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Abstract

In contrast to the privatization and regulatory reforms currently underway at European airports, airports in the US remain publicly owned. There, airports negotiate legally binding contracts with airlines and finance large investment projects with revenue bonds. Applying insights from transaction cost economics, we argue that the observed variation in contractual and financing arrangements at US airports corresponds to the parties' needs for safeguarding and coordination. The case evidence presented reveals that public owners set the framework for private investments and contracting. Airline contracts and capital market control result in efficient investment and act as a check on the cost inefficiency typically linked to public ownership.

Key Words: Transaction Cost Economics, Contract, Public Ownership, Air Transport

JEL: L93, D23, L33

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1 Introduction

While the large-scale privatization of European airports has been underway for several years, US airports remain firmly in the hands of local government agencies. US airports do, however, rely heavily on private sector contracting as well as airline investments in the operation and financing of infrastructure. The conditions for utilization of airport facilities are set down in legally binding contracts between airport operators and airline users. The degree to which individual airlines are able to exercise vertical control over airports varies widely depending on the contractual and financing arrangements in place. In the literature on US airports, vertical control of airport investment and operational decisions has been described as creating entry barriers (Abramowitz and Brown 1993, Dresner, et al. 2002, Hartmann 2006) and violating US anti-trust laws (Dempsey 2002, Hardaway and Dempsey 1992, Notes 1990). This paper takes a different perspective. Drawing on the research in transaction cost economics (Williamson 1985, 1991, 1999), we propose that specialized contractual and financing arrangements in airline-airport supply relationships support relationship-specific investments and economize on transaction costs.

Our empirical analysis reveals that contractual and financing arrangements for the use of terminal and gate facilities vary substantially. These bilateral arrangements between airports and airlines range from short-term contracts to long-term leases and ‘quasi-integration’ by single airlines through project-financed dedicated terminal facilities. Based on a transaction cost analysis and evidence from a series of case studies, we propose that specialized vertical arrangements economize both on ex-ante coordinative requirements in the stage of planning and constructing terminal facilities, as well as on ex-post safeguarding problems in the presence of quasi-rents during the operating stage.

At the airports reviewed in our case study, terminal investments supported by special arrangements increased total gate capacity, thus allowing existing and potential competitors to expand. Public airport operators retained special rights in these arrangements to monitor and enforce efficient gate usage. These findings challenge the claim put forward in the barriers to entry literature that specialized arrangements between airport and airlines are welfare-reducing.

A second policy implication refers to the critique of public agencies' role as airport proprietors in the United States. We argue that the primary deficits of public ownership identified in the literature—overinvestment and managerial slack (Thompson and Helm 1991)—are mitigated in US governance model. With regard to the revenue bond financing of large investment projects and the accompanying airline agreements, capital markets and airlines exert substantial control over airport investment projects. Cost inefficiencies in airport operation are limited as public agencies rely heavily on the private sector to operate the airport (outside procurement and airline involvement).

In the remainder of the paper we proceed as follows. Section 2 applies transaction cost economics as the lens of analysis to examine contracting problems in the airport-airline supply relationship. In Section 3, we provide a general introduction to the US airport governance model, and present the results of a case study on the contractual and financing arrangements at four selected US airports. In Section 4, we discuss our main findings and outline potential future research opportunities.

2 Transaction Cost Assessment

2.1 Theory

Given the literature's focus on airport-airline contracts as barriers to market entry, we argue that transaction cost economics (Williamson 1979, 1985, 1991) offers a promising complementary perspective for analyzing vertical arrangements between US airports and airlines. Developed as a response to the Coasian puzzle on the boundaries of the firm, transaction cost economics (TCE) provides an operationalized and tested framework¹ for the design of inter-organizational (supply) relationships. The theory makes the behavioral assumption of bounded rationality and opportunism², implying that contracting is incomplete and costly. In a world of incomplete contracts, the comparative cost advantage (in terms of production and transaction costs) of an organizational or contractual arrangement depends primarily on its ability to address contractual hazards in exchange relationships.³ Such safeguarding and adaptation problems in exchange rest in the attributes of the transaction, namely *asset specificity* and *uncertainty* (Williamson 1985).⁴

¹ The theory's predictions have been corroborated in a large number of industry studies. See Boerner and Macher (2002), David and Han (2004), Geykens et al. (2006), Klein (2005), and Rindfleisch and Heide (1997) for surveys on the empirical literature in TCE.

² TCE assumes economic actors to be bounded in their rationality, i.e., "intendently rational, but only limited to do so" (Williamson 1985, p. 45) and to be opportunistic, i.e., "self-interest seeking with guile" (Williamson 1985, p. 47).

³ The early TCE literature identified three generic governance forms: market, hybrid, and hierarchical governance. *Market coordination* of a transaction results in high-powered incentives, leads to autonomous adaptation via the price mechanism, and relies on classical contract law (enforcement through courts). Transactions within the firm (*hierarchy*) rely on administrative controls (low-powered incentives), coordinated adaptation, and law of forbearance (enforcement via management fiat, as courts 'forebear' to hear internal conflict within organizations). *Hybrid forms*, such as long-term contracts or joint ventures, are located on the continuum between market and hierarchy and share characteristics of both polar forms. Private ordering, e.g., arbitration, supplements court enforcement in these arrangements (Williamson 1985, 1991). More recent research has explored subclasses of hybrid modes, for example supply contracts or strategic alliances (Eckhard and Mellewigt 2006, Ménard 2004 for recent surveys).

⁴ Frequency of transactions, the third attribute operationalized in Williamson's TCE framework, is of secondary importance in determining economic organization. Williamson (2005) argues that a high transaction frequency is required to spread the large fixed cost of specialized arrangements over a large

The more *relationship-specific the assets*⁵ in supply relationships are, the higher the parties' quasi-rents—the excess of the asset's value over the value of its best alternative use or user (Klein, et al. 1978).⁶ The existence of quasi-rents attaches a value to the continuation of a supply relationship. In particular in transaction environments with a large degrees of non-predictable change (*environmental uncertainty*), a number of non-specified states of nature might arise that disturb the relationship (Williamson 1985). Faced with distributional gains, parties are inclined to behave opportunistically and hold up other parties for their quasi-rents. Farsighted economic actors anticipate ex-post safeguarding and adaptation problems in their relationship and design contractual or organizational forms to address contractual hazards in such a way as to economize on transaction costs. Contractual/organizational form and technology choice (for example, whether or not to invest in a specialized technology) are determined simultaneously by the parties ex-ante. In consequence, the alignment between contractual/organizational form and the particular transaction allows for joint value maximization while economizing on transaction costs. Thus, along with the direct transaction costs (mainly costs of developing and maintaining an exchange relation, monitoring exchange behavior, and guarding against opportunism), there also exist opportunity costs in the form of inferior performance of sub-optimal governance structures (Ghosh and John 1999).

number of transactions. Repeated interactions help to build the parties' reputation, which acts as an informal safeguard by enlarging the self-enforcing range of contracts.

⁵ Asset specificity takes the form of site specificity, physical asset specificity, dedicated asset specificity, human capital asset specificity, brand capital specificity (Williamson 1985), temporal specificity (Masten, et al. 1991) and contractual specificity (Pirrong 1993).

⁶ This excess of return keeps the asset in its current use, and can include pure rents as well (Holmstrom and Roberts 1998).

2.2 The Airport-Airline Relationship: Transaction Cost Considerations

Unlike most companies in the ‘private sphere’, an airport operator engages in various transactions with governmental agencies and private parties for any major investment project (see table 1 for a summary).

Table 1: Transactions Associated to an Airport Investment Project

Stage	Parties	Transaction	Time
Approval	Airport with governmental agencies, politicians, residents	<ul style="list-style-type: none"> ▪ Siting and environmental approval ▪ Public and political support 	up to 20 years
Planning and Construction	Airport with airlines, architects, engineers, and general contractor	<ul style="list-style-type: none"> ▪ Planning and design ▪ Construction 	up to 5 years
Operating	Airport with airlines and non-aviation companies	<ul style="list-style-type: none"> ▪ Use of infrastructure 	30 years

During the *approval stage* of an investment project (new airport, runway expansion, etc.) the airport operator negotiates with multiple governmental agencies, politicians, and local residents to obtain both legal and political approval⁷. The time period for approval depends heavily on the type of project—approval for a new airport can take up to 20 years, while the addition of a new terminal wing might not require explicit approval at all. After government approval has been obtained, the airport operator enters into collaboration with airlines, architects, engineers, and a general contractor in the *planning and construction stage*. Once construction is completed, the operator receives the option to actually market the facility during the *operating stage*. During the period of operation, which is typically 30 years for airport infrastructures, a transaction occurs every time the airport grants the airline the right to use its infrastructure. In determining how to price the transactions

⁷ Airports must in particular seek local political and public support to overcome the NIMBY (not-in-my-backyard problem). The NIMBY problem occurs when a development is locally undesirable (increase in pollution), but socially beneficial. In a world of positive transaction costs, mechanisms for efficient bargaining might be precluded, requiring specialized institutional arrangements (Richman and Boerner 2006).

during the operating stage, the infrastructure proprietor seeks to recoup both the cost of the up-front investment as well as the cost of maintaining, developing, and operating the infrastructure.

Expanding on Fuhr and Beckers' (2006) conceptualization of the relevant unit of analysis, we focus on two interdependent contracting problems between airlines and airports. Relationship-specific investments and uncertainty may result in (a) ex-post contracting hazards during the operating stage and (b) ex-ante coordination problems in the planning and construction stage. In designing efficient governance arrangements⁸, airports and airlines must take institutional constraints such as public ownership and sector-specific regulations into account. Section (c) provides a brief discussion of the costs and competencies of 'public' governance models as developed in transaction cost economics.

a) Contracting hazards resulting from relationship-specific investments and uncertainty

According to the heuristics of TCE, bilateral contracting problems between a particular airline and its airport supplier will reside in quasi-rents associated with relationship-specific investments and uncertainty in the transaction environment. We argue that both airports and airlines might invest in relationship-specific assets and that the process of 'quasi-rent generation' differs systematically (Fuhr and Beckers 2006). *Airport quasi-rents* are incurred through spot investments in dedicated infrastructure facilities and capacities, for example, a terminal facility catering to the particular needs and growth requirements of a single carrier. *Airline quasi-rents* are accrued over time as a carrier builds up market share and invests in (i) advertising, (ii) human capital in the network/route optimization process, (iii) site-specific assets or rights (e.g., maintenance facilities or slots⁹). The simplified matrix presentation in Figure 1 displays four generic types of dependency in the

⁸ The term *governance* is defined as "the institutional framework in which contracts are initiated, negotiated, monitored, adapted, enforced and terminated" (Palay 1984, p. 43).

⁹ A *slot* is a time window in which the airline is entitled to use the runway of a congested airport.

airline-airport supply relationships as a function of the amount of specific investment by the parties.

Figure 1: Typology of Airline-Airport Supply Relationships

Asset Specificity Airport Investments	high	Type 3 Unilateral Dependency	Type 4 Bilateral Dependency
	low	Type 1 Hit & Run	Type 2 Unilateral Dependency
		low	high
		Asset Specificity Airline Investments	

Early advocates of US airline deregulation expected airlines and airports to incur negligible sunk costs, i.e., to incur non-specific investments.¹⁰ Under such a hit-and-run scenario (*type-1 relationship*), any airline at a particular airport could be immediately substituted by an equally well-suited new entrant or competitor. Conversely, a shift in airport pricing could result in airlines reallocating their productive resources.

Since either the airport or the airline may invest in relationship-specific assets (*type-2 or type-3 relationship*), the dependent party will seek a specialized (contractual) safeguard to protect its quasi-rents before investing in relationship-specific assets. An airline, for example, is interested in securing the conditions for access to airport facilities for a

¹⁰ Unlike contestability theory—the primary theoretical foundation of US airline deregulation—TCE magnifies conditions of asset specificity as the dominant determinant of economic organization in intermediate exchange. Williamson (1985, p. 31 footnote) puts the difference as follows:

“Differences between Transaction Cost Economics and ‘contestability theory’ (Baumol, Panzer and Willig, 1982) in asset specificity respects are noteworthy. Both approaches to the study of economic organization acknowledge the importance of asset specificity, but they view it from opposite ends of the telescope. Thus contestability theory reduces asset specificity to insignificance, so that hit-and-run entry is easy. Transaction Cost Economics, by contrast, magnifies the conditions of asset specificity. The existence of durable, firm-specific assets is held to be widespread, and accordingly hit-and-run entry is often infeasible”

prolonged period in order to safeguard the quasi-rents that reside in complementary investments associated with large-scale entry/operations.

Bilateral dependency in *type-4 relationships* occurs if both airline and airport must incur specific investments in order to install a joint business model. Some authors (Fuhr and Beckers 2006, Langner 1995) have argued that establishment of the hub-and-spoke business model¹¹ in particular entails substantial quasi-rents in supply relationships between hub carriers and their hub airports. Michael Levine (1987, pp. 468-469), analyzing the industry phenomena observed in the decade following the US airline deregulation, points towards the co-specialization of assets, arguing that “new hub entry always requires [...] substantial firm- and transaction-specific investments in advertising and initial operations and often requires substantial facilities investments as well, for example, to assemble enough gates for an efficiently-sized hub”.

We also suggest that depending on the business model and any cospecialized assets associated with it, airport suppliers will face different levels of *environmental uncertainty*. An origin-and-destination airport, on the one hand, faces limited uncertainty regarding future traffic volume, since future demand will be a function of the economic development of its local catchment area. A hub airport operator, on the other hand, faces carrier-specific volume uncertainty for its hub-related capacity investments. Once dedicated hub capacity has been put into operation, the airport operator relies heavily on realization of the forecasted increase in transfer passengers to achieve efficient capacity utilization over time.

¹¹ The rise and dominance of the hub-and-spoke network structure is considered an outcome of airline deregulation. Hub-and-spoke network structures allow the carrier to exploit economies of density (Berry, et al. 2006, Brueckner and Spiller 1994, Caves, et al. 1984) and to offer a differentiated product (in terms of high connectivity) to business travelers (Berry, et al. 2006).

b) The coordination problem of complex investments across organizational boundaries

Airport investment projects involve the cooperation of a number of parties (the airport authority, airlines as users, architects, engineers, general contractors, etc.), all of which can impact the project's design and cost parameters during the planning and construction stage. Development projects at airports will vary in terms of their complexity. The design and construction of a general-purpose terminal for airline users with typical preferences, for example, will be a far less complex undertaking than the development of a state-of-the-art hub terminal facility for a dedicated airline user. Seeking optimal solutions to the complex problems that inevitably arise in the latter type of projects will involve extensive knowledge transfers among the different parties involved (Nickerson and Zenger 2004). Hybrid arrangements, sharing most of the characteristics of hierarchical governance, dispose over superior capacities for adaptation¹² and knowledge transfer to govern complex terminal development projects.

c) Costs and competencies in public governance arrangements

From the structuralist viewpoint of TCE, researchers have argued that both *public ownership* and *regulation* represent discrete governance models that offer safeguards against extreme conditions of bilateral dependency and information asymmetry (Crocker and Masten 1996, Goldberg 1976, Williamson 1976, 1999). *Public ownership/agency* represents a hierarchical governance form in which the supply of goods or services is determined by authoritative decisions of the government. If the government decides to allow private parties to carry out certain type of transactions, it may retain administrative control as a *government regulator* or cede (temporary) control by contracting out the transaction. Williamson (1999) proposes that comparative efficiency of such public

¹² In their formal model on procurement contracts, Bajari and Tadelis (2001) show that cost-plus contracts with their superior adaptation capabilities economize on the procurement of complex construction projects.

governance models depends on (i) the excess (operating) cost hazards inherent in the transaction; (ii) the degree of asset specificity, and (iii) the transaction's probity requirements¹³. The government should thus contract out if the transaction entails high cost control hazards but relatively low bilateral dependency and probity hazards. Governance by a *public agency* is the most efficient means of managing transactions with a low excess cost hazard but high bilateral dependency and strong probity requirements. *Regulation* takes the middle ground between contracting out and public governance in terms of the following attributes: efficiency incentives, strength of administrative controls, type of employment relations, and dispute resolution mechanisms (Ruiter 2005).

3 Empirical Study

3.1 Governance Model of US Airports

Commercial airports in the United States are owned by municipalities and operated by special government agencies or departments.¹⁴ Unlike government-owned but corporatized airports in Europe, US airports are non-profit organizations without share capital and with no corporate tax liability. Besides local regulations and ordinances, airports are subject to statutory regulations enacted by Congress and policy statements issued by the Federal

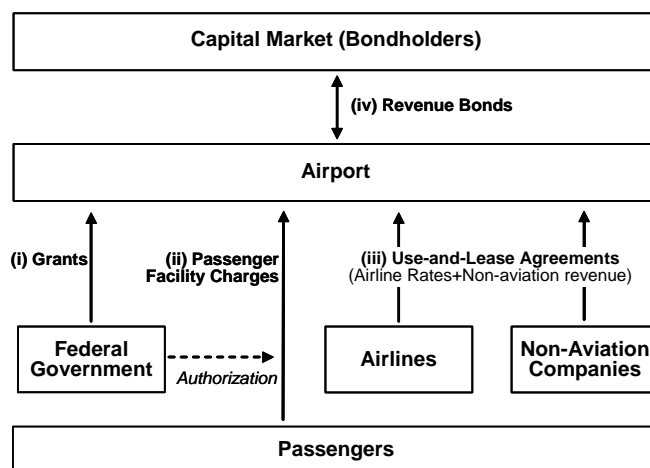
¹³ Williamson (1999) chooses among a number of potential applications (provision of infrastructure, regulatory transaction, etc.) the organization of 'sovereign transactions' to extend the existing TCE framework to cover public governance forms. In his chosen application, 'probity transactions' require a degree of loyalty and rectitude in their execution that cannot be crafted into a purely private governance arrangement. While Williamson concludes that sovereign transactions, such as foreign affairs, foreign intelligence, and managing the money supply, are not suitable for a comparative efficiency assessment, he does claim a general applicability of the proposed framework to other kinds of transactions (Ruiter 2005).

¹⁴ According to the FAA/OST Task Force Study (1999, p. 3), 54.2% of commercial airports in the US are directly owned and operated by cities or counties, followed by regional ownership (22.7%), state ownership (9.3%), multi-jurisdictional authorities (6.2%), specialized (air)port authorities (4.1%), and other ownership forms (private, etc.) with 3.1%. So far, only Stewart Airport has been leased under a 99-year lease contract to a private operator under the FAA pilot privatization program (the program allows up to five airports to shift from public to private ownership and control).

Aviation Administration (FAA)¹⁵. The two fundamental principles of US federal aviation law are *reasonableness of airport charges* and *revenue non-diversion* (airport revenues must be used and expended for capital expenditures and operating costs of the specific airport or local airport system).¹⁶

US airports are constrained by rules tied to their federal funding sources, their airline agreements, and their obligations to bondholders. Figure 2 displays the primary administrative/contractual relationships and the revenue sources of a typical US airport: (i) federal grants, (ii) passenger facility charges, and (iii) airline rates and non-aviation income as specified in the use-and-lease agreements. Larger airports finance their capital expenditures primarily through (iv) revenue bonds, which are secured exclusively by revenues from airlines and non-aviation companies or future income from passenger facility charges.

Figure 2: Revenue and Financing Sources of US Airports



¹⁵ The FAA is an agency within the US Department of Transportation. It operates the national air traffic control system, conducts research and development, administers grant distribution in the Airport Improvement Program, and is in charge of safety and security regulations.

¹⁶ The major pieces of federal legislation establishing these requirements are the Airport and Airway Improvement Act of 1982 and the Airport Noise and Capacity Act of 1990. In addition, airport operators must also heed environmental laws (e.g., the National Environmental Policy Act, the Noise Control Act, the Airport Noise and Capacity Act) and safety-/security related laws (e.g., the Aviation and Transportation Security Act). State and local governments set complementary environmental and safety laws for airports.

(i) *Federal Grants in the Airport Improvement Program (AIP)*. The primary objective of the Airport Improvement Program (AIP) is to build and maintain a nationally integrated airport system. Grants are allocated by the FAA based on passenger volume (entitlements grants) and on a project-specific basis (discretionary grants). The distribution formula favors small and reliever airports, whose access to bond financing is limited¹⁷. AIP Funds must be pledged to aviation-related projects and require extensive up-front consultation with airlines. The funding for the Airport Improvement Program comes from the Aviation Trust Fund, which is alimented by taxes on airline tickets and fuel¹⁸.

(ii) *Federal Authorization for Passenger Facility Charges (PFC)*. In 1990, the federal government established an alternative funding source by allowing airports to impose a local passenger facility charge (maximum of \$4.50 per departing passenger). Its primary motivation was to decrease airport dependency on bond financing and related use-and-lease agreements with dominant airlines (GAO 1990).¹⁹ Airports must ask the FAA for authorization to levy PFCs by pledging the use of such funds to eligible capital expenditures. Such projects must (i) increase or preserve capacity, (ii) enhance security or reduce noise, or (iii) improve airline competition. Compared with federal grants, which are not eligible for debt repayment or revenue producing portions of terminals, the FAA is less restrictive on the use of PFC-receipts (CRS 2003).

¹⁷ The structure of AIP funds distribution reflects the national priorities and objectives of assuring airport safety and security, stimulating capacity, reducing congestion, helping fund noise and environmental mitigation costs, and financing small state and community airports. Small airports obtain approximately 60% of their funding from federal grants, while medium and large airport obtain less than 10% (GAO 2003)

¹⁸ The total expenditure from the Aviation Trust Fund in the fiscal year 2005 amounted to \$11,156 million, with \$3,531 (32%) dedicated to the Airport Improvement Program (GAO 2005, pp. 2-3).

¹⁹ The US General Accounting Office commented as follows on the objectives of introducing PFCs as an alternative airport funding source in the Aviation Safety and Capacity Expansion Act of 1990:

“A PFC gives airports a source of revenue for financing airport expansion projects, independent of airline control and reduces airports’ needs to rely on airlines to pay for or guarantee capital projects. Airports that are less reliant on airline financing and guarantees should be better able to resist pressure to enter into long-term contracts containing restrictive provisions. Fewer restrictive contracts, in turn, should give airports more flexibility both in stimulating competition and in reducing congestion and delay” (GAO 1990, pp. 2-3)

(iii) *Airline use-and-lease agreements*. US airports negotiate legally binding agreements with their airline customers. These *airline use-and-lease agreements* establish the terms and conditions for the use of airport facilities and specify the method for calculating airline rates. As a result of private negotiations, each contract is unique to the given airport or even to specific terminal facilities of that airport. Contractual arrangements between airport and airlines operate at a *multilateral* and *bilateral* level:

- *Multilateral agreements* between airports and airlines (hereinafter referred to as master use-and-lease agreements) provide the general contractual framework for the airlines' use of airport facilities. While the use of airfield and other general airport assets are always covered in the master use-and-lease agreement, most airports prefer to negotiate separate bilateral lease agreements to govern the use of terminals and gates. The design parameters for master use-and-lease agreements most commonly discussed in the literature are *rate-making methodology* and what are known as *majority-in-interest clauses* (MII clauses). The former of these two entails distinguishing between (i) residual, (ii) hybrid, and (iii) compensatory master use-and-lease agreements.²⁰ Under a *residual agreement*, the so-called signatory airlines (the carriers that signed the master use-and-lease agreement) pledge to cover the full cost of airport operations required for the airport to break even. Rates are determined by the 'residual cost' remaining after revenues from non-signatory airlines and non-aviation sources have been deducted from the airport's full operation costs (debt service, interest, and operating expenses). In a *compensatory agreement*, airline rates are

²⁰ The difference in rate-making methodology closely resembles the distinction between single till (hybrid and residual agreements) and dual till price regulation (compensatory agreements). While the type of price regulation is usually defined in the national regulatory framework, the rate-making methodology at US airports is subject to negotiation between airlines and airports.

determined by allocating the operating expenses and the pro rata share of debt service to the facilities actually used by the airlines (runway system and the aviation-related part of the terminal). *Hybrid agreements* contain both compensatory and residual elements. In most cases, airline rates are determined by both direct costs and the costs allocated to the airfield and terminal cost centers, with terminal concession revenues offsetting the cost coverage requirement. Revenues and costs of the remaining cost centers (for example parking lots) are not considered in the determination of airline rates. Depending on the rate-making methodology utilized, the financial risk of an overall revenue shortfall is either borne by the airport proprietor (compensatory agreements) or by the signatory airlines (hybrid and residual agreements). Survey data on US airports shows that in particular residual and hybrid agreements include *MII clauses*, which require the airport operator to request approval for capital expenditures by a majority of its signatory carriers.²¹

- *Bilateral Agreements* between the airport and airlines specify the rates and the conditions for the use of gates (hereinafter referred to as gate leases or gate agreements). One can distinguish between three generic contract types: (i) exclusive-use gate leases, (ii) preferential-use gate leases, and (iii) airport-controlled gates. Under an *exclusive gate agreement*, a specific airline has the right to occupy a number of gates or parts of a terminal facility for a specified duration (usually for extended time periods). Primary tenants may also sublease

²¹ MII clauses are included in 84% of all residual agreements, in 74% of all hybrid agreements, and in 20% of all compensatory agreements based on survey data in the FAA/OST Task Force Study (FAA 1999, pp. 7-9). The design of the MII clauses varies—in some cases signatory airlines are able to delay projects (weak control rights); in other cases signatory carriers can reject the airport's projects (strong control rights).

gates to smaller carriers with the airport's approval²². A *preferential agreement* is similar to an exclusive arrangement but usually ties the airline's exclusivity right to a certain minimum gate usage.²³ Third, when gates are *airport-controlled*, allocation occurs on a per-turn basis or through short-term contracts.

(iv) *Revenue Bonds*. While some airport investment projects are funded exclusively through federal grants or PFCs on a pay-as-you-go basis, large capital improvement programs are financed through revenue bond proceeds. Depending on the source of revenue pledged to service interest and repayment, one distinguishes between *general airport revenue bonds (GARBs)*, *special facility revenue bonds (SFRBs)*, and *PFC-backed bonds*. Almost all large US airports issue *GARBs*, which pledge the airport's future revenue to interest and debt repayment²⁴. The municipality, which issues the bonds in most cases, is under no obligation to step in if revenue bonds default. Debt ratings assigned to airport revenue bonds will thus differ from municipality bonds, which are backed up with the full faith and credit of the local government (Hu, et al. 1998).²⁵ As interest on municipal bonds is tax-exempt under federal tax law, airport bonds have more favorable interest rates than similar securities. Since US airline deregulation in 1979, airports have increasingly engaged in conduit financing²⁶ for specific projects (fuel farms, maintenance facilities, but also terminals). In these project finance arrangements, airports retain asset

²² Some airports regulate subleasing rates by restricting mark-ups on the primary rate (FAA 1999, p. 47).

²³ Preferential lease arrangements are heterogeneous as some include "use-it-or-lose-it" rules or "use-it-or-share-it" rules. While most preferential agreements come close to exclusive agreements, some preferential agreements are short-term in nature and thus allow for a periodic reallocation (FAA 1999, pp. 35-42).

²⁴ Bondholders have first claim to airport revenues after operating and maintenance expenses have been paid.

²⁵ Some smaller US Airports have issued general obligation bonds, which are backed up by 'the full faith and credit' of the issuing local municipality.

²⁶ The 'conduit' may be the municipality, the city, or a specific public agency so as to qualify for tax exemption.

ownership but transfer the right for exclusive usage²⁷ to the project sponsor under long-term lease agreements. The tax-exempt SFRBs issued by the conduit are exclusively secured by the specific project's revenue stream, which is guaranteed by the project sponsor (full recourse). The airport is without any obligation to SFRB bondholders in case of default. Following the introduction of PFCs in the mid 90's, airports have started issuing *PFC-backed Bonds*, which are secured exclusively by future passenger facility charges. Contingent on prior approval by the FAA, these bond receipts can only be used for eligible and approved capital expenditures.

3.2 Case Studies

Building on the transaction cost reasoning presented above, the primary objective of our empirical study is to develop a more thorough understanding of the economic mechanisms driving the variation in contractual and financing arrangements at US airports. We consider the case study research design to be particularly promising since the observed contractual phenomena are difficult to quantify, are not well understood, and need to be studied in a natural setting (Yin 2003). In each case study, we explore each of the observed contractual and financing arrangements in terms of its capacity to (i) safeguard relationship-specific investments, (ii) facilitate coordination in the planning and construction phase, and (iii) allocate rights and obligations between public and private parties. Since we consider the variation in contractual and financing arrangements for gates and terminals to be of primary interest, our case study selection includes airports with recent terminal investment projects and different airport business models.

²⁷ In consequence, the sponsor obtains the right to use a resource, the right to alter the resource in its substance, the right to appropriate gains and the obligation to carry losses associated with the resource. As airports retain formal ownership, the sponsor may not sell the resource and receive the proceeds.

Table 2: Main Characteristics of Case Study Airports

No.	Case Study Airport	Passengers (2005)	Airport Operator	Airport Business Model (Airline Market Share)
I	Boston Logan Intl. Airport (BOS)	27.0 million	Massachusetts Port Authority	National Spoke Airport: Delta Airlines (18.0%), American Airlines (17.5%)
II	New York John F. Kennedy Airport (JFK)	40.9 million	New York and New Jersey Port Authorities	International Spoke Airport: Jetblue (24.9%), American Airlines (19.9%)
III	Portland Intl. Airport (PDX)	13.9 million	Port of Portland	Low-Cost Airport: Alaskan Airlines (36.6%), Southwest Airlines (16.5%)
IV	Detroit Metropolitan Airport (DTW)	36.4 million	Wayne County Airport Authority	Hub Airport: Northwest Airlines and affiliates (78.9%)

Data for the case studies were obtained through secondary data sources (airport publications, bond prospectuses, and newspaper articles) and semi-structured expert interviews with airline and airport senior management. Given the confidential nature of the contracting arrangements between airport and airlines, we have drawn heavily on information contained in bond prospectuses at each respective airport.²⁸

3.2.1 Case I: Boston Logan International Airport

Despite the growing importance of low-cost entrants, Boston Logan International Airport (BOS) continues to rely heavily on a limited number of established carriers to service its origin and destination traffic. In the last decade, the airport has invested substantially in the modernization of its terminal infrastructures, using a combination of financing sources (revenue bonds, reserve funds, PFCs, federal grants, and project financing). Under the

²⁸ The prospectuses for the following bond series were reviewed: Revenue Bonds Series 2005 (\$453.8 million) issued by Massachusetts Port Authority; SFRBs Series 1994 (\$434.3 million) and 2005 (\$387.7 million) issued for the Terminal 1 development/refinancing at JFK; SFRBs Series 2005 (\$770.0 million) issued for American Airlines Terminal at JFK; SFRBs Series 1997 (\$934.0 million) for International Airline Terminal development at JFK; Refunding Revenue Bonds Series 2006 (\$143.3 million) issued by the Port of Portland; Airport Revenue Bonds, Series 2005 (\$507.2 million) issued by Wayne County Airport Authority. In addition, we conducted a systematic search of ‘The Bond Buyer’—a newspaper dedicated to the municipal bond industry—for articles associated with the airports in our case studies. The Port of Portland provided us with copies of the current and past use-and-lease agreements.

compensatory master use-and-lease agreement, revenues from non-aviation sources are not used to offset airline rates but are at the authority's spending discretion²⁹. In the absence of an MII clause in the master use-and-lease agreement, the airport is not obligated to seek approval for its investment projects from the airlines.

While airline rates for the use of runways and general airport assets are set homogeneously on a cost plus basis under the master use-and-lease agreement, bilateral gate lease agreements vary substantially in their design. The airport has granted long-term leases to several of its larger carriers (a total of 57 of 102 contact gates have been under long-term leases in 2005). Several larger carriers have employed project finance arrangements, issuing SFRBs to finance investments in dedicated terminal facilities (Delta Airlines) or the modernization of dedicated terminal piers (United Airlines and US Airways). In the purest form thereof, Delta Airlines only pays a ground lease to the airport, as the entire terminal facility has been project-financed. Delta's cost per passenger is a function of the required SFRB debt service, terminal-operating expenses, offsetting non-aviation revenues from concessionaires, and the number of enplaned Delta passengers. Other carriers that have employed SFRBs to modernize single terminal piers must cover both the costs allocated to their facilities by the airport as well as the obligations to their bondholders. In the absence of project finance arrangements, other airlines' terminal rates are set by the airport on the basis of the debt service and operating expenses allocated to the gates under lease. In contrast to smaller airlines whose terminal rental rates are set annually in short-term contracts, larger carriers have contractually secured long-term access to a number of dedicated gates³⁰.

²⁹ Concessions and parking revenues amounted to \$132.0 of a total \$341.0 million in airport revenues in 2004

³⁰ Jetblue, American and Northwest Airlines have signed long-term or revolving contracts with the airport.

Specialized contractual and financing arrangements have been negotiated, despite the airport's preference for short-term contracts (in order to allocate terminal capacity efficiently) and its general belief that carriers are substitutable for almost all origin-and-destination routes served from BOS today³¹. If airport investments are indeed non-specific to a particular carrier or business model, airport quasi-rents should be small. On the other hand, project finance arrangements employed in the development of the Delta terminal and the modernization of terminal piers have allowed the sponsoring airlines to customize the facility according to the preferences of their customers as well as their own operational requirements.

From our perspective, three factors have resulted in specialized contractual and financing arrangements at Logan airport. *First*, airlines demand long-term gate leases to safeguard quasi-rents residing in quality-enhancing and site-specific investments in terminal or gate facilities. The existence of such quasi-rents surfaced, for instance, during Delta's failed attempt to sublease sparse terminal capacity during its bankruptcy proceedings. None of the expanding or established carriers in the Boston market was willing to bear the high rental cost of the premium facility³². *Second*, the airport has sought to separate relationship-specific assets from the general asset base. Accordingly, the project finance arrangement employed to finance the Delta terminal facility has sheltered the airport and other airlines from burying the costs of a 'bad' private investment. If the Delta Terminal had been financed with Logan's traditional financing sources (e.g., general revenue bonds) and governed under the master use-and-lease agreement, all carriers would

³¹ In its bond prospectus, the airport points towards its experiences in the liquidation of Eastern Airlines in the late 80s. All routes served by Eastern Airlines were subsequently taken over by other legacy carriers.

³² Expanding low-cost carriers in the BOS market (AirTran, Jetblue and Southwest) considered the premium facility (designed before September 11) and its high rental rates to be in violation of their low-fare business model. Even alliance members of Delta decided against relocation in the face of the rental rates and the costs of relocating their operations.

have to pay the costs associated with the underutilization of the terminal facility. *Third*, even in the absence of investments in dedicated terminal assets, one can see a correlation between large market shares and long-term gate lease agreements. In our view, large carriers in the BOS market (Jetblue, American Airline, etc.) have contractually secured long-term gate access in order to safeguard quasi-rents residing in complementary investments associated with large-scale operations (i.e., investments in advertising, network optimization, and/or site-specific maintenance facilities).

The airport's transfer of the right to use and operate dedicated terminal assets for extended time periods has been accompanied by contractual safeguards to assure efficient gate utilization. Besides the airport-wide preferential gate use policy³³, all long-term leases contain gate recapture and forced sublet provisions. These provisions permit the authority to repossess a tenant's gate(s), if the carrier's average gate utilization falls below an agreed upon percentage of the airport's average. The airport is obligated to grant a 'cure period' to the primary tenant, in which the carrier is able to increase its gate utilization level above the negotiated threshold. Common among all long-term lease arrangements is the idea that the threshold requirement for gate utilization increases over time—in most cases obligating long-term tenants to use their gates as efficiently as the airport's average in the final periods of their leases.³⁴ In addition to safeguarding an efficient use of gates, the airport has agreed to market surplus terminal capacity due to the 'failed' Delta investment. During

³³ Under the Logan preferential use policy, the airport may schedule arrivals and departure at the gate of the tenant for any period that the tenant is not using the gate.

³⁴ American Airlines, for example, must keep its gate utilization above 75% of Logan's average number of domestic aircraft movements per gate. If American's gate utilization should drop below the threshold, the carrier can evade recapture of its gates by bringing back its gate utilization above the threshold in the following 12 months (cure period). Even if Massport is entitled to *relet* American Airlines gates to another carrier, it may only do so for a maximum of 12 months, during which American may repossess the gate if it achieves a certain gate utilization level. Other long-term leases follow a similar structure, but deviate in the specified dimension above (cure periods, threshold values, etc.). According to the lease signed with Delta Airlines, for example, Massport may not recapture any gates at all in the first five years of the new Terminal's operations. The authority may, however, force Delta to sublet up to four gates to other airline tenants or new entrants.

Delta's bankruptcy proceedings, the authority, Delta's creditors, and Delta Airlines signed an agreement under which Delta permanently surrenders one-third of its dedicated terminal space. Under the agreement, the authority will attempt to market the surrendered gates to other carriers, but does not assume any financial obligations to Delta's SFRB creditors.

3.2.2 Case II: John F. Kennedy Airport

Despite being a major international gateway airport (47.8% international passengers), John F. Kennedy International Airport (JFK) has turned into Jetblue's primary base airport (24.6% market share). The airport is also a secondary hub for American Airlines (19.9%) and Delta Airlines (15.0%), and a US gateway airport for numerous international airlines such as British Airways (3.2%), Air France (1.8%), and Lufthansa German Airlines (1.5%).

Unlike the master use-and-lease agreement at a typical US airport, the multilateral agreement at JFK exclusively determines the conditions of use and the rate-making methodology for the runway system and other general airport assets³⁵. Passenger terminals, on the other hand, have been traditionally built and operated under long-term lease agreements (duration between 25 and 30 years) by a primary airline tenant.³⁶ At present the public airport operator has completely withdrawn from directly developing and operating passenger terminals. Instead, private capital and management know-how have been employed to finance and operate terminals. Despite the possibility for third-party developments such as the international airline terminal (Terminal 4) by a consortium of

³⁵ The Port Authority and airlines have recently completed the negotiation of a new compensatory master use-and-lease agreement with 20-year duration (2004-2023).

³⁶ The sole exception used to be the International Airline Building, which was operated by the Authority up to 1997, before being replaced with a private third-party development.

private investors³⁷, large airlines prefer to “quasi-integrate” into the terminal stage through long-term leases and project finance arrangements. The contractual arrangements for the use of gates at JFK take place in a two-tier structure:

- *Tier #1 Quasi-integration:* Large airlines with significant operations at JFK sign long-term leases and obtain substantial decision and control rights in developing and operating dedicated terminal facilities. These terminal investments are financed through special facility revenue bonds with full recourse to the sponsoring airline. The primary airline tenant has preferred access to the gates during peak times and is able to buffer uncertainty related to future traffic growth. Similar to Delta’s project finance arrangements at Logan Airport, primary terminal tenants bear the full financial risk in these project finance arrangements. The cost per passenger is determined by amount of ground lease to the authority, the obligations to SFRB bondholders, the operating expenses of the terminal, offsetting non-aviation revenues, and offsetting revenues from subleasing agreements with other airlines.
- *Tier #2 Contracting in the subleasing market:* The majority of airlines at JFK contract for the use of gates through subleasing contracts with either primary airline tenants or the private third-party operator of the international air terminal. Contract design and rental rates vary in the subleasing market. Primary airline tenants usually sign short to medium-term contracts with subleasing airlines and maintain unilateral termination rights to retain flexibility for future traffic

³⁷ The shareholders are Schiphol USA LLC (40% equity interest), LCOR JFK Airport LLC (40%), and Lehman JFK LLC (20%). Schiphol USA LLC is an indirect subsidiary of N.V. Luchthaven Schiphol, a government-owned company running Amsterdam Airport. LCOR JFK Airport LLC is an indirect subsidiary of a large real estate developer in the United States. Lehman JFK LCC is an indirect subsidiary of Lehman Brothers, a large US investment bank.

expansion. The exception here are contracts between airline tenants and large subtenants (e.g., United Airlines in the British Airways terminal), which are long-term agreements and do not include unilateral termination rights. It is interesting to note that the private operator of the international airline terminal and larger international carriers have also chosen to negotiate long-term sublease contracts. These agreements include special privileges, such as preferred access to gates during peak times, as well as long-term revenue commitments by the carriers via take-or-pay clauses. Small international carriers forego such contracts and prefer to negotiate short-term commitments, leaving them with a high degree of flexibility. Rates in the subleasing contracts are market-based, with smaller carriers presumably achieving the lowest cost per enplaned passenger, as they are able to take short-term advantage of market opportunities.

‘Quasi-integration’ into the terminal stage allows large carriers in the JFK market to determine the cost and design parameters of their terminal facilities as well as to collaborate directly with architects, engineers, and the general contractor during the planning and construction phase. For the operation of the terminal, primary tenants have either chosen to outsource terminal operations and maintenance or rely primarily on their employees.³⁸

Neither private terminal investments nor bilateral contracting for the use of gates takes place in a void. Rather, the Port Authority plays a central role by (i) setting rules and standards in the terminal’s investment and operating stage (building standards, safety), (ii) providing support services (utilities, security, fire, police) and infrastructures (runways,

³⁸ Terminal 1 and the international airline terminal (Terminal 4) are run by lean operating companies with primary responsibility to procure services, monitor quality, maintain financial control, and retain/acquire sublessees. American Airlines, on the other hand, has opted to outsource a minor portion of its terminal operations (e.g., a master concessionaire agreement for its non-aviation business).

apron, roads, light rail), and (iii) acting as a marketer for terminal capacity if private investments fail³⁹. The authority monitors competition in the market for gate capacity by approving all subleasing arrangements at JFK. Under certain circumstances it may also oblige the primary tenant to sublease gates currently not in use. The airport is able to do so because it retains formal ownership of all airport facilities and only transfer the rights for design and usage to primary terminal tenants. Given the large volume of private terminal developments since the 90s and the authority's recent agreement with Jetblue to develop a dedicated terminal, we argue that the institutional arrangement has neither impeded large-scale entry nor resulted in underinvestment by private parties.

3.2.3 Case III: Portland International Airport

Since 1990, US legacy carriers have steadily decreased their presence at Portland International Airport (PDX).⁴⁰ Today, two low-cost carriers, the Alaskan Airline Group (36.3% market share) and Southwest Airlines (16.5%), dominate the airport. The airport operates a single terminal and disposes over abundant runway and terminal capacity. The authority funds its capital expenditures through GARBs, PFC-backed bonds⁴¹, federal grants, and income generated at non-airline cost centers. The terms and conditions for the use of gates and runways are established in a single master use-and-lease agreement. The current five-year master use-and-lease agreement was negotiated by appointed chairs of the Airport Affairs Committee (a representative of Alaskan, Southwest, Northwest Airlines and a consultant representing smaller carriers). Under the hybrid agreement, signatory airlines have committed to pay the residual costs of the terminal and the runway cost

³⁹ Several terminals were under temporary management of the authority because primary tenants had exited the market (for example Easter Airlines, Pan Am, and TWA). In most of the current lease arrangements with primary tenants, the Port Authority has the option/right to relet the facility if the primary tenant defaults.

⁴⁰ United Airlines' market share decreased from 23.3% in 1990 to 14.6% in 2005. Delta Airlines' market share dropped from 17.2% in 2001 to 8.9% in 2005 as the carrier ceased its PDX-based hub operation.

⁴¹ The PFC-approved project volume (\$681.8 million) included the (i) terminal expansion south, (ii) terminal explaining road, and (iii) the light rail extension to the airport and the light rail station at the airport.

centers after terminal concession revenues have been subtracted. Other cost centers such as ‘ground transportation’ (including airport access routes and parking) and ‘non-aviation’ (commercial and industrial property ground leases), are operated at the airport’s discretion and are outside the scope of the agreement. By signing the use-and-lease agreement, the signatory carriers agree to pay equal terminal rental rates per square foot⁴². The parties have also agreed on an incentive-based revenue share formula and an approach to MII-approval for capital expenditures. For the latter, the airlines have opted against case-by-case approval and instead earmark approved projects, having set an upper ceiling for total capital expenditures (\$299 million) for the agreement’s duration (five years). The revenue share formula obliges the airport to conceded \$6 million p.a. from non-airline revenues to its signatory carriers.⁴³

At present, the process of negotiation (by appointed representatives) as well as the contracting outcome (a homogenous contractual arrangement for all signatory carriers) indicate that the carriers’ need for a specialized contractual safeguard is similar and limited in nature. The airport continues to struggle with the excess capacity in its terminal facilities resulting from a general traffic downturn and Delta Airlines’ termination of its Asia hub operations in 2001. When Delta did not prolong the majority of its leased terminal space with the expiration of the ten-year master use-and-lease agreement in 2001, the airport was forced to allocate the cost of excess capacity to all carriers serving PDX. The cost increase has been perceived as a threat to the LCCs’ ability to further expand traffic at PDX in a difficult market environment. Alaskan Airlines, for example, could transfer a substantial portion of its regional hub operations to alternative hub airports such as Seattle or San

⁴² The sole exception is the outdated Concourses A, whose rental rate is 20% below the equalized general rate. Non-signatory carriers, accounting for less than 0.1% of all enplaned passengers at PDX, pay a 25% premium on terminal rental rates and landing fees.

⁴³ The airport is able to lower the revenue share from non-airline cost centers if it lowers its operating and maintenance expenses in the airline cost centers that are below its budget.

Francisco. Southwest Airlines, on the other hand, could cut routes if profitability suffers from a significant rate increase. Both airlines and airport have responded to the competitive pressure and have adapted the use-and-lease agreement accordingly over time.⁴⁴

3.2.4 Case IV: Detroit Metropolitan Wayne County Airport

Detroit Metropolitan Airport (DTW) is a hub airport for Northwest Airlines and competes for connecting passengers with other nearby hub airports such as Chicago (American and United Airlines), Cleveland (Continental Airlines), and Cincinnati (Delta Airlines). Northwest Airlines and its affiliated regional airlines are by far the largest carriers at DTW with approximately 80% market share. In its ongoing airport investment program, the airport is replacing its outdated terminal infrastructure with two new terminal facilities. The *South Terminal* is a \$1.4 billion facility, which has been designed specifically to accommodate Northwest's hubbing operation. The *North Terminal* (estimated investment volume at \$443 million) will accommodate the entire spectrum of non-hubbing operations at DTW upon completion in 2008. Both terminal investment projects, which will increase total gate capacity, have obtained the approval of at least 85% of DTW airlines as required by the MII clause. Under the airport's residual agreement, both non-aviation revenues (\$106.8 million) and PFCs (\$70.3 million) are used to offset the airport's operating cost and debt service (\$309.4 million). These large offsetting revenue positions have made DTW one of the least expensive hub airports in its peer group. The bulk of recent

⁴⁴ The current master use-and-lease agreement was preceded by a five-year agreement with differentiated terminal rates (2001 to 2005), a ten-year agreement without revenue share formula (1991 to 2001), and a twenty-year residual agreement (1971-1991).

investments have been financed with two general airport revenue bond series (\$1.01 billion in 1998 and \$508 million in 2005).⁴⁵

Anticipating the different contracting problems associated with the respective terminal investment projects, airport and airlines have agreed to negotiate two separate use-and-lease agreements. The *first agreement* with Northwest Airlines is matched in duration (30 years) the latest maturity dates of the GARB series 1998/2005. Under the agreement, Northwest leases almost the entire gate capacity of the South Terminal until 2032. The negotiations for a *second agreement* with the 13 remaining signatory carriers at DTW will be terminated upon completion of the north terminal.⁴⁶ Under both agreements, the cost of runway and general airport assets are allocated at an equal rate to all carriers. The operating expenses and the pro rata share of debt service for each terminal, however, will be allocated through separate cost centers to the respective groups of airline users. The separate use-and-lease agreement between the airport and its hub carrier (Northwest Airlines) addresses the hazards inherent in the distribution of airport quasi-rents during the operating stage. According to an estimate contained in the authority's bond prospectus, the cost per enplaned passenger would increase from 7\$ to approximately 22\$ if Northwest were to terminate its hubbing operations at DTW⁴⁷. The long-term gate lease arrangement and the terminal cost center structure shelter non-hubbing carriers from the cost of excess capacity if Northwest grows at a slower pace or withdraws part of its traffic. Northwest Airlines, on the other hand, is able to safeguard the quasi-rents residing in cospecialized assets by contractually securing long-term access to dedicated gates. These cospecialized

⁴⁵ Other funding sources include PFCs, federal grants, and State of Michigan grants.

⁴⁶ At the time of writing, no information is available on the design of bilateral gate lease arrangements between the authority and airlines in the North Terminal. There is no indication, however, that a single airline or consortium of airlines has approached the Authority to arrange for a specialized arrangement comparable to the one with Northwest Airlines.

⁴⁷ The estimate is taken from the airport consultants report in the bond prospectus of the 2005 GARB series.

assets have accrued over time as Northwest has invested in human capital assets for the optimization of its DTW hub-and-spoke schedule, in advertising for routes originating or transferring through DTW, and in site-specific investment (for example local aircraft maintenance facilities). While the preferential gate lease agreement allows the assignment of non-occupied Northwest gates to other carriers, the hub carrier has full flexibility to expand and reduce its hub operations, as it is not restricted by use-it-or-lose-it rules.

It is interesting to note that instead of employing a project finance arrangement, the airport has issued GARBs (secured by the entire revenue stream of the airport) to finance the Northwest terminal investment. If Northwest Airlines were to reject its lease in a future bankruptcy proceeding, the remaining airlines or general bondholders would have to carry the cost of excess capacity. One possible explanation is that the competitive pressure from nearby hub-and-spoke systems drove both partners to avoid the higher financing costs of a project finance arrangement. Instead, Northwest and the authority opted to negotiate a separate contract before the start of the planning and construction stage of the *South Terminal development*. Based on the agreement, the carrier has acted as a project developer with design and construction control and wide-ranging financial responsibility. The authority's role has been restricted to setting and enforcing standards, approving major construction elements, and maintaining general project oversight in its landlord function. From Northwest's perspective, the arrangement has optimally supported the generation of the dedicated terminal facility.⁴⁸ For the operation of the terminal facility, Northwest Airlines and the airport have agreed to rely heavily on outside suppliers. The parties have,

⁴⁸ The Director of Design and Construction at Northwest Airlines has commented on the Northwest-headed collaborative arrangement as follows:

"It was really a collaborative effort where SmithGroup [the architect], Northwest, and Wayne County worked hand-in-hand, developing the conceptual phases through schematic and design developments, and finally construction drawings. [...] As a result of our customer knowledge, and through simulations based on the projected flight schedules in the future, we were able to look at how everything would affect customer short- and long-term. Customer waiting is minimal; everything flows smoothly; and connections, both domestic and internationally, work extremely well" (Monroe 2002, pp. 40-41)

for example, awarded a master operations-and-maintenance contract, the management of the 11,500-car parking garage, and janitorial services to private firms. In contrast to the active role of Northwest in the development of the South Terminal, the remaining airlines have been consulted solely in anticipation of the planning and construction stage of the *North Terminal*. Responsibility for project management and coordination with outside suppliers has remained with the authority.

4 Discussion

The US institutional environment grants airports and airlines substantial freedom to design contractual and financing arrangements to govern transactions in their supply relationship. The general conditions for the use of airport infrastructure are established in multilaterally negotiated master use-and-lease agreements. This general contractual framework is complemented by bilateral agreements on the use of terminals and gates. Applying insights from transaction cost economics, we have argued that contractual and financing arrangements in the terminal area support relationship-specific investment and economize on transaction costs. On the basis of the case study evidence presented, we argue that the parties economize in three dimensions.

(i) *Protection of Quasi-rents Residing in Relationship-Specific Investments*. Visualized through a simplified matrix presentation, we have argued that different types of dependency between airlines and airports exist. *Airport quasi-rents* reside in spot investments in dedicated infrastructure facilities, while *airline quasi-rents* are continuously built up through complementary investments in their network structures and large-scale operations. Value differentials between first and second-best use of such assets are primarily linked to *volume uncertainties* inherent in the airline's traffic development.

Airlines with significant investments in complementary assets (advertising and network development) and quality-enhancing investments in dedicated terminals or gates protect quasi-rents by contractually securing long-term access to dedicated gates ex-ante. Our case study evidence reveals that contractual design in the airline-airport relationship depends on the severity of contracting hazards (relationship-specific investment and volume uncertainty). The arrangements observed in our case study airports include short-term contracts, long-term leases, and airlines as ‘quasi-owners’ of project-financed terminal facilities. Depending on the design of the arrangement, signatory carriers (residual and hybrid agreements) or a single airline (project finance arrangement) turn into residual claimants for a revenue shortfall. In return, airlines demand control through MII clauses or management of the terminal development project. Our evidence also suggests that airports employ project finance arrangements for relationship-specific terminal investments in order to separate relationship-specific from general-purpose assets. Such separation shelters other airlines or the airport’s general bondholders from bearing the quasi-rents of a ‘bad’ relationship-specific investment by the project’s sponsor.

(ii) Coordination in the Planning and Construction Stage. Relationship-specific investments in dedicated facilities such as the terminal development for Northwest Airlines at DTW have been accompanied by separate contracts and project finance arrangements. Under these arrangements, the future airline user obtains decision and control rights for the planning and construction of the dedicated facility. We argue that the comparative (transaction cost) advantages of airlines rather than airports steering terminal development projects arise from the following features: reduced information asymmetries between future user(s) and the airport on the lifetime cost of the terminal facility; facilitated knowledge transfer between the future airline user and third parties (for example

architects, engineers, consultants); and superior adaptive capabilities as changes unfold during the planning and construction stage. Investments in general-purpose terminal facilities, on the other hand, are directly coordinated by the public airport operator at our case study airports.

(iii) Allocation of Rights and Obligations between Private and Public Parties. Our findings reveal that the US governance model deviates in two important aspects from the traditional public agency model of European airports. On the one hand, revenue bond financing of large investment projects and accompanying airline agreements result in substantial control by capital markets and airlines. On the other hand, the number of transactions directly managed by public bureaucrats is limited, as airports rely heavily on airlines and outside suppliers in operating the airport. At the airports reviewed in our case studies, public agencies were primarily involved in the (i) coordination of investments and operation of the runway system or general airport assets, (ii) facilitation of private arrangements in the terminal area by setting standards and rules, (iii) management or marketing of facilities if private terminal investments fails, and (iv) safeguarding airline competition.

Our transaction cost assessment of the US airport governance model raises two policy implications and points the way toward future research opportunities. The proposed efficiency rationale for the occurrence of specialized contractual arrangements between airlines and airports challenges the dominant perception in the literature on *airport barriers to entry*. Our case study evidence indicates that relationship-specific terminal investment projects, supported by specialized arrangements, have increased airport gate capacity for competitors. In addition, all arrangements included special monitoring and enforcement rights for the public operators to safeguard airline competition (i.e., tying the

right to exclusive gate use to utilization levels, or scheduling competitors into unused gates). Given the limited number of cases, future empirical research should seek to substantiate the raised efficiency proposition as well as to present contra-factual (case study) evidence. As our evidence stems from recent terminal development projects it would be interesting to know if past FAA policy changes and an increased awareness by airport authorities has systematically attenuated the threat of anti-competitive airline agreements.

The second policy implication refers to the critical perception of public ownership of airports in a liberalized air transport market. Morrison and Winston (2000, p. 4), for example, suggest that the “[T]he industry’s primary inefficiencies stem from government management of airport and air space capacity, which limits competition and compromises service [...] if the public is to enjoy the full benefits of airline de-regulation, airports and air traffic control may need to be privatized”. Given our results, we argue that the cost typically associated with public ownership of airports—overinvestment and lack of managerial effort (Thompson and Helm 1991)—are mitigated in the US airport governance model. Revenue bonds and airline agreements set efficient incentives for economic investments, as bondholders and airlines bear the risk of ‘bad’ investments. Cost inefficiencies in the airport operation are limited, as public agencies rely heavily on the private sector in the operation of the airport (outside procurement and airline involvement). The retention of special rights and obligations by public agencies as airport landlords creates an institutional framework in which private investment and contracting takes place. As such an arrangement avoids the direct transaction costs as well as the distorted investment incentives of a regulated fully privatized airport operator, it remains to be demonstrated whether alternative arrangements are able to achieve a superior performance.

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