

Advances in Spatial Science

Peter Forsyth
Jürgen Müller
Hans-Martin Niemeier
Eric Pels *Editors*

Economic Regulation of Urban and Regional Airports

Incentives, Efficiency and Benchmarking





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Advances in Spatial Science


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Editors

Economic Regulation of Urban and Regional Airports

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Chapter 1

Introduction



Peter Forsyth, Jürgen Müller, Hans-Martin Niemeier, and Eric Pels

This book discusses the current state of the art in the literature on, and the practice of economic regulation of, airports. This topic has received ample attention in the literature, but recent developments in aviation markets, policy and the literature concerning regulation and benchmarking necessitate a new overview.

1.1 Background

Forsyth et al. (2004), in their book “The Economic Regulation of Airports”, stress that “most of the discussion in this book has taken as read that strong competition between airports is not feasible” (p. xxviii). They stress that sometimes, like in the UK, airport policy prevents competition as in the case of BAA’s London airports (since then policy has changed). They argue further that competition between footloose low-cost carriers and full-service carriers might intensify and spread from secondary low-cost airports to the large regulated airports. Airports will then

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be forced to react and this will “raise the bigger question of whether, in more competitive circumstances, there is a continued need for formal price regulation”. The last 15 years have proven that this conclusion was exactly right. BAA was broken up in 2009 and although this remained an exception to the rule that airports within close vicinity have been privatised as a group and have not been broken up, it made competition a more attractive option for policy. The success of footloose low-cost carriers increased pressure also on large airports. To what degree, and if sufficient to make competition work, are questions on which airlines and airports disagree. Airport Council International Europe conducted a number of studies, arguing that airports are no longer a natural monopoly, but a competitive industry. IATA argued the opposite. While acknowledging that some competition exists for small regional airports they argued that airports still have persistent market power. Competition Authorities found that Manchester and Stansted Airport were subject to competition, while London Heathrow, Dublin and Schiphol have persistent market power. Because airports are often seen as facilitators of regional economic growth, the issue of whether or not an airport has market power is important to consider, also when making regional policy. An airport may link the economy to the rest of the world, and thus facilitate business and tourism. When an airport is a poorly regulated, whether it is a natural or regional, monopolist, it will not deliver the connectivity the region aims at. Instead, it will exploit the local region by offering less connectivity for the business and too high travel costs for tourism, in order to generate monopoly rents. Establishing whether or not an airport has market power, and how to regulate market power, therefore is crucial to regional policy.

In the last 20 years regulation also changed. In 2004 light-handed regulation was brand new. The Australian regulator switched from tight price caps to a form of monitoring which termed it light-handed regulation—a term very attractive as the UK style of price capping had become increasingly bureaucratic. Light-handed regulation had in the beginning a relatively easy field. Major capacity extensions like Terminal 5 at Heathrow were not necessary and some of the capacity extensions were more straight-forward than in the UK. Regulating investment became an important issue not only at LHR, but also in Dublin and at the Paris Airports and other European Airports. UK style of price capping has been copied by other European states—sometimes not perfectly well, but sometimes very well. The idea of incentive regulation has been adopted step by step. The EU Commission also tried to establish an independent regulator in each member state. After long fights, it succeeded in some countries like Italy, France and Portugal, but failed in Germany and Spain. The idea of designing good institutions and good incentive has gained momentum and has changed regulatory practices, at least in some countries. These changes in policy give academics a rich field for research and like the practitioners they come to different results and draw different recommendations. This book tries to provide an overview about these debates.

The debates about airport regulation are complicated by the Covid-19 crisis. The top 10 busiest airports from 2019 lost 60.2% on average of their traffic in the first half of 2020 (ACI 2020). In Europe, non-EU airports, while hit hard, were less impacted than EU-airports, due to differences in the severity of the outbreak and national

travel restrictions, and also due to the scope of the geographical networks served. Airports with a relatively high share of domestic passengers were hit, relatively speaking, less hard (Aviation24.be 2020). In other words, airports serving international and intercontinental trunk routes have been hit hard due to the current crisis, while under normal circumstances these airports are congested and oftentimes seeking to expand capacity in order to remain competitive. The increased pressure of low-cost carriers on large airports, as mentioned above, did not prevent these airports falling out of the list of the busiest airports.

Some airlines, often major airlines, flying international and intercontinental routes, received support. The common rationale is that hubs and hub airlines contribute to the local and national economies. Other airlines survive on their own, or fail, and these often are low-cost or regional airlines. This book will not address state support or economic effects, but from the perspective of competition policy it is interesting to see how the Covid-19 crisis exposes how a decline in the intercontinental market seems to hit (some) airports relatively hard, indicating a lot of traffic is only channelled through major airports under “normal” conditions. While this is not evidence for the abuse of market power, it does indicate traffic on trunk routes is channelled via a relatively small number of airports. At the same time, traffic on national/local markets allowed smaller airports to recover faster, while competition levels in such markets may be comparatively small. While we do not take a stance in the debate between IATA and ACI mentioned above, the developments we have seen since 2019 seem to suggest that under normal circumstances airports potentially may have some market power, even though this is not evidence for market power *abuse*. This observation, combined with the policy changes discussed above, necessitates an overview of the sources and practice of airport regulation.

This book provides this overview, and it does so in three parts. Part I provides a theoretical background on the need for regulation and systems of regulation. Airport competition is discussed, as well as common forms of regulation, and potential pitfalls. Part II discusses benchmarking, because benchmarking is often applied as an input to the regulatory process. Although benchmarking is necessary, reviews of how benchmarking is applied in the literature and in practice show improvements are possible. Part III provides examples from practice. Further details on the various parts are given below.

1.2 Part I: The Need for Economic Regulation

Chapter 2 focusses on airport competition. If an airport is subject to strong competition, it will not have much market power, and regulation will not be needed to keep prices down. But significant economies of scale and scope can lead to a natural monopoly situation in the airport’s catchment area. In addition, the large amounts of land needed for airports means that cities often have space for only one major airport. Connectivity is also better at larger airports, adding to their attractiveness. There is an advantage for regions of being served by only airport. But there are several factors

that can give rise to competition, high population density being the most potent. Passengers can choose between airports (and destinations served from the airports), but airlines face significant switching costs and often do not have much countervailing power, unless they are very well politically connected, and/or when they dominate the airport.

Given that high population density is perhaps the key driver of airport competition, one would expect that regulation would be unnecessary for airports, large or small, in high population density countries, such as the UK, but necessary in low population density countries. One might expect that regulation would be observed with large and small airports in these countries. However, the actual patterns of regulation only partly conform to this expectation (see the table below for Europe). In the UK, the larger airports, such as London Heathrow, are the regulated airports, while in Australia only large airports are subject to (light-handed) regulation. Thus, it appears that the size, not proximity to competition, is a critical factor in determining whether an airport is regulated. Chapter 2 explores why this is the case and also discusses why airlines with potential market power may not have an incentive to abuse market power.

Chapter 3 explores competition caused by the overlap between destinations in origin-destination and transfer markets. The results of this chapter show the majority of hub airports in Europe have a dominant position, both in the origin-destination and in the transfer market. But market concentration in transfer markets has been decreasing steadily. Based on these results, a straight-forward conjecture would be that airports have market power and should be regulated. Chapter 4 argues airport regulation is necessary, but neoclassical policy prescriptions, focusing on the deadweight losses of monopolies are inconsistent with the patterns of regulatory decisions and processes we observe in practice. In recent years an alternative rationale of regulation has emerged, based on transaction cost economics. This form of regulation focuses on the need to protect and promote the sunk investments of consumers—airlines—of the monopoly facility, rather than the deadweight loss.

1.3 Part I: Systems of Regulation

Following this discussion on the need for regulation, Chaps. 5–10 analyse systems of regulation. Chapters 2–4 already discussed “incentives” to abuse market power, and the following chapters discuss this issue in a more theoretical setting. Chapters 5 and 6 provide further detail on why “standard” policy, focusing on the deadweight loss, may fail. Chapter 5 argues that low-powered airport regulation reduces the airport’s ability to gain rents, but potentially leaves the rents to airlines when airlines have market power. After all, the companies involved (the regulated airport and the airlines) still have the incentive to maximise profits. High-powered regulation leaves the rents with the local airport rather than with the airlines, which may be politically convenient. In conclusion, different forms of regulation will have a different welfare impact, not always to the benefit of the final consumer. Chapter 6 examines airport

privatisation and various forms of airport regulation, taking into account the behaviour of public administration and non-aeronautical services of an airport. This chapter concludes that price-cap regulation on aeronautical services could reduce airport charges, but also introduce an underinvestment in airport capacity that could lower social welfare, again because the company still has the incentive to maximise profits and there is no “penalty” to the company if the regulator’s objectives are not reached. Chapters 5 and 6 thus provide some theoretical background to the argument put forward in Chap. 4: common policy prescriptions are inconsistent with what we observe in practice, because such prescriptions create (additional) inefficiencies, such as underinvestment. Chapters 7 and 8 therefore discuss a light-handed approach (LHR) to regulation (price monitoring, Chap. 7) and investment regulation (Chap. 8). Traditional regulation of firms with market power, be it cost plus regulation or incentive regulation, is recognised as having several drawbacks. As a result, some countries have replaced this regulation with LHR. Chapter 7 seeks to evaluate LHR in the context of airports. LHR is not a well-defined concept, but the elements which make up LHR can be identified. The potential positive features of LHR can be sketched out, and as can be the way it works. This leads on to a discussion of actual performance under LHR, and especially given the Australian experience. There is evidence that LHR works well in several respects, though its performance in some other respects, particularly in terms of its impact on productive efficiency, has not been much tested in a rigorous way. The chapter includes a discussion of how LHR might work if applied to other airports. It concludes with a review of the key findings and questions which remain to be settled.

Chapter 8 discusses regulation of investment in airports. Simple regulatory formulae, such as price caps, seem to work, but problems develop when major investments are required. Then it is difficult to ensure adequate investments in capacity and quality are made. One of the reasons for this problem is that regulators rely heavily on prices, but regulated prices are used to address several conflicting tasks, such as optimising capacity use, cost recovery, and incentives for investment. Additional instruments are therefore necessary, such as rewards for quality, and slots and trigger mechanisms for investment.

Chapter 9 discusses the difficult European airport (regulatory) environment. It adopts a political economy perspective. Many airports operate close to capacity and have high charges. In spite of this they perform quite well operationally. Slots create large rents which can be used to enable poor efficiency and enable the airlines and airports to create implicit contracts to underinvest and share the rents. This rent sharing is a possible explanation of why reform of regulation in Europe has been very slow and imperfect.

1.4 Part II: Benchmarking

One key issue in airport regulation is the application of benchmarking. Benchmarking is applied to determine the relative efficiency of the regulated airport, measured against its peers (comparable airports, performing just as well or better). After all, an airport that manages to increase its efficiency should also be able to reduce its prices. Benchmarking thus provides very important information to regulators and airport operators, but it is not a straight-forward exercise.

Chapter 10 discusses the three main methods for estimating airport performance, and the literature assessing the impact of regulation on airport performance. Regulation impacts airport efficiency, but this effect depends on the impact of governance form and competition levels on technical and cost efficiency. The chapter also provides a comprehensive review on the effects of regulation on economic efficiency. Of policy relevance in particular is whether incentive regulation is more conducive to cost efficiency more than cost-based regulation. Price-cap regulation in the UK had positive effects so strong that the regulated airports outperformed the competing airports. The chapter also outlines limitations of these studies and argues for more research to quantify the effects of regulation on cost and also allocative efficiency.

Chapter 11 discusses the many ways in which benchmarking has been used in the airport industry. It also examined some of the key issues associated with benchmarking. It takes a critical view of the actual practice of benchmarking and stresses the main pitfalls and dangers of benchmarking, such as lack of good data and misinterpretations in airport policy and regulation.

Chapter 12 provides an overview of practical issues facing a regulatory office seeking to use benchmarking to set a price cap at an airport. It uses the specific experience of Dublin airport price-cap regulation, where many different approaches to benchmarking have been investigated over the years. Because of the application to Dublin Airport, this chapter is on the border between Part II (on benchmarking) and Part III (practice), but due to the strong focus on benchmarking, it is included in part II of this book.

1.5 Part III: Regulation in Practice: Facts and Systems of Regulation

Following the discussions of benchmarking in regulation, Chaps. 13–18 provide country case studies to see how airports are regulated and benchmarking is applied in individual countries (see below table for the main results). While airport regulation is relevant all over the world, this book focusses on Europe and Latin America.¹

¹North America has adopted two models of airport regulation which are distinct from the rest of the world. Most US airports are operated either directly as public organizations or by port authorities.

Europe makes for an interesting case because EU airlines are allowed to fly within EU countries. For example, easyJet (easyJet Europe after Brexit) can offer flights within France. Airport regulation, on the other hand, often still is a local (national) issue. Airports may compete for services offered by airlines from other EU countries (and competition may have increased), while they are regulated by local regulators. Furthermore, regulation has been reformed in some European countries like Italy, France, Portugal, while other countries are still regulating airport in the traditional cost-based approach. Table 1.1 summarises the regulatory situation in the European countries discussed in Chaps. 13–17. The situation in Latin American countries is rather different and difficult to compare. Overall, the conclusion is that there is strong market power in most cases studied. But the regulator is not independent in quite a few of the countries studied.

Chapter 13 describes the development of airport economic regulation in the UK, comparing the system which was in force between 1987 and 2014 with the current regime. The chapter concludes the new system is more fit for purpose for today's UK airport industry. The first indications at Gatwick show the innovative and more light-handed approach has brought improvements. This finding is in line with the more theoretical expectations from Chaps. 2–6.

Chapter 14 discusses the French case. The competitive environment and the institutional and regulatory framework for airports in France have undergone major changes over the past three decades. While competition and carrier consolidation, and the growing importance of low-cost airlines, can be observed in the countries we have studied in this book, the institutional changes in France are more unique. The 2005 Law changed the rules on airport ownership and opened it up to private investors, leading to a different ownership structure of the larger French airports today, even though the planned privatisation of the Paris airports had to be postponed. The regulatory framework of airports has therefore also undergone major changes with the creation of a sectoral regulatory agency ASI, whose powers have been transferred in 2019 to the ART (Transport Regulatory Authority). Both single-till and dual-till regulation are being used. There are differences between the regulation of the large airports and the regulation of state-owned small regional airports. They are under the supervision of the DGAC, and for local airports (below 100,000 pax/p.a.) under the supervision of the Prefect, an administrator in charge of a local region.

Chapter 15 concludes that the large main German airports have persistent market power. All public airports have been corporatised and some of the large airports have

The vast majority of activities are outsourced by long-term contracts with the airlines. Investments are supported by the government. Airport charges are regulated through the full cost recovery principle so that the charges rose in the Covid-19 crisis as the decrease in output led to higher average costs. A similar reaction happened at Canadian airports. Canadian airport are not-for-profit corporations at the local level. The US and the Canadian governance models have not changed much. The US model has been well analyzed by Graham (1992, 2018) and the Canadian model by Tretheway and Andriulaitis (2008). Regulations in Africa and Asia which we do not cover in this book are analyzed in Winston and Rus (2008).

Table 1.1 Summary table of regulation in different European countries

Country/airport	Ownership	Market power	Independent regulator	Regulation
Austria				
Vienna	Minority private	High	Yes	Incentive
Denmark				
Copenhagen	Majority private	High	No	Light Handed
France				
CDG & Orly	Minority private	High	Yes	Incentive
Nice	Majority private	High	Yes	Incentive
Lyon	Majority private	High	Yes	Incentive
Marseille	Public	High	Yes	Incentive
Germany				
Düsseldorf	Minority private	High	No	Cost based
Frankfurt	Minority private	High	No	Cost based
Hamburg	Minority private	High	No	Cost based
Munich	Public	High	No	Cost based
Stuttgart	Public	High	No	Cost based
Hungary				
Budapest	Fully private	High	No	Incentive
Italy				
Milan Bergamo	Minority private	High	Yes	Incentive
Milan Linate	Minority private	High	Yes	Incentive
Milan Malpensa	Minority private	High	Yes	Incentive
Rome Ciampino	Majority private	High	Yes	Incentive
Rome Fiumicino	Majority private	High	Yes	Incentive
Venice	Majority private	Low	Yes	Incentive
Netherlands				
Amsterdam	Public	High	Yes	Cost based
Portugal				
Lisbon	Fully private	High	Yes	Incentive
Porto	Fully private	High	Yes	Incentive
Spain				
Barcelona	Minority private	High	No	Incentive
Madrid	Minority private	High	No	Incentive
Malaga	Minority private	High	No	Incentive
United Kingdom				
Heathrow	Fully private	High	Yes	Incentive
Gatwick	Fully private	High	Yes	Light Handed
Stansted	Minority private	Low	Yes	Deregulated
Manchester	Minority private	Low	Yes	Deregulated

been partially privatised with a minority share for the private investors. Ownership and regulation have not been separated, although this has been demanded by airlines as well as the German competition commission. Traditionally German airports have

been cost plus regulated. Attempts to reform this system have worked at some airports for some time, but in the end failed.

Chapter 16 evaluates changes in the market position of Schiphol airport in Amsterdam over the last decade. Examining the key developments, the chapter suggests the airport has probably strengthened its position in the markets for provision of infrastructure for both origin-and-destination and transfer passengers. However, through Schiphol Group's partial ownership of nearby operating airports (Eindhoven and Rotterdam) it has attracted services of some of the key LCCs, which have previously served the area via alternative gateways for the airlines serving O&D passengers. At the same time, several recent studies have documented increasing competition between the airports in the European context. The authors suggest therefore that a new investigation of market power of Schiphol airport is in order.

Chapter 17 compares privatisation, competition and of regulation for airports in Austria, Denmark, Italy, Hungary, Portugal and Spain. It shows that privatisation has set out mixed incentives for efficiency. Competition has increased for some airports, but the major airports still have persistent market power, because market structure has not changed with privatisation. This puts a heavy importance on the incentives from regulation, as we have seen in earlier (more theoretical) chapters (4–6). Even though we might expect competition levels to be higher in cities, regions or countries with high population density, this is very often not the case as they have been jointly privatised. Instead, these airports in these countries should be regulated for reasons discussed in Chap. 2. This chapter analyses how effective regulation is and how strong the incentives for efficiency are. For example, although Spain has adopted incentive regulation, the effects are not so strong as the regulator is not independent and the Spanish state still holds the majority share in the airports. Italy, Portugal and Hungary have reformed ownership and regulation in a much more consistent way, with clearer incentive for efficiency.

Chapter 18 describes the state of private participation and economic regulation of one hundred and eighteen airports in six major countries in Latin America. These countries in some cases have populations exceeding those of many European countries, and projections, by, e.g., Goldman Sachs, show the economies of, e.g., Mexico and Brazil are expected to be amongst the largest 10 economies in the future. Attention to these countries therefore is needed. The chapter concludes that concession contracts, regional companies, system of airports, and revenue-sharing clauses with the government are common features among airports. Under the body of rules needed to enforce regulation, regulatory agencies exhibit low levels of governance and weak economic regulation, as might be expected from the discussion in Chaps. 2 to 6.

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Part I
Theoretical Background: Market Power
and Regulation

Chapter 2

How Strong Is Airport Competition: Is There a Case for Regulation?



Peter Forsyth, Jürgen Müller, Hans-Martin Niemeier, and Eric Pels

Abstract Given the natural monopoly properties and higher levels of connectivity of large airports, workable airport competition may not be possible, requiring regulation. This simple rule becomes more complicated, when looking also at the product range of airports, difference in consumer preferences and their price elasticity or competition from other transportation modes like high-speed rail on short-haul routes, thereby also affecting the catchment area. Control of access to aviation-related services, like ground handling, can also matter. Private versus public ownership of airports complicates the picture, as do airport capacity constraint. Transaction costs and opportunistic behaviour can also lead to regulation.

After covering the literature concerning airport regulation, the chapter goes on to look at a number of actual cases involving market power and its regulation. It also looks at airports charging behaviour and price discrimination, depending on the level of congestion at an airport. A number of studies of airport competition and its implications for regulation are summarized, especially for the UK, the Netherlands [Schiphol] and Australia. The studies commissioned by the ACI, which suggest that airports should be just subject to competition law and regulation should be the exception are also discussed.

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Keywords Natural monopoly · Scale effects · Market power · Catchment area · Countervailing power · Demand side and supply side substitution · Price discrimination

2.1 Introduction

The intensity of the discussion about airport competition accelerated in 2012 with the study by Copenhagen Economics (2012) for Airport Council International (ACI) Europe. This study and the continuous stream of studies from ACI have put competition at the forefront of airport policy discussion, but the issue goes back even to the times when airports were in the public hands and were regarded as public utilities. Starkie and Thompson (1985) envisaged a competitive airport market for the London metropolitan area and recommended breaking up BAA first and selling the airports separately. The Thatcher government did not follow this recommendation and privatized BAA as group of regulated airports. In spite of this the idea of airport competition continued to be explored (Starkie 2002; Forsyth et al. 2010). The critical question is whether competition can be relied upon to limit the use of market power at airports or whether regulation needs to be used to do this.

This chapter addresses this question by first discussing the case for regulation. Thereafter we provide a brief overview of airport competition (Sect. 2.2) and then look at the factors determining the substitutability of airports (Sect. 2.3). In Sect. 2.4 we discuss the concept of countervailing power and apply it to the airport-airline relationship. In Sect. 2.5 we assess some evidence of the use of market power and then, before drawing some conclusions, we review studies of competition and market power.

2.2 Competition and the Case for Regulation

2.2.1 *Market Power and the Classic Case for Regulation*

Our interest here in airport competition is in that it can render regulation concerning market power unnecessary. If an airport is subject to strong competition, it will not have much market power, and regulation will not be needed to keep prices down (there may be other reasons for regulation however). In addition, connectivity is also greater at larger airports, adding to their attractiveness. As a consequence, there are definite advantages for regions for being served by only airport.

On the other hand, several factors can give rise to competition. The most potent of these is high population density, which may lead to a number of airports being close by in the same region. Hence there has been much interest in measuring the catchment areas of airports. Passengers can choose between airports if they are in the same region/catchment area, but it is not easy for airlines to choose which airports they will fly to and from. There are switching costs in the short run, and in

both the short and long run, airlines need to fly to and from the places which the passengers wish to fly from. Airlines do not usually have much countervailing power, unless they are very well politically connected, and/or when there are few airlines willing or able to serve an airport (and perhaps the airport or city is keen to ensure air service—see Sect. 2.5.1).

Given that high population density, which leads to the likelihood that there may be several airports in the same catchment area, is perhaps the key driver of airport competition, one would expect that regulation would be unnecessary for airports, large or small, in high population density countries, such as the UK, and necessary in low population density countries, such as Australia and Canada. One might expect that regulation would be observed with large and small airports in these countries. There are many countries in between, such as France, Germany and the USA. However, the actual patterns of regulation only partly conform to this expectation. In the UK, most airports are not regulated, but the larger ones, such as London Heathrow, are regulated, in some cases, quite tightly. On the other hand, in Australia, only large airports are subject to (light-handed) regulation, while medium sized airports, such as Adelaide's (800 km, away from the nearest airport capable of handling a medium/large sized aircraft, such as the Airbus A330 or Boeing 777), are not regulated at all. It appears that the size, not proximity to competition, is a critical factor in determining whether an airport is regulated.

There are some good reasons why this is so. For a start, there are not many airports which are close to a large airport which can serve all of the traffic which it does. London Heathrow may be quite close to many airports, all of which can handle a Boeing 737 or an Airbus A320, but not many which can handle medium to long distance aircraft, such as Boeing 747 s and Airbus A380s.¹ The large airport may have considerable market power over part of its product range. The large airport, in a large city, will have an advantage over smaller airports outside the city taking into account the cost of access and the time cost. (Heathrow slot prices are very much higher than Gatwick slot prices—for many travellers to or from London. Heathrow has the advantage over Gatwick even though Gatwick is significantly cheaper, suggesting that Heathrow and Gatwick are not strong substitutes).

At the other end of the scale, there are small airports which are quite distant from the nearest competitor—this is especially true for countries like Canada and Australia. This suggests that they have significant market power, but nonetheless these airports are not regulated. These airports' market power may be limited by competition between destinations, in the case of airports serving leisure destinations, or by ample competition from other modes, such as road or rail (Productivity Commission 2002).² Some of these airports are operated by not-for-profit enterprises

¹But see Maertens (2010) who showed that many airports have extended capacity for intercontinental flights in Europe but have never received such flights.

²The development of surface transportation infrastructure, as a factor increasing substitutability between the airports and modes of transportation, will be a factor limiting the airport's market power. However, for practical purposes, a more precise evaluation will be necessary.

or municipal authorities—these may not be exercising the market power they possess. For the medium sized airports which are privately owned, local communities may have some say over the pricing policies of the airport—they will be expected to be good corporate citizens and to not make use of their market power. This would involve keeping prices close to cost. It is also possible that such airports may be using their market power to allow costs to be higher than the minimum possible (in the way that cost-plus regulated firms do). Market power may be being used in a way which is not apparent (such as over capitalizing the airport). Small airports often have difficulty in covering costs, even at relatively high prices, and for these the risk of abusing market power is small.

There may be good reasons why it is the large airports which are regulated, and the small to medium sized airports are not regulated. But it is also feasible that authorities have not been making good choices when it comes to airport regulating. Some airports which do face sufficient competition may be being regulated, at a cost in terms of efficiency and administration, and some airports which face very little competition may be not regulated, and which are able to exercise their market power, at a cost in terms of efficiency. There is a need to scrutinize the decisions about which airports should and which airports should not be regulated.

A standard argument for market failure, and thus the need to regulate, is usually found in scale economies, potentially making the airport a natural monopoly. Intuitively, smaller airports (measured in the number of passengers or flight movements) will have strong scale economies, while large airports have had more opportunity to exploit scale economies. If the bigger airports are regulated, this is then because the expectation is the market power they have comes from other sources, for example a locational monopoly. Small airports need to set the price above marginal cost in order to survive (without subsidies). So, while there may be good reasons to regulate large airports, we must be certain about the nature of the source of market failure and the need to regulate.

2.2.2 The Allocative Efficiency Argument

If an airport is privately owned, and has a monopoly, it will have the incentive and ability to charge high prices. This has an impact on allocative efficiency—it will produce too little of its services at too high a price. This is the classic argument in favour of regulation, and it is used in a wide variety of cases of utility regulation (Armstrong et al. 1994). With airports, the allocative efficiency gain from regulation is not likely to be great. For most monopoly airports, the elasticity of demand will be very low.³ In theory, this would enable the airport to price at a substantial multiple of

³This is the case when there are no good substitutes because airport charges are only a small proportion of air travel demand which is also not very elastic. For an alternative view, see Starkie and Yarrow (2013). Note we do not refer to a point elasticity here, but to the general shape of the

cost. In practice, airports are not likely to make full use of the market power they have—they may set prices above costs, but there may not be an enormous margin (the reasons for this behaviour may be several—the influence of commercial revenues is often mentioned). In this case, there will be an allocative efficiency loss, though it is quite small due to the nature of (some) airport assets—some necessary inputs may not be readily changed in the short run.⁴ The classic allocative efficiency argument for regulation is not strong.

If there were strong competition for the airport, it would not be able to charge high prices for its services, and this source of allocative inefficiency would be eliminated. However, there is also the possibility that the airport faces some competition, perhaps from one or two (perhaps less convenient) airports. In this case, the main airport would be partially constrained by the prices set by the competing airports. It is quite likely that the main airport has adequate capacity to serve all of the traffic to and from the region. The efficient solution to the airport allocation problem is that only that traffic which prefers the less convenient airports will use them—the main airport will set its prices such that they are sufficiently low such that this occurs, in other words, the airport will have a higher capacity utilization. However, there is also a distinct possibility that the main airport will set relatively high prices, inducing some of the traffic which it could handle efficiently to travel to the higher cost alternatives, requiring allocative inefficient expansion at less favourable airports.⁵

This type of situation can also occur with other services provided by the airport, most notably car parking. It is possible that the airport has ample space to provide car parking spaces, and that this parking may be the most efficient supply. However, if the airport has high parking charges, many users may be attracted to other, less convenient, car parks which are cheaper. The result will be a less efficient allocation of cars to car parks than can be achieved. In principle, regulation of car park charges, can achieve a more efficient outcome in terms of the lower overall costs and lower parking charges.

This inefficient allocation of traffic between airports, or cars to spaces, need not come about. If the airports were pure profit maximizers, and if they have highly accurate estimates of their market power, they would price their services and the amount of capacity they provide. The potential operators of less convenient airports will see that the customers with the highest willingness-to-pay choose the most convenient airports, even though the price may be high. The less convenient airports may then face the choice of investing in capacity or quality, without certainty that they will attract enough passengers (with a high willingness-to-pay) to make good on their investment.

demand function. Also, on an inelastic demand curve will the monopolist look for price–output combinations which yield positive marginal revenues and a point elasticity larger than one in absolute value.

⁴But see Basso and Ross (2010) and Basso (2013).

⁵This could be particularly true if the main airport finds it difficult to price discriminate between users. It is also quite possible that the privately owned main airport is not a pure profit maximizer. In this situation, there can be a prima-facie case for regulation to keep prices closer to cost.

In reality, airport operators have imperfect information about their market power (and thus do not have the required knowledge to set optimal prices) and do not always act as profit maximizers (possibly decades of experience as public enterprises have conditioned their behaviour). Regulation may be able to avoid these sources of allocative inefficiency. A little competition may lead to results less efficient than monopoly. This also suggests that if there are two or more airports, it can be more efficient for them to have the same owners rather than different owners. If the one owner allocates traffic efficiently, single ownership does have at least one advantage (though this needs to be set against the costs of the owner using its market power). After all, in an industry which relies heavily on fixed assets, price competition may eventually result in prices falling below the level of fixed costs. The deregulation of the airline industry and rail industry in the USA caused many potential competitors to merge in order to reduce competition, but also to reduce fixed costs and over capacity. One of the reasons for regulation of airline markets in the USA prior to 1978 was to reduce the effect of excess capacity and destructive competition.

2.2.3 Regulation, Competition and Public Airports

One should not assume that there is a case for regulation of an airport only if it is privately owned. There can be a case for regulation of publicly owned airports. Some major public airports such as Amsterdam and Munich Airport have been regulated. The UK regulator regulated publicly owned Manchester Airport and the private London BAA airports irrespective of their ownership. Currently, Manchester airport is not regulated, since competition from other nearby airports, such as Liverpool's, has been judged sufficient to moderate its behaviour. The fact that Manchester has a minority private investor since 2013 has no effect on this decision. A number of European airports, in particular those of Germany (e.g. Hamburg, Frankfurt, Dusseldorf), and French airports such as Paris Charles de Gaulle, or airports in Spain are partly privatized, though still majority owned by the state. The charges and prices of all of these are regulated.

Most public airports will not seek to maximize profits, thereby creating a dead-weight loss in efficiency terms. However, they can use their market power, if they have it, and reduce efficiency in other ways. One way in which they can do this is by producing inefficiently—if the airport is subject to competition, its ability to do this is reduced. Another possibility is where an airport raises its charges and invests excessively—the more the airport faces competition, the less scope it has to do this. A publicly owned airport can also seek to provide an excessively high level of quality. It will be less likely to do this if it faces competition (low-cost carriers have switched to lower cost, albeit less convenient airports when the major airport has been offering too high a level of service quality).

There are several ways in which an airport can use its market power, resulting in less efficient pricing and operation. If competition is effective (but see the previous subsection), these ways will be cut off, and there is no need for regulation. However,

if the public airport does have strong market power, it will often use it in a way detrimental to economic efficiency. In this case, regulation may help lessen this source of inefficiency.

2.2.4 Alternative Arguments for Regulation: Transaction Costs and Opportunistic Behaviour

The standard approach that regulation should correct the welfare losses from persistent market power has been questioned from the perspective of transaction cost theory (see chapter by Biggar in the volume). Biggar (Chap. 4) and other authors like Wolf (2003)⁶ argue that in practice regulation is not done to avoid the deadweight loss of monopoly pricing, but to protect investors and users which make sunk investments from being expropriated. Both sides, the airport investors as well as the users make investments in long-lived physical investments. The airport builds runways and terminals. The airlines also make long-term investments to equip these facilities with. Airlines built their base and station aircraft. They invest in lounges and marketing campaigns. Hub carrier built up their network. Both parties face the danger of opportunistic behaviour which could make the relation specific investment unprofitable. The airport might face the problem that the users could force charges down to marginal costs which do not cover the average costs. Likewise, once the airline has made the investment, the airport could take advantage of this and raise its charges so that it extracts all the profits and the airline just receives the marginal costs of its sunk investment. In theory, perfect contracts could offer a solution, but in world of risks and radical uncertainty contracts cannot be complete and need also discretionary power. Such discretionary power could be provided by regulatory contracts. For example, the regulatory asset base (RAB) approach of UK style price caps offers the commitment of the regulator that airport charges do not fall to marginal costs, but will be sufficiently high to cover average costs (Helm 2010).

2.2.5 Distribution, Regulation and Competition

The distribution of producer and consumer surplus can be affected by regulation, and this means that the relative merits of competition and regulation can vary as a result of regulation. Typically, regulation can result in customers gaining from regulation, at the expense of producers (though this may not always be the case, where regulation is systematically designed to help producers at the expense of customers).

⁶Dieter Helm (2009, 2010) without explicitly referring to transaction cost theory calls this the “time inconsistency” problem of infrastructure investment, that is the danger stemming from opportunistic behaviour to charge only marginal costs for a sunk investment.

In the airport context, in the absence of competition, prices can be lower as a result of regulation. It is not clear that there are any obvious disadvantages from lower or higher prices. If producers and customers have equal weights, whether a price is higher or lower is immaterial. Sometimes regulators express a preference for consumers over producers—in such a case if regulation keeps prices down, this will be a benefit from regulation. On the other hand, if the airport is publicly owned, and the government has a high marginal welfare cost of raising taxation, additional profits earned by the airport achieved by higher prices would be welfare increasing.

Thus far, we have used the term “customers” of the airport advisedly. Airlines and their passengers are different and are affected differently. It does not necessarily follow that the final incidence of higher or lower airport prices falls entirely on the passengers, and/or that they are unaffected. One possibility, which is relevant for many, particularly larger, airports is that their capacity is slot constrained. If this is the case, an increase in airport charges will be paid for entirely by the airlines—in a competitive market they are unable to increase their own fares and suffer a reduction in slot rents (Forsyth and Niemeier 2008). If the airline markets are very competitive, an increase in airport charges will be passed on in full to the passengers. However, airline markets are very often likely to be less than perfectly competitive—very many airline markets have one, two, or three independent airlines competing. In such a case, they can be more accurately characterized as oligopoly rather than competitive. If this is the case, an increase in airport charges will be paid for by both the airline and its passengers (Forsyth 2017).

To sum up, there is no general case on distributional grounds for or against regulation of airport charges. However, regulation has implications for airport charges and the distribution of traffic between the airport, the airlines and their passengers. Depending on the context there can be a case for or against regulation as a result of its effects.

2.3 Airport Competition: A Brief Overview

2.3.1 *Privatization and Incentives for Profit*

For many years, airports were regarded as quintessential public utilities. They were publicly owned and managed and were normally priced to cover costs. They were regarded as natural locational monopolies, though there was not much analysis of the natural monopoly assumption. The question of competition did not really arise. For most cities there was only one major airport, and the closest airport was assumed to be quite distant. Such an airport would have a monopoly of access by air. While there were exceptions to this rule—for example, some cities had two or more airports—public ownership and cost-plus pricing rendered the question of competition irrelevant.

From the 1980s, airports began to be privatized. Initially, the three London and four Scottish airports of BAA were privatized, and later on, other airports were

privatized. The privatization move has still a way to go—countries are gradually privatizing their airports, though many still exist in public hands. When the three London airports of BAA were privatized, they were privatized as a group, though the issue of whether it might be better to privatize them individually, to foster competition, was raised (Starkie and Thompson 1985)—recently the airports have been de-merged. More recently, the Spanish airports have been privatized as a group, precluding the development of airport competition.

Privatization would affect the incentives of the airports—an airport with market power would seek to use this to put up its prices, so gaining higher profits with low output. As a result, most larger airports were regulated at the time of privatization. In recent years, there has been less of an assumption that competition is infeasible for most airports, and more willingness to analyse whether competition could come about. This has happened in the UK, which has removed or lessened the regulation of Manchester, then Stansted, and more recently London Gatwick airports. In short, airport competition is now recognized as a possibility, and the question being posed is whether it is sufficiently strong for regulation to be lessened or removed. For a survey of different aspects of airport competition, see Forsyth et al. (2010).

2.3.2 Types of Airports and Sources of Competition

There are several ways in which airport competition can come about (Tretheway and Kinkaid 2010).

One of these is where there are several airports in the same city. This can be the case in large cities such as London, Paris, New York, Tokyo, Shanghai and Los Angeles. Competition can exist if the airports are independently operated, as in the case of London now. One consideration which determines how strong competition concerns how close the two or more airports are. In the case of Tokyo, Haneda airport is close to the city centre, but Narita is quite remote—68 km away from Tokyo Station. In London, Heathrow and Gatwick do compete, though they are not perfect substitutes for one another—charges are significantly lower at Gatwick, and the prices of slots at Heathrow are much greater than at Gatwick.

Another source of competition can come about if airports are not in the same city, but in close by cities. There are many situations in which it can come about. Two large cities, such as Manchester and Liverpool, are quite close, and their airports compete. Low-cost carriers (LCCs) have been quite adept in seeking out airports which serve a city and also a broader region. These may be hitherto secondary airports, former military airports or, occasionally, new entrant airports. Many of these smaller airports are only able to serve some of the product range of airports—for example, they may have short runways which cannot cater for long-haul flights. Nevertheless, they are capable of providing strong completion for part of the range of services offered by the primary airport.

With both of these sources of competition, the strength of the competition will depend on how close the airports are, i.e. how easily they can be reached. As a result,

the distance between potential competitors drives a lot of the analysis of whether an airport has market power. One way of assessing competition is to measure the distance between airports or the travel time necessary to access them (see Sect. 2.4.2). Another way, which is related, is to survey passenger preferences and measure whether they are prepared to travel to further away airports. This will be related to the passenger's values of time—typically, business travellers will have a higher value of time and will be more likely to opt for the closer airport than leisure and visiting friends and relatives (VFR) travellers.

For two types of airports, hubs and cargo airports, proximity is less important as a determinant of competition. Some airports are primarily hubs for transfer traffic (e.g. Dubai, Abu Dhabi) while others have a strong role as an origin-destination airport as well as a hub (London Heathrow, Amsterdam Airport Schiphol). The business of a hub airport is to serve connecting traffic. As a result, the competitor of a hub airport need not be close. Frankfurt may be a strong competitor for London, and Dubai for Istanbul (see chapter on hub competition in this book). Hub airports are actively seeking to gain business from other hubs. Furthermore, hubs are now seen as very desirable by governments, since they are seen as the source of wider economic benefits (WEB) of air travel. The recent London Airports Commission (2014, 2015) put a very high weight on the perceived hub benefits of Heathrow airport.

Finally, airports compete for cargo traffic. There are some airports which are virtually all cargo airports or some which have large cargo businesses. These may be located close to large industrial areas (Hong Kong) or may be hubs (Memphis). Cargo is less time sensitive than passengers, and the catchment area of a cargo airport may be larger as a consequence. Cargo airports, especially those which are hubs, may be competing with others some distance away.

Competition between airports can be constrained. One obvious way is that not all airports can serve the whole range of potential traffic. Only the very large ones can serve long distance flights using large aircraft, such as the Airbus A380. However, one of the more important constraints is that of capacity. Many airports, in Europe, in North America and some parts of Asia are capacity constrained. These airports are subject to excess demand—they would like to serve more flights than they are currently able to. Capacity constraints do not preclude competition, but they do blunt its effectiveness. This will be particularly the case of the limited capacity is not efficiently rationed—which is often the case. Airports rarely use prices to ration demand (Heathrow, Gatwick and Brisbane are exceptions), though slot markets are sometimes tolerably efficient (as in London). Airports which rely on opaque slot markets (most of Europe) or delays (most of the US airports) ration scarce capacity inefficiently.

Competition between two airports, one of which is capacity constrained, can be consistent with moderate efficiency if the capacity is efficiently rationed, but it will not bring down prices (the airport with adequate capacity will be able to increase its prices to take advantage of its competitor's higher prices). Competition is desirable, but it is not as effective as when both the airports are unconstrained. The UK CAA's decision to use a form of light-handed regulation for Gatwick, given that its

competitor Heathrow is very capacity constrained, is understandable—total deregulation might not be a prudent choice.

Thus far we have discussed airports which have targeted traffic in general. As LCCs have developed, they have made extensive use of airports which have limited facilities and which are often quite distant from population centres or tourist destinations. Quite often there are only one or two airlines which make use of these “LCC” airports. The introduction of these new airports has increased the effective competition for the established airports. These “LCC” airports may not have much market power, since LCCs often are readily able to switch airports. Destinations and airports may seek to subsidize airlines to come and offer services (Sect. 2.5.3).

2.4 Substitutability of Airports

Passengers and/or airlines (or other companies) may perceive different airports as substitutes if these airports offer services in line with the customer’s expectations. The airports must not only have overlapping geographical catchment areas, but also the service offered must be similar. This is discussed in more detail in the following subsections.

2.4.1 Demand Side and Supply Side Substitution

From the demand side, the passengers’ willingness to switch between airports depends on their sensitivity to various factors, such as price of flight, schedule convenience, airport proximity, airport convenience, etc. If airports are perceived as close substitutes, this puts pressure on airlines serving a particular airport to adjust their business strategies and potentially curtail their services. Secondly, on some (especially longer haul) markets, airports competing for O&D traffic may be located outside of what is conventionally considered an airport’s catchment area.⁷

Airport customers include different types of companies (airlines, logistics service providers, etc.) using airport capacity as an input into their production process. Airport market power then becomes relevant if supply substitution is limited, because, as discussed above (Sect. 2.2.4) and below (Chap. 4), airport users make sunk investments in order to benefit from the airport to produce their output.

⁷This appears to be the case, for instance, for European traffic to North Africa, where Paris area airports have a traditionally strong position on EU–North Africa market.

2.4.2 Provision of Infrastructure for O&D and Transfer Passengers and for Cargo: The Definition of Catchment Areas

An airport attracts passengers within a certain geographical area around the airport, which is called the catchment area of the airport. The relevant geographic market in the downstream markets for air transportation services is defined by these catchment areas. Since the demand for the provision of infrastructure for landing and take-off of different types of aircraft is derived from demand downstream, the geographic market definition for the upstream markets has to take the catchment areas of the downstream markets into account.

The European Commission's approach towards the definition of the geographic market in the airline industry is a two-step approach. The first step is to take a certain circle area around the airport as a starting point. The distance from the airport and the travel time needed for access is of great relevance. With reference to passenger transportation, the circle tends to be wider for long-haul or intercontinental flights and smaller for regional or short-haul flights.⁸

In the second step it is necessary to determine the exact catchment area (see former merger cases by the European Commission). In the KLM/Martinair merger case, the Commission conducted a passenger survey at Schiphol airport to investigate if Dusseldorf and Brussels airports belong to the catchment area for time-insensitive long-haul flights to Caribbean destinations. Tour operators considered Schiphol airport's catchment area of 200 km and 2 h drive as relevant, so Dusseldorf and Brussels airport belong to the catchment area of Schiphol airport for long-haul flights.⁹

If these catchment areas do not overlap with that of another airport capable of providing access to the same kind of infrastructure, we can say that the airport is indeed a local monopolist. However, the catchment area for O&D passengers is different from that for transfer passengers and cargo, so the same analysis must be done with respect to transfer passengers and cargo transport.

Transfer traffic emerges because many airport-pair markets worldwide lack non-stop air services, or airlines offer indirect alternatives to compete with the direct services offered by other airlines. Passengers travelling on those routes will be required to change planes and sometimes carriers along the way. These transfer passengers have a choice among airports hosting airlines that offer such transfer services. The "need" for airlines to accept transfer passengers largely depends on the size of the home markets. If the airline desires to serve a worldwide network with relatively high frequencies, while demand from its home airport is relatively low,

⁸ As a starting point for the definition of the catchment area, the Commission considers distances of 100 km and one-hour travel time for short-haul flights and distances of about 300 km for international airports. For a hub airport, the Commission considers the main European hub-airports as belonging to the same catchment area, which can be reached within a 2 h flight.

⁹ See Mueller et al., p.61ff.

transfer passengers are essential to keep the load factor at acceptable levels. Since most airlines flying long distance routes rely on transfer passengers to some extent to keep the load factor at acceptable levels, competition in these markets is quite tough, both for airlines and airports. The geographic catchment area is quite broad, with Middle Eastern airports competing for transfer traffic with European airports in some long-haul markets.

Cargo transportation is not time-sensitive, contracts are of short duration and airlines have a greater flexibility to adjust their networks as a reaction to price changes compared to passenger airlines. This works in favour of the broad geographic catchment area. Within Europe there are strong indications that the relevant geographic market for air cargo is EU-wide.

Markets are separate from each other if substitution between different services is low, which restricts competitive pressure, but this does not seem to be the case for cargo.

2.4.3 High-Speed Rail Competition

High-speed rail (HSR) affects airports in two ways. First, there is substitutability towards rail services on the short-haul routes. Second, high-speed rail can increase the airport's catchment area. For example, the opening of the Channel Tunnel caused some airlines to exit the London-Paris market, while at the same time Air France could use the link to feed its intercontinental network. But this effect is not only limited to the London-Paris market. On a number of routes, development of high-speed rail has led to reduction or elimination of air services. The most vivid examples in the EU are Paris-Brussels, Paris-Lyon and Madrid-Seville markets, where share of high-speed rail exceeds 75%. At the same time, high-speed rail can enlarge the airport's catchment area and bring more O&D passengers to the airport.

In general, it is difficult for the airlines to compete with HSR on routes where travel time by rail is 4 h or less, meaning that the airline is likely to expect a significant competitive effect. This of course depends on the pricing strategy of the HSR operator, with HSR often being the more expensive alternative. If low-cost carriers compete in the market, they often offer the lowest fares.

Gonzales-Savignat (2004) conducts a survey of travellers on Barcelona-Madrid HSR line to evaluate responsiveness of business and leisure travellers to price and non-price characteristics of rail services. In addition to discovering the obvious fact that leisure travellers are more price sensitive, the author finds that business travellers are found to be more sensitive to travel time changes than leisure travellers. Greengauge (2006) investigates the effects of the introduction of high-speed rail at Heathrow and finds that such a development will likely bring a transformation in general rail access to the airport from such geographical regions as North England and Scotland, as well as the near-continent (France, Belgium, the Netherlands and parts of Germany).

2.4.4 *Bundling: Aviation-Related Services and Market Power*

An airline requires certain aviation-related services while its aircraft is at the airport, including refuelling as necessary, cabin servicing and/or luggage handling. These ground handling services cannot be performed outside of the airport's premises. The relevant issue is whether the airport itself will be interested in getting involved into provision of such services, and if it will have incentives to restrict entry of other providers. The airline can provide ground handling internally (in this case, it can also sell its ground handling services to other carriers at the airport) or purchase it at the airport. In the latter case, ground handling can be provided by the airport itself, or by a specialized company operating at the airport. It is obvious that an airline with substantial presence at the airport will be less likely to outsource ground handling and instead take advantage of economies of scale associated with organizing the activity internally. The degree of airports' involvement in provision of ground handling services varies across the world, and its determinants are not as of yet well understood. For instance, while in the USA only the smaller airports have recently started testing the water in this area, Fraport—a company managing Frankfurt International Airport—has been offering ground handling and other services not only at its home base, but also at twelve other airports worldwide.

From the point of view of economics, the main issue with the airports' involvement in aviation-related services is their control over essential inputs in the process. Airports operating their own ground handling services might restrict competitors' access to those inputs (these include apron, luggage belt, fuel facilities, etc.), with detrimental consequences for competition. Such issues are within the realm of regular competition policy—firms which are denied access to essential inputs can refer the matter to the relevant competition agency. The regulator has to however understand that the airport, being in control of the essential inputs, may have an incentive to engage in exclusionary practices. On the other hand, if the airport faces competition (in origin-destination or transfer markets), margins in general will be relatively low. Promoting competition between service providers may then lead to wasteful competition and/or low wages may lead to a shortage in staff, as currently witnessed at some European airports.

2.5 Countervailing Power

2.5.1 *Are There Alternative Airports Available?*

What if the airlines have countervailing power—would this mean that the negative effects of market power at the airport level would be eliminated or reduced? There are several sources of countervailing power, but they can be grouped into two. The first of comes about as a result of political power—the airline or airlines may have more political power than the airport, and they may be able to induce the government

to tilt the balance in their favour. This may be done informally, or quite formally—for example, they may be able to induce the government to regulate the airport. The second source of countervailing power is market based—the airline(s) may be sufficiently strong as a buyer of the airport's product to influence the terms of sale. Essentially this is the bilateral monopoly case.

In this case, the airport has a monopoly over landings at the airport, and the airline is the sole buyer of its services (it is possible that there are several airlines but that they collude in dealing with the airport). The results also depend on the market structure in the airline's product market, though in this case, it is implausible that the airline will be anything other than a monopoly. There are several possibilities with bilateral monopoly, and it can be less inefficient than pure one-sided monopoly. The two firms will share the monopoly profits, and the traveller will be worse off than under competition. If the airline and airport collude, joint profit maximization will lead to greater output and greater passenger welfare, but passengers will be still worse off than under competition, see, for example, Zhang and Zhang (2006) for an extensive analysis and discussion.

The genuine bilateral monopoly situation is feasible, but it is likely to be rather rare. There are several cases where there is a monopoly of airport services but there are likely to be few cases where these are matched by monopsony and monopoly with airlines. A possible example could be one where there is a remote airport and one airline which serves it, and there are no alternative airlines which are capable of serving it (perhaps because specialist aircraft are required). In this situation, while the result is better than pure monopoly, there may still be a case for regulation.

There are some specific cases in which the airport may have relatively little market power. One of these is that of hub airports with little origin and destination traffic. Of course, most hubs do have very significant non-transfer traffic (which is why they have grown large). However, some airports mainly serve hub traffic—some airports in the USA are (or were) cases of this, and the Gulf airports (such as Abu Dhabi) also are. The airlines which use them can threaten to switch their operations (over the medium to long term) and have strong bargaining power.

2.5.2 Are Airline Markets Competitive, Contestable or Concentrated?

Other than these sorts of situations, monopsony power on the part of the airline will depend on the airline having monopoly power in its product markets—and this is rather unlikely. Airline markets tend to be quite competitive in the main. While they are not purely competitive or contestable, airlines typically do not have much market power (if they did they would be much more profitable than they are now). Even though the number of competitors in a route market tends to be small in all but the largest markets, they do not behave as small group oligopolists. While empirical tests showed that they are not highly contestable, they still are somewhat contestable.

If fares are high, new airlines will quickly bring them down. If a market gap emerges, new airlines will swiftly close it—as happened when the dominant carrier at Budapest, Malev, exited, see Bilotkach et al. 2014). This means that it is difficult for an airline or airlines to gain sufficient monopoly power to exercise countervailing power.

It is important not to assume that size or apparent market dominance gives countervailing power. Some airlines are very large, but this does not mean that they are able to exercise countervailing power over airports which have some market power. Large airlines complain about the largely deregulated Auckland Airport, which has high fees and is very profitable. Airlines may threaten withholding of fees, but in the end they pay up. Sometimes large airlines have some political power—but by the same token, local airports have the ear of local politicians and are seen as local champions. This is discussed in some country studies in later chapters.

An apparently strong position at an airport need not convey countervailing power. An airline may have a high percentage of flights from an airport, but this will not translate as market power. If the airport puts up prices, what can the airline do? It cannot switch to an alternative airport if there are none to go to. If it refuses to pay, it will vacate the market, and another airline will enter, and pay the price which the airport insists on.

2.5.3 Countervailing Power and Subsidies

Subsidies paid to airlines have become a significant issue in recent years. These subsidies may be paid by regional or national governments, or they can be paid by the airports themselves. The existence of a subsidy suggests that the market power of airports is not absolute—monopolies do not usually pay their customers to use their facilities. Airports nowadays often price discriminate—this does not necessarily mean that they provide subsidies. However, sometimes airports provide unambiguous subsidies. This could come about if a region considers that air services create wider economic benefits (WEBs), or the airport may be too small to be profitable. The Airports Commission for London put a high weight on connectivity benefits in its recommendations even though London is already very well connected (Airports Commission 2015). The net effect of this is that even with monopoly airports, the airlines can some market power. This is an aspect which has yet to be researched thoroughly.

2.5.4 Countervailing Power and Passenger Interests

Suppose that an airport faces little competition, but that the airlines which fly to it have countervailing power—the extreme case would be a bilateral monopoly. The airport will not be able to act as a monopolist, but will be needed to share its market

power with the airline. This will influence the price-output choice of the airport and airline, and the outcome may be a more efficient choice than the pure monopoly airport situation.

However, this does not imply that the passengers gain from the presence of countervailing power. The passengers will pay a high price, as the airline and airport share the monopoly rents (Zhang and Zhang 2006). If the objective is to keep prices low to the ultimate consumer, the passenger, countervailing power of the airline does not help—to keep prices down, regulation will still be necessary.

2.5.5 Competition and Countervailing Power: A Summary

In the sections above, there has been a range of factors which will determine whether an airport has market power and is subject to countervailing power—these will influence the case for regulation. These are summarized in Table 2.1. Four types of airports are considered—these are Major Hubs (e.g., London Heathrow, Amsterdam Schiphol), Large city airports (e.g. Düsseldorf, Melbourne), Low-Cost Carrier Oriented airports (e.g. Hahn, Charleroi) and small regional airports (e.g. Inverness).

This table is modelled on a simpler table set out in the 2002 Productivity Commission Report (Productivity Commission 2002, p 133—see Sect. 2.7.2). The catchment area is an important determinant of competition, as are the type of traffic served (business or leisure) and the presence of alternative modes for access. The presence of countervailing power by airlines affects the case for regulation, and the willingness of the airport to subsidize airlines to provide services is an indicator of the relative market power of the airlines and airport. Whether an airport faces competition from alternative hubs is relevant, as is whether it is capacity constrained (constrained airports may have market power).

Table 2.1 enables one to check the different factors which affect the case for regulation. Some typical examples are given. Thus, London Heathrow faces competition in its catchment area, and hub competition, but it is capacity constrained. Düsseldorf is not a hub, but it too is constrained. It is unlikely to be subsidizing airlines though it may price discriminate. Hahn Airport faces less competition from other modes, and it may face countervailing power from the few airlines which fly to it. Finally, Inverness Airport is relatively remote in the UK and faces relatively little competition.

2.6 Some Evidence of the Use of Market Power

2.6.1 Airport Charging Behaviour

There is no “one-size-fits-all” recipe that will allow understanding airport charges in airports dominated by a single airline or few carriers. To begin with, there are two

Table 2.1 Factors determining market power and countervailing power at airports

Factor	Catchment area	Type of traffic	Competition from other modes	Countervailing power	Subsidies	Hub competition	Capacity constraints
Major Hub Heathrow	High	Business	Strong	Low	No	Yes	Yes
Large City Düsseldorf	High	Business	Strong	Low	No	No	Yes
LCC Oriented Hahn	Moderate	Leisure	Moderate	High	Possible	No	No
Regional Centre Inverness	Small	Business	Low	Moderate	Possible	NA	No

types of dominated or concentrated airports. Large concentrated airports are typically dominated by a hub operator, whereas high concentration at the small airports may be driven by economies of scale. Such airports need their captive customers as much as the customers need the airports. With London Heathrow being probably the only exception, most currently large airports in Europe will lose a significant share of their traffic if the hub operator leaves or is forced into bankruptcy. Such a setup will necessitate some sort of bargaining between the concentrated airports and corresponding airlines. How to evaluate the likely relative strength of the parties' bargaining positions, and possible outcomes of such bargaining? Current literature has addressed relationship between airport dominance and airfares (Borenstein 1989; Bilotkach 2007), as well as between the airport concentration and air traffic delays (Brueckner 2002; Mayer and Sinai 2003). The apparent consensus from the above studies is that airlines with the dominant positions at airports will charge higher airfares. This increases the potential surplus that can be shared between the airlines and the airport. Also, empirical evidence indicates that the dominant airlines internalize some of the self-imposed congestion externalities.

In the light of the above-stated, it is not obvious whether the airport or the airline will have a better bargaining position. This is especially true in case of an airline running a single-hub network. An air carrier with several hub airports in its network can utilize this network structure to its advantage, using a credible threat of routing some of the transfer traffic through another hub to negotiate lower aeronautical charges. It is not very difficult for an airline with multi-hub network to dismantle one of the smaller hubs—we have witnessed a number of such moves in the US airline industry over the last decades. For instance, when Delta Air Lines decided to stop using Dallas-Fort Worth airport as one of its hubs, it has decreased the number of destinations served out of that gateway from over 70 to just six over a year. Few airlines within the EU, however, currently operate a dual-hub system. In addition to the obvious consideration of the scale of operation required for the two- or multi-hub network to become a viable option, nationality clauses still present in bilateral agreements with some countries also get in the way.

Take the case of KLM Royal Dutch airlines. For this carrier, locating a potential second hub within the Netherlands will probably not make sense, as hub airports require substantial O&D traffic to be viable. And KLM will not be able to use that second hub airport to channel traffic to or from destinations located in countries that include a nationality clause in their air services agreement with the Netherlands. While there has been some progress towards removing this clause (e.g. US-EU Open Aviation Area agreement allows EU carriers to fly to the USA from other EU countries than their home state), it will take a number of years (if not decades) before nationality clauses become history. On the other hand, if KLM dismantles its hub at Amsterdam Airport Schiphol,¹⁰ no other Dutch carrier will be able to replace it in the foreseeable future. In either case, it appears that the larger the carrier, the better its position in the airport-airline bargaining relationships. Size of the carrier's

¹⁰The KLM/Air France merger included dual-hub guarantees, which expired in 2011.

home country also matters, given the regulatory regime in international aviation. An important point to make here is that the latter consideration will remain important until a nationality clause is eradicated from bilateral air service agreements pretty much worldwide.

2.6.2 The Presence of Price Discrimination

Facing different customers and no restrictions on pricing, an airport could potentially price discriminate. Moreover, as it should not be too difficult for the airport to obtain information about the airlines' business and ultimately their demand for the airport's services, we are most likely to see third-degree price discrimination.¹¹ Recall that price discrimination involves different price-cost margins (not just prices) for selling the same product to different customers. The following factors are likely to affect the nature and extent of price discrimination by the airports. First, the extent of the airline substitutability between the nearby airports will affect elasticity of the airlines' demand with respect to aeronautical charges. Second, location of an airport in question will matter. Third, and perhaps most importantly, the airport's ability to price discriminate will depend on the traffic mix, both within and across the airlines. These factors will be compounded with other characteristics, such as capacity constraints and demand variability.

To visualize how the factors we listed above can affect the feasibility and extent of price discrimination by an unregulated airport, consider the following example. Suppose an airport decides whether to price passenger Boeing 737 take-offs or landings differently for different airlines. The question is: "When will a rational airport price discriminate?", holding all other things equal. The traffic mix will clearly play a role. An airline using our hypothetical Boeing-737 to haul vacation travellers to a holiday destination will clearly be more sensitive to higher charges than a carrier using an identical aircraft to shuttle business travellers, especially if we analyse an airport well connected to a major metropolitan area, and therefore considered convenient by business travellers. In the same way, similar price discrimination is less feasible for a more remote airport. Overall, substitutability between nearby airports will, other things equal, limit the extent of price discrimination. We expect traffic mix and airport location to be the primary determinants of feasibility of discriminatory treatment of airlines. Capacity constraints will probably limit price discrimination, as the constrained airports will focus on the most profitable market segment, subject to this constraint. Thus, a capacity constrained airport in our example will not offer discounted charges aimed at the customers specializing in leisure passengers and will instead price them out to either more remote airports or

¹¹ Some volume-based discounts that airports may offer to some of their customers purchasing a lot of services may be due to a decrease of average variable costs of the airport via economies of scale, so volume-based discounts that might be offered to such an airline may simply reflect this.

off-peak departure/arrival times. This is very well in line with a discriminating monopolist pricing out relatively few customers with low valuation, as accommodating them will limit the profit it can get from the less price sensitive market segments. Capacity constraints might contribute to the fact that such airports as Amsterdam, Madrid and Munich set lower charges for transfer passengers as compared to the O&D traffic, whereas London Heathrow does not offer such a differentiation in charges. Offering the air-lines discounts on transfer passenger charges could exacerbate the congestion problem at Heathrow and make the airport less attractive for air travellers, and ultimately for airlines. At the same time, we can expect congested airports to price discriminate in time dimension, setting higher charges at the expected peak travel times. This is somewhat contrary to the current practice of higher night-time charges observed at some major airports. The regulators will most probably have to keep imposing these noise-based night-time charges on the otherwise unrestricted airports. A rational airport will have an incentive to lower its night-time charges, to attract and raise revenue from less departure-time conscious leisure, charter and cargo traffic. Here we have a classical negative externality problem requiring regulator's intervention.

In conclusion, looking at the hypothetical unregulated airports, we can expect the highest degree of price discrimination across different services by relatively uncongested airports, conveniently located for business travellers.¹² Congested airports will most probably practice departure or arrival-time based price discrimination. Higher substitutability between the current and the nearby airports will reduce the extent of such discrimination.

2.7 Studies of Competition and Market Power: A Brief Review

There have been a number of studies¹³ of airport competition and its implications for regulation, completed in recent years. There has been considerable attention given to airport competition in the UK, and regulators have factored it in to the design of regulation (see Sect. 2.7.1). In Europe there have been studies in countries such as Germany (Malina 2010; Strobach 2010) and Greece (Papatheodorou 2010), and Maertens (2012) has studied airport market power for the whole of Europe. The Australian Productivity Commission examined airport competition in detail when recommending regulation in Australia (see Sect. 2.7.2). Other general studies include the Copenhagen Economics Study (see Sect. 2.7.3).

¹²Note that this discrimination might be taking place both within and across the airlines. Some airline's services to London and Heraklion might be subject to different charges, keeping other things constant.

¹³One of the first studies for Europe is the study by Air Transport Group (2002).