of an ME3 carrier. Therefore the variable is a dummy taking the value 0 when there are not any ME3 carriers offering service in the given OD market and taking the value 1 when there is at least one ME3 carrier offering service in the OD market. The second treatment effect is the presence of each ME3 carrier independently. There are consequently three dummy variables: one for Emirates, one for Etihad and one for Qatar. These variables take the value 0 when the carrier does not serve the market and the

value 1 when the carrier does serve the market. Finally, the third treatment effect is the number of ME3 carriers present. The variable takes the value 1 when only one ME3 carrier is present, 2 when only two are and 3 when all three ME3 carriers are present. The method used to determine carrier presence will be explained in the Data Sources section 5.3.

Overall, we are aiming to express nonME3 traffic as a function:

$$NonME3\ traffic = f(ME3Presence, market\ attributes, fixed\ effects)$$

This expression translates into three regressions:

(1)

$$Y_{it} = \beta_1 * ME3Presence_{it} + \beta_2 * OriginGDP_{it} + \beta_3 * Nonstop_{it} + \alpha_i + \gamma_t + \epsilon_{it}$$

(2)

$$Y_{it} = \beta_1 * EKPresence_{it} + \beta_2 * EYPresence_{it} + \beta_3 * QRPresence_{it} + \beta_4 * OriginGDP_{it}$$
$$+\beta_5 * Nonstop_{it} + \alpha_i + \gamma_t + \epsilon_{it}$$

(3)

$$Y_{it} = \beta_1 * NumberOfME3Present + \beta_2 * OriginGDP_{it} + \beta_3 * Nonstop_{it} + \alpha_i + \gamma_t + \epsilon_{it}$$

Where i is the OD market and t is the year. Y_{it} is the natural logarithm of the nonME3 traffic in OD market i in year t. α_i are the market fixed effects and γ_t the year specific effects. The three treatment effects are represented by the first terms in each expression. These sets of regressions were run separately for US to India OD markets and Europe to India OD markets.

5.3 Data Sources

In order to build this model, four data sources were used for each regression. The first is the Amadeus travel intelligence traffic flow data described in Chapter 4. The data was collected from the second week to the last week of every year between 2010 and 2015. This data served to populate the dependent variable array.

The second set of data used was Diio Schedule data described in Chapter 3. This data was also collected every year between 2010 and 2015. The data served to identify the existence of a nonstop in the given market or to identify the presence of ME3 carriers. Determining whether there was a nonstop just required looking at all the scheduled flights between the US and India or Europe and India every year. As scheduled flights are nonstop, any flight appearing in the list was considered nonstop. In the given year, the OD markets between the origin and destination of the flights in the list had the nonstop presence dummy variable set to 1. Determining the presence of ME3 carriers in the OD market was slightly more complicated as it involved checking the entire list of destinations served nonstop from their respective hubs. When Diio recorded a nonstop flight from the ME3 carrier's hub to both the origin and destination of the given OD market, then the ME3 airline was considered present in that particular market.

The third set of data used was the Origin GDP. In the case of EU-India OD markets, the origin gross domestic products were measured at a country level using data from the World Bank. In the case of US-

India OD markets, the origin gross domestic products were measured at a US metropolitan area level using data from the Bureau of Economic Analysis (BEA).

Table 5.2 below summarizes the different variables used in the model and how they were evaluated. All of these variables were measured for each market i in each year t.

Table 5.2: Description of the variables in the model

Variable name	Explanation
NonME3 Pax$_{it}$	Total number of passengers carried by nonME3 carriers in market *i* in year *t*
EK/EY/QR Presence$_{it}$	Presence of EK/EY/QR scheduled flights between both: • the origin of market *i* and DXB/AUH/DOH in year *t* • DXB/AUH/DOH and the destination of market *i* in year *t*
ME3 Presence$_{it}$	Presence of at least one ME3 carrier in market *i* in year *t*
Nonstop Presence$_{it}$	Presence of scheduled nonstop flights in market *i* in year *t*
Origin GDP$_{it}$	GDP level in trillions of USD at the origin of the OD market in year *t*

5.4 Data Processing

Amadeus provides data at an OD market-itinerary-year level. The first step was therefore to compile all this data at an OD market-year level while maintaining sufficient information from the itineraries to calculate ME3 vs nonME3 traffic in each OD market and year. This split was done by determining from each itinerary if there had been a connection and, if so, if one of the connecting airports was DXB, AUH or DOH. For each itinerary of a given OD market where one of these three airports was a connecting airport, the corresponding traffic was counted as ME3 traffic. The remaining traffic in the given OD market was then counted as nonME3 traffic. This method was applied in each OD market every year.

Given the limitations of the Amadeus model when little public data is available to use as constraints in their estimates, we ignored all OD markets we believed to be potentially too small to be estimated accurately. Therefore, only OD markets with over 650 total passengers per year were kept. From this dataset, we removed all OD markets with 0 nonME3 traffic as the regression would run with the natural log. In the US-India dataset only 1 of 1,397 data points was removed. In the Europe-India dataset only 27 of 2,885 data points were removed. By taking the natural log of the resulting values we generated the dependent variable vector. Then, values for the independent variables just had to be linked to each OD market in each year. The GDP and presence data just had to be matched to the origins for the former and to each OD market for the latter. Once this processing was completed the regressions could finally be run.

Several tests were performed in order to ensure the validity of the model. Through an F test we compared the individual and time fixed effects model with a regular ordinary least squares (OLS) regression. The p value from the F test of all six regressions indicated the fixed effects method was a better choice. We then conducted a Hausman test to evaluate whether a random effect model could be better, and again in all six regressions the p value indicated the FE method was a better choice. Finally, we tested our models for homoskedasticity with the Breusch-Pagan test. The low p value indicated the presence of heteroskedasticity. We solved for the heteroskedasticity by applying robust standard errors. All results presented in the following section are therefore with robust standard error.

5.5 Results

<u>Europe - India OD markets</u>

Table 5.3: Results from regressions in EU-India OD markets

Independent Variables	Dependent Variable		
	Ln(NonME3Traffic)	Ln(NonME3Traffic)	Ln(NonME3Traffic)
ME3 Presence	-0.225***		
	(0.069)		
Emirates Presence		-0.383***	
		(0.067)	
Etihad Presence		0.090	
		(0.090)	
Qatar Presence		-0.240***	
		(0.061)	
Number of ME3 Present			-0.183***
			(0.048)
Origin GDP	0.489***	0.447***	0.471***
	(0.141)	(0.140)	(0.141)
Nonstop Presence	0.902***	0.889***	0.895***
	(0.171)	(0.163)	(0.162)
Year 2011	-0.025	0.004	-0.002
	(0.041)	(0.041)	(0.041)
Year 2012	-0.058	-0.019	-0.027
	(0.041)	(0.041)	(0.040)
Year 2013	-0.071	-0.020	-0.030
	(0.048)	(0.048)	(0.048)
Year 2014	0.119**	0.183***	0.173***
	(0.055)	(0.059)	(0.058)
Year 2015	0.223***	0.275***	0.288***
	(0.057)	(0.060)	(0.060)
Note: *p<10%; **p<5%; ***p<1%			

Table 5.3 summarizes the results from the three regressions run for the EU-India OD markets. Going from left to right, in the first regression ME3 presence was the treatment effect, in the second regression the effect of the presence of each ME3 carrier specifically was tested and finally in the third regression the effect of an increasing number of ME3 players present in the market was captured. The principal coefficients of interests are the estimates on these treatments, presented in the upper part of the table. As a natural logarithm transformation was applied to the dependent variable, these coefficients can be translated into the percentage impact of the treatment on the dependent variable by:

$$\Delta\% NonME3traffic = 100 * (\exp(\beta_{Treatment}) - 1).$$

Applying this calculation to the coefficients on the treatment(s) yields the results in Table 5.4. These figures can be interpreted as the percentage change in nonME3 traffic associated with the treatment effect. The first three treatment effects are dummy variables indicator of presence whereas the last treatment effect is the actual number of ME3 present.

Table 5.4: Percentage effect of treatments

Independent Variables	Dependent Variable		
	NonME3Traffic	NonME3Traffic	NonME3Traffic
ME3 Presence	-20.1%***		
Emirates Presence		-31.8%***	
Etihad Presence		9.4%	
Qatar Presence		-21.3%***	
Number of ME3 Present			-16.7%***
Note: *p<10%; **p<5%; ***p<1%			

Table 5.4 shows interesting results concerning the effect of ME3 presence on nonME3 traffic. The model estimates that in an average OD market from Europe to India, the presence of ME Emerging Airlines was associated with a 20.1% reduction in traffic on nonME3 carriers. According to our definition of diversion and stimulation, this result indicates that through the high capacity and traffic growth described in Chapters 3 and 4, ME3 airlines have been diverting market away from other legacy airlines competing in the same markets. More specifically, the model shows that Emirates and Qatar have been by far the highest contributors of market diversion. We can say with over 99% confidence that each of these two airlines have individually had a direct impact on nonME3 traffic. Emirates, offering the highest capacities to Europe, is unsurprisingly the one having the strongest impact. The model estimates that its presence in OD markets from Europe to India diverted almost a third of the traffic that would have otherwise flown on other legacy airlines. Qatar is estimated to have diverted over a fifth. Etihad's results on the other hand are not statistically significant. This is not surprising given the much more recent growth in capacity to Europe from the Abu Dhabi carrier. Finally, the cumulative effect of ME3 airlines in a given OD market is also evident. The presence of one extra ME Emerging airline in an OD market between Europe and India, on average, led to a further 17% diversion of traffic away from nonME3 airlines. The presence of all three ME Emerging carriers was estimated to divert 50% of nonME3 traffic.

Looking at the coefficients on the control variables from Table 5.3 is also interesting. The two controls with statistically significant effect are Origin GDP and Nonstop Presence. As one could expect, both these variables lead to increased nonME3 traffic. With a higher GDP, more Europeans can afford to travel to India and more economic activity is likely to generate more business travel. The model indicates that with an extra trillion USD in GDP in the European country of origin, traffic on NonME3 carriers rose on average by 63%. Nonstop service between Europe and India being offered only on nonME3 carriers, the presence of a nonstop is expected to lead to increased nonME3 traffic. The nonstop not only makes the trip more appealing to passengers but more importantly, as shown in Chapter 4, from Europe, ME3 carriers limited their growth in markets where nonstop service existed. This meant that even though the ME3 airlines may have been present in these markets, their willingness to compete was much lower in these markets than in markets without nonstop. The model estimated that the presence of a nonstop increased nonME3 traffic by 146%.

Table 5.5: Results from regressions in US-India OD markets

Independent Variables	Dependent Variables		
	Ln(NonME3Traffic)	Ln(NonME3Traffic)	Ln(NonME3Traffic)
ME3 Presence	-0.383***		
	(0.081)		
Emirates Presence		-0.299***	
		(0.078)	
Etihad Presence		-0.096	
		(0.080)	
Qatar Presence		-0.253**	
		(0.103)	
Number of ME3 Present			-0.223***
			(0.043)
Origin GDP	1.558***	2.013***	2.237***
	(0.574)	(0.602)	(0.638)
Nonstop Presence	0.213***	0.271***	0.389***
	(0.030)	(0.076)	(0.045)
Year 2011	-0.016	-0.019	-0.020
	(0.025)	(0.026)	(0.026)
Year 2012	-0.084***	-0.088***	-0.100***
	(0.029)	(0.030)	(0.030)
Year 2013	-0.059*	-0.056*	-0.066**
	(0.035)	(0.033)	(0.033)
Year 2014	-0.088**	-0.074**	-0.087**
	(0.038)	(0.037)	(0.036)
Year 2015	-0.175***	-0.164*	-0.176***
	(0.047)	(0.048)	(0.048)
Note: *p<10%; **p<5%; ***p<1%			

Table 5.6: Percentage effect of treatments

Independent Variables	Dependent Variable		
	NonME3Traffic	NonME3Traffic	NonME3Traffic
ME3 Presence	-31.8%***		
Emirates Presence		-25.8%***	
Etihad Presence		-9.2%	
Qatar Presence		-22.4%*	
Number of ME3 Present			-20.0%***
Note: *p<10%; **p<5%; ***p<1%			

Results from Tables 5.5 and 5.6 indicate that ME3 carriers can also be associated with diversion of nonME3 traffic in US-India OD markets. In an average US-India OD market, the presence of an ME3 carrier was associated with a 31.8% reduction in nonME3 traffic. Based on the diversion definition used above this means ME3 airlines diverted 31.8% of nonME3 traffic. This trend is in the same direction as that measured in Europe-India OD markets, but with higher impact. This was expected given the higher capacity and traffic growth from ME3 airlines to the US than to Europe. At an individual level, Emirates is again the airline with most effect on nonME3 traffic. Its presence in an OD market is associated with a 25.8% reduction in nonME3 traffic in the market. Qatar is associated with 22.4% diversion from nonME3 traffic but with less statistical significance. The estimate of the effect of Etihad's presence in an average market is still not statistically significant. This is not surprising given that Etihad has grown capacities to the United States much more recently. It still offers much fewer seats to the United States than its two ME competitors so the smaller effect detected in the coefficient was expected as well.

The coefficients on the presence of individual carriers are lower than those observed from Europe to India, despite the coefficient for ME3 presence being higher. This could be explained by the more distributed network of ME3 airlines in EU-India OD markets than US-India. In US-India OD markets it is less common to see only one of the three airlines serving an OD market. Usually more than one are present, so the ME3 presence variable captures the cumulative effect whereas the carrier specific variable counts only the individual effect. From Europe we could expect to see less overlap of ME3 carriers so ME3 presence is more often equivalent to the presence of just one ME3 carrier. This hypothesis is supported by the OD level analysis made in Chapter 4. In Europe to India OD markets, ME3 airlines focused their growth on a long tail of smaller OD markets, Table 4.3. By concentrating on such a diverse range of OD markets it is likely to see many OD markets without overlap from ME3 airlines. On the other hand, in US-India OD markets we saw ME3 airlines focused their growth in the top 100 OD markets, Table 4.5. Therefore, with a narrower range of markets it is much more likely to see overlap.

Looking at the coefficient on the number of ME3 carriers present in Table 5.6 confirms the intuition from the previous paragraph. In US-India OD markets we can see that the presence of one extra ME3 carrier is associated with 20.0% diversion from nonME3 airlines. This is two thirds of the diversion associated with the presence of any ME3. From Europe, the presence of one extra ME3 carrier was associated with 17% diversion, very close to the 20% diversion associated with the presence of any ME3 carrier. Since there is more overlap in US-India OD markets, the indicator of ME3 presence is more often equivalent to the presence of several ME3 carriers than in the dataset of OD markets from Europe to India. Therefore, we would expect the difference between the ME3 presence and number of ME3 present coefficients to be higher in US-India OD markets than in EU-India OD markets.

Finally, looking at the control variables generates similar observations as those made in Europe-India OD markets. The statistically significant control variables are Origin GDP and Nonstop Presence. For the same reasons as those described previously, origin GDP and nonstop presence are expected to be positively correlated with nonME3 traffic. Comparing the coefficient of the latter to the one observed from Europe again confirms the intuition developed in Chapter 4. From Europe, ME3 airlines decided to focus their growth in OD markets without nonstop, leaving the nonstop markets with far less competition. From the US we observed ME3 airlines focused their growth in all top OD markets, including those with significant nonstop traffic. As a result, we would expect the presence of a nonstop in a US-India OD market to be associated to a smaller gain in nonME3 traffic than that observed from Europe. Table 5.5 shows that in

US-India OD markets, the presence of a nonstop is associated with a 24% increase in nonME3 traffic, relative to a 146% in Europe to India OD markets.

5.6 Conclusion

The previous Chapters of this thesis showed the tremendous growth of ME3 capacity and traffic from Europe and the United States to destinations beyond the Middle East. In many cases these increases in capacity and traffic seemed to be accompanied by either stable or decreasing trends from other legacy carriers competing in the same markets. This aggregate level analysis allowed us to observe that most of the growth in traffic in these markets had been generated by ME3 carriers but did not answer the question of whether this ME3 growth was achieved through market stimulation or diversion from other carriers. European and US legacy carriers often accuse the ME3 airlines of diverting their traffic while the ME Emerging airlines defend their role as stimulating new traffic. This Chapter has allowed us to tie the previous traffic analysis to the question of diversion and stimulation.

The econometric model estimates suggest that the presence of ME3 airlines in OD markets between Europe and India and between the US and India between 2010 and 2015 was associated on average with 20% and 32% diversion from nonME3 carriers respectively. This means that in markets where at least one ME3 carrier was present, nonME3 traffic was on average 20% and 32% lower than what was expected in the absence of the ME3 carrier.

In addition, the effect of each of the three ME Emerging airlines could be estimated separately. As expected, Emirates with the highest capacity and traffic in the selected OD markets is the one associated with the most diversion. In EU-India and US-India OD markets where Emirates was present, nonME3 traffic was on average 32% and 26% lower than what was expected in the absence of Emirates. The results also show very high confidence in the effect of Emirates on nonME3 traffic. Qatar Airways is associated with slightly less diversion: its presence reduced nonME3 traffic by 22%. Finally, Etihad has lower coefficients which are not statistically significant. Given the more recent development of the Abu Dhabi based carrier this result is not surprising.

Furthermore, the additive effect of the presence of ME3 carriers confirms their strong role in traffic diversion. OD markets where all three ME Emerging airlines are present, are associated, on average, to 50% and 60% diversion from nonME3 traffic. These results were statistically significant.

Overall, the measure of diversion allowed us to directly relate the effect of growing ME3 carriers on traffic for other airlines. These regressions all suggest that by growing in markets between Europe and India and the US and India, ME3 carriers have diverted traffic from legacy carriers serving these markets. We can see that the higher traffic and capacity growth we observed from the US translate into higher diversion from US legacy carriers. This has been source of significant debate between the US airline industry and policymakers. A brief discussion of this debate is provided in the next Chapter.

Chapter 6 Subsidy Debate Between US and ME3 carriers

6.1 Introduction

Previous Chapters have shown the rapid capacity and traffic growth from ME Emerging airlines in OD markets from Europe and the United States to Southeast Asia. ME3 airlines have grown to 26% and 37% market shares in OD markets between Europe and India and the US and India, respectively. The model developed in Chapter 5 then estimated that in an average OD market from Europe to India, the presence of ME3 carriers diverted 20.1% of expected nonME3 traffic. In an average OD market from the US to India, the presence of ME3 carriers diverted 31.8% of expected nonME3 traffic. These significant effects on other carriers have led to controversies about the level of capacity that ME3 airlines deploy in or out of Europe and the United States. This Chapter will focus on the US debate as the effects of ME3 traffic growth on the US carriers have been more significant, and the intensity of the debate is proportionately greater.

The 1944 Chicago Convention defined a set of rights granting airlines from a country the privilege to enter and/or land in another country's airspace [23]. Between 1992 and 2015 the US Department of State negotiated Open Skies agreements with over 100 countries; among them are Qatar and the UAE. As a result, Emirates, Etihad Airways and Qatar Airways are allowed to fly to and from the United States freely. One requirement of the agreement is that all airlines flying between the two countries involved compete under fair conditions. Over the past few years, US airlines have accused the ME3 carriers of unfair competition. In January 2015 the three US legacy carriers published a white paper to convince the Obama administration to review the Open Skies agreement with the ME3 carriers' home nations[24].

US airlines accuse ME Emerging carriers of receiving over $42bn of subsidies from their respective governments. The US carriers believe that these subsidies are signs of unfair competition and so break the conditions of the Open Skies Agreement[24]. In response, the ME3 carriers independently denied the claims of unfair competition and argued that US airlines have also benefitted from subsidies and government support through a unique legal framework[25].

In this Chapter we will first focus on setting up the context in which airline subsidies can exist. Then we will review and discuss the subsidy claims made by both US airlines and the ME Emerging carriers.

6.2 Airline Subsidies and the Associated Regulation

As described by Paul Krugman, for years Free Trade has been the ideal of economists[26]. In a world with Free Trade, the principle of comparative advantage would naturally differentiate countries by skills, technology, and tastes in a way which would allow them to trade between each other. However, Krugman argues that trade has evolved: trade may not be driven as much by comparative advantage anymore but by economies of scale often creating imperfectly competitive international markets. This has led to the idea of strategic trade policy where governments would intervene to rebalance the scale and maintain competition (e.g. preventing monopolies from foreign companies)[26].

With these changes in the global economy, governments have taken more interventionist positions, either by imposing taxes, tariffs, or by subsidizing industries. Where taxes and tariffs have been very specifically regulated by the General Agreement on Tariffs and Trade (GATT) since 1947, subsidies were considered far later[27]. One reason for this is the difficulty to agree on a definition of subsidy.

Theoretically, market equilibrium is reached in the absence of any government intervention. As a result we can assume that any shift away from this equilibrium may be caused by government intervention. A shift which causes losses to producers would then be called a tax, and a shift which increases returns a subsidy[28].

The issue with this simple theoretical definition is its difficult translation into the real world[28]. How can market equilibrium be defined? There is no place on earth where a market is 100% free trade, with absolutely no government intervention. Even if you wish to take a model as close as possible to market equilibrium, it becomes very complicated to determine which government activities are acceptable within the free market framework, as the "benchmark". Governments launch countless tax programs or expenditures which directly or indirectly impact private entities. For instance, governments participating in airport construction, highway or security indirectly facilitate the activities of private companies; yet should these expenditures be part of the benchmark or considered as subsidies?

The complexity in defining subsidies is one of the reasons why subsidies have long been ignored by regulation. In fact the major piece of international regulation which applies to the airline subsidy claim only emerged from the Uruguay Round Agreements between 1986 and 1994: the Agreement on Subsidies and Countervailing Measures (SCM). Prior to this agreement, the World Trade Organization (WTO) was relatively tolerant with subsidies. The agreement is composed of thirty-two articles. In the context of our analysis we will focus on four articles: articles 1, 2, 5 and 6.

The first major contribution of the agreement was for all signatory countries to agree on a definition of subsidy. Article 1 describes three fundamental elements that must be satisfied to prove a subsidy exists[29]:

1) There must be a financial contribution to a private entity. This can be through grants, loans, equity infusions, tax exemptions, provisions of goods or services.
2) The contribution must be by a government or public body within the territory of a member State.
3) The contribution must generate a positive net benefit.

Article 2 then defines the specificity of a subsidy[29]. The agreement only focuses its attention on subsidies that may distort the market. Therefore if a subsidy is available to all actors in the market then there is no advantage conferred to anyone in particular so the market is not distorted. Thus, specificity means the government subsidy has targeted a particular enterprise, industry or region. After satisfying the three conditions of article 1 the subsidy must satisfy the specificity criteria of article 2 in order to be considered.

Articles 5 and 6 define the "actionable" category[29]. In order to be actionable the subsidies must cause serious prejudice to the petitioner. Prejudice is the result of direct adverse effects on the petitioner's business. For example, the Airbus-Boeing WTO appellate body review shows the relevance of these two articles in the airline case[30]. In order to resolve the dispute, the body analyzed market by market where Airbus' subsidies had negatively impacted Boeing. Only in the specific markets where there was proof of prejudice did the Appellate Body require remedies[30]. This example shows that if one was to evaluate specifically the subsidy claims from US and ME3 carriers, he would need to understand exactly how the potential company-wide subsidies affected the corresponding petitioner.

6.3 Potential Subsidies Received by US Legacy Airlines

The US airline industry has benefitted from two periods of government intervention. The first ensured the development of aviation by construction of infrastructure and acquisition of equipment. The second ensured the survival of the US airline industry in a deregulated market and guaranteed equal service to communities across the country.

The purpose of this section will be to explore the areas where the US government supported the airline industry. A Congressional Research Service Report on aviation Federal Spending from 1999 describes the government spending the US airline industry has benefited from since its inception in the early twentieth century[31]. Over the eighty-year period covered by the report, the government spent $155 billion in support of aviation activities.

Development of Aviation

Broadly speaking government intervention in the early stages of the airline industry can be split into two categories. The first category was aimed at supporting aircraft acquisitions, with programs such as the Aircraft Loan Guarantee program between 1957 to 1983[31]. The second category, involving much higher levels of investments, financed the development of the infrastructure to operate these aircraft. Air Traffic Control (ATC) or Airport Improvement Programs (AIP) are examples of infrastructure that were directly financed by government[31].

Aircraft loan guarantees allowed local carriers to acquire new aircraft with Federal guarantees of up to 90% of the loan. Determining whether this type of program is a subsidy requires knowing if the airline could have obtained the loan on similar terms without the federal guarantee. Since there is little data informing us on this we cannot assess whether the WTO rules would consider this program as a subsidy.

Air Traffic Control, airports and their improvement programs serve all airlines willing to fly there. Within the Open Skies Agreements, nothing theoretically prevents ME3 carriers from benefiting from US airports or ATC as much as US carriers. However, US carriers rely on ATC and use these airports more as they operate US domestic flights, which ME3 carriers cannot operate. They can also use small aircraft to feed passengers to their US hubs and then fly large aircraft to the Middle East or beyond. Concentrating the passengers traveling to the Middle East via their hub is likely to offer them economies of scale which ME carriers cannot benefit from if they want to serve the same OD markets. Therefore, although in theory ME airlines could have benefitted as much from these programs, one could defend that in practice these programs may have given an advantage to US carriers.

Equal Service to Communities

In 1978, the US airline industry was deregulated, leading to a completely new approach to managing air transportation. Legacy airlines started focusing on profits. This shift in business strategy had the potential of eliminating many communities from the air transportation network. Similarly, as airlines emerged from bankruptcy post the 2007/2008 crisis, they implemented "capacity discipline": significant capacity cuts as a result of low demand and high fuel prices. Smaller airports were particularly impacted by these moves. Between 2007 and 2012, domestic flights from the top 29 US airports reduced by 8.2% against a 21.7% drop at all the smaller airports[32]. The high jet fuel prices made the smaller regional jets even less desirable, causing airlines like Delta to replace 37-50 seat jets with 51-76 at reduced frequencies[33]. Capacity discipline gave bargaining power to airlines, forcing small airports to develop creative solutions to attract carriers to their communities. These solutions typically involve financial incentives such as

revenue guarantees, waived fees, advertising assistance or direct subsidies to the airlines providing the service [34]. Part of the funding for these creative incentives comes from government subsidies. US domestic routes are eligible for two subsidy programs: the Small Community Air Service Development Grant program (SCASDG) and the Essential Air Service Program (EAS).

Both programs are only applicable to domestic routes, which, as in the previous case of infrastructure financing, makes it difficult to determine the possible adverse effects for ME carriers. One could say that US carriers benefit from unfair subsidies in US-ME-Asia markets as these programs subsidize them for flying these passengers to their hubs, from where they can fly them to the ME or Asia. In response, US carriers could argue that these programs concern a limited number of passengers, so their potential effect on the specific US-ME-Asia market is negligible.

On top of these subsidy allegations, claims from the Middle East suggested that the US carriers also benefited from the unique US Chapter 11 clauses by entirely reorganizing their businesses[35] when they were facing financial difficulties, as discussed below.

Claims of an Advantageous Legal System
The US airline industry has been particularly concerned by Chapter 11 bankruptcies. All US legacy airlines have gone through bankruptcy. More specifically, all the airlines linked to the complaint on ME3 carriers' subsidies have filed for bankruptcy at some point.

Table 6.1: Bankruptcy history of US legacy airlines

Code	Airline Name	File 11	Date Filed
DL	Delta Airlines	YES	9/14/2005
AA	American Airlines	YES	11/29/2011
UA	United Airlines	YES	12/9/2002

Under Chapter 11, debtors benefit from unique tools to reorganize their businesses. Among these, the entity can renegotiate or cancel contracts and is protected from lawsuits against the business through an "automatic stay" which prevents creditors from interfering with the debtor in control[36]. Although more indirect than clear subsidies, this type of regulation can also be viewed as a tool to affect the competitive environment. In one of the rebuttals from the ME3 carriers, Etihad claimed that the US carriers above received $71bn in subsidies through combinations of pension termination, debt relief and favorable financing[35].
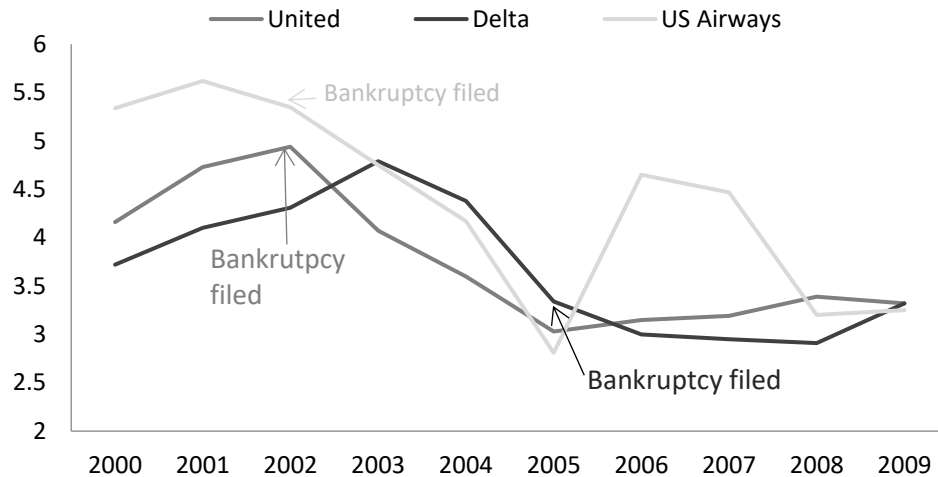
Figure 6.1: Labor Costs per Available Seat Mile (cents)[6]

As a result of their respective bankruptcies, Delta, US Airways and United all significantly reduced their cost structure. Figure 6.1 shows that labor costs per ASM were considerably reduced following each airline's Chapter 11 bankruptcy filing[6]. Following their example, AMR (parent company of American Airlines) filed for bankruptcy in 2011[37]. AA modernized its aircraft by ordering over 500 new planes while rejecting the previously signed aircraft leases. By acquiring newer planes AMR reduced its maintenance and operating costs. AMR could also renegotiate financing agreements for these new aircraft[38].

The competitive advantages conferred from the Chapter 11 clauses were critical for these US airlines to face growing LCC competition. However, Chapter 11 does not cause any direct public spending. It may have consequences which require government intervention (e.g. terminating employee contracts) but it does not involve direct transfers from the public body to the company. The renegotiations are at the expense of workers or businesses, not the state. Therefore, not only is it again difficult to quantify if these rules have benefited US carriers in markets to the ME and Asia, but it is also unclear if they would be viewed as subsidies under WTO rules.

6.4 Potential Subsidies Received by ME3 carriers

In the white paper published in January 2015[24], the US legacy carriers accused the UAE and Qatar of providing $42 billion of subsidies to their flag carriers between 2004 and 2014. Given that all three airlines are privately owned, they do not disclose publicly their financial statements. The figures used in the white paper come from detailed analysis of a mixture of data sources including financial statements, leaked studies, contracts. In response to the white paper, each of the three ME Emerging carriers published independent rebuttals to deny the allegations.

Etihad (EY)

In its rebuttal document, Etihad discusses at length the sources of its financing[39]. The company recognizes that $14.3bn was raised through the Abu Dhabi government since 2003, $9.1bn through shareholder equity and $5.2bn through shareholder loans. The report contends that these investments do not represent subsidies as the equity of the company grew through the investments: more airplanes were acquired, more destinations were served and the group developed other businesses such as travel

management or distribution capabilities. However, an investor would only buy shares if the company is equity worthy and a creditor would only lend if the company is creditworthy. Determining whether the company is equity worthy or creditworthy would therefore be critical in one's assessment of the US subsidy claims. The Code of Federal Regulations defines equity worthiness based on whether a rational private investor would make the investment[40]. This depends on the expected rate of return, so the performance of the company at hand, as well as the risk involved, measured as volatility in the company's performance. As the airline does not provide details of its financial performance, it is very difficult to assess the equity or credit worthiness of the company.

With this debt and equity, Etihad undertook several investments which were specifically targeted by the US legacy carriers' subsidy claims. First, the white paper accuses Etihad of benefiting from $6.6bn subsidies for the acquisition of its aircraft[24]. These potential subsidies would have been given as loans without specific terms. The white paper argues that the loan can be considered as forgiven since the financial statement states it "is in the nature of quasi-equity". However, given that the government is also the main shareholder one could argue that this should then be seen as an equity infusion rather than just debt being forgiven. The WTO would then consider the equity worthiness of the company to determine whether it is a reasonable investment from the shareholder, or whether it is a subsidy.

As mentioned previously, in the dispute between Airbus and Boeing the WTO appellate body estimated the effect of subsidies market by market[30]. Applying this approach to the $6.6 billion claimed subsidies would require estimating what fraction of the total amount impacted US airlines. One method to do so could be to prorate these figures by the number of seats on Etihad which compete with US airlines. This could be done by just counting the percentage of Etihad seats on US-AUH routes. However, given the very low percentage of local passengers on these flights one could also argue that seats beyond the ME should be included in measuring the impact on US airlines. Given the wide range of OD markets Etihad can serve from its hub, it is unclear what fraction of the potential subsidy would cause prejudice to US airlines.

The white paper also claims that Etihad benefitted from $751m of government grants for participating in the economic development of the region. The justification of the grant is "for the airline's economic contribution and its role in the development of Abu Dhabi"[24]. In its response, Etihad attributed these revenues to promotions from the Abu Dhabi Tourism Authority[39]. The ADTA paid for the placing of their "Abu Dhabi to the World" slogan on Etihad's fleet. Although the ADTA is state owned, this transaction is the result of a service provided to a separate entity. The question becomes whether the ADTA paid the market price for this service. If it did then there is little reason to classify this grant as a subsidy. If it didn't, then one can argue that the State used the grant as a way to subsidize its flag carrier.

The US legacy airlines also accuse the government of covering the $640m expenses related to the sponsorship of the Manchester City soccer club [24]. Etihad could defend that UK-ME-Asia markets are the only markets targeted by this advertisement. US carriers could respond that the league in which Manchester City plays is widely watched in the US and therefore the impact of the sponsorship goes far beyond the UK-ME-Asia markets[41].

At its home airport Etihad benefits from a fee exemption on connecting passengers. US airlines evaluated this to be equivalent to a $501m subsidy[24]. They argue that the foregone government revenue from connecting passengers would be classified as a subsidy. Since Etihad has 88% of all connecting traffic at AUH they then claim that it should be considered specific to the airline[24]. However, from the Open Skies agreement, US carriers are allowed to transit passengers through Abu Dhabi airport onto other

international destinations. They would then benefit from the same fee exemption[39]. Given the very limited size of the UAE domestic market, there are very few markets where Etihad could benefit from this and not US carriers. Furthermore, the Etihad rebuttals points out that the UK has the same regulation, meaning US carriers could benefit from this at London Heathrow, which would also allow them to serve the US-Asia market[39]. Consequently, although most beneficial to Etihad in practice, it is not evident that these subsidies would be considered specific under WTO regulation.

Finally, US carriers accuse the UAE of granting $3.5bn to Etihad in 2014. The details of the transactions and the usage of the funds are unknown so it is impossible to determine how these grants could have impacted US carriers, and if so what fraction of the amount could be considered actionable.

Qatar Airways (QR)
As in the Etihad case, one would have to determine the equity and credit worthiness of QR to assess the US subsidy claims accurately. In the absence of financial statements it is difficult to reach any objective conclusion on the matter.

In the analysis of QR, the white paper is far less specific in the usage of subsidies than with Etihad. The paper accuses Qatar of benefiting from $8.4bn of subsidies through loans or shareholder advances[24]. Then the authors show evidence for $6.8bn of subsidies from government guarantees on their loans. Qatar Airway's response helps us in understanding the government's role in this claim[42]. The collaterals used to borrow from commercial institutions were the aircraft, but since the State of Qatar did not ratify the Cape Town Convention many lenders didn't feel confident with these guarantees. The State therefore served as the guarantee. Additionally, since QR does not trade debt publicly there was no public rating of its liabilities[42]. The State guarantee solved for this lack of accessible information to investors. In response the US carriers could defend that the market price for a loan depends on numerous factors including the policies the country has chosen to follow. By operating under a legislation which refused to ratify the Cape Town Convention and by refusing to trade its debt publicly, US airlines believe QR should have faced the higher interest rates the market imposed.

In addition to these cash subsidies the white paper also accuses QR of receiving subsidies as free land. The airline received several plots of land in 2011 and sold some of them in 2013 for $452m[24]. The provision of a good at no cost may appear as a subsidy – specific given that only Qatar Airways benefited from it. However, it is unclear if it can be proven that the potential subsidy caused a severe prejudice to US airlines, especially given the absence of information on how this land was used.

Like Etihad, Qatar Airways benefits from airport fee exemptions for connecting passengers. With 83% of its passengers connecting at DOH this represents a significant waiver. In total a study showed this was equivalent to $616m since 2004[24]. Although 98% of the connecting traffic at Doha Airport is from Qatar Airways [24], for the same reasons as those described concerning the Abu Dhabi airport, it is not clear that these exemptions could be considered as subsidies.

The white paper also found that the airline was receiving part of the revenues of the airport. Between 2006 and 2014 these revenues added up to $215m for the airline[24]. However, Qatar Airways was selected as the operator of the airport[43], which involves a business activity requiring compensation. Like the ADTA revenues from Etihad, the question then becomes whether the government is paying the market price for QR to complete this activity.

Finally, the airline received $22m worth of grants from the government for "incentives and route subsidies"[24]. This could be treated similarly to the EAS or SCASDG grants described earlier, although the network differences between Etihad in the UAE and the US carriers in the US create different practical implications for these programs.

Emirates (EK)

During the oil crisis in 2008-2009 the white paper claims that the government stepped in to protect Emirates from the huge losses it would have incurred from its hedging strategy. When oil peaked at $147 per barrel in July 2008, analysts forecasted prices would rise over $200. Airlines consequently took strong positions against the rise. When the oil price collapsed this translated into huge losses for the industry (Delta reported losses of $2bn[24]). In the case of Emirates, US carriers claim that the subsidy to cover this loss was between $1.6bn and $4bn[24].

The second subsidy the US legacy carriers claimed with respect to Emirates concerns airport infrastructure. Terminal 3 and Concourse A, exclusively used by Emirates, are said to have received between $292m and $438m of subsidies. The US carriers claim that the exclusivity makes the subsidy related to the construction of these two parts of the airport specific. However, ME3 airlines could argue that the impact of this infrastructure on US traffic is extremely limited: 1) DXB is the only international airport in Dubai, so terminating or originating passengers have no other choice but to use this one 2) For a passenger buying a ticket US-Asia, the quality of the connecting airport is one of many factors playing in the decision process. Price, total flight time and quality of service are examples of other important factors to passengers. Therefore it is unclear if this potential subsidy could be considered as actionable.

Additionally, Emirates benefits from the same airport advantage as Qatar Airways and Etihad for its connecting traffic: waived airport fees. Between 2004 and 2014 these potential subsidies accumulated to over $1bn[24].

Other Artificial Advantages

In addition to the regular subsidies described above, US legacy carriers also accused the ME3 carriers of benefiting from unfair cost advantages due to their national policies. Below are the two strongest arguments made in the white paper.

- In both the UAE and Qatar unions are prohibited which makes labor cost negotiations nonexistent. Furthermore these laws ensure smooth operations by banning any type of strike or collective action. These laws allow the ME3 carriers to have labor costs at around 21.5% of total costs excluding fuel, against 41 to 46% for US legacy carriers[24].
- Tax laws are not applied to domestic companies. Emirates in 2013-2014 was able to save as much as $523m[24]. On the other hand, in the US all domestic airlines are subject to taxation.

This local policy can appear as an anti-competitive tool favoring domestic carriers. However, for the same reasons as those mentioned in the Chapter 11 claims previously, these types of advantages are not direct subsidies, as there is no direct financing or guarantee provided by the government. However they may have an indirect impact on government expenditures. As a result it is difficult to conclude on the validity of this claim.

6.5 Conclusion

This Chapter discussed the subsidy debate between ME3 and US legacy carriers. US airlines have accused the ME3 carriers of benefiting from over $42 billion in subsidies since 2004[24] while ME3 airlines responded by denying the claims and accusing US airlines of also receiving government support, such as the equivalent of $71 billion through the advantages conferred by Chapter 11 clauses[35].

This review has shown that US and ME3 carriers have benefited from public funding throughout their initial stages of growth, and to a certain extent still do today. US airlines relied on the government to build the system they operate in: Air Traffic Control, airports, security. In addition, they still strongly benefit from improved infrastructure financed by federal funding as well as from a few subsidized routes and from an advantageous legal environment when the airlines face default. According to a 1999 Congressional report, the US aviation industry benefitted from $155 billion of government funding over the eighty-year period ending in 1998[31].

Similarly, ME3 carriers benefited from government support in the acquisition of their fleets and the building of local infrastructure. They still appear to receive government financing to help expand their fleets, as well as specific fee and tax exemptions allowing them to operate under financially attractive conditions. Most aviation related companies in the region being state owned, there is very little public data to confirm the exact amount of government support the UAE and Qatari airline industry received, but public documents indicate several billions of USD have been transferred from the government to these airlines in the form of equity infusions or loans.

However, these potential subsidies were granted in very different contexts for each of these airlines, making it extremely difficult to determine any potential unfairness. The subsidies had different purposes, preventing us from drawing direct comparisons between them. Furthermore, the wide network of ME3 carriers and US legacy airlines, associated with the very high connecting traffic in ME3 hubs, makes it impossible to allocate the subsidies to specific markets and hence to quantify the prejudice potentially caused to other airlines.

Overall, both sides appear to have legitimate arguments in their defense and there is no clear way of comparing the monetary amounts they received. Given the current publicly available information, we believe there is no conclusive evidence why either of the parties should be penalized for subsidy related benefits. Nonetheless, we expect this policy dispute between the competing airlines to continue, if not for legal purposes at least for public relations and political purposes.

Chapter 7 Conclusion

The objective of this thesis was to explore the impact of ME Emerging carriers on European and US legacy airlines. The impact of these carriers was first measured at a capacity level by analyzing schedule data in markets where ME Emerging carriers and US or European airlines have competed since 2010. Then we studied how these changes in capacities translated into changes in traffic flows by looking into the Amadeus Travel Intelligence data which models origin destination traffic flows around the world. We also quantified through an econometric model the effect of ME Emerging carriers on traffic for other airlines. This allowed us to estimate the extent to which ME3 airlines were diverting traffic from US and European competing carriers. Finally, we discussed the subsidy debate between US legacy airlines and the ME3 carriers.

Airlines in the Middle East have captured significant attention from foreign governments, media and consumers due their strategic positioning which allows them to compete in a wide range of origin destination markets around the globe. Born thirty-two years ago or less, Emirates, Etihad Airways and Qatar Airways are the only Middle East airlines in the top 20 airlines by traffic in 2015[11]. Their defining characteristic compared to competitors in the region is the pace and scope of their growth strategy. Their capacity expansion has relied on an increasingly global network, leading to average stage lengths above 2,300 miles in 2015. The strongest regional competitors Saudia, Oman Air and Turkish Airlines have also grown rapidly, but with a greater focus on regional flights. Given this significant network difference it appeared evident that Emirates, Etihad and Qatar are the ME airlines most critical in the analysis of the impact of ME carriers on European and US legacy airlines. We refer to these ME Emerging carriers as the ME3.

In Chapter Three, analyzing schedule data showed the very high growth rates of ME3 carriers on routes where they compete with European or US legacy carriers. Overall, both European and US airlines have been impacted by ME3 carriers, although the effects seemed proportionately stronger in the US. The growth in seats by ME3 carriers between their hubs and the US was over 181% between 2010 and 2015. This compares to 97% seat growth to Europe over the same period. At the same time, US legacy carriers cut all routes to the ME excluding Israel while European airlines directly competing with the ME3 carriers (i.e. excluding partner airlines) reduced capacities overall by just 1%.

The pattern of expansion observed in the US and Europe is also different. In the US, ME3 airlines only targeted primary airports as partnerships with local airlines such as JetBlue for Emirates or American Airlines for Qatar allowed feeding traffic from secondary airports. In Europe, ME3 carriers expanded capacity to both primary and secondary airports. At primary airports this growth made them the largest providers of service (e.g. Paris CDG) while at secondary airports it made them the only providers of service to the ME (e.g. Lyon or Stuttgart).

Chapter Three also showed the effect of ME3 capacity on destinations in Southeast Asia and the Indian Subcontinent. These markets were studied in light of the positioning of ME3 hubs that allows their airlines to compete in OD markets from the US or Europe to Southeast Asia and the Indian Subcontinent. In the Indian Subcontinent, ME3 airlines grew their seats to India by 50% by providing service to many more destinations than nonstop players from Europe. European airlines concentrated their efforts on the top destinations by number of seats while ME3 carriers spread their growth to regions with heterogeneous

demand levels. Given the size of the Indian population, secondary cities still represent large markets for ME3 carriers. In Southeast Asia the European presence was much lower as nonstop capacities were provided mostly by Southeast Asian players. As a result, ME3 carriers could not differentiate themselves through their network to the same extent. Instead they increased aircraft sizes and frequencies to build market share to the region.

The finding that ME3 carriers' growth in capacity from the US and Europe to the Middle East and then from the Middle East to the Indian Subcontinent and Southeast Asia was much higher than the growth of any of the local carriers on each of these sets of routes suggested that OD connecting traffic plays a major role in the growth strategies of these three airlines. Chapter Four confirmed this hypothesis: growing capacities to the Middle East from Europe and the United States has allowed ME3 airlines to increase traffic from the US and Europe to destinations beyond the ME. Chapter Four analyzed markets to India specifically as the capacity analysis had shown the strong focus of ME3 and European airlines on India. In 2015, India alone represented over 56% of the ME3 seats to the Indian Subcontinent and over 73% of the seats from Europe to the Indian Subcontinent.

Overall, EU-India OD traffic grew by 14% between 2010 and 2015. More than 76% of this growth came from connecting traffic, mostly from passengers connecting once. 60% of the growth was associated with ME3 carriers which consequently grew their market share from 22% to 26% over the period. At the same time, US-India OD traffic grew by over 26% with 90% of the positive growth coming from passengers connecting once. In total the ME3 carriers were associated with 86% of the positive growth, as their networks offered new one-connect options and likely stimulated the overall demand in these markets. This has allowed them to increase their market share in these OD markets from 19.5% to 37.4% in just five years. In both the EU-India and US-India markets, ME3 carriers have driven most of the growth. As was the case for capacity, they have had a greater impact on traffic from the US than from Europe.

The network coverage observations made in Chapter Three were also evident in the traffic analysis of Chapter Four. From Europe, passengers flying through Abu Dhabi, Dubai or Doha reach a much wider set of destinations than passengers connecting in top European hubs. Of passengers originating in Europe and flying with ME3 carriers, 41% end up in cities other than Mumbai, Bangalore, Chennai and Delhi against 13% of those flying on other airlines and connecting in top EU airports LHR, FRA, IST and CDG. Similarly, 45% of passengers from the US flying to India with ME3 carriers end up in cities other than this top five whereas only 15% of those flying through LHR, FRA, EWR, HKG or CDG end up in such cities.

Chapter Four also provided an insight into the stimulation vs diversion effect of ME3 carriers in markets to India from the perspective of origin airports. From Europe, the analysis suggested that ME3 airlines grew their market share in OD markets to India from secondary European airports by stimulating new traffic additional to the traffic changes of other carriers. This contrasted with the effect in OD markets to India from primary EU airports, where ME3 carriers grew their traffic by amounts similar to the reductions faced by other carriers. In the US, the diversion versus stimulation effect of ME3 carriers by origin airport is less consistent than in Europe. There is no obvious difference between the airports where their growth mostly stimulated the market and those where they grew mostly by diverting market from other airlines.

Furthermore, the analysis of the US-India and Europe-India markets at an OD level offered an explanation as to why the impact from the US has been much higher than from Europe. The Europe analysis showed that ME3 carriers grew most of their traffic in markets without nonstop competition, meaning smaller OD markets. When they did not face this competitive disadvantage, they grew their market share at the

expense of the legacy players competing in the same market. From the US we noticed the much smaller number of OD markets served nonstop as well as the low frequencies of these nonstop flights. As a result, the ME3 carriers were less constrained by nonstop competition in their network development. Due to this major difference between the US-India and Europe-India competitive landscapes, we saw that ME3 airlines increased capacities between the US and the ME much faster than between Europe and the ME, which led to much higher effects in markets from the US to India than from Europe to India.

The aggregate level analysis in Chapter Four allowed us to observe that most of the growth in traffic in markets from Europe and the US to India had been generated by ME3 carriers. However, it did not look into the nature of this demand. European and US legacy carriers often accuse the ME3 airlines of diverting their traffic while the ME Emerging airline defend their role as stimulating new traffic. Chapter Five allowed us to tie the previous traffic analysis to the question of diversion and stimulation.

We developed a two-way fixed effect econometric model to respond to this question. The model estimated the effect of the presence of ME3 carriers in an average OD market, on the nonME3 traffic in that market. The model controlled for market and year heterogeneities through market and time fixed effects. The regression also included control variables such as GDP and nonstop presence controlling for other market attributes which could impact nonME3 traffic. The model was run for both the EU-India and US-India OD markets separately. Estimates suggested that the presence of ME3 airlines in OD markets between Europe and India and between the US and India between 2010 and 2015 were associated on average with 20% and 32% diversion from nonME3 carriers respectively. This means that in markets where at least one ME3 carrier was present, nonME3 traffic was on average 20% and 32% lower than what was expected in the absence of the ME3 carrier.

In addition, the effect of each of the three ME Emerging airlines was estimated separately. As expected, Emirates with the highest capacity and traffic in the selected OD markets was the one associated with the most diversion. In EU-India and US-India OD markets where Emirates was present, nonME3 traffic was on average 32% and 26% lower than what was expected in the absence of Emirates. Furthermore, the additive effect of the presence of ME3 carriers confirms their strong role in traffic diversion. OD markets where all three ME Emerging airlines are present, were associated, on average, to 50% and 60% diversion from nonME3 traffic. All results were statistically significant.

Overall, the measure of diversion allowed us to directly relate the effect of growing ME3 carriers on traffic for other airlines. These regressions suggest that by growing in markets between Europe and India and the US and India, ME3 carriers have diverted traffic from legacy carriers serving these markets. The higher traffic and capacity growth observed from the US translated into higher diversion from US legacy carriers.

This has been source of significant debate between the US airline industry and policymakers. US legacy carriers have lobbied for limiting the level of capacity that ME3 carriers deploy in or out of the United States as they believe these airlines are competing unfairly. Specifically, US airlines have accused the ME3 carriers of benefiting from over $42 billion in subsidies since 2004[24]. In response, ME3 airlines denied the claims and accused US airlines of also receiving government support. Etihad stated that US airlines benefited from the equivalent of $71 billion when restructuring their businesses under Chapter 11 clauses [35]. The discussion in Chapter 6 suggested that both US and ME3 carriers have benefited from public funding. US airlines relied on the government to build the air transportation system they operate in today and still strongly benefit from improved infrastructure, a few subsidized routes and an advantageous legal structure when facing default. Similarly, ME3 carriers benefited from government support in the

acquisition of their fleets and the building of local infrastructure. They still appear to receive government financing to help expand their fleets, as well as specific fee and tax exemptions allowing them to operate under financially attractive conditions. However, these potential subsidies were granted in very different contexts for each of these airlines, making it extremely difficult to determine any potential unfairness. Given the current publicly available information, we believe there is no conclusive evidence why either of the parties should be penalized for subsidy related benefits.

Future Research

Overall, ME3 carriers have outpaced European and US airline capacities to the ME and beyond. To India, this ME3 capacity growth was accompanied by significant OD traffic growth from both the US and Europe – a large majority of which was driven directly by ME3 carriers. Through this growth, ME3 carriers have diverted traffic from nonME3 airlines. Looking forward, new analyzes could be conducted to complete these results.

The traffic analyzes from Chapters Four and Five could be replicated on a wider range of geographies. Looking at the Southeast Asia region, and more specifically at OD markets between the US or Europe and Thailand, Singapore or Malaysia would provide an insight on the impact of ME3 presence over a larger region. The case studies from Chapter Three showed key differences in the ME3 strategy in Southeast Asia compared to the Indian Subcontinent, mainly due to the different competitive landscapes. We could therefore expect different impacts from ME3 presence on nonME3 traffic in these markets.

The econometric model from Chapter Five allowed us to evaluate diversion or stimulation from the point of view of nonME3 players. As a next step it would be interesting to look at diversion or stimulation at the market level. Quantifying the amount of growth from ME3 carriers that relied on diversion from other carriers versus the amount of growth that stimulated the market in average OD markets between the US/EU and the Indian Subcontinent or Southeast Asia could be interesting to complement this analysis.

Finally, this thesis has shown the very ambitious role ME3 players are aiming to take in global air transportation. The capacity increases needed to reach these objectives require very significant financial resources. Furthermore, the ME3 hubs are within 235 miles of each other, and all three airlines rely very heavily on connecting passengers. One natural question arising from this thesis is the sustainability of their models in this environment. Whether all three airlines can co-exist with their current business model remains an unanswered question in the industry.

Appendix

Table 8.1: Airport and City codes

IATA Code	Airport	City	Country
ALA	Alma Ata	Alma Ata	Kazakhstan
AMS	Amsterdam	Amsterdam	Netherlands
ARN	Stockholm Arlanda	Stockholm	Sweden
ASB	Ashkhabad	Ashkhabad	Turkmenistan
ATL	Atlanta	Atlanta	United States
ATQ	Amritsar	Amritsar	India
AUH	Abu Dhabi	Abu Dhabi	UAE
BAH	Bahrain	Bahrain	Bahrain
BCN	Barcelona	Barcelona	Spain
BEG	Belgrade	Belgrade	Serbia
BKK	Bangkok	Bangkok	Thailand
BLR	Bangalore	Bangalore	India
BOM	Mumbai	Mumbai	India
BOS	Boston	Boston	United States
BRU	Brussels	Brussels	Belgium
CAN	Guangzhou	Guangzhou	China
CCU	Kolkata	Kolkata	India
CDG	Paris De Gaulle	Paris	France
CMB	Colombo	Colombo	Sri Lanka
COK	Cochin	Cochin	India
CPH	Copenhagen	Copenhagen	Denmark
DEL	Delhi	Delhi	India
DEN	Denver	Denver	United States
DFW	Dallas/Fort Worth	Dallas/Fort Worth	United States
DIU	Diu	Diu	India
DME	Moscow Domodedovo	Moscow	Russia
DMM	Dammam	Dammam	Saudi Arabia
DOH	Doha	Doha	Qatar
DTW	Detroit	Detroit	United States

City Code	City name	Country
AMD	Ahmedabad	India
AMS	Amsterdam	Netherlands
ATH	Athens	Greece
ATL	Atlanta	United States
ATQ	Amritsar	India
BER	Berlin	Germany
BHX	Birmingham	United Kingdom
BLR	Bangalore	India
BOM	Mumbai	India
BOS	Boston	United States
BRE	Bremen	Germany
BRU	Brussels	Belgium
BUD	Budapest	Hungary
CCU	Kolkata	India
CHI	Chicago	United States
COK	Cochin	India
CPH	Copenhagen	Denmark
DED	Jolly Grant	India
DEL	Delhi	India
DFW	Dallas/Fort Worth	United States
DND	Dundee	United Kingdom
DUB	Dublin	Ireland
EVN	Yerevan	Armenia
FLR	Florence	Italy
FRA	Frankfurt	Germany
GOI	Goa	India
GVA	Geneva	Switzerland
HAM	Hamburg	Germany
HEL	Helsinki	Finland

IATA Code Airport	City	Country
DUB	Dublin	Dublin	Ireland

IATA Code	Airport	City	Country
DUB	Dublin	Dublin	Ireland
DUS	Dusseldorf	Dusseldorf	Germany
DXB	Dubai	Dubai	UAE
EWR	New York Newark	New York	United States
FCO	Rome L Da Vinci	Rome	Italy
FRA	Frankfurt	Frankfurt	Germany
GLA	Glasgow	Glasgow	United Kingdom
HEL	Helsinki	Helsinki	Finland
HKG	Hong Kong	Hong Kong	Hong Kong
HYD	Hyderabad	Hyderabad	India
IAD	Washington Dulles	Washington	United States
IAH	Houston Intercontinental	Houston	United States
ICN	Seoul Incheon	Seoul	South Korea
IST	Istanbul	Istanbul	Turkey
JDH	Jodhpur	Jodhpur	India
JED	Jeddah	Jeddah	Saudi Arabia
JFK	New York J F K	New York	United States
KWI	Kuwait	Kuwait	Kuwait
LAX	Los Angeles	Los Angeles	United States
LHR	London Heathrow	London	United Kingdom
LIS	Lisbon	Lisbon	Portugal
MAA	Chennai	Chennai	India
MAD	Madrid	Madrid	Spain
MAN	Manchester	Manchester	United Kingdom
MCO	Orlando	Orlando	United States
MCT	Muscat	Muscat	Oman
MIA	Miami	Miami	United States
MUC	Munich	Munich	Germany
MXP	Milan Malpensa	Milan	Italy

City Code	City name	Country
HOU	Houston	United States
HYD	Hyderabad	India
IEV	Kiev	Ukraine
JDH	Jodhpur	India
LAX	Los Angeles	United States
LED	St. Petersburg	Russia
LIL	Lille	France
LIS	Lisbon	Portugal
LON	London	United Kingdom
LRH	La Rochelle	France
LYS	Lyon	France
MAA	Chennai	India
MAD	Madrid	Spain
MAN	Manchester	United Kingdom
MIL	Milan	Italy
MOW	Moscow	Russia
MUC	Munich	Germany
NQT	Nottingham	United Kingdom
NYC	New York	United States
PAR	Paris	France
PNQ	Poona	India
PRG	Prague	Czech Republic
RFN	Raufarhofn	Iceland
ROM	Rome	Italy
SEA	Seattle/Tacoma	United States
SFO	San Francisco	United States
STO	Stockholm	Sweden
STR	Stuttgart	Germany
SXV	Salem	India

IATA Code	Airport	City	Country
NAG	Nagpur	Nagpur	India
NRT	Tokyo Narita	Tokyo	Japan
ORD	Chicago O'Hare	Chicago	United States
OSL	Oslo	Oslo	Norway
PEK	Beijing/Peking	Beijing	China
PHL	Philadelphia	Philadelphia	United States
PVG	Shanghai Pu Dong	Shanghai	China
RUH	Riyadh	Riyadh	Saudi Arabia
SEA	Seattle/Tacoma	Seattle/Tacoma	United States
SFO	San Francisco	San Francisco	United States
SHJ	Sharjah	Sharjah	UAE
SIN	Singapore	Singapore	Singapore
SVO	Moscow Sheremetyevo	Moscow	Russia
TAS	Tashkent	Tashkent	Uzbekistan
TLV	Tel Aviv	Tel Aviv	Israel
TPE	Taipei	Taipei	Taiwan
TXL	Berlin West Tegel	Berlin	Germany
VIE	Vienna	Vienna	Austria
VKO	Moscow Vnukovo	Moscow	Russia
YVR	Vancouver	Vancouver	Canada
YYZ	Toronto	Toronto	Canada
ZRH	Zurich	Zurich	Switzerland

City Code	City name	Country
TRV	Thiruvananthapuram	India
VIE	Vienna	Austria
WAS	Washington	United States
WAW	Warsaw	Poland
ZRH	Zurich	Switzerland

Table 8.2: Airline IATA Codes

IATA Code	Airline
AA	American Airlines
DL	Delta Air Lines
EK	Emirates
EY	Etihad Airways
QR	Qatar Airways
UA	United Airlines

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