



German Airport Performance

Changes in the Structure of German Airport Charges (2003-7)

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Abstract

This paper illustrates that the structure of airside charges for 10 international German airports has considerably changed. After looking at the evolution of charges, it analyzes the possible implications for the risk sharing between airports and airlines induced by this change. Understanding the development of charges structure can give us important clues about the risk sharing, welfare effects and allocative efficiency in the aviation industry.

Design/Methodology/Approach: Due to highly individual structure of every airport and an increasingly deregulated market, a comparative analysis of charges is difficult. To allow a comparison three samples of airports were built. Inside the samples, airports are similar in regard to passenger number, aircraft movement, number of gates, terminal size and types of aircrafts that land. We analyze the structure of charges, present levels and trends, while distinguishing between regulated and non-regulated, fixed and variable charges.

Findings: We find a change in the airside charges structure of German Airports (due to deregulation induced by the European Union). First, the share of variable charges, namely passenger related component of airside charges, is increasing. Second, the analysis shows a decrease in the level of regulated charges, while those of central infrastructure remained approximately at the same level. According to these findings, we argue that airports are exposed to more risk than under the previous regime.

Keywords: airport industry, airport charges, distribution of risk

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1. Introduction

The growth in the civil aviation industry - due to the ongoing changes of the world economy towards a global network economy - is also evident in Germany. The figures of the *Statistisches Bundesamt* show an increase of passenger air traffic from 121 Million in the year 2003 to 164 Million in the year 2007¹ (an increase of 36 percent).

Airlines and airports are the two major players of the aviation market, whose relationship is determined by a specific characteristic of mutual dependence. As a result, this dependence contributes to forming a particular pattern of distribution of market risk. The distribution of risk is foremost observable in the height and structure of their airside charges. Especially since the deregulation of the market starting in the late 1990s, airport charges are now much more subject to negotiation rather than regulation. As a consequence German airports now have highly individual structures of charges, with an increasing variability, i. e. the ratio of fixed and passenger related charges. Our analysis also shows a decrease of regulated landing charges, while the unregulated charges, i.e. those for central infrastructure remained approximately at the same level.

The first and main aim of this paper is therefore to highlight the change in the level and structure of airport charges as a consequence of liberalization for a subset of 10 of the 19 international German airports.

¹ Statistisches Bundesamt (German Federal Office for Statistics):
<http://www.destatis.de/jetspeed/portal/cms/Sites/destatis/Internet/DE/Content/Statistiken/Verkehr/Personenbefoerderung/Tabellen/Content75/BefoerdertePersonen,templateId=renderPrint.psml>

The second aim is to identify possible causes for the variability of charges and the third, to analyse the implications of this change on the distribution of risks to the two major players in the aviation market, airports and airlines.

This paper will first review the relevant literature on airport pricing and then develop the research methodology on the basis of which results will be presented in section three. In the fourth part of the paper we analyse possible reasons for this change and examine in part five the impact of variability on the distribution of risk. We close with a summary of the results and suggestions for further research.

2. Theoretical Background

Airport charges express the value of the service produced by the airports, thus the price of its service.

To set prices several methods are feasible, focussing on different objectives. These methods comprise concepts such as cost-plus pricing, value-based pricing, etc. to optimise revenues and profits^{1,2} or marginal cost pricing and Ramsey pricing to ensure the recovery of costs, secure social welfare and steer economic investment in facilities^{3,4} and average-cost pricing, which is the traditional and predominantly used approach⁵. Yet none of these concepts

¹ See Phillips, R. L. "Pricing and Revenue Optimization." Stanford: Stanford University Press, 2005.

² See Shy, O. "How to price." New York: Cambridge University Press, 2008.

³ See Böcker, F. (ed.), "Preistheorie und Preisverhalten." München: Vahlen, 1982, pp. 119-138.

⁴ See Hogan, O., et alii, "Calculating the Short-Run Marginal Infrastructure Costs of Runway Use: An Application to Dublin Airport." In: Forsyth, P., et alii (ed.), "Economic Regulation of Airports: Recent Developments in Australasia, North America and Europe." Hants: Ashgate Publishing Ltd., 2004, pp. 75-82.

⁵ See Martin-Cejas, R. R., "Airport Pricing Systems in Europe and an Application of Ramsey Pricing to Spanish Airports." In: "Transport Research Part E.", Vol. 33, No. 4, 1997, pp. 321-327.

handles the aspect of risk or its allocation to the parties involved respectively¹.

This paper provides a first empirical basis upon which further research on the topic of risk and risk allocation in the aviation industry can be conducted. Further research will also be necessary to find a quantitative method to measure and operationalise risk akin to the RAROC method in the P&C insurance industry.

3. Methodology and Results

3.1 Research Methodology

Since the deregulation of the market for airport services, starting in the late 1990s with the *European Council Directive 96/97*, airport charges in Germany are increasingly subject to negotiation rather than regulation, and certain infrastructure services are now charged separately and landing charges are now much more an issue for the airlines to look at ^{2 3}.

As a consequence German airports have now highly individual charges structures, which differ extensively between the different

¹ The banking and insurance industry started recently to use risk as a guide in allocating their capital. To generate adequate returns some P&C (property and casualty) insurance companies implemented a risk adjusted capital model called RAROC (risk adjusted return on capital) to guide their pricing and business strategy. See Nakada, P. et alii, "P&C RAROC: A Catalyst for Improved Capital Management in the Property and Casualty Insurance Industry." *The Journal of Risk Finance*, 1999, p. 52-69.

² This has been implemented in the "Verordnung der Bodenabfertigungsdienste auf Flughäfen", BADV of 10 12 1997.

³ Before, airport charges had been rather uniform and also included charges for ground handling services, that were provided exclusively by the airport. Now the airport charges the handlers for the "central infrastructure services" like access to and baggage handling facilities etc. These "unregulated" charges have to be paid by the handling agents as part of his costs of doing business with the airlines.

international airports. This is partly related to the economic environment in which each airport is located, their available infrastructure, and the market they serve - in terms of destinations and carriers. Since a detailed analysis of the evolution of charges that Germany's 19 internationally operating airports seemed to be neither feasible nor reasonable within the time and research budget of the project, we have limited our analysis to a subset of airports.. We built three comparable clusters of 10 airports, with focus on domestic and European flights.

These clusters were built according to the following airport characteristics, which comprehensively describe airport size:

Aircraft movements and number of passengers

Check-In-Counters and number of gates

Terminal size

Length of runway

Number of runways

This comparison made it possible to categorise the airports into the following groups¹:

Small airports:

Bremen BRE

Dresden DRS

Münster FMO

Medium airports:

Köln CGN

Hamburg HAM

Stuttgart STR

Tegel TXL

¹ See appendix c) for details.

Large airports: Frankfurt FRA
 München MUC
 Düsseldorf DUS

Subsequently we chose a relevant fleet mix for every cluster of airports to be able to calculate an aggregate level of charges¹.

In terms of charges structure we made the distinction between variable and fixed charges. Fixed components of airside charges are weight related landing charges, which have to be paid per ton. Variable charges are passenger related charges, which the airline has to pay per passenger, such as security charges. Therefore we also have to make the assumption that the seat load factor (SLF) of every aircraft shall be 80 percent.

The analysis covers a period of five years from 2003 until 2007. The charges data was collected from charges manuals published by the airports in the magazine *Nachrichten für Luftfahrer (NFL)*, the aircraft movement data for the calculation of the fleet mix was provided by *Arbeitsgemeinschaft Deutscher Verkehrsflughäfen (ADV)*, the data about the physical constitution of the airports was collected from the airports' websites, internet open databases and *GAP* databases, and the characteristics of the aircrafts were gathered from the producers' websites.

¹. To be relevant at least 70 percent of the total number of flights had to be operated by the aircrafts represented by the chosen fleet mix. The outcome is a group consisting of the Airbus 320 family, Boeing 737 family, Bombardier Canadair Regional Jet (CRJ) and British Aerospace 146 (BAE 146, aka Avro RJ). To ensure the comparability of airports we did not consider intercontinental aircrafts, which are not operating from every airport mentioned, such as the Boeing 747. See Appendix b) for details.

The calculations include all airside charges except ground handling, since the market for ground handling services is completely deregulated.

3.2 Results

Since we are mainly interested in the evolution of the charges structure, we will have a first look at the variability for 2007, the last year for which we have data. The share of variable charges and fixed charges for the three samples is shown in the figures below:

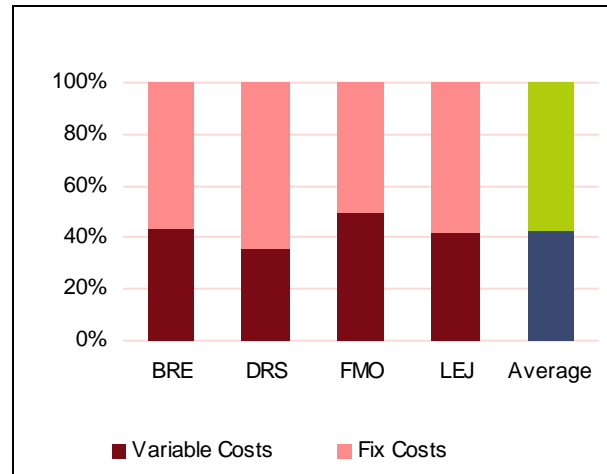


Fig. 1 Composition of charges for Small Airports (2007)

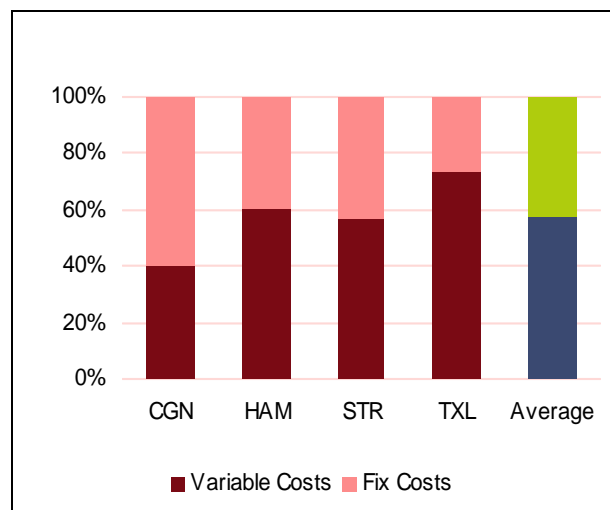


Fig. 2 Composition of charges for Medium Airports (2007)

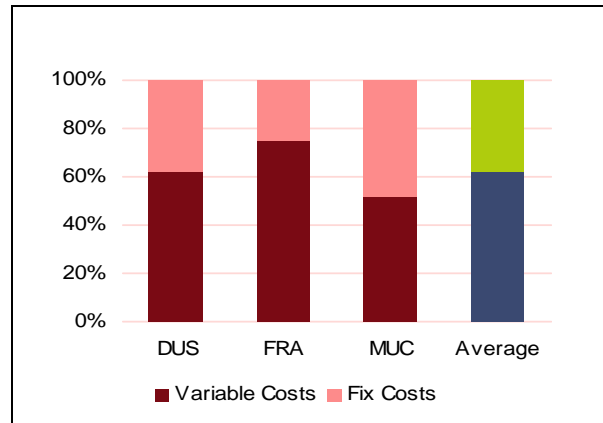


Fig. 3 Composition of charges for Large Airports (2007)

The first inspection reveals that the degree of variability is increasing with airport size, but there is not much difference in the average for the medium and large airports.

The time trends of the single airports are shown in the next figures below:

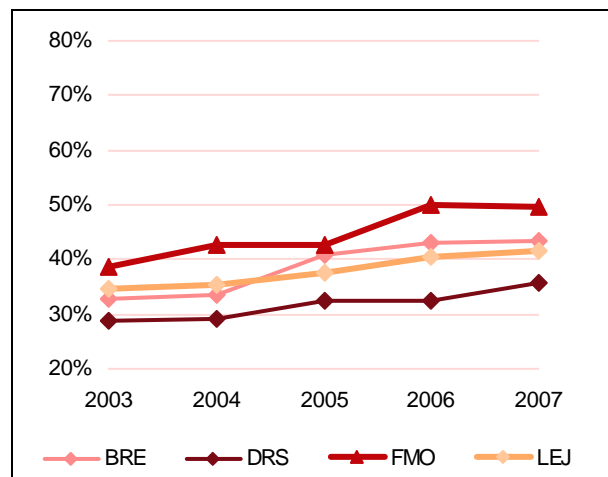


Fig. 4 Evolution in variability of charges for Small Airports (2003 – 7)

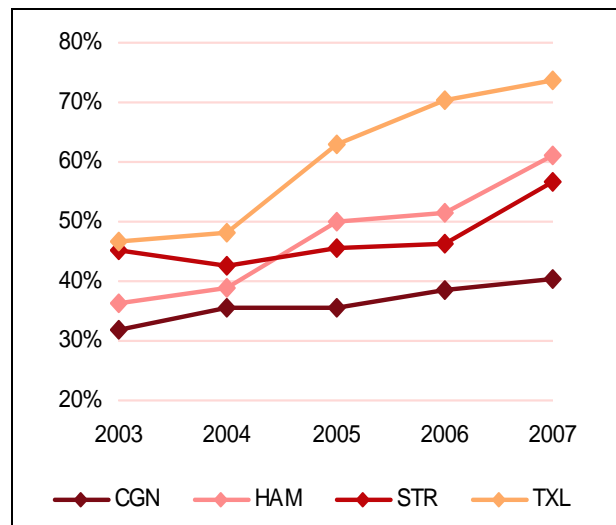


Fig. 5 Evolution in variability of charges for Medium Airports (2003 – 7)

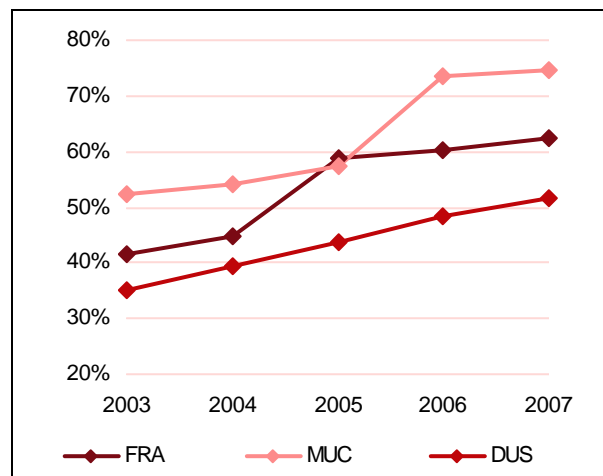


Fig. 6 Evolution in variability of charges for Large Airports (2003 – 7)

These figures clearly show firstly a change in the charges structure of German airports towards an increasing variability, especially for the larger airports. In some airports, like TXL, HAM, STR and MUC this change in the charges structure is particularly pronounced.

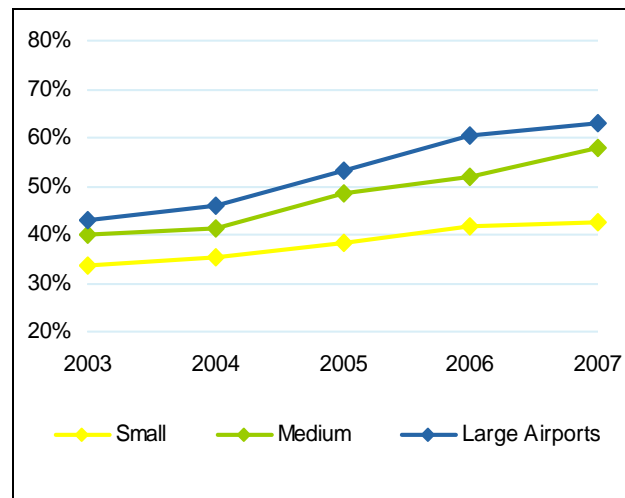


Fig. 7 Evolution in variability of charges for all Clusters (2003 –7)

Secondly the analysis shows a decrease of regulated landing charges, while the unregulated charges, i.e. those for central infrastructure remained approximately at the same level.

Thirdly it seems that the degree of variability is increasing with airport size.

4. Reasons for the Change in the Charges Structure

Different reasons for this development could be plausible, but further analysis is necessary to really understand what was responsible in detail for these changes. As a first step we list a number of suggestions.

i) Increase of demand, efficiency and seat load factor (SLF)

The increasing competition for air transport services required an increase in efficiency and therefore also a higher SLF. At the same time, with the associated growth in passenger volume, the airports

want to participate financially, since they also have to operate with a higher volume of passengers,.

ii) Airlines want to reduce risk and pass some charges directly through to customers.

a) Airlines, especially low cost carriers (LCC) push the airports, not only to lower their landing fees, but also to accept a higher degree of variability to minimise their risks on the cost side entailed with their dependence on air traffic volume. This of course depends on the market power of airports and airlines.

b) Airlines in their pricing policy seem to want to pass costs like security charges, taxes and landing charges along to the passengers as externally imposed costs, for which they are seemingly not responsible, to realise their aggressive pricing policy¹.

iii) Weight of Aircrafts

The weight of aircrafts in relation to the amount of passengers they are able to carry may have decreased as a result of state-of-the-art design and use of lighter material. Thus it would be reasonable from the airports point of view to shift charges from fixed weight based charges to flexible passenger based charges, if the weight based charges cannot be increased².

5. Impact of Variability on the Distribution of Risk

Whatever reason might cause this development, a look at the empirical evidence seems to support the assumption that a shift of risk from the airlines towards the airports has been taking place.

¹ In an increasingly competitive market, especially after the appearance of LLC, such a policy does not make much sense, as a customer should be interested in the final price.

² We could not find evidence to support that reason. See appendix c).

Further research in the form of scenario comparison, like applying the same charges schemes to different traffic developments, has to be done in order to show what distribution of risk would emerge, if the old charges structure had been kept. We also plan to do the same scenario analysis by using different SLF.

However, in a situation where the airports' revenues depend to more than 50 percent (for large and medium sized airports) on the number of passengers using their facilities, the dependence of the airport on attracting efficient airlines and thereby growing air traffic is undeniable. The discussions we had with airports on this topic made us realise that this fact is known and even welcome. Airports seem to be doing rather well financially with this increased variability in a situation of growing air traffic demand. The situation might change in a more stagnant environment, which could be expected after the recent increase in the price of crude oil and the problematic situation many airlines, in particular LCC, are facing at the moment.

6. Conclusion

What we have shown is that a development towards rather flexible airport charges is an ongoing process in Germany. Connected with this is a shift of risk. The level of risk to which airports are exposed still has to be quantified before it can be credibly used in the drawing of policy conclusion. A possible way to do so is to conduct a scenario comparison as mentioned above.

From an economic point of view the development of the charges structure can give us important clues about the welfare and allocative efficiency of pricing policies in the aviation industry. To this we have added the point that it may be worthwhile to look at the risk sharing between airports and airlines as well.

7. Appendix

a)

2005	Length of Runway	Nr. Of Runways	Terminal Size (sqm)	Nr. Of Gates	Check In Counters	Passengers	Aircraft Movements
Small							
Bremen BRE	2038	1	36000	10	40	1.7 Mio	33600
Dresden DRS	2508	1	55000	12	24	1.78 Mio	29000
Münster FMO	2170	1	35000	18	38	1.5 Mio	28600
Medium							
Köln CGN	8137	3	200000	55	80	10 Mio	140000
Hamburg HAM	6916	2	90000	55	108	11.8 Mio	134000
Stuttgart STR	3345	1	121000	70	116	10 Mio	140000
Tegel TXL	5447	2	27000	18	103	11.7 Mio	137000
Big							
Frankfurt Frau	12000	3	800000	174	386	52 Mio	476000
München MUC	8000	2	500000	218	311	30.6 Mio	386000
Düsseldorf DUS	5700	2	285000	84	142	16.5 Mio	189000

Table 1 Airport Characteristics

b)

Airport	Aircraft Family	Average	2007
BRE	B737	94,4%	98,3%
DRS	A320	95,7%	96,8%
FMO	CRJ	95,4%	97,8%
LEJ	BAE146	85,4%	71,3%

Table A 3 Fleet Mix Small Airports

Airport	Aircraft Family	Average	2007
CGN	B737	74,1%	73,5%
HAM	A320	74,9%	88,9%
STR	CRJ	79,1%	83,8%
TXL	BAE146	86,3%	92,5%

Table A 4 Fleet Mix Medium Airports

Airport	Aircraft Family	Average	2007
FRA	B737	68,4%	69,1%
MUC	A320	86,6%	89,0%
DUS	CRJ	83,3%	92,3%
	BAE146		

Table A 5 Fleet Mix Large Airports

c)

Aircraft	Typical Seating	MTOW	Tons/Passenger	Year of First Delivery
A320	150	73.5	0.490	1987
A321	185	83	0.449	1993
A319	124	64	0.516	1995
A318	107	59	0.551	2002
A330/300	335	230	0.687	1993
A330/200	293	230	0.785	1997
A340/300	295	275	0.932	1991
A340/200	239	275	1.151	1992
A340/600	380	372	0.979	2001
A340/500	313	372	1.188	2002
A380	525	560	1.067	2007

Table A 2 of Weight of Aircrafts (own analysis)

8. Literature

Böcker, F. (edt.), "Preistheorie und Preisverhalten." München: Vahlen, 1982.

Hogan, O., et alii, "Calculating the Short-Run Marginal Infrastructure Costs of Runway Use: An Application to Dublin Airport." In: Forsyth, P., et alii (edt.) "Economic Regulation of Airports: Recent Developments in Australasia, North America and Europe." Hants: Ashgate Publishing Ltd., 2004.

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