ACI EUROPE
AIRPORTS COUNCIL INTERNATIONAL

HOW AIRPORT CAPACITY IMPACTS AIR FARES

SYNOPSIS

This document is produced by ACI EUROPE and summarises the SEO Amsterdam Economics & Cranfield University Report *"The Impact of Airport Capacity Constraints on Air Fares",* highlighting some of its key insights and analysis.

Unless otherwise stated, all material within this summary document has the original Report as its reference. The full Report provides significantly more material, including a detailed explanation as to the methodology and data used, and underlying assumptions & caveats.

The full Report can be accessed in the 'Policy Library' section of the ACI EUROPE website. **www.aci-europe.org**

INTRODUCTION

Think about the last time you were at an airport. The destinations you could have flown to. The sights and sounds of departures and arrivals. The extraordinary number of different nationalities walking the same halls as you. If the airport was a congested one, you probably felt some of the effects of the lack of airport capacity – aircraft queueing for the runway, delayed departure and perhaps even, delayed arrival at your destination.

These are some of the inconveniences that air travelers can see for themselves over the course of their journey, but there are other less visible, yet no less important effects too. Specifically, the more congested an airport is, the higher air fares tend to be.

The growing number of congested airports in Europe flies in the face of numerous warnings on the economic impact caused by the airport capacity crunch. Political awareness is growing, not least because the efficiency goals of the EU's flagship air transport project, the Single European Sky, will not be realised if airports become the bottlenecks of European air transport. As part of the efforts to investigate and further catalogue the negative effects that stem from the capacity crunch - such as inefficiency and inconvenience - SEO Amsterdam Economics & Cranfield University sought to explore the impact it has on air fares that the travelling public pay to fly from these airports.

This synopsis aims to provide you with the key findings of their report.

1

WHAT'S AT STAKE

SEO Amsterdam Economics & Cranfield University have estimated that passengers in Europe are paying **€2.1 billion** every year in higher air fares, due to capacity constraints at European airports.

Limited airport capacity in turn limits airline competition – particularly at the busiest times of the day or year. People's demand to fly continues to rise, but at congested airports additional aircraft are unable to land or depart. With demand increasing and supply staying constant, instead price goes up – meaning that passengers have to pay higher air fares at these airports. And with no additional airport capacity, entry from new competitors is not possible.

As a result, every 10% increase in airport congestion leads to an aggregate +1.4% to 2.2% increase in air fares.

With European airports due to become even more congested in the coming years, the problem is only going to get worse. Based on EUROCONTROL *'Challenges of Growth'* projections of future airport capacity constraints, SEO Amsterdam Economics & Cranfield University estimate that by 2035 European passengers will be paying an additional **€6.3 billion** in higher air fares each year, specifically due to airport capacity constraints.[1]

[1] This is not the only negative impact of the airport capacity crunch. In a study for ACI EUROPE, Inter*VISTAS* estimates these foregone annual macro-economic benefits as a result of the capacity crunch for the European economy at 2 million jobs and almost €97 billion of GDP until 2035.

2

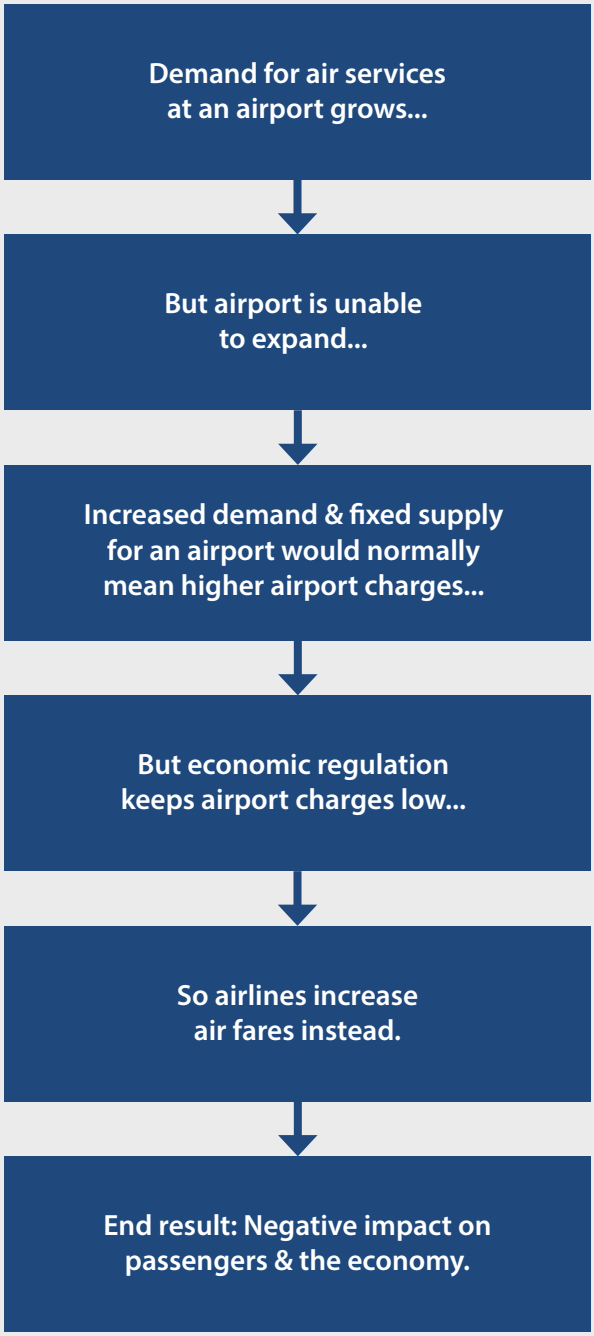
HOW AIRPORT CAPACITY IMPACTS AIR FARES

Every airport can only handle a finite number of passengers and aircraft at a time. These limits can be a result of physical (e.g. maximum number of flights that a runway can accommodate) and/or regulatory constraints (e.g. no flights allowed after a certain hour in the evening). Because people want to fly more on certain days and at certain times, many of the larger airports will reach their capacity limit for some, but not all of the time.

When an airport reaches its capacity, there is an inherent limit to the number of passengers that can use that airport (either overall or at specific times). In theory this would allow airports that are both congested AND have substantial market power to increase their airport charges, as more and more people wanted to use the airport to fly. However, in Europe all medium & large airports are subject to economic regulation[2], and so airport charges cannot rise on the basis of demand alone. But there is no mechanism in place to prevent airfares rising instead.

More and more people want to use air services to and from the airport, but no more inbound or outbound flights can be added, as there is not enough airport capacity to accommodate them. Instead airlines react to the higher demand by raising prices and allocating aircraft seats to the passengers who pay the highest prices.

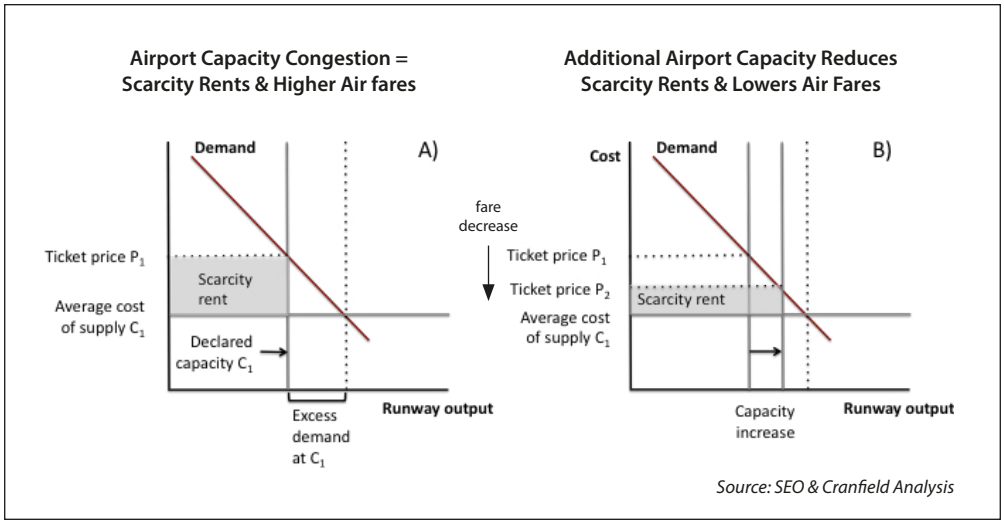
[2] All EU airports with more than 5 million passengers per annum, as well as the largest airport in each Member State are subject to the EU Airport Charges Directive. This requires airports to be transparent and to consult with airlines, and takes away their power to made decisions on airport charges. If airlines are not satisfied with charges at an airport, they can appeal to an Independent Supervisory Authority, which will make the ultimate decision.


Demand for air services at an airport grows...
But airport is unable to expand...
Increased demand & fixed supply for an airport would normally mean higher airport charges...
But economic regulation keeps airport charges low...
So airlines increase air fares instead.
End result: Negative impact on passengers & the economy.

There is no threat of new airlines coming into the market to lower fares via competition, as there is insufficient space at the airport to accommodate their entry.

This premium that airlines can charge passengers is known as the *'scarcity rent'* – it is a price passengers are paying which does not correspond to any underlying cost incurred by the airline. In Europe, these scarcity rents currently amount to **€2.1 billion** per annum.

So what is the solution to this problem? Ultimately, the only answer is to put in place sufficient airport capacity to meet underlying demand. More airport capacity will allow both new and/or incumbent airlines to put in place aircraft capacity – increasing supply and meaning that passengers will not have to pay as much to secure one of the available seats.



Source: SEO & Cranfield Analysis

As well as costing European passengers more money, this dynamic has two important implications:

1. The ultimate solution to the problem is to align airport capacity with demand. Sufficient airport capacity benefits both the wider economy and society – but where scarcity rents are being collected, it is not in the interests of incumbent airlines to see these being competed away once extra airport capacity is delivered, in particular when part of that additional capacity is paid for by the incumbent, but used by new entrants.

2. If air fares are based on demand, and not on airline costs, then it is unclear whether additional economic regulation of congested airports will really benefit passengers. When scarcity rents are being earned by airlines, then changes in their costs (e.g. higher or lower airport charges) are not passed through via higher or lower air fares. So current efforts to regulate airport charges may not lead to lower air fares. And if regulation unduly restricts airport capacity by handing excessive control over airport capacity expansion to incumbent airlines, then passengers may even end up paying higher airfares instead.

AIRPORT SLOTS – SCARCITY RENTS IN PRACTICE

The sale of airport slots between airlines offers an alternative insight into the volumes of scarcity rents being collected. Airlines would not pay multi-million sums for the right to operate at an airport at a specific time, if they were not confident that they could more than recoup these sums from passengers via higher air fares.

Slot trading (as opposed to the simple exchange of slots) would not occur in the absence of scarcity rents.

Airlines are not obliged to disclose the transaction price of slot trades, and in some jurisdictions the legal framework for slot trading is unclear – meaning that inter-airline arrangements involving slot exchanges may occur without formally being registered as 'trades'. This further limits transparency.

However, on occasion information from individual transactions has emerged indirectly. Most recently Oman Air paid Air France-KLM a reported US$75 million, for a single pair of slots (take-off and landing) at Heathrow in early 2016.

In recent years the European Commission has been looking closely at slot policy more generally, and in 2011 proposed a set of measures to reform current regulatory arrangements – including proposed legislating to formally allow for secondary airport slot trading. Of all the proposed measures, secondary slot trading was estimated by the Commission to have by far the greatest potential overall economic benefits - at over €3.1 billion each year.*

The estimated benefit of enabling slot trading suggests that the underpinning scarcity rents are likely to be substantial.

**'COMMISSION STAFF WORKING PAPER - Summary of the Impact Assessment Accompanying the document Proposal for a Regulation of the European Parliament and of the Council on common rules for the allocation of slots at European Union airports (Recast)'* European Commission, December 2011. Note the €3.1 billion does NOT refer to the value scarcity rents underlying secondary trading, but rather the wider economic benefits of secondary trading.

3

GETTING INTO THE DETAIL

3.1 How Scarcity Rents are Collected by Airlines at Capacity Constrained Airports

Airlines primarily use sophisticated revenue management techniques to target those passengers at an airport with the greatest willingness and ability to pay. Pricing & product-mix strategies are used to ensure that out of all potential passengers, the available seats on an aircraft are ultimately taken by those passengers who are prepared to pay the most. Other potential passengers who are unwilling or are unable to pay are pushed or 'crowded out' to other airports or other modes of travel - or else do not fly at all.

→ Higher fares for late bookings

When booking well in advance, it can still be possible to secure cheap air fares at congested airports. However at congested airports there are less of these opportunities available, and air fares can 'spike' more steeply, as the date of travel approaches.

→ More 'premium' tickets

Airlines also respond by dedicating more of their aircraft capacity to 'premium' seats at congested airports – i.e. more expensive first-class and business-class seats. More passengers have to purchase premium seats if they wish to fly from these airports, and a reduced number of economy-class seats are made available.

Higher Average Frequency to Fewer Destinations

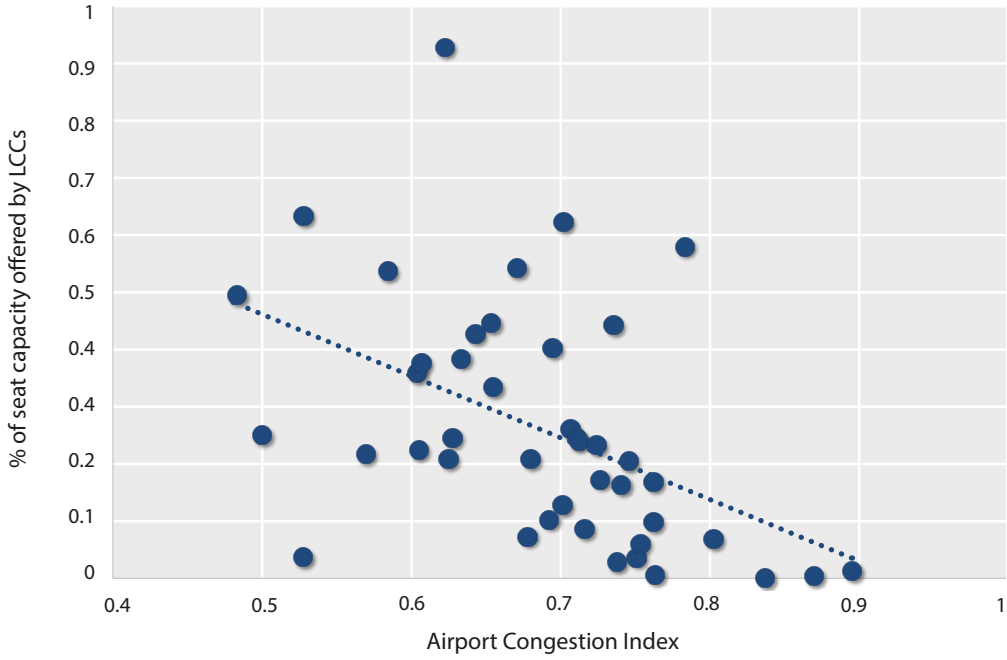
At congested airports, airlines focus on high-frequency services on high-demand routes. A subset of passengers will pay extra for regular and convenient departure/arrival times. In effect the airline is enacting the equivalent of airport charges 'peak pricing'.

Focusing on increased frequency to a reduced number of destinations is more cost effective for the airline, while allowing the collection of greater revenues. However citizens of the surrounding area may ultimately be left with a reduced choice of destinations.

Low Cost Carrier Presence

Finally, in spite of recent moves upmarket by some low cost carriers (LCCs), congested airports still have less LCC activity, thus limiting the possibility of lower fares[3]. Congestion creates barriers to entry for LCCs – particularly at peak times. In addition, the high cost of purchasing runway slots might mean that offering low fares may not be realistic, as the price of slots would need to be recouped via higher air fares.

Airport Congestion vs. LCC Presence

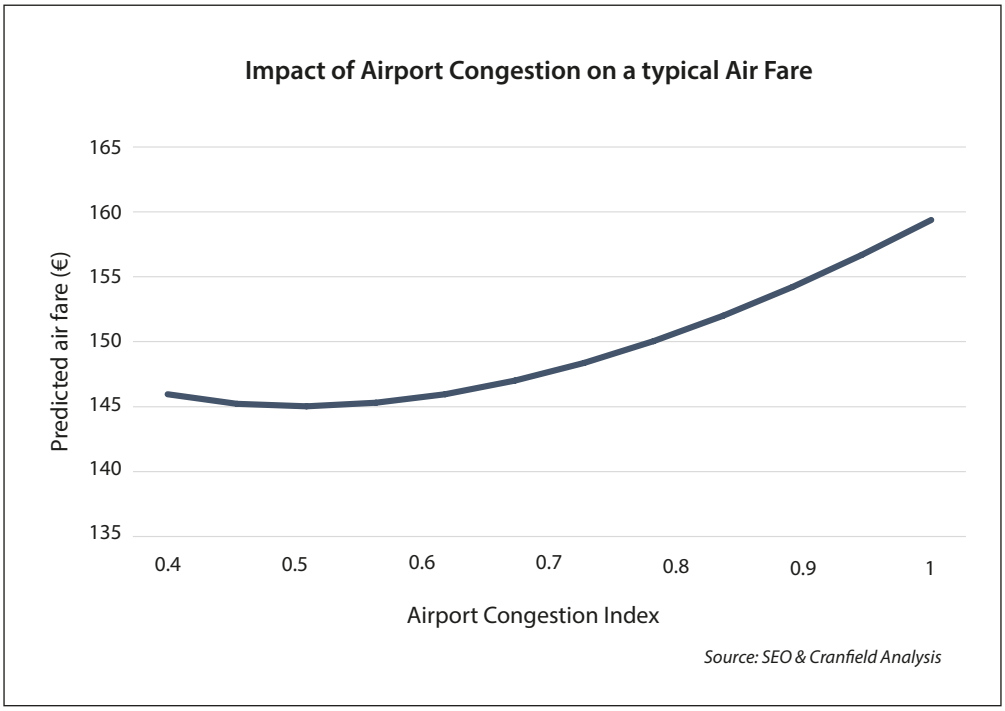


Source: OAG Scheduler Analyser; SEO & Cranfield Analysis

[3] LCC presence reduces overall fare levels at an airport, not only due to the fares offered by the low cost carriers themselves, but also via the corresponding competitive pressures placed on incumbent legacy carriers.

3.2 Airport Capacity & Air Fares – a Non-Linear Relationship

The more congested an airport becomes, the disproportionately higher are the associated premiums on air fares at that airport. Econometric analysis confirmed that an exponential model successfully estimated the relationship between airport congestion and air fare levels[4]. The below graph charts out how this relationship would play out in a liberalised market, for a typical air fare.



There are 2 lessons from this. Firstly – that the issue of airline scarcity rents is particularly concentrated at a smaller number of the most congested airports – as predicted by the underlying economics.

Secondly, the uncovered relationship demonstrates that this phenomenon is not limited to just one individual airport. While the degree of congestion and specific regulatory arrangements (such as legalised slot trading) make Heathrow an excellent case study, scarcity rents are being earned on air fares at a wider cohort of congested European airports.

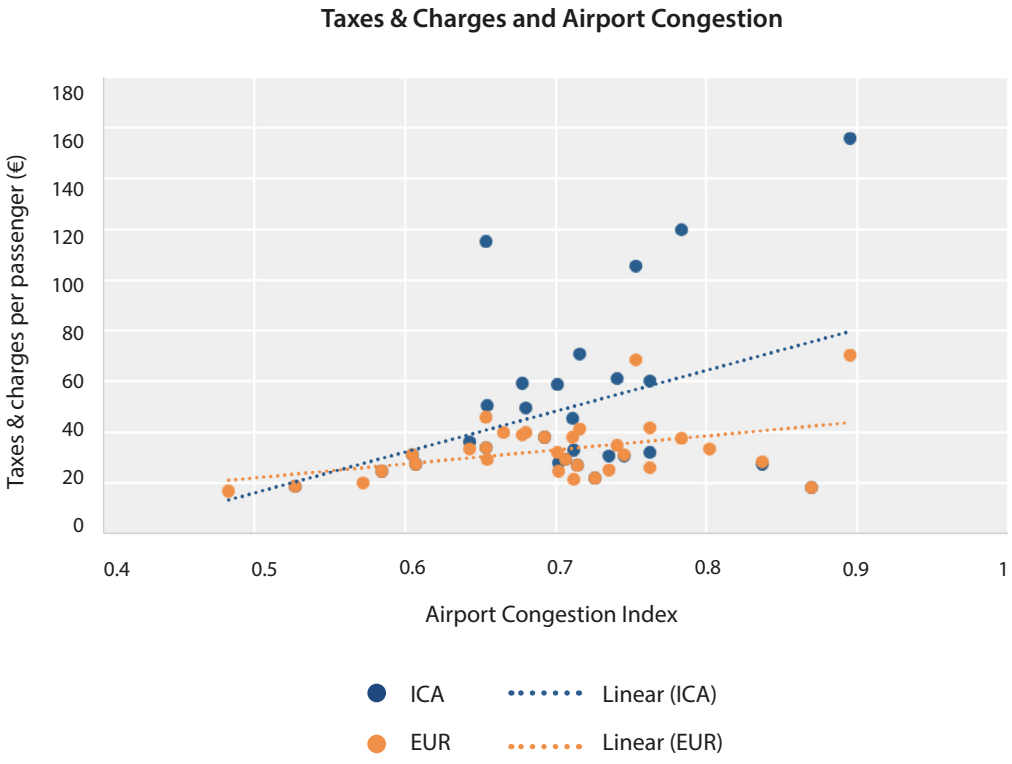
[4] The non-linear model was not used to estimate the absolute value of air fare premiums due to sensitivity over the choice of a 'benchmark' level of airport capacity to compare against. Small variations in this benchmark level of congestion would lead to very large differences in the overall estimation of the total absolute air fare premium.

3.3 The Role of Airport Charges

If economic regulation is insufficient at congested airports with substantial market power, then part of the scarcity rents could by captured by the airport operator, via higher charges. Governments could also use taxation as a means of capturing scarcity rents.

SEO & Cranfield University charted the 'taxes and charges' component of air fares against the degree of congestion at the departing airport. If governments & airports were capturing scarcity rents, then there should be a positive trend, with higher 'taxes & charges' at congested airports.

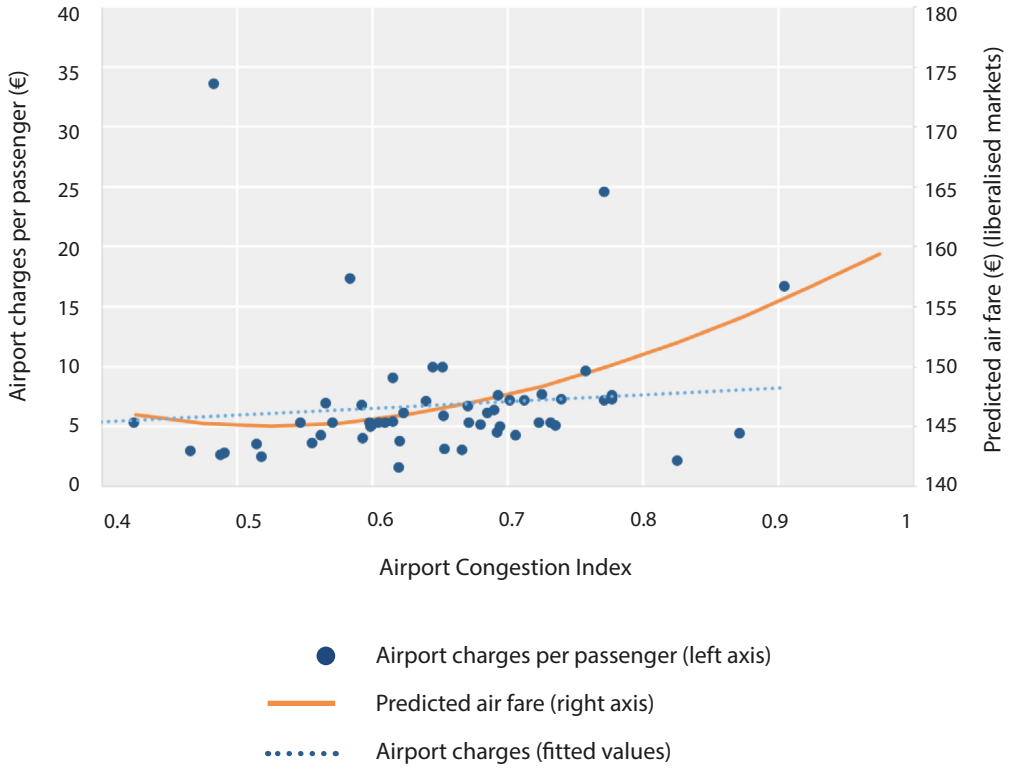
This did indeed seem to be the case – but only for intercontinental flights. For intra-European flights, the relationship was far weaker.



Source: SEO & Cranfield Analysis

And when taxes where stripped out, and only airport charges were considered, the relationship between congestion and airport charges was particularly weak.

Airport Charges, Air Fares and Airport Congestion



Source: ACI EUROPE analysis based on SEO & Cranfield material

Although the evidence is not conclusive, the data indicates that governments may be capturing some scarcity rents, while airport operators are less likely to be doing so. This is intuitive – there are few restrictions on a government which intends to tax aviation, while the framework of economic regulation under which all medium and large European airports operate, should prevent equivalent increases in airport charges.

Finally, SEO & Cranfield attempted to incorporate a variable for airport charges into the overall econometric model. This could only be performed on a smaller subsample, due to a lack of sufficient data. Nevertheless, results from an analysis of the subsample demonstrated that a similar premium on air fares was still detected, even when the level of airport charges was accounted for in the model.

OTHER EMPIRICAL STUDIES OF AIRLINE SCARCITY RENTS AT CONGESTED AIRPORTS

- When a European airport becomes severely constrained, average fares are **+18%** higher than they would be if the airport was unconstrained – *PWC (2013) 'Fare differentials. Analysis for the Airports Commission on the impact of capacity constraints on air fares'.*

- Due to capacity constraints, air fares at Heathrow & Gatwick are respectively **18%** & **7%** higher than at other London airports – *Frontier Economics (2014) 'Impact of airport expansion options on competition and choice. A report prepared for Heathrow Airport.'*

- Slot constraints at US airports lead to higher fares, but less delays – *Van Dender, K. (2007) Determinants of fares and operating revenues at US airports. Journal of Urban Economics, 62(2), 3-17-336.*

- Average yields are significantly higher at US airports with slot controls, gate constraints & high gate utilization during peak hours *– Dresner, M., Windle,. R., & Yao, Y. (2002) 'Airport barriers to entry in the US' Journal of Transport Economics & Policy (JTEP), 36(3), 389-405*

4

POLICY IMPLICATIONS

1. Europe's airport capacity crunch must be addressed

The problem is ultimately one of insufficient supply. EUROCONTROL predicts that by 2035 up to 19 airports across Europe will be as congested as Heathrow is today. And higher air fares are but one of the wider costs to society of an airport capacity crunch. There is no single solution to this challenge – responses are needed from a mix of local, national and European authorities. Steps which would help include the streamlining of local planning rules, the provision of strong political support for specific projects and the setting of clear airport capacity targets at an EU level. It is also essential that necessary investment into airport infrastructure continues to be properly incentivised and supported.

2. Remove incumbent airlines' disincentive to support expansion

A complementary approach would be to create 'airport infrastructure funds' at airports where it is clear that scarcity rents are being collected by airlines. Higher airport charges could capture some of the scarcity rents, and ring-fence collected rents into a fund specifically dedicated to financing expansion of airport capacity. As well as removing the incentive airlines have to oppose expansion, the fund would help to address the underlying problem – a shortage of airport capacity.

3. Ensure existing policies do not become an unnecessary barrier to airport expansion

Economic regulation of airports gives airlines considerable influence over airport infrastructure projects. The EU Airport Charges Directive requires airports to consult with airlines on new infrastructure projects. Airlines can appeal to independent regulators, if they oppose any investments which are to be funded by airport charges. The independent regulator will make the final decision.

In cases where airlines are collecting scarcity rents, they have little or no motivation to support airport expansion. In such cases, the interests of airlines and passengers are not aligned, with potentially damaging implications for the wider society and economy around the airport.

In situations where regulators are deciding on major airport expansion projects, it is important that the views of airlines are taken into consideration. However incumbent airline opposition should not automatically lead to an expansion project being halted.

4. Monitor air fares to establish a greater understanding of the extent and location of scarcity rents

The Report identifies the presence of such scarcity rents across Europe, but individual data collection would be required at individual congested airports to determine the presence or volume of such fare premiums.

Given the importance of the issue to airport economic regulation – if fare premiums are being earned then regulatory control of airport charges may not result in lower air fares for passengers - regulators may wish to individually or collectively monitor air fares at affected airports, to better understand the wider market dynamic at the airport and the potential ultimate impact on passengers.

METHODOLOGY

SEO Amsterdam Economics & Cranfield University analysed a set of over 64,000 fares for flights from a representative sample of 38 European airports to 103 destination airports. Destination airports were located both within and outside of Europe. This covered a total of 3,881 airport-pair markets. The data was for fares booked in 2014, and was sourced from the Marketing Information Data Transfer (MIDT) dataset. To deepen & double check the overall analysis, a separate data collection of 'offered fares' was made, based on future fares offered via the Google Flights service.[5]

Two detailed econometric models were built to estimate all the key determinants of air fares, including a variable to capture the degree of capacity constraints at both the origin and destination airport on each individual route.[6] Reflecting the dynamics of the different markets, the models covered an 'internal' market, encompassing flights to liberalised markets (i.e. intra-EU routes & routes to/from Open Skies destinations) and an 'external' market, covering flights to destinations which do not have liberalized air services agreements with the EU.

The model established a relationship between airport congestion and air fares. But to estimate the absolute impact on air fares, it was necessary to compare the situation against a base case – how much higher are air fares compared to a situation of ample airport capacity across Europe?

To identify this 'base case' the congestion values were considered, of all airports with more than 30,000 aircraft movements. The median congestion value of all airports (0.596) was chosen as the 'base case' against which to compare the current situation. The median congestion value is the congestion score of the 'middle' airport which is neither particularly congested nor uncongested. This approach reflects the fact that airport expansion comes with a cost, and it is not reasonable to compare the current situation against a scenario with no airport capacity constraints whatsoever. This 'base congestion value' is broadly equivalent to the capacity utilisation of an airport such as Brussels or Stockholm Arlanda.

[5] Specifically, the 'QPX Express Travel Application Programming Interface'.
[6] The 'Capacity Utilisation Index' (CUI). See full Report for further details on methodological approach.

	'Internal' market (liberalised)	'External' market (non-liberalised)
Hub	0.0015	0.1812 ***
LCC	-0.0407 ***	-0.0593
Fuel	0.1034	0.1659 ***
Distance	0.2972 ***	0.4080 ***
HHIroute	0.0205	-0.0541 ***
HHIairport	0.0139	-0.0297 ***
CUI	**0.1367** **	**0.2214** ***
GDP	0.3790 ***	0.1680 ***
POP	0.1555 ***	0.0927 ***
Time effects	yes	yes
Constant	-3.7660 ***	-1.4810 ***
Number of fare observations	**38.966**	**25.089**
R-squared (overall)	**0.4022**	**0.3461**

*Legend: ***: p<0.01; **: p<0.05; *: p<0.1 / Source: SEO & Cranfield analysis.*

'Hub' - whether either the origin or destination airport is classified as a hub or not.
'LCC' – whether a low cost carrier operates on the route or not.
'Fuel' – Euro price per gallon for A1 jet fuel in the specific month.
'Distance' - The great circle distance between the origin & destination airports, in kilometres.
'HHIroute' – A measure of the airline market concentration on the specific route.
'HHIairport' – A measure of the combined airline market concentration at the origin and destination airport.
'CUI' – the sum of the capacity constraint values as both the origin and destination airports.
'GDP' - the sum of the monetary value of the economy around both the origin & destination airport.
'POP' - the sum of the population in urban areas within a 100km radius around both the origin & destination airport.

For each airport, average congestion on each route was re-calculated, assuming the airport had a congestion value of 0.596. The congestion values of destination airports were left unchanged. Compared to the base scenario, the actual airport congestion values for each route allows an estimation as to how much higher air fares currently are, compared to a scenario of adequate airport capacity.

The results were then summed for all airports. In reality scarcity rents are collected by airlines only at airports with some degree of market power at specific times or in particular markets. As airport market power tests are still only being performed on a limited scale, there was no way of integrating this into the model and subsequent calculations. While the model gives an 'average' value for the relationship between airport capacity and scarcity rents to allow the calculation of absolute figures, scarcity rents are likely to be greater at those airports with substantial market power and significant congestion, and less so or absent at all other airports, as suggested by the non-linear model in Section 3.2. Applying the 'average impact' to all airports allows an estimation of the absolute impact within Europe overall. However, scarcity rents at individual airports cannot be credibly identified via this model.

The impact of airport capacity constraints on air fares in 2035 was based upon 2035 forecasts from EUROCONTROL's *"Challenges of Growth"*[7]. EUROCONTROL estimates aggregate levels of unaccommodated demand for different countries or groups of countries. This unaccommodated demand was allocated to individual airports, proportionate to the flight frequencies of these airports, to produce unconstrained forecasts for each airport. This allowed an estimation of future congestion values, drawing on EUROCONTROL data and supplementing with specific peak hour capacity assumptions for single & multi-runway airports where necessary.

To estimate absolute values, the same methodology was applied as was employed to assess the situation today.

[7] Specifically forecasts from the most-likely 'Regulated Growth' scenario.

AIRPORTS COUNCIL INTERNATIONAL

In 2016, SEO Amsterdam Economics & Cranfield University sought to investigate and further catalogue the negative effects that stem from the looming airport capacity crunch facing Europe. Key amongst these negative effects is the consequence that passengers pay higher air fares at congested airports – as higher demand and fixed supply means that prices increase. The results of this unique research project were subsequently made available in a report entitled "The Impact of Airport Congestion on Air Fares" (2017).

This synopsis aims to provide you with the key findings and methodology of that report.

ACI EUROPE is the European region of Airports Council International (ACI), the only worldwide professional association of airport operators. ACI EUROPE represents close to **500 airports** in 45 European countries. In 2015, our member airports handled over 90% of commercial air traffic in Europe, welcoming more than **1.9 billion passengers, 18.9 million tonnes of freight** and **22.8 million aircraft movements**. These airports contribute to the employment of **12.3 million people**, generating **€675 billion** each year **(4.1%) of GDP** in Europe.

EVERY FLIGHT BEGINS AT THE AIRPORT.

www.aci-europe.org
Twitter: @ACI_EUROPE

Produced by ACI EUROPE
Designed by Caroline Terrée