The Institutional Arrangements between Airlines, Airports, and Handling Companies — A Transaction Cost Assessment

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Abstract:	Die Dissertationsschrift analysiert die institutionellen Arrangements zwischen Fluggesellschaften, Flughäfen und Abfertigungsunternehmen unter Anwendung der Transaktionskostentheorie. Der entwickelte Erklärungsansatz und die Fallstudienergebnisse belegen, dass die Unterschiede bei vertikalen Vertragsbeziehungen und Organisationsformen zwischen Fluggesellschaften und Flughäfen mit dem Volumen der spezifischen Investitionen und dem bilateralen Anpassungsbedarf erklärt werden können. Des Weiteren wird die Vertragsgestaltung zwischen Fluggesellschaften und Abfertigungsunternehmen in der Arbeit untersucht. Die qualitativen und quantitativen Ergebnisse zeigen, dass dedizierte Investitionen und die Standardisierung von Vertragselementen die Gestaltung von Abfertigungsverträgen maßgeblich beeinflussen. Die Wahl von effizienten Vertrags- und Organisationsformen wird jedoch durch die Vergabe von Lizenzen an neue Wettbewerber in der EU behindert.
Schlüsselwörter:	Transaktionskostentheorie, Vertrag, Deregulierung, Luftverkehr
Abstract:	This thesis draws on transaction cost economics to analyze the institutional arrangements between airlines, airports, and handling companies. The developed explanatory framework and the presented case study evidence corroborate the proposition that contractual and organizational arrangements between airlines and airports vary with the amount of relationship-specific investments and the bilateral need for adaptation. In addition, we analyze the contract design decision between airlines and handling companies in this thesis. Our qualitative and quantitative results show that dedicated asset specificity and the degree of standardization of contract provisions explain the contract design decision. The award of temporary licenses to new entrants in the EU is shown to impede efficient contractual and organizational arrangements.
Keywords:	Transaction Cost Economics, Contract, Deregulation, Air Transport

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Frankfurt, June 2008.

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Vorwort

Die vorliegende Dissertationsschrift entstand während meiner Zeit als externer Promovent am Lehrstuhl für Wirtschafts- und Infrastrukturpolitik (WIP) an der Technischen Universität Berlin. Ein Großteil der Arbeit wurde während eines Aufenthalts an der TU Berlin im Jahr 2006 verfasst.

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1 Summary

1.1 Introduction

There is common agreement that competition in deregulated airline markets has rendered large welfare gains to society[1]. Given the advanced stage of airline deregulation, academics have explored policy options to increase economic efficiency of downstream infrastructure suppliers in the air transport value chain. Performance implications of airport privatization as well as the design of price regulation have received ample attention in this research context (e.g. Czerny 2006, Oum, et al. 2006, Oum, et al. 2004, Parker 1999, Starkie 2002, Wolf 2003). Closely related have been discussions on the European Commission's efforts to liberalize the European ground handling market (Kunz 1999, Soames 1997, Templin 2007).

Despite sound theoretical foundations on the benefits of pervasive competition and on the principles of regulated monopoly, relatively little is known about the design of optimal liberalization policies that govern the transition to competitive market conditions (Armstrong and Sappington 2006). Advocates of US airline deregulation in the 1970's, for example, did not predict most of the post-deregulation phenomena (emergence of dominant hub-and-spoke carriers, frequent flyer programs, and airline alliances, etc.), but expected deregulated airline markets to closely assimilate the result of a contestable market (Levine 1987). Quite similar, recent changes as well as persisting differences in the institutional arrangements between airlines, airports, and handling companies warrant a thorough economic analysis. Consequently, this thesis intends to inform future policy decisions and research by analyzing the underlying economics of the institutional arrangements between airlines and airports, respectively handling companies, in distinct institutional environments[2].

[1] Accounting for fare and service quality changes, Morrison and Winston (2000, p. 2) estimate that the annual net benefits to travelers exceeds $20 billion per annum in the United States.
[2] The institutional environment is defined as the "set of fundamental political, social and legal ground rules that establishes the basis for production, exchange, and distribution" (Davis and North 1971, pp. 6-7).

In line with this overarching objective, the papers in this thesis share two commonalities:

- Transaction cost economics (Klein, et al. 1978, Williamson 1971, 1975, 1979, 1985, 1991) serves as the theoretical foundation to develop propositions on the comparative efficiency of distinct contractual/organizational arrangements.
- All papers are empirical in nature, either presenting case study evidence on airline-airport governance arrangements or econometric results on handling contracts.

Figure 1-1 displays the two generic transactions, which constitute the units of analysis in this thesis.

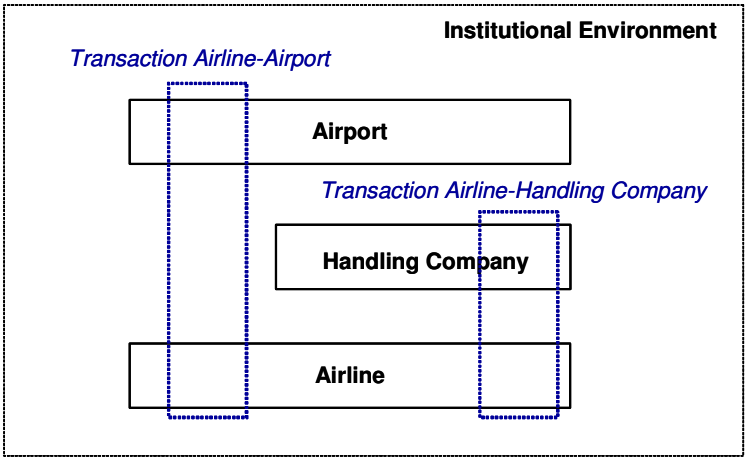

Figure 1-1: Units of Analysis

The make-or-buy choice of firms has been the focal theme in the development of transaction cost economics (TCE). Early empirical studies have tested the theory's predictions by drawing on data from competitive industries, which are characterized by limited interaction between the parties' governance choice and rules in the institutional environment. These conditions do not apply straight-forward in our industry context as government ownership, government regulators, and sector specific laws set constraints for the governance choice of airlines, airports, and handling companies. In consequence, the development of TCE-based research propositions in this thesis draws on recent extensions on the archetypical make-or-buy theme in the early literature. The extensions in this thesis include: (i) hybrid governance structures between private and public parties, (ii) contract

design and investments under institutional constraints, and (iii) the impact of repeated interactions on contract design in buyer-supplier relationships. Depending on the type of research propositions in the respective paper, the empirical studies are either qualitative (case studies) or quantitative (econometric) in nature.

The present summary chapter is organized as follows. Section 2 reviews the theoretical foundations of transaction cost economics, introduces recent extensions and empirical findings, and places the articles in this thesis within this literature. Section 3 reviews the thesis and states the contributions of each article. Section 4 concludes.

1.2 Transaction Cost Economics: Theory and Applications

1.2.1 Theoretical Foundations

The development of *property rights theory* (PRT), *contract theory*, and *transaction cost economics* (TCE) have contributed to the emergence of the larger research program of New Institutional Economics[3]. Contract theory can be subdivided into the branches: *principal agent theory* (PAT) and *incomplete contract theory* (ICT). *Table 1-1* states the unit of analysis, the main assumptions, and the principal issues of each theoretical branch. Among these theoretical branches, TCE is most suitable as the primary theoretical foundation of this thesis. The classical PRT literature operates at a more general level and has a limited applicability for contracting problems in buyer-supplier relationships. A similar argument applies to PAT, which would require us to model the relationships between airlines, airports, and handling companies as principal agent problems. ICT, on the other hand, makes strong assumptions on the rationality of the contracting parties (complete and symmetric information) and is extremely difficult to test empirically (Whinston 2003). TCE, although lacking the degree of formalization of ICT, provides an operationalized framework, which allows us to derive testable propositions.

[3] The literature is not clear which fields of research should be subsumed under the New Institutional Economics. Besides the three mentioned branches, constitutional economics and public choice theory are most commonly considered to be part of the New Institutional Economics (see Richter and Furobotn 2003, pp. 39-49 for a discussion). Williamson argues that "the New Institutional Economics (1) holds that institutions matter and are susceptible to analysis, (2) is different but not hostile to orthodoxy, and is (3) an interdisciplinary combination of law, economics, and organization in which economics is the first among equals" (Williamson 1996, p. 3).

Table 1-1: Main Theoretical Branches in New Institutional Economics

Branch	Unit of Analysis	Main Assumptions	Principal Issue	Primary Contributors
PRT	Institution	Externalities, unclearly and difficult to enforce property rights, vested interest	Comparative assessment of ex-ante property rights allocation and ex-post distributional conflicts	Coase, Alchian, Demsetz, DeAlessi, Furobotn, Pejovich
PAT	Principal-agent contract	Self-interest, information asymmetry, risk aversion	Principal agent relationship should reflect efficient organization of information and risk-bearing costs	Jensen, Meckling, Fama, Alchian, Demsetz, Holmstrom, Spence, Shavell
ICT	Asset ownership	Complete and symmetric information of contracting parties, but imperfect information of third parties	*Ex-ante* allocation of decision rights and residual surplus to motivate non-contractible commitment	Grossmann, Hart, Moore, Dewatriport, Aghion, Rey
TCE	Transaction	Opportunism, bounded rationality, farsightedness	Creation of procedures for decision making e*x post* and of mechanisms to render commitments enforceable	Coase, Williamson, Alchian, Klein, Demsetz, Barzel

Source: Table draws on Furobotn and Richter (2003, pp. 40-42), Brousseau and Glachant (2002, p. 15), and Eisenhardt (1989)

TCE's intellectual roots stem from the Coasian puzzle as posed in Ronald Coase's seminal essay on the nature of the firm (Coase 1937). In his essay, Coase sets out to clarify why a firm emerges at all in specialized exchange economy or put differently, why production is not exclusively coordinated via prices on markets. His straight-forward proposition is that using the price mechanism comes at a cost, which turns coordination of certain transactions within a firm into the preferred option for profit-maximizing entrepreneurs. Coase, however, remains abstract on the conditions and mechanisms causing a comparative (dis)advantage of markets, respectively firms.

Oliver Williamson's primary contribution has been the development of an integrative transaction cost framework to address questions of economic organization. Williamson considers the transaction, defined as the transfer of a good or service between two technologically separate units, as the appropriate unit of analysis. The predictive power of his transaction cost approach for the organization of economic activity, resides in the

discriminating alignment hypothesis, which states that "transactions, which differ in their attributes, are aligned with governance structures, which differ in their cost and competencies, in a discriminating (mainly transaction-cost-economizing) way" (Williamson 1991, p. 277). The transaction cost framework can thus be subdivided in the following dimensions: (a) behavioral assumptions of economic actors, (b) the attributes of transaction, and (c) economizing governance modes.

a) Behavioral assumptions

The behavioral assumptions of economic actors in TCE are *bounded rationality*, *opportunism*, and *farsightedness*. Williamson draws on the construct of bounded rationality, assuming that human actors lack hyper-rationality, but are "intendedly rational, but only limited to do so" (Simon 1961, p. xxiv). In consequence, all complex contracts are unavoidably incomplete and costly to design. *Opportunism*, on the other hand, is defined as "self-interest seeking with guile" (Williamson 1985, p. 47). Opportunistic parties are inclined to defect from the spirit of cooperation if faced with substantial distributional gains. As economic actors are capable of looking ahead (*farsightedness*[4]), they anticipate contractual hazards in the period of cooperation and design adequate governance safeguards ex-ante.

b) Attributes of the transaction

The first step towards an operationalization of TCE in terms of the discriminating alignment hypothesis is the development of the principal dimensions of the transaction. The primary attributes developed are the *frequency* of transacting, the degree of uncertainty in the transaction environment (*environmental uncertainty*) as well as on the parties' behavior (*behavioral uncertainty*), and the *asset specificity* of investments supporting the transaction.

Frequency of transaction works in two opposing ways (Williamson 2005). A high transaction frequency favors specialized governance arrangements as the high fixed set-up costs are spread over a larger number of transactions. Repeated interactions between parties, on the other hand, build up reputation, which serves as a low-cost informal

[4] Williamson places the assumption of farsightedness in contrast to myopic economics actors (in the manner of the behavioral theory of the firm).

safeguard as it enlarges the self-enforcing range of contracts. Frequency as a transaction attribute is deemed to be of secondary importance in determining the organization of the transaction.

In TCE, *uncertainty* has been conceptualized in two different ways. *Environmental uncertainty* refers to the amount of non-predictable changes in the transaction environment, such as changes in technology or shifts in demand preferences. The resulting need for adaptation in supply relationships depends on both, the frequency of disturbances as well as the consequentiality of the disturbances (Ménard 2004, Williamson 1991). The second form of uncertainty, *behavioral uncertainty*, has been initially defined as "uncertainty of a strategic kind" (Williamson 1985, p. 58). In the literature, few operationalization of the construct behavioral uncertainty exist. Most commonly it refers to the ex-post costs of evaluating and assessing the parties' performance during the period of cooperation (Rindfleisch and Heide 1997).[5]

Asset specificity of supporting investments takes a dominant role in explaining economic organization in the transaction cost framework. Asset specificity refers to the degree of non-redeployability of an asset.[6] The excess of the asset's value over the value of its best alternative use or user determines the amount of quasi-rents inherent in such relationship-specific assets (Klein, et al. 1978). As partners invest in relationship-specific assets, the existence of quasi-rents results in bilateral dependency, which attaches a value to the continuation of the supply relationship for each party. Such dependency might be incurred through a spot investment, which causes a 'fundamental transformation' as a large number bargaining situation ex-ante turns into a small number situation during contract implementation and at contract renewal intervals. In other instances, quasi-rents might also be accumulated during the period of cooperation. The existence of quasi-rent in a supply relationship poses a safeguarding problem as parties might hold-up each other. A hold-up situation is most likely to occur if a future state of nature has not been specified as a

[5] Besides these ex-post measurement cost, ex-ante screening activities and the selection of an appropriate partner are an additional source of transaction costs.

[6] A number of conditions of asset specificity have been developed in the literature: 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).

contractual contingency and/or enables one of the parties to expropriate substantial quasi-rents by behaving opportunistically.

c) Economizing governance modes

Conditions of asset specificity and uncertainty result in safeguarding, adaptation, and performance evaluation problems in (supply) relationships. Distinct governance arrangements offer different competencies to address these problems in a comparative superior manner. As 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, an efficient alignment between governance form and a particular transaction allows for joint value maximization, while economizing on transaction costs. Thus, next to direct transaction costs (mainly costs of developing and maintaining an exchange relation, monitoring exchange behavior, and guarding against opportunism), the opportunity cost in form of inferior performance of a sub-optimal governance structure exists (Ghosh and John 1999). *Table 1-2* summarizes the direct and indirect transaction costs resulting from different governance problems in supply relationships.

Table 1-2: Sources and Types of Transaction Cost

Source and Type of Transaction Cost	**Asset Specificity**	**Environmental Uncertainty**	**Behavioral Uncertainty**
Nature of Governance Problem	Safeguarding	Adaptation	Performance Evaluation
Direct Transaction Costs	Costs of crafting safeguards	Communication, negotiation and coordination	Screening and selection (ex-ante) Measurement costs (ex-post)
Indirect Transaction Costs (Opportunity Costs)	Failure to invest in productive assets	Maladaptation, failure to adapt	Failure to identify the appropriate partner (ex-ante) Productivity losses through effort adjustments (ex-post)

Source: Adapted from Rindfleisch and Heide (1997, p. 46)

The notion of governance as a mean to economize on transaction costs has been initially based on the dichotomy between markets (buy) and hierarchies (make) (Williamson 1971, 1975). The performance differential in organizing a transaction under

the respective governance mode is rooted in its attributes: incentive intensity, administrative control, and the supporting legal rules regime. The combination of these attributes in turn gives rise to the adaptive capacity of the governance structure, in both autonomous and cooperative respects[7]. *Market coordination* offers high power incentives, low administrative controls, relies on contract enforcement via public courts (classical contract law), and coordinates the allocation of resources autonomously via prices. The *hierarchical organization* of a transaction, on the other hand, offers low power incentives, strong administrative control by managers, and enforcement via management fiat (as courts forebear to hear intrafirm disputes, the firm itself is the court of ultimate appeal). In contrast to markets, adaptation within firms occurs in a sequential and cooperative fashion. In its subsequent works, Williamson (1985, 1991) introduces the class of *hybrid governance* arrangements as a third generic mode. Hybrid arrangements, such as long-term contracts or joint ventures, are positioned on the continuum between the polar modes and share characteristics of both, market and hierarchy. Mechanisms of private ordering, for example arbitration, replace court ordering as the primary method of dispute settlement.[8] Williamson argues that these discrete governance modes are internally consistent in their strengths and weaknesses. The advantages of one mode can neither be replicated in another mode nor are parties able to intervene selectively to attenuate the weaknesses of a chosen governance mode.[9]

Given the costs and competencies of each governance mode, TCE hypothesizes that parties will align governance structures with transactions (differing in their attributes) as to economize on transaction costs. As shown in *Figure 1-2*, markets are most efficient in

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[7] Transaction cost economics argues that adaptation is the central problem of economic organization. Referencing works of Friedrich Hayek (1945) and Chester Barnadt (1938), Williamson distinguishes between two types of adaptation. In the case of *autonomous adaptation,* individual parties respond to market opportunities as signaled by changes in relative prices. *Cooperative adaptations*, on the other hand, are accomplished through administration within hierarchies (for example business firms). Transaction cost economics recognizes that a high performance economic system needs adaptive capacities of both kinds to address distinct contracting hazards (Williamson 1998).

[8] See also Ménard (2004) for a review of the literature on hybrid governance modes.

[9] Williamson puts the failure to replicate management fiat as a conflict resolution mechanism as follows:

> "[…] the reason why the market is unable to replicate the firm with respect to fiat is that market transactions are defined by contract law of an altogether different kind. There is a logic to classical market contracting and there is a logic for forbearance law, and the choice of one regime precludes the other. Whether a transaction is organized as make or buy – internal procurement or market procurement, respectively–thus matters greatly in dispute resolution respects: the courts will hear disputes of one kind and will refuse to drawn into the resolution of disputes of the other. Internal disputes between one division and another regarding the appropriate transfer prices, the damages to be ascribed to delay, failures of quality and the like are thus denied a court hearing." (Williamson 1991, p. 275)

coordinating transactions which are characterized by a low degree of asset specificity. For such low hazard transactions, autonomous partners are able to adapt effectively to exogenous disturbances.

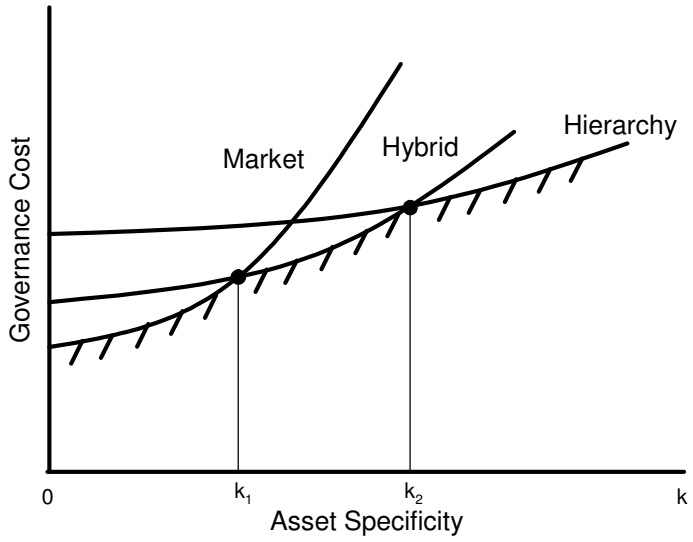

Figure 1-2: Governance Cost as a Function of Asset Specificity
Source: Adapted from Williamson (1991, p. 284)

As parties invest in relationship-specific assets (as *k* increase in *Figure 1-2*) and disturbances become more frequent and consequential, high powered incentives of market contracting impede adaptability. When bilateral parties are unable to respond quickly and easily, because of disagreements and self-interested bargaining, maladaptation costs are incurred. At certain threshold points (k_1 and k_2) the higher bureaucratic costs of hybrid, respectively hierarchical, governance modes will be offset by the bilateral adaptive gains.[10] Williamson and Riordan (1985) extend this reduced form analysis to incorporate production cost considerations, arguing that the production cost saving from economies of scales diminishes as asset specificity (*k*) increases.

Given the performance implications of an alignment between transactions and governance modes, TCE assumes that observed modes are comparative efficient, since competition will have sorted out inefficient, that is non-aligned, governance modes. Given its comparative perspective on economic organization, the theory's ramification for public

[10] This alignment logic has been subsequently developed for subclasses within the three generic modes. Researchers have, for example, explored the choice between equity versus non-equity alliances (Oxley 1997) or the transaction cost advantages of cost-plus versus fixed price contracting (Bajari and Tadelis 2001).

policy is that extant practices for which no superior feasible alternative can be described and implemented are assumed to be efficient (Williamson 1996, pp. 7-10).

1.2.2 Extensions and Empirical Studies

While the early development of the transaction cost framework and subsequent empirical tests have focused on the make-or-buy decision, the TCE framework has been subsequently extended with applications to questions of corporate governance, corporate finance, contracting for natural monopoly (especially in relation to the efficacy of franchise bidding), non-standard forms of contracting (for example take-or-pay purchase agreements) and other hybrid arrangements (for example strategic alliances).[11] In this thesis, we draw on three evolving theoretical extensions in the TCE literature and explore each in empirical studies with applications to the air transport industry.

a) Governance arrangements in the 'public sphere'

Current research in TCE is seeking to integrate governance modes in the 'public sphere' into the classical TCE framework (markets, hybrids, hierarchies). Three generic governance modes have been discussed in the literature. *Public ownership/agency* represents a hierarchical governance form (similar to the firm), in which the supply of goods or services is determined by authoritative decisions within the government. In case 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. Both *public ownership/agency* and *regulation* are viewed as discrete governance modes, which offer safeguards against extreme conditions of bilateral dependency and information asymmetry beyond those that can be privately crafted (Crocker and Masten 1996, Goldberg 1976, Williamson 1976, 1999). Rather than viewing regulation as a substitute for competitive market forces, the transaction cost perspective analyzes government regulation in process terms (Crocker and Masten 1996). In his seminal work on regulation as an administered contract, Goldberg contrasts the different perspectives as follows:

[11] Surveys on the extensive TCE literature are provided by Boerner and Macher (2002), David and Han (2004), Geykens et al. (2006), Klein (2005), Macher and Richman (2006), Rindfleisch and Heide (1997), and Shelanski and Klein (1995)

> "in searching for a rationale for regulation we should look not at the shape of the long-run average cost curve, but instead at the complexities involved in devising and administering such a contract […] natural monopoly industries will be characterized […] not by their alleged decreasing average cost: but by the feature which make long-term relationships between consumers and producers desirable" (Goldberg 1976, p. 431)

In our research context, transactions between airlines and airports do not take place in an unregulated environment but are almost always governed (at least in part) by public owners and/or administered by government regulators. Unlike the usually stylized relationship between utility companies and consumers, the transactions between airlines and airport are situated in an intermediate market. Less severe information asymmetries and substantial transaction frequency turn specialized governance structures feasible.

Our general research hypothesis is that airlines and airports seek economizing governance arrangements in a liberalized air transport market, as these bring them closest to joint value maximization. As both, different constraints (for example the legal framework) as well as the evolving nature of air transport liberalization will impact the governance choices in the respective institutional environment, an explorative approach to our research hypothesis is pursued. Both articles on the institutional arrangements between airports and airlines in this thesis develop first research propositions and present case study evidence.

Chapter 2 examines recent changes in vertical governance between airlines and airport suppliers in the German institutional environment. Our results show that private bilateral governance modes, such as airline equity ownership in airports and bilateral long-term contracts, act as complements to the traditional regime of cost plus regulation as well as (partial) public ownership in Germany.

Chapter 3 analyzes the contracting and financing arrangements between airlines and airports in the US institutional environment. Despite government ownership in airports, the existing set of rules allows airlines and airports to rely on bilateral contracting as well as on private capital via revenue bond financing. Based on the presented transaction cost reasoning and case study evidence, we argue that the parties vary contractual and financing arrangements to economize on transaction costs.

The developed efficiency-based explanation for the variation in the vertical governance arrangements between airlines and airports in this thesis should be considered as a

complement to the market power explanation in the existing literature. In past studies strong airline control on 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). Serebrisky (2003), presenting a case from Argentina (a privatized airport group acquired the second largest national airline), argues that integration between the two stages is anti-competitive and should thus be prohibited. Given the validity of both efficiency and market power explanations, policy decision-makers have the option to decide on a case by case basis or to establish a sector-specific set of rules to attenuate the threat of anti-competitive agreements.

b) Contract design and investments under institutional constraints

A central tenet of TCE is that the discriminating alignment between transactions and governance results in superior performance. Based on the hypothesized performance differentials between aligned and non-aligned governance modes, all observed governance modes in competitive markets should be comparatively efficient. The great majority of empirical studies testing TCE's prediction on economic organization are, however, indirect tests. Rather than measuring performance differentials directly, such studies test the link between observed governance forms and proxy variables for the transaction attributes asset specificity and uncertainty. The primary reasons for employing indirect tests are the difficulties in measuring direct transaction costs as well indirect costs (opportunity costs of non-observed contractual/organizational forms). Indirect test as well as the reduced dorm models employed in empirical studies have been subject to criticism (Masten 1993, Masten and Saussier 2002, Yvrande-Billon and Saussier 2005).[12] Researchers have suggested that future empirical work in TCE should seek to (i) overcome data limitations and test the link between governance and performance in direct tests (e.g. Masten 1993, Masten, et al. 1991), (ii) test TCE's underlying behavioral assumption (Tsang 2006), (iii) integrate variables to control for misalignment (Masten 1993, Masten and Saussier 2002, Yvrande-Billon and Saussier 2005).

[12] For a critique on the normative implications of TCE and past empirical studies see Goshal and Moran (1996) and Carter and Hodgson (2006).

Chapter 4 in this thesis contributes to the latter stream of literature, specifically exploring the obligation to award temporary licenses to new entrants in the handling market as a source of misalignment. Such misalignment indicates an identifiable discrepancy between the mode of organization and the characteristics of transactions involved (Ménard and Yvrande-Billon 2005). Similar to work by Ménard and Yvrande-Billon on franchise agreements for the provision of railway services in the UK (2005, 2004), we examine the impact of licensing as an institutional constraint on contract duration. Past empirical studies in TCE, have shown contract duration to be a key contractual dimension to protect quasi-rents from relationship-specific investments (Crocker and Masten 1988, Joskow 1985, 1987, Saussier 1999). If the duration of a contract can not be adapted to the features of the transaction, that is to the degree to which specific assets are involved, a misalignment occurs. The basic proposition on the effects of such misaligned governance structures is one of inferior performance in terms of production and transaction costs. The dynamic propositions are that the transaction partners adapt to institutional constraints in various ways: (i) exit or capture only a small part of the market, (ii) adapt an inferior governance structure, or (iii) adapt the attributes of the transaction (seek less-specific investments) (Yvrande-Billon and Saussier 2005).

c) Impact of repeated interactions on contract design

Within the class of hybrid governance modes, empirical research on contracts in dyadic supply relationships has a strong tradition. While early studies have focused on single contractual dimensions such as contract duration (e.g. Joskow 1985, 1987) or the occurrence of contracting terms such as take-or-pay provisions (e.g. Masten and Crocker 1985), recent research has addressed the design of contract in its entirety (e.g. Crocker and Reynolds 1993, Saussier 2000). The transaction cost trade-off in the design of a contract, i.e. its level of completeness, can be expressed as follows (Saussier 2000, p. 193):

> "Setting aside the cost of writing the agreement, the main cost incurred in the search for a more complete contract (as against an incomplete one) will be the information cost, the negotiation cost, and the potential 'maladaptation cost' or 'renegotiation cost' of being trapped in a bad contract [...] the principal gains from a more complete contract (as against an incomplete one) are (i) for the contractant that has developed specific assets, a reduced exposure to the opportunism of the other party; (ii) savings on repeated re-negotiation costs"

In the light of mixed empirical results in past studies, academics have started to frame the referred to transaction cost trade-off in a dynamic context. Researchers have proposed that informal safeguards such as trust ("shadow of the past") and reputation ("shadow of the future") act as low cost substitutes for formal contracts, that is a more complete contract.[13] On the other hand, the cost of specifying a more detailed contract might be reduced in repeated interactions between buyer and supplier as both parties learn to design adequate contracts (Argyres, et al. 2007, Argyres and Mayer 2007, Mayer and Argyres 2004). The net effect of informal safeguards (trust and reputation) and learning (in our specific case employing standardized contract terms) determines whether prior interactions result in a more or a less complex contract (Ariño and Reuer 2004). Academics have also suggested that multi-dimensional constructs of contract completeness/complexity[14] will inform the TCE trade-off (Reuer and Ariño 2007). In contrast to earlier studies, which have employed aggregate, uni-dimensional measures of contract completeness (e.g. via counting the occurrence of terms), researchers have convincingly argued that contract terms are designed to serve distinct functions (e.g. Anderson and Dekker 2005, Avadikyan, et al. 2001, Dekker 2004, Klein-Woolthuis, et al. 2005, Reuer and Ariño 2007).

Our work in Chapter 5 discusses two interdependent aspects in the contract design decision in supply relationships. *First*, the alignment between contracting terms in distinct functional classes (safeguarding, coordinating, and contingency adaptability dimension) with the attributes of the transaction is explored. *Second*, we analyze how learning impacts the design of provisions within functional classes via standardization of contracting terms.

[13] Based on their review of the empirical literature on open-end alliance contracts and contracts with a pre-specified duration (e.g. Luo 2002, Parkhe 1993), Ariño and Reuer (2004) conclude that reputation effects decrease contractual complexity. For a discussion on the role of trust and contracts, see for example Klein-Woilthuis et al. (2005).

[14] Ariño and Reuer (2004) argue that in the absence of detailed information on the transaction, contractual complexity, rather than completeness, is in most cases a more appropriate construct. In their perspective completeness represents a measure relative to the attributes of the governed transaction, while complexity is a contract design feature per se.

1.3 Thesis

This thesis consists of four individual articles. In this section, the contribution of each article is presented. *Table 1-3* classifies each article (chapter) according to the unit of analysis (transaction), the theoretical refinement, and the employed empirical method.

Table 1-3: Classification of Articles

Chapter	Transaction	TCE Refinement	Empirical Method
Chapter 2	Airline - airport	Hybrid governance between private and public parties	▪ Case studies German airports
Chapter 3	Airline - airport	Hybrid governance between private and public parties	▪ Case studies US airports
Chapter 4	Airline - handling company; Government - handling company	Contract design and investments under institutional constraints	▪ Regression analysis ▪ Case study on tendering practices for handling licenses
Chapter 5	Airline - handling company	Impact of repeated interactions on contract design	▪ Regression analysis ▪ Qualitative evidence on contract design

Chapter 2: Vertical Governance between Airlines and Airports – A Transaction Cost Analysis

Competition in deregulated markets forces airlines to continuously re-evaluate their firm boundaries. Both, the equity sale of an airport to private investors or a large scale airport investment project are settings in which airlines and airports will re-consider their vertical governance arrangements. Drawing on transaction cost economics, we develop an informal explanatory framework, present case study evidence from German airports, and formulate propositions on comparative superior airline-airport governance structures. The governance choice of airlines and airports in the German institutional context is discussed within three stylized scenarios: (i) privatization of hub airports, (ii) hub terminal expansion projects, and (iii) low cost terminal expansions projects at base airports.

We argue that the relationship between a *hub-and-spoke carrier (HSC)* and its *hub airport supplier* is characterized by bilateral dependency, high transaction frequency, and substantial environmental uncertainty. The *HSC* accumulates quasi-rents as it builds up its

hub-and-spoke schedule at the respective hub airport. The hub carrier will invest in site-specific assets as well as accrue human capital assets during its recurrent schedule optimization process. *Hub airports*, on the other hand, will incur quasi-rents through spot investments in hub-related infrastructure facilities. Such investment projects are dedicated to the hub-and-spoke business model as capacity is chosen to accommodate future growth in transfer passengers. In addition, hub terminal infrastructure will be designed to optimally support ground processes of the hub-and-spoke model.

Following TCE's generic predictions, we propose that specialized hybrid governance structures economize on the transaction between hub airports and hub carriers. One alternative is a trilateral governance structure, in which the airport-airline relationship is administered by a government regulator. On the basis of our case study evidence of recent changes in vertical governance at Munich and Frankfurt Airport, we suggest that hub airlines and hub airports design complementary bilateral governance structure to safeguard quasi-rents and facilitate adaptation. In case of (partial) privatization of its hub airport, the local HSC will judge the (future) regulator's capabilities to protect its quasi-rents. If the regulator's reputation and capabilities are judged to be poor, the HSC will incur the cost of a complementary governance structure in order to access private bilateral conflict resolution and enforcement mechanisms. The recent minority stake of Lufthansa German Airlines in Frankfurt Airport's second privatization tranche is considered as such an example.

A government regulator might also not be capable to protect the hub airport's quasi-rents rooted in expansion investments. Assuming that the local HSC has yet to invest in the development of its local hub-and-spoke schedule, it will be able to expropriate quasi-rents from its hub airport supplier by behaving strategically (withholding volume growth in its hub development). In such instances, the safeguarding properties of outside price regulation will be inadequate to fully protect the airport's quasi rent. This is illustrated in the presented evidence on the recent equity joint venture between Lufthansa German Airlines and Munich airport. We argue that the minority equity stake by the airline in the joint venture represents an investment hostage to support the airport's relationship-specific investment.

Compared to the relationship of HSC and hub airport, bilateral dependency is far smaller in the supply relations between value based carriers (VBAs) or low cost carriers (LCCs) and their airport suppliers. At so called *base airports*, a single VBA concentrates substantial passenger volume in its linear network as well as stations aircrafts and staff. These airports face investments in dedicated terminal capacity to accommodate the future growth of a particular VBA. Such dedicated terminal capacity might not be readily marketable to an alternative VBA and result in airport quasi-rents. The VBA's dependency increases during the time of cooperation with its base airport as it invests in regional advertising to develop a local low-cost brand and to mobilize demand for new routes. Anticipating this build up of brand capital at its base airport, the carrier is interested in maintaining a long-lasting supply relationship with its base airport. We propose that both parties seek long-term bilateral agreements to safeguard projected volume growth, respectively the price for using airport infrastructure. Based on our case study evidence, we suggest that observed contracting practices between VBAs and German airports (for example, tailored changes in airport fee structures and designated marketing programs for a single carrier) reflect the parties' uncertainty on the enforceability of their long-term contracts. Smaller regional airports also demand credible commitments by their primary VBA in the form of take-or-pay clauses and investment hostages prior to investments in additional terminal capacity.

The developed framework in chapter 2 presents a first institutional explanation for recently observed changes in vertical governance between airlines and their infrastructure suppliers in Germany. In contrast to the discrete view on governance modes in TCE, we have argued that privately crafted governance structures act as a complement to regulation and public ownership. We suggest that future research should seek to develop a more thorough understanding of how regulation, public ownership, and differences in institutional environments influence the governance choices between airlines and airports.

Chapter 3: Contracts, Financing Arrangements, and Public Ownership – An Empirical Analysis of the US Airport Governance Model

Building on the insights of the preceding paper on vertical governance between airports and airlines, we analyze the arrangements between airlines and airports in the US institutional environment. In the United States, airlines and airports negotiate legally binding contracts

to establish the terms and conditions for the use of airport facilities. Airports issue revenue bonds to finance large-scale investment projects. In contrast to recent privatization reforms currently underway in Europe, commercial airports in the United States are owned and operated by local government departments or agencies.

Our empirical analysis reveals that the contracting and financing arrangements governing the use of terminal and gates 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. The degree of airline control on an investment project varies with the type of financing (project finance or general airport finance sources) and the design of the underlying airline agreement. Our case study evidence shows that public airport operators retain certain rights in specialized vertical arrangements with airlines, in order to monitor and enforce efficient gate usage.

Based on the presented transaction cost reasoning and case study evidence, we propose that the contractual arrangements at US airports economize on transaction costs. Specialized arrangements facilitate coordination between the parties in the planning and construction stage of the facility. They also safeguard quasi-rents as they serve as a credible commitment and a framework to address disputes during the operating stage of the facility. The allocation of rights and obligations between private and public parties reveals that the US airport 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 under direct management of public bureaucrats is limited, as airports rely heavily on airlines and outside suppliers to operate the airport.

On the basis of the case study evidence from four US airports, we find that terminal investments supported by special arrangements have increased total gate capacity, thus allowing existing and potential competitors to expand. These findings challenge the dominant perception in the literature, which has considered specialized arrangements to act as an market entry barrier (Abramowitz and Brown 1993, Dempsey 2002, Dresner, et al. 2002, Hardaway and Dempsey 1992, Hartmann 2006, Notes 1990). It must be noted,

however, that our evidence stems from recent terminal development projects. Problems of anti-competitive airline agreements might have been attenuated lately as a result of FAA policy changes and an increased awareness by public airport authorities.

A second policy implication refers to the critique of public agencies' role as airport proprietors in the United States. Revenue bonds and airline agreements set efficient incentives for economic investments as bondholders and airlines bear the risk of 'bad' investments. Cost inefficiencies are limited, as public agencies rely heavily on the private sector in the operation of the airport (outside procurement and airline involvement). We thus propose, that the primary deficits of government ownership in airports as identified in the literature – overinvestment and managerial slack (Thompson and Helm 1991) – are mitigated in the US airport governance model.

Chapter 4: (De)regulation of the European Ramp Handling Market – Lessons to be Learned from an Institutional Perspective?

With the *Directive 96/67/EC on access to the ground handling market at community airports* (hereinafter referred to as the 'Directive') the European Commission aimed to introduce competition to national handling markets. At the time the Directive was passed in 1996, ramp handling in most member states was provided exclusively by either (public) airport operators (for example German airports) or by national flag carriers (for example Iberia Airlines in Spain).

The existing literature on the liberalization of the European ground handling market has explored issues such as access to essential airport infrastructure facilities (Kunz 1999), the ex-ante political processes preceding the Directive (Soames 1997), and the Directive's impact on market structures and handling quality (Templin 2007). The work in Chapter 4 takes the existing set of rules as spelled out in Directive as given and specifically examine if the award of temporary licenses to new entrants[15] has prevented airlines and handling companies to design efficient contractual and organizational structures. Our econometric results on contract duration (sample of 42 ramp handling contracts) as well as qualitative evidence on the award practices of licenses at German airports support our general

[15] The Directive obliges member states, which have decided to limit the number of new entrants at a particular airport (as allowed by Article 11 of Directive), to award operating licenses with a maximum duration of seven years.

proposition on the adverse effects of temporary licenses. The conducted regression analysis corroborates the results of past industry studies in TCE studies (airlines and handling companies vary contract duration to economize on transaction costs). The proxy variables for dedicated asset specificity (investments in handling equipment and maintenance shops) and the stage of liberalization display the strongest impact on contract duration. Contracts, which have been negotiated in a member states with a licensing award process, display a significant reduction in their duration.

The results from our regression analysis are strengthened by the qualitative evidence from our in-depth exploration of the award practices for operating licenses to new entrants at German airports. The German market is in particular interesting since new entrants must apply for operating licenses and compete with incumbent airport handling companies. Our results reveal that the current institutional arrangement for the award of licenses in Germany results in considerable direct as well as indirect transaction costs. Direct transaction costs are rooted in the licensing procedure itself as well as legal challenges associated to the award processes. Indirect costs, on the other hand, surface in the inability of new entrants to craft appropriate governance safeguards to support relationship-specific investments in equipment and maintenance shops. We argue that new entrants choose not to compete in market segments which require investments in equipment and staff dedicated to handle carriers with large operations at German airports. Although we are not able to estimate the costs of reduced investment levels and misaligned governance structures, these indirect costs are likely to be particularly large at airports with dominant carriers (for example hub and large spoke airports). Given these findings, we suggest that alternative arrangements, for example permanent licenses or licenses with longer duration, should be considered in a revision of the Directive.

Chapter 5: Contractual Design and Functions – Evidence from Service Contracts in the European Air Transport Industry

Chapter 5 explores the transaction cost trade-off in the design of contract provisions within distinct functional classes. We also examine the impact of learning via the use of standardized contracting terms.

Our main results corroborate the findings in earlier TCE studies on the relationship between contractual complexity and the level of relationship-specific investment. The proposition, however, that contract provisions within distinct functional dimensions (safeguarding, coordination, and contingency adaptability) have unique antecedents in transaction attributes is not supported. Asset specificity displays a dominant impact on the observed variation in all analyzed provisions in our sample of 42 ramp handling contracts. A clear separation of provisions based on their functionality has been difficult in our empirical context. The service level agreements (SLA) attached to the actual handling contract, for example, display both a safeguarding as well as coordinating function. Specifically, complex SLAs serve to align more closely ex-ante expectations for quality control procedures, for example, describe a course of action and responsibilities in case quality problems occur. A more detailed description of performance parameters in combination with penalty payments in SLA, however, also provides stronger safeguards against both, shirking on quality by the handling company and unjustified claims for quality improvements by the airline.

Our empirical evidence on the contracting practices in the ramp handling market further reveals that learning via standardization of contract provision plays an important role. Well-known contractual hazards and a stable transaction environment in this industry result in the heavy use of "off the shelf" contract terms at most airport locations. Standard setting in the handling industry allows both, airlines and suppliers to economize on transaction costs. The identified learning processes take place at the industry and at the firm level. While provisions with a *safeguarding* and *contingency adaptability* function are shown to be standardized at the industry level, contract elements with a *coordinating function* are standardized across similar transaction at the firm level.

1.4 Concluding Remarks

This thesis encompasses four individual articles applying transaction cost economics to the institutional arrangements between airlines, airports, and handling companies. The first two articles (Chapter 2 and 3) apply TCE to the vertical governance structures between airlines and airports in the German, respectively the US institutional environment. The articles presented in Chapter 4 and 5, draw on recent refinements in the literature on contract design and test these within empirical studies on the contracting practices in the ramp handling market. Specifically, we analyze institutional constraints as sources of misalignment (Chapter 4) and the impact of learning on the contract design decision (Chapter 5).

While the predictions of transaction cost economics have been extensively studied in other industries (e.g. the automobile industry), the present analysis of the institutional arrangements in the air transport industry represents the first of its kind.[16] Given the constraints in the parties' governance choices, the theoretical foundations of this thesis are based on recent extensions of the transaction cost framework. The thesis' primary objective has been the development of propositions and their exploration within empirical studies, all of which draw on unique sets of data. The proposed link between performance and the design of the institutional arrangement in this thesis is important as policy decisions are continuously taken in the transformation process towards a more competitive air transport system. A more thorough understanding of this link will improve the quality of policy decisions at the *level of the institutional environment* (for example, whether and how the Commission should revise the Directive on the liberalization of the ground handling market) and at the *governance level* (for example, how bilateral long-term contracting and other non-standard contractual/organization forms between airports and airline impact efficiency).

On the basis of our results, we have suggested preliminary policy implications as well as future research opportunities. Future research should attempt to develop detailed policy implications on the basis of the presented transaction cost reasoning as well as challenge the raised propositions via detailed empirical studies.

[16] Exceptions are studies by Langner (1995) on the allocation of airport slots and Wolf (2004) on airport privatization.

2 Vertical Governance between Airlines and Airports – A Transaction Cost Analysis

2.1 Introduction

European liberalization of air transport has resulted in intense competition among established airlines and new airline business models. In this competitive environment, airlines are reevaluating their firm boundaries in the quest for further efficiency gains. This is particularly important for supply relations with air traffic control providers and airports – suppliers facing either privatization or strong pressure to invest in infrastructure expansion to meet rising demand.

In both settings, (i) the equity sale of airports to private investors and (ii) the expansion of infrastructure capacity, airlines and infrastructure companies[17] are forced to re-consider their vertical governance structures.[18] Research on airports has traditionally focused on the welfare benefits of private ownership and regulatory aspects. In this paper, a different perspective is taken. Each of the two settings outlined is analyzed as a "*boundary of the firm problem*" in the interfirm supply relationship between airlines and airports.

Transaction cost economics (TCE) is applied to formulate propositions on how airports and airlines establish vertical coordination. The theory hypothesizes that the two partners will seek transaction-cost-minimizing governance structures, as these bring them closest to joint profit maximization (Ghosh and John 1999, Williamson 1985). Transaction cost theory offers a particularly well-suited lens of analysis given its applicability to the central question of vertical integration and the strong empirical support for its hypotheses on economic organization.[19]

In the current paper, however, we consider its application to the supply relationship between airlines and airports as distinct from the usual empirical setting. Transactions between airlines and airports do not take place in an unregulated environment but are almost always governed (at least in part) by public owners and/or administered by government regulators. While competition is often assumed to sort out inefficient from

[17] The terms "infrastructure company" and "airport" are used synonymously in the following.
[18] Governance structure is defined as "an institutional matrix in which integrity of the transaction is decided" (Williamson 1996, p. 378).
[19] See Boerner and Macher (2002), Klein (2005), and Rindfleisch and Heide (1997) for an overview on the extensive empirical literature.

efficient governance structures, its selection function in this context is limited due to the institutional constraints and recent nature of liberalization. As a consequence, we approach our research question by developing an informal explanatory framework and explorative case studies. We start by deriving research propositions, and then discuss them in the light of several case studies.

As the starting point for our proposals, we argue that governance structures in the supply relationships *hub airline and hub airport* and *value-base carrier and base airport* are undergoing vertical re-alignment. We propose that hub-and-spoke carriers (HSC) seek strong hybrid governance structures, which display most characteristics of hierarchical governance. HSC evaluate the hold-up threat considering the safeguarding properties of the outside government regulator. Thus, if the regulator has a poor reputation and regulatory institutions are weak, HSC incentives to build private bilateral governance structures are strengthened. Hub airports, on the other hand, need a credible commitment from hub airlines prior to investing in specific hub infrastructure.

Furthermore, we propose that weak hybrid governance structures are sought in the supply relationship between *Value-Based Carriers (VBA) and base airports*. While VBAs attempt to safeguard their sunk investment in regional and route-specific brand capital, base airports want to protect their investment in dedicated terminal capacity for their base carriers. We propose that these parties seek long-term contracts. Provided the base airport invests in new terminal capacity, complementary safeguards in the form of financial hostages or investment hostages are needed.

The paper proceeds as follows. In Section 2, we identify the unit of analysis – the transaction – and analyze the antecedents of frequency, asset specificity, and uncertainty in airport-airline supply relations. In Section 3, we develop propositions on vertical governance in three research scenarios: (i) privatization of a hub airport, (ii) terminal expansion at a hub airport, and (iii) terminal expansion at a base airport. We present explorative case studies to corroborate and challenge the propositions. Section 4 concludes with a discussion of results and future fields of research.

2.2 Transactions between Airlines and Airports

2.2.1 Transaction Cost Economics as the Lens of Analysis

The question of vertical integration and the design of interfirm supply relationships has been discussed extensively in the literature on the theory of the firm. In his recent summary of the literature on vertical integration, Joskow states that "there is not and will never be one unified theory of vertical integration" (Joskow 2005, p. 320). The different theories can be classified into market power explanations and efficiency-based explanations[20]. TCE belongs to the latter.

In the specific research context of airline/airport interfirm supply relationships, there has been discussion of the antitrust implications for airport lease agreements (Notes 1990), market power arguments (Dresner, et al. 2002, Serebrisky 2003), and strategic alliances (Albers, et al. 2005). In our view, transaction cost theory offers a promising lens of analysis; with it, we hope to develop the first efficiency-based explanation for the realignment of airport/airline supply relationships from a comparative economics organization perspective. One of the theory's main strengths is its operationalized framework. Furthermore, it has been validated by a large number of empirical studies. The TCE hypothesis on economic organization incorporates inefficiency in both the ex-ante investment decision, and at the ex-post level, in the contract execution phase.[21]

2.2.2 The Transaction as the Unit of Analysis

Transaction cost economics owes its predictive power to the discriminating alignment hypothesis, which states that "transactions, which differ in their attributes, are aligned with governance structures, which differ in their cost and competencies, in a discriminating (mainly transaction-cost-economizing) way" (Williamson 1991, p. 277). Direct transaction

[20] The most important literature based on the market power argument deals with strategic behavior aiming at raising rival's cost in the short run or at foreclosing vertical markets in the long run (Aghion and Bolton 1987, Ordover, et al. 1990). Traditional efficiency-based theories use production cost explanations (Panzar 1989) or frame vertical integration as a special solution to the double mark-up problem in successive monopolies (Tirole 1988). The dominant theories in New Institutional Economics encompass the more formal property rights approach to vertical integration (Grossmann and Hart 1986, Hart and Moore 1990) and transaction cost theory (Klein, et al. 1978, Williamson 1971, 1985). In the strategic management literature, the boundaries of the firm are often discussed by drawing on resource-based or capabilities-based theories (Barney 1991, Peteraf 1993, Teece, et al. 1997, Wernerfelt 1984) and evolutionary arguments (Jacobides and Winter 2005).

[21] The fact that airport infrastructure is a durable and long-term good will lead far-sighted decision-makers to assign particular importance to ex-post adjustments when deciding on the vertical governance structure.

costs include the cost of developing and maintaining an exchange relation, monitoring exchange behavior, and guarding against opportunism in exchange. Indirect transaction costs, on the other hand, encompass the opportunity cost of inferior performance of sub-optimal governance structures, as well as the cost of maladaptation when critical information is revealed ex-post.

To start with, we need a clear definition of the transaction, which will constitute our unit of analysis. We can identify the following major transactions and associated cost positions at the airline-airport interface[22]:

(1) Transactions of *planning and construction* are interactions between the infrastructure operators, construction companies, architects, and airlines in the design and the construction phase of the infrastructure.

(2) Transactions in the *maintenance* of infrastructure include all transactions aimed at maintaining the infrastructure at a defined level of service quality.

(3) Transactions in the *development* of infrastructure include all adjustments to the characteristics of the infrastructure during the period of operation, as customers and governmental bodies may demand these changes.

(4) Transactions in *daily operations* consist of all activities in the direct operation of the infrastructure. Examples include terminal management, allocation of gates, baggage tracing, and apron control.

While the latter three transactions occur in the operation stage, the *planning and construction* transactions take place in the investment stage. Through this up-front investment, the airport generates the option to use the infrastructure in the subsequent operating stage.[23]

[22] Transactions of approval and transactions of non-aviation commercial activities have been excluded as they do not directly occur between airlines and airports. Transactions of approval include all transactions between airports, governmental bodies, and non-government organizations during the process of ex-ante approval of the new infrastructure/airports. Transactions of commercial activities include all non-aviation activities, such as retailing, parking, etc.

[23] The logic described borrows from a TCE analysis on the interfirm supply relationships between railway companies and their rail track infrastructure suppliers, by Brenck *et al.* (2004).

Therefore, the relevant transaction for our analysis is the one that occurs every time the airport grants the airline the right to use airport infrastructure – such as runways, aprons or terminal – in the operating stage. Defining the unit of analysis as this kind of transfer of a property right to use infrastructure, we aggregate the above transactions into a single transaction called *usage of infrastructure*. In determining how to price the transaction *usage of infrastructure* during the operating stage, the airport includes both the cost of the up-front investment as well as the cost of maintaining, developing, and operating the infrastructure. *Figure 2-1* displays this temporal logic in the supply relationship between airline and airports. Airports and airlines determine the governance structure prior to the investment and operating stage[24], as the decision on the specificity of the investment is endogenous to the determination of the governance structure.

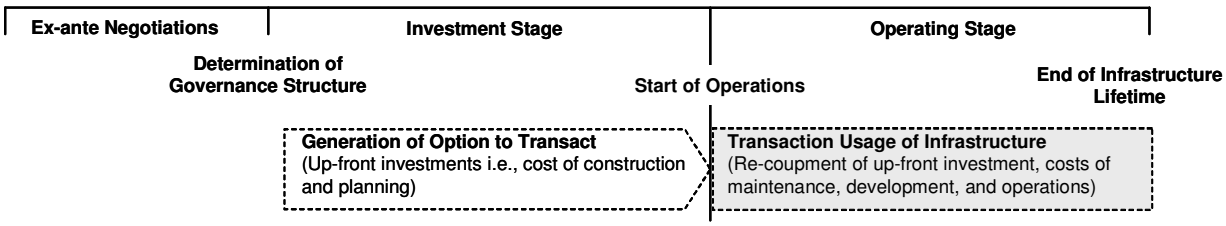

Figure 2-1: Transactions between Airlines and Airports

2.2.3 Transaction Attributes

Given our unit of analysis, the question is whether the attributes of the transaction *usage of infrastructure* are the same across all airline/airport supply relationships. In line with prior work on contractual relations in the nodes of the airline's network, our working hypothesis is that discrete differences do exist (Fuhr 2006b, Langner 1995). In the following, we will explore the aspects of *asset specificity*, *uncertainty,* and *frequency* in airline/airport supply relationships.

2.2.3.1 Frequency Distribution in Airline Networks

Among the transaction attributes mentioned above, frequency is of secondary importance to the others. Non-specific transactions are still coordinated most efficiently in markets,

[24] For the sake of simplicity, we do not enter into a discussion of the services (for example, terminal cleaning) being contracted out once the vertical governance structure between airline and airport has been established.

even if they occur frequently. As specificity and uncertainty cause a comparative cost disadvantage for market coordination, frequency works in two opposing ways. On the one hand, high transaction frequency spreads the fixed cost of specialized governance structures over a large number of transactions. On the other, frequent interactions help build reputation, which functions as an informal safeguard (Williamson 2005).

The transaction frequency in the airline/airport supply relation depends on the airline's *network structure* and the *airport's role* in the network.

In a *hub-and-spoke network*, economies of density and scope are exploited by bundling traffic at a central hub airport (Brueckner and Spiller 1994, Caves, et al. 1984). On the supply side, the ability to employ larger aircraft types in both continental and intercontinental traffic, and higher productivity in ground operations result in significantly lower unit costs. Demand or market economies are achieved through the larger number of connections offered in a hub-and-spoke network. Integration of the hub-and-spoke carrier's flight schedule with the networks of its airline alliance partners (Shy 2001) allows for further exploitation of these economies. The resulting transaction frequency in the nodes of a hub-and-spoke network is as follows:

(1) *Hub Airports*: HSC and airports display a *high frequency* of transactions (measured in landings), with the hub airline market share usually above 50%.

(2) *Secondary Airports*[25]: HSC and airports display a *moderate to high frequency* of transactions. Traffic generated at these airports contributes a substantial part of feed into the network.

(3) *Other Spoke Airports*. Transaction frequency is *low*, as these airports contribute a small portion of traffic to the network, but they are greatest in number.[26]

[25] The term secondary airport borrows from a classification of airports by Hirschhausen *et al*. (2004). Secondary airports are situated in large catchment areas, provide a large portion of the HSC network feeder traffic, and attract point-to-point traffic.

[26] Applying this classification, Fuhr (2006c) finds the following cumulative frequency distribution in an empirical analysis of a hub-and spoke network: the two hub airports contribute 44.1% of all aircraft take-offs (54.5% of all departing passengers); adding the ten largest spoke airports brings the number to 75.7% (80.8%) with the remaining 58 spoke airports in the network contributing the other 24.3% (19.2%). All figures are derived from the analysis of a single European HSC for airports within the European Union.

In the United States, the hub-and-spoke system is considered an outcome of deregulation (Reynolds-Feighan 2001, Shy 2001). Analysis of the temporal configurations of European hub-and-spoke networks shows that HSCs in Europe have also increasingly relied on hubbing since deregulation (Burghouwt and De Wit 2005).

The second phenomenon resulting from deregulation has been the emergence of a competing business model. Value based airlines (VBA) – more commonly know as low cost carriers – employ a linear network structure with short and mid-distance flights in their route portfolio.[27] In these linear networks, frequency is more evenly distributed (Reynolds-Feighan 2001). VBAs maintain supply relations with two types of airports: base airports and non-base airports. At a base airport, planes, personnel and in some cases supporting services (such as aircraft maintenance facilities) are stationed. These airports are located in attractive catchment areas, in which the VBA attempts to build a strong regional brand to generate demand for the large number of routes originating from the base airport. Similar to the relationship between hub carriers and hub airports, a single VBA dominates its base airports. *Table 2-1* shows a selection of dominant carriers at hub or base airports, including their market shares and shares in the number of transfer passengers.

[27] In the literature, there is no uniform definition of a low cost carrier (LCC) or value based airlines (VBA). In our study, we regard the linearity of the network structure as the key criterion. However, it should be noted that the sharp distinction between the classic VBA and the HSC business model is blurring due to the introduction of hybrid business models and network structures. Nevertheless, we regard the focus on the polar models as sufficient for our analysis. The abbreviations LCC and VBA are used synonymously.

Table 2-1: Market Shares at European Hub and Base Airports

Airport	Business Model	Dominant Carrier	Market Share	Transfer passenger[28]
Amsterdam (AMS)	HSC	KLM	76%	58%
Frankfurt (FRA)	HSC	Lufthansa	75%	65%
Paris (CDG)	HSC	Air France	73%	44%
Munich (MUC)	HSC	Lufthansa	63%	46%
Heathrow (LHR)	HSC	British Airways	51%	34%
Hahn (HHN)	VBA	Ryanair	93%	n/a
Berlin (SXF)	VBA	Easyjet	46%	n/a
Cologne (CGN)	VBA	Germanwings	31%	n/a
Stansted (STN)	VBA	Ryanair	63%	n/a
Luton (LTN)	VBA	Easyjet	58%	n/a

Source: MIDT, 2004.

The transaction frequency in the supply relation between VBA and airport is as follows:

(4) *Base Airports*: Transaction frequency between VBA and base airport is *moderate to high*. A single VBA dominates its base airport and disposes over a large market share.

(5) *Non-Base Airports*: Transaction frequency is *low*, as these airports only connect to a few other airports in the linear network.

2.2.3.2 Uncertainty

The behavioral assumption of *bounded rationality* in TCE relaxes the classic assumption of perfect information. In consequence, individuals are unable to assign probabilistic values to future states of contingencies. Economic agents will thus estimate the degree and consequences of *environmental uncertainty* based on their past experience and present expectations. Both the frequency of disturbance as well as the degree of consequentiality determine the need and the required adaptive capabilities in exchange relationships (Ménard 2004). Market coordination is best suited to coordinate exchange when uncertainty is low and market participants adapt autonomously on the basis of information provided via the market price mechanism. As uncertainty increases, price alone becomes

[28] Market shares and transfer quotas are based on the number of departing passengers. At hub airports, alliance partners of the local HSC have been included.

unable to coordinate exchange efficiently. Autonomous adaptation is increasingly replaced by coordinated adaptation in hybrids, and in the extreme, substituted with full administrative controls[29] in hierarchical governance (Williamson 1991).

As parameters of the state of nature are revealed, transaction partners face *behavioral uncertainty* of their counterpart as economic actors are assumed to be *opportunistic*. The resulting strategic behavior includes non-disclosure and disguise of relevant information in the adaptation process (Williamson 1985). The resulting behavioral uncertainty has been conceptualized as the difficulty or cost of performance evaluation (Ghosh and John 1999, Rindfleisch and Heide 1997). Performance evaluation tends to be especially difficult with complex transactions, as "more details need to be accounted for and more dimensions exist in which something can go wrong" (Masten 1984, p. 193).

As uncertainty is hard to define[30], let alone to measure, we attempt to identify the extent and sources of uncertainty in the ex-ante determination of the price for the transaction *usage of infrastructure* in the operating stage. Farsighted airport planners will determine the pricing of the transaction based on the projected traffic growth, as well as an estimate of the investment volume and running cost during operations. If uncertainties are negligible, the partners can write a permanent long-term contract or define a price adjustment formula ex ante.

In terminal and airport expansion projects – as in most infrastructure projects – costs are sunk the moment the capacity is generated, and time horizons of 30 years or longer are common. Substantial uncertainties exist on both the demand and the supply side of the transaction. They arise due to the following uncertainties:

- accuracy of the demand forecast and the nature of demand
- investment volume in the design, planning and construction phase
- costs of infrastructure maintenance and operation

[29] Some researchers have argued that uncertainty acts as disincentive for vertical integration in high technology industries. For a discussion on the role of uncertainty on the generic governance modes market, hybrid, and hierarchy see Ménard (2004), Williamson (1991), and Rindfleisch and Heide (1997).
[30] See Rindfleisch and Heide (1997) for an analysis on the different definition of uncertainty in the TCE literature. See also Klein (2005) for a critique on the treatment of uncertainty in empirical studies in TCE.

- costs of infrastructure development due to technological changes, customer needs, or changes in legal or governmental regulations

When environmental uncertainty is introduced to the contracting problem described, the price determined ex-ante has to be adjusted as contingent states of demand and supply condition materialize. Since writing a complete contingent contract is either not feasible or comes at prohibitive costs, airlines and infrastructure suppliers enter into ex-post re-negotiations. The effects of demand changes and cost developments on an equitable price of the transaction during the operating stage are difficult for outside parties to estimate, and it is thus impossible to objectively determine the adjusted price. In an attempt to estimate an "equitable"[31] price, outside parties such as airlines or arbitrators face substantial information asymmetries. For example, airport suppliers can behave strategically, that is, not disclose full information on the true effects of the external changes.[32] These information asymmetries have the most severe effect in complex transactions that take place between airlines and their hub airports and large secondary airports. Determination and allocation of costs, for example, becomes increasingly difficult as one moves from simple regional airports to larger airports with multi-product offerings.

2.2.3.3 Asset Specificity

Asset specificity takes on a dominant role in TCE in explaining efficiency differentials between the generic governance modes of *market*, *hybrid*, and *hierarchical governance*. Exchange partners place value on a continuation of an existing exchange relationship based on their investments in relationship-specific assets. The resulting quasi-rent is defined as the excess of an asset's value over the value of its best alternative use or user (Klein, et al. 1978). This excess of return keeps the asset in its current use, and can include pure rents as well (Holmstrom and Roberts 1998). In the literature, six different conditions of asset specificity have been developed: site, physical, human capital, brand, dedicated, temporal, and contractual asset specificity (Masten, et al. 1991, Pirrong 1993, Williamson 1985).

[31] Partners to exchange have an incentive to devise terms that provide for an "equitable" division of ex-post contractual surpluses, as this minimizes the probability that contracts will be re-negotiated or performance will be evaded. See Masten and Saussier (2002) for a discussion on the term "equitable" in the literature.
[32] The example given refers to strategic behavior of the infrastructure company. Airlines, however, might as well behave strategically. Airports rely on growth estimates provided by the airline based on its expected success of its business model. These estimates might be over-estimate or inherent business risk might not be fully disclosed.

Two characteristics of idiosyncratic investments are particularly noteworthy: first, mutual gains from specific investments exceed the gains of non-specific investments, and second, restricted redeployability of a relation-specific asset causes a fundamental transformation (Williamson 1985). A fundamental transformation occurs as the build-up of specific assets turns a large number ex-ante bargaining situation for the supply of a good or a service into a small number bargaining situation ex-post. The resulting mutual dependency either occurs *immediately* through a joint investment or is built up *continuously* as partners invest in complementary assets (Ménard 2004). We argue that these different forms of quasi-rent creation are of particular importance in our research settings. In the following, a distinction is thus needed between the airport's and the airline's perspective on the origins and extent of quasi-rents.

Airline Perspective. What are the antecedents of an airline's quasi-rents in the supply relation with a particular airport? We argue that they are reflected in the cost of excluding the airport from its network (this includes the opportunity cost of foregone profits as well). To put it differently, to what extent can the airport hold up the airline by raising its prices for the usage of its infrastructure before the airline will either downgrade the airport in its network hierarchy or stop servicing the airport?[33]

Intuitively, one would argue that quasi-rents are greatest for hub airports, less for large secondary airports with their substantial feeder traffic, and insignificant for simple spoke airports. In linear networks, on the other hand, the losses incurred for switching base airports will exceed the costs of substituting non-base airports in the network. We attempt to substantiate this intuition by exploring the nature of *site-specific* investments and investments in *human capital* and *brand name capital* in more detail.

Site-specificity at hub and secondary airports includes the HSC's investments in maintenance and training facilities to assure the high productivity of operations at these airports. However, a far greater source of quasi-rents is rooted in the optimization of the hub-and-spoke flight schedule. These quasi-rents originate through a mixture of *human capital asset specificity* in the scheduling process itself (Langner 1995) and *site specificity*

[33] Besides the extreme option of stopping to service the airport, the airline can change the hierarchical role of the airport in its network. HSCs might downgrade a former secondary airport to a simple spoke airport, while VBAs might turn a former base airport into a non-base airport.

through grandfathered slots and bilateral traffic rights.[34] Flight schedules are planned around the hub airport and are continuously optimized through a trial-and-error procedure in order to determine which (new) destinations are profitable or which combination of aircraft rotations result in the highest asset productivity. In this revolving scheduling process, slots and international traffic rights are taken into account as constraints. In consequence, the cost of switching a *hub airport* within a fully developed schedule will be extremely high. *Secondary airports* will also create quasi-rents, although to a lesser extent, as the upstream and downstream traffic is aligned with the banks of connecting flights in the hub. Again, as large secondary airports are slot-constrained, matching slot pairs are attained over time to optimize the feeding structure.

In contrast to the bilateral dependency arising from site-specific investments and the specificity of human capital assets discussed above, quasi-rents will be far lower in the supply relations of value-based carriers with their airports. In most cases, training and technical maintenance is contracted out, airports in the networks are usually not slot-constrained, and the VBA's business model is not affected by international bilateral agreements.[35] Even though the trial-and-error procedure determining the optimal route portfolio of point-to-point routes originating from a base airport still applies, the resulting quasi-rents are smaller. Optimization is less complex, being restricted to a subpart of the network, is based on a single aircraft type, and is subject to fewer constraints. *Human capital asset specificity* and *site-specific investment* are in most cases negligible. To a certain degree, site-specific investments at their large base airports occur as VBAs either invest in their own maintenance facilities or enter into long-term maintenance contracts.[36]

However, investment in *brand building* in the catchment area of the base airport is considered a substantial sunk cost. The success of the VBA business model is rooted primarily in lower unit costs due to employment of one single, large aircraft type, the high

[34] A slot is a time window in which the airline is entitled to use the runway of a congested airport. In Europe, slots are not allocated through markets, but are quasi-owned by airlines on a historical basis ("use it or lose it rule" or grandfather rights). Bilateral traffic agreements specify the traffic rights and the number of flights between two countries. These rights are not carrier-specific, but are tied to a specific airport or country.
[35] The full range of "freedoms of the air" are granted to carriers with operating certificates in the European Union since the implementation of the final liberalization package in 1997.
[36] The underlying logic of these investments at large base airports is an increase in aircraft productivity. The productivity gains are derived from the quick resolution of technical problems during operations and routine maintenance checks, which take place at night, when aircrafts are parked for their night stopovers.

productivity of resources and personnel, and the omission of complexity-driven services. In order to attain a high seat load factor, VBAs must mobilize sufficient demand through lower prices and significant advertising expenditures in the respective catchment area. The value of such mobilized demand through the establishment of local "low-cost brands" at the catchment as well as at the route level causes the VBA to value a continuing relationship with its base airport supplier.

A similar line of argument applies to the HSC and its sunk costs in brand building for transfer connections via its hub airport. Such decentralized and route-specific brand capital is built up through indirect distribution channels (via travel agencies) as well as with direct customers (Langner 1995).

Airport Perspective. In the preceding analysis on the antecedents of quasi-rent creation in hub-and-spoke and linear networks, we argued that most specific investments are of the continuous type and are gradually built up in the establishment of the airline's network. Airports, on the other hand, are faced with a potential immediate creation of quasi-rents through an idiosyncratic "spot" investment.

In our view, *dedicated asset specificity* and *physical asset specificity* of airport infrastructure are the antecedents to bilateral dependency between airports and specific carriers. The airport determines the specificity of the investment in its decision on the capacity and functionality of infrastructure in the early part of the planning and design stage.

Assuming the airport intends to expand its terminal and/or runway capacity, it faces the option of investing in either a general-purpose asset or a specialized asset. A general-purpose asset would provide sufficient capacity to serve local demand in the catchment area and include basic functionalities, that is, standard spoke terminal and continental runway technology.

Now assume both airport and a particular airline can mutually gain through the (further) development of a hub-and-spoke network, given that adequate hub infrastructure is provided. Specialized hub infrastructure allows for optimal transfer processes and results in a comparative competitive advantage of the HSC. The infrastructure company is now confronted with an investment in relationship-specific infrastructure.

Physical asset specificity is caused by terminal layouts specific to transfer passenger processes, investment in a high-speed and automated baggage system for dedicated logistic processes, and runways for intercontinental airplanes. *Dedicated asset specificity* exists as terminal and runway capacities are now designed not only to provide for local traffic, but for expected transfer traffic.

For the airport to recover its sunk investments, it must work with the HSC for a defined period of time and for an expected traffic growth path. Quasi-rents accrue due to the difference in value between the optimal and the second-best use of the hub infrastructure. Following our classification of airports, this second-best use will be that of a secondary airport in the HSC network. As argued above, it is unlikely that the infrastructure company will attract an equally well-suited HSC, as other hub-and-spoke carriers are already locked into their respective hub airports.

So far our line of argument assumes that airports generally do not compete in the same catchment area or to attract new carriers. However, this assumption appears invalid particularly in the case of VBAs and their strategy of network expansion. These carriers evaluate and negotiate with various base airports across Europe prior to establishing new airports in their network. *Non-base airports* are unlikely to invest in new capacity, as underutilized existing capacity suffices in most cases to handle the additional volume. Potential *base airports*, however, are faced with infrastructure expansion at least on the terminal side when VBAs begin establishing large-scale operations. Even though VBAs demand general purpose infrastructure matching their low-cost business model (Barrett 2004), quasi-rents are created as dedicated capacity exposes the airport to a hold-up situation. In the early development of their linear network at the base airport, VBAs are still able to exit the catchment area or withhold growth at little cost. Alternative VBAs, on the other hand, will either be locked into their base airports or able to exploit the weak bargaining position of the airports due to sunk investments.

2.3 Vertical Governance: Some Propositions

So far, the focus has been on the attributes of frequency, uncertainty, and asset specificity of the transaction *usage of infrastructure* and on the differences in the stylized airline/airport supply relationships. Following the heuristics in TCE, specialized vertical governance structures should surface in supply relations between *HSCs and their hub airports* and *VBAs and their base airports*. We have argued that in these exchange relationships, transaction frequency is substantial, environmental uncertainty is significant, and relationship-specific investments of both the continuous and the immediate type occur.

Based on our transaction cost reasoning, first propositions on the vertical governance decision are developed in three supply scenarios: (i) privatization of a hub airport, (ii) terminal expansion at a hub airport, and (iii) terminal expansion at a base airport.

These propositions are supported and challenged via explorative case studies on occurrences of specialized vertical governance structures between airlines and airports. For scenario (i) privatization of a hub airport, we explore Lufthansa's[37] recent minority investment in Frankfurt International Airport. The Terminal 2 joint venture between Lufthansa and Munich Airport is subject to analysis in the second scenario. Third, we attempt to shed some light into the contracting practices between VBAs and base airports in Germany.

We have several objectives in presenting these short case studies. First, we analyze the airlines' and airports' goals and incentives for creating specialized vertical governance modes. Second, we elaborate on the costs and competencies of the chosen organizational form and contrast them against a purely administered transaction by an outside regulator. Finally, we evaluate the degree to which the evidence presented corroborates our transaction cost reasoning and propositions.

2.3.1 Hub Airport Privatization

The alignment with a transaction cost minimizing governance structure in the airline/airport supply relationship differs from the typical contractual problem addressed in

[37] Lufthansa German Airlines (Lufthansa) is a publicly listed company, which has been fully privatized since 1997. Next to British Airways and Air France, it is Europe's largest hub-and-spoke carrier.

the TCE empirical literature. In the majority of cases, the transaction *usage of infrastructure* is not privately governed in a dyadic supply relationship, but administered by a government regulator. The transaction cost (administered contract) perspective analyzes economic regulation in process terms rather than as a substitute for competitive market forces[38] (Crocker and Masten 1996).

In his seminal work on regulation as an administered contract, Goldberg (Goldberg 1976, p. 431) contrasts the perspectives as follows.

> "in searching for a rationale for regulation we should look not at the shape of the long-run average cost curve, but instead at the complexities involved in devising and administering such a contract … natural monopoly industries will be characterized … not by their alleged decreasing average cost: but by the feature which make long-term relationships between consumers and producers desirable"

Further, Williamson (1999) argues from a comparative economic organization perspective that both public ownership[39] and regulation as discrete governance modes offer safeguards against extreme conditions of bilateral dependency and information asymmetry beyond those that can be privately crafted.

However, the relationship between airline and airport differs in important aspects to the usually stylized relationship between utility companies and consumers. First, the contractual problem is situated in the intermediate goods or services market. Thus, information asymmetries are less severe and it is feasible to create specialized governance structures. On the other hand, airports can only partially be considered a natural monopoly industry as they do face competition in certain market segments (Starkie 2002).

From an institutional point of view, airport price regulation represents a long-term contract between airports and airlines that is enforced by a third party – in our case, a government regulator. However, such trilateral governance of the transaction (Williamson 1985, Wolf 2004) might be further supported by a privately crafted dyadic governance structure.[40]

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[38] From the neoclassical perspective, price regulation represents a second-best response to a condition of (uncontested) natural monopoly. Regulation is considered as an imperfect substitute for competition.

[39] Public ownership is not subject to further analysis. We assume that public owners, intending to (partially) privatize a hub airport, will start to behave like private investors.

[40] The privatization of NATS (Air Traffic Control in the UK), for example, resulted in a strong hybrid governance structure (today 42% ownership stake by an airline consortium). As prices of NATS are determined via a price cap formula, regulation and vertical integration apparently act as complements.

Why is this? From the airline's perspective, regulation represents a safeguard against opportunistic pricing behavior by the airport. The regulator evaluates the adequacy of the airport's pricing proposal for the transaction *usage of infrastructure* on the basis of the cost and revenue data provided. The resulting price is then applicable to all airlines transacting with the airport. For the majority of airlines serving a hub airport, regulation represents a transaction cost minimizing governance structure.

The local HSC, on the other hand, will be particularly vulnerable to hold-up by the airport, as it has accumulated large quasi-rents in the development of its hub-and-spoke schedule. As the hub airport makes the transition from public to private ownership, the local HSC will evaluate the safeguarding properties of the regulatory regime. In any case, the regulator faces a problem of information asymmetry in its evaluation of the adequacy of the airport's pricing proposal. The complexity of the pricing decision for the transaction *usage of infrastructure* in the hub supply relationship will further facilitate the airport's strategic behavior. Put differently, the cost of measuring current performance and estimating future performance in the determination of an equitable price may be extremely high for an outside party. The hub airport's management may not fully disclose or may even distort information on the effects of parametric changes in cost or revenue conditions. Through the acquisition of equity ownership in its hub airport, the HSC becomes an inside party, and establishes a complementary private safeguard to regulation. A regulator with a high reputation and strong institutional support for enforcing regulation will mitigate the HSC's incentive to seek equity ownership in its hub airport.

Proposition 1a: *HSCs seek equity ownership in their respective hub airports to safeguard their accumulated quasi-rents by accessing private enforcement mechanisms.*

Proposition 1b: *Effective regulation and high reputation of the regulator will weaken the hub airline's incentives to safeguard the transaction via a privately crafted, vertically integrated governance structure in its dyadic supply relationship with its hub airport.*

Case study 1: Privatization of Frankfurt International Airport

Frankfurt airport is Lufthansa's primary hub airport and the third-largest airport in Europe in terms of passengers (52.2 Mio. passengers in 2005). Lufthansa's market share is about 58%, and its share of transferring passenger amounts to approximately 65%. Frankfurt Airport is slot-constrained as it operates at its runway capacity limit most of the day.

When Frankfurt Airport was partially privatized in 2001, its public owners sold 29.4% of the airport's equity in an initial private offering. Prior to going public, ownership had been split between the federal government of Germany (25.9%), the federal state of Hessen (45.2%), and the city of Frankfurt (28.9%). In the last quarter of 2005, the federal government sold another 11.6% of its remaining shares via a private placement to institutional investors. In this second privatization tranche, Lufthansa acquired a 4.9% share in Frankfurt International Airport and has subsequently increased its stake to 9.1%. Lufthansa had several objectives in the acquisition of this minority equity stake:

- More direct influence on the airport's strategic and investment decisions via a seat on the supervisory board[41]
- A higher degree of operational and process quality, based on a shared understanding of each company's processes and objectives
- Stronger control on the airport's cost development

In its strategic assessment of the European air transport market, Lufthansa stresses that competition is increasingly taking place at a new level: between whole air transport systems rather than simply between airlines. This, in turn, requires a closer vertical coordination between hub carrier, hub airport, and national air traffic control.[42]

We have proposed that HSCs, faced with the privatization of their respective hub airports, will evaluate the safeguarding properties of the outside regulator. In comparison with sophisticated regulatory regimes, such as those in the UK, price regulation for Frankfurt Airport and its supporting regulatory institutions must be considered weak. The current cost-plus regulation is unlikely to serve as an appropriate safeguard.[43] In line with

[41] According to the German law on co-determination (MitbestG), the supervisory board must be parity-staffed by representatives of shareholders and employees. Active members of the board of directors are not allowed to serve on the supervisory board (§ 105 AktG), as the supervisory board's main functions are to appoint and control the company's board of directors.

[42] Another stepping stone towards a more tightly coordinated relationship with its infrastructure suppliers is Lufthansa's plan to place a bid for the Deutsche Flugsicherung GmbH (German Air Traffic Control), which is going to be privatized in 2006 (Lufthansa 2006).

[43] Cost-plus regulation, in a narrow sense, does not exist in Germany. Under German law (§ 43-1 LuftVZO and §6 LuftVG), the regulatory agencies at the federal state level are bound to approve the airport's charges proposal. The criteria usually applied are cost-relatedness, sustainability of infrastructure supply, and equitable discretion. The regulatory agencies, which are departments within one of the ministries at the federal state level, are thus not "true" economic regulators. In some instances, airlines and airports have negotiated contracts, attempting to assimilate a fee-cap contract. Once airport and airline have agreed on a fee

proposition 1b, we argue that the conflict of interests of the federal state of Hessen in its dual role as regulator and owner, combined with the lack of well-developed regulatory institutions, has strengthened Lufthansa's incentive to seek an equity stake. As its hub-and-spoke network is fully developed and site-specific investments are large, Lufthansa aims to protect its accrued quasi-rents (proposition 1a). In contrast to a purely administered contract by an outside regulator, Lufthansa gains access to inside information as well as special enforcement mechanisms through its seat on the supervisory board.

Frankfurt Airport's upcoming investment volume amounts to approximately 3.4 billion euros for additional terminal and runway capacity until the year 2015 (Schulte 2005). Lufthansa has stated its belief that as partial stakeholder it can exert a stronger influence on the focus and cost efficiency of these investments. Furthermore, Lufthansa's equity stake gives evidence of a credible commitment to further investments in its network development at Frankfurt airport.

2.3.2 Hub Terminal Expansion

We proceed to the second scenario, in which both airport and HSC are faced with a hub terminal expansion and need to decide on the mode of vertical governance.

From the airport's perspective, price regulation does not serve as an adequate safeguard for quasi-rents created through a spot investment. Sunk costs in specialized terminal infrastructure and dedicated capacity render hub airports most vulnerable to hold-up when the additional capacity is put into operation (t_1 in Figure 2). The HSC's threat of withholding growth is particularly credible in the early phase of infrastructure expansion projects. As time proceeds and expected demand materializes in the operating stage, the infrastructure company will gradually recoup its sunk cost by charging the airlines for the usage of infrastructure. As displayed in *Figure 2-2*, the airport's decrease in quasi-rents runs in the opposite direction to the HSC's accumulation of quasi-rents in its network development.

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cap formula, the airport will sign a contract under public law with the regulatory agency (for a comparison on regulatory institutions in Europe see Wolf 2003). Frankfurt airport, for example, has been governed by such a five-year "quasi" fee cap contract since 2002 (for a detailed analysis see Klenk 2004).

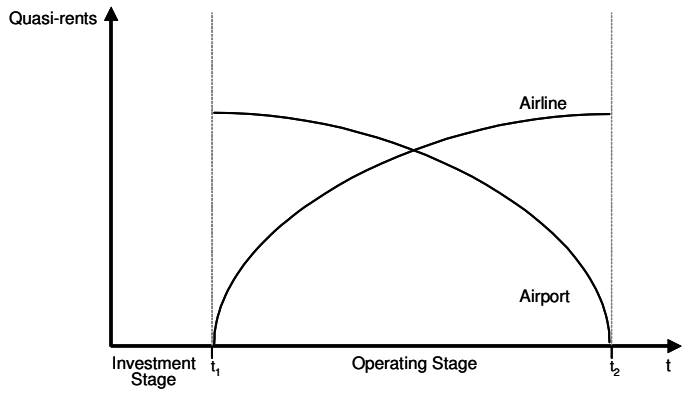

Figure 2-2: Development of Quasi-rents in Operating Stage

Hub airports, anticipating this hold-up situation, require a credible commitment by the hub airline prior to the specific investment. Such a credible commitment can take the form of a financial or investment hostage.[44] If such a credible commitment is not given, the hub airport might refrain from investing in a specialized terminal asset in the first place.

Proposition 2a: *Hub airports need a credible commitment by the HSC in order to pursue a hub terminal infrastructure expansion project.*

The hub airport's requirement for a jointly crafted investment hostage decreases if the specific infrastructure investment is undertaken for an established hub carrier. In the extreme, the new investment takes place at t_2 in Figure 2, when the airport has recouped its specific investment over the lifetime of the infrastructure. In this case, the HSC's extant quasi-rents, generated through its continuous complementary investments in its network development, serve as a sufficient credible commitment.

Proposition 2b: *Extant quasi-rents of the HSC serve as a credible commitment in a hub terminal expansion and mitigate the airport's incentive to craft a joint investment hostage.*

In both cases, a HSC with either an established or a non-established hub-and-spoke network will anticipate the accumulation of quasi-rents during the upcoming operating stage (commencing at t_2 / t_1) of the infrastructure. Thus propositions 1a and 1b hold equally in a hub terminal expansion project.

[44] In his seminal work, Williamson (Williamson 1983) discusses the role of hostages to support exchange in vertical supply relationships. Requirements for hostages, for example, equity ownership, may have ex-ante screening effects or ex-post bonding effects. For the hub airport, the latter in particular is significant.

Case study 2: Hub terminal expansion at Munich Airport

Terminal 2 at Munich Airport was built and operated by multiple joint venture companies of Lufthansa (40% ownership) and Munich Airport (60% ownership). With the inauguration of Terminal 2 in 2003, the airport doubled its terminal capacity to 50 million passengers. The overall investment volume for the new terminal amounted to approximately 1.6 billion euros, with 1.2 billion euros accruing to the joint venture activities, hence a respective Lufthansa stake of 480 million euros. Despite Lufthansa's equity involvement, Munich Airport remains the formal owner and operator for all airport infrastructure facilities. The BOT project[45] has not been accompanied by regulatory or institutional changes. Fees at Munich Airport are subject to the cost-plus regulation usual in Germany, with the Ministry of Commerce, Infrastructure, Transport and Technology of the federal state of Bavaria as responsible regulators.

One wonders what might have been the contributing factors for both partners to set up such a unique governance structure. In the mid 90's, Lufthansa was confronted with two, initially separate developments: *first*, Munich Airport intended to build a new terminal, as Terminal 1 was reaching its capacity limit, and *second*, growth at Lufthansa's primary hub airport Frankfurt was limited due to a lack of runway capacity. Lufthansa's strategic decision to follow a dual hub strategy and its need for terminal expansion at Munich Airport coincided, and resulted in the partnership. Lufthansa stated the following objectives for its equity involvement in the Terminal 2 expansion:

- Optimal terminal layout to support hub operations
- Branding Terminal 2 as a premium transferring facility for Lufthansa and Star Alliance customers
- A competitive airport fee level to develop a second hub-and-spoke network

Munich Airport, on the other hand, stated that its main objective for entering into a partnership with Lufthansa was to achieve a long-term commitment to develop Munich Airport as a second international hub airport in Germany (Klingenberg and Klingelhöfer

[45] Terminal 2 represents a BOT project (Build, Own, Transfer), and thus falls back into public ownership at the end of the operating stage.

2003). Furthermore, the airport claims that the Terminal 2 infrastructure expansion provided the basis for a significant regional welfare gain.

We have argued that the hub airport's quasi-rents reside in a spot investment and are rooted in *physical asset specificity* and *dedicated asset specificity*. The doubling of terminal capacity can not be explained by the local demand in the Munich catchment area, which is comparatively small. Due to the lock-in of other European HSC at their hub airport, Munich Airport depends on Lufthansa to channel transfer passengers via Munich by investing into new routes. Other relationship-specific investments, such as the high-speed automated baggage system, specialized boarding bridges, the three-story terminal layout, and a terminal satellite building, support the logistics and the transfer passenger and security-related processes of a hub operation. It is unlikely that in the absence of Lufthansa's 40% equity stake, the specific investments in Terminal 2 in terms of functionality and capacity would have taken place. The existing Terminal 1 infrastructure was initially designed to support point-to-point traffic. In 1997, when the decision was made to jointly invest in a hub terminal, Lufthansa was in the early phase of developing its hub-and-spoke network in Munich (Burghouwt and De Wit 2005). We argue that in line with proposition 2a, Munich Airport safeguarded the transaction *usage of infrastructure*, by requiring Lufthansa to commit an equity stake. Lufthansa's 40% equity stake represents an investment hostage, which, on the one hand, partially internalizes the relation-specific terminal investment and, on the other hand, binds Lufthansa to pursue the development of a second hub-and-spoke network at Munich Airport.

We now turn to the analysis of the governance structures themselves and the influence of regulation regimes on the organization decision. The joint venture governance structure represents a strong form of hybrid coordination. In the *investment stage* of Terminal 2, two special-purpose companies (denoted as MOB and IMMO in *Figure 2-3*) and a parity-staffed project team enabled the formulation of the user requirements, quick assessment of cost-benefit trade-offs and conflict resolution during the project. While the building company (FMBAU) executed and controlled orders with its subcontractors, IMMO and MOB held asset ownership and financing responsibility. A trilateral advisory council, consisting of public owners, senior airline management, and airport representatives,

controlled and decided on issues in the investment stage. The resulting organizational set-up is displayed in *Figure 2-3*.

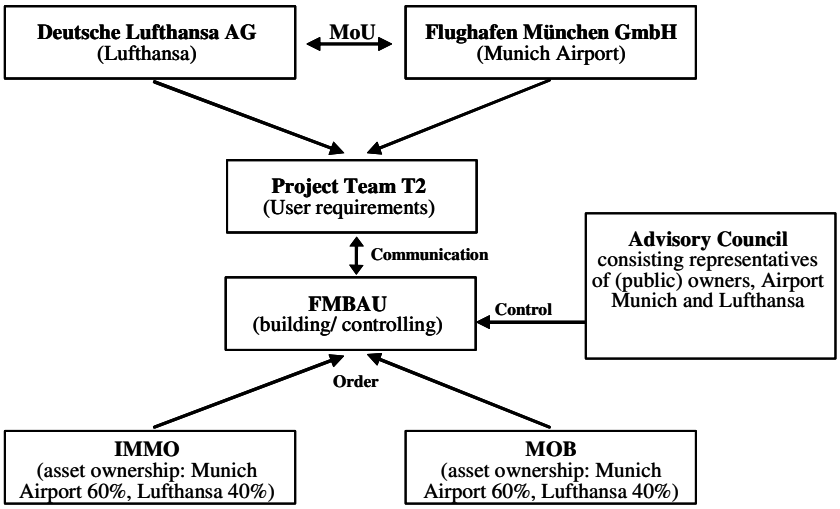

Figure 2-3: Vertical Governance Structure in the Investment Stage

With the start of the *operating stage*, a separate joint venture company (T2-BG[46]) has taken over responsibility for running, maintaining, and developing Terminal 2. T2-BG is parity-staffed with employees from both partners and has autonomous responsibility for a sub-set of decisions related to operations, procurement of services, and marketing.

Prior to investing in the joint venture, both partners negotiated a Memorandum of Understanding (denoted as MoU in *Figure 2-3*), which outlines the spirit and the instruments of cooperation. In line with recent literature on the economics of hybrid governance (Ménard 2004), one encounters the *pooling of resources* (capabilities of both, airport and hub airline, are accessed in both investment and operating stage), *contracting* (within the joint venture a multitude of procurement contracts, for example, for ground handling services, exist) and *competition* (Terminal 2 and Terminal 1 compete for other airline customers).

[46] The abbreviation T2-BG stands for Terminal 2 Betriebsgesellschaft, the name of the operating company of the Terminal 2.

Munich Airport charges the airlines each time the transaction *usage of infrastructure* occurs.[47] The cost base for the transaction *usage of infrastructure* includes depreciation, interest, running expenditures, and smaller investments for the development of both terminals. Conflicts on rent distribution will arise between carrier and airport, given that the pricing for the transaction *usage of infrastructure* needs to be adjusted continuously. Agreements need to be reached over such issues as the time span for cost recovery and the effects of deviations from forecasted traffic development. The joint determination of relevant cost information in the investment stage alleviates the problem of information asymmetry regarding re-financing needs during the operating stage. The information on the remaining cost positions and on the demand conditions can be evaluated mutually. Bilateral conflict-resolution mechanisms between the partners assure an equitable rent distribution.

The need for a privately crafted governance structures appears to be of particular importance here, as Lufthansa could not depend on regulation to serve as a sufficient safeguard against opportunistic pricing. The superior information-sharing and conflict-resolution mechanisms in the organizational set-up described corroborate propositions 1a and 1b.

2.3.3 Low Cost Terminal Expansion at Base Airport

In their negotiations on the establishment of new bases in their network, value-based carriers face a large number bargaining situation with prospective airports ex-ante. However, once the VBA stations aircrafts and crews, invests in regional and route-specific brand-building, and in some rare cases, establishes an aircraft maintenance facility at its base airport, a fundamental transformation occurs. An ex-post change of its base airport or a downgrade to a non-base airport will result in a financial loss. A farsighted VBA, anticipating its increasing dependency on its base airports, will thus seek to protect these evolving quasi-rents in the development of its base airport.

Prospective base airports, on the other hand, may or may not be faced with an investment in dedicated terminal capacity to accommodate the future growth of the VBA.

[47] The charges applicable to the usage of terminal infrastructure in Germany, include the passenger service charges and central infrastructure charges (for the usage of essential facilities for ground handling operations).

Provided that idle capacity is not available, we argue that base airports will invest into dedicated terminal capacity.[48]

Therefore, it is efficient for both partners to enter into a long-term agreement. The rationale of these contracts is the VBA's desire to fix prices in the long run, while the respective base airport attempts to assure a certain traffic development. Therefore, one would expect prices for the transaction *usage of infrastructure* to be fixed to a forecasted traffic development. Given that the base airport is vulnerable in the early phase of the network development, a unilateral commitment in the form of take-or-pay provisions or investment hostages may be required. Such safeguards support continuity in the bilateral relationship.

Proposition 3a: *VBAs seek to establish long-term contractual safeguards with their base airports to protect against the expropriation of their quasi-rents.*

Proposition 3b: *Base airports seek to establish complementary safeguards to protect their investment in carrier-specific infrastructure capacity.*

The relationships between VBAs and these airports are in many cases not explicitly administered by a regulator. However, VBAs and base airports are still faced with difficulties in their desire to enter into exclusive bilateral contracts, as airport charges are bound to be transparent, cost-related, and non-discriminatory.[49] The legal regulations and guidelines affecting their contractual relationships have become increasingly complex. At the supranational level, the European Commission has recently specified in its State Aid Guidelines the circumstances in which a publicly owned airport can enter into marketing agreements. Any marketing agreement must be publicly announced, available to all interested carriers, temporally limited, and must pursue profit objectives. On the other hand, challenges might also be brought forward against discriminatory pricing, based on competition law at the European as well as at the national level. Examples of recent legal challenges include the Charleroi/Ryanair decision by the European Commission.

[48] Even though investment volumes in these general-purpose, low-cost facilities are low compared to hub terminal investments and to a certain extent marketable to alternative LCCs, we argue that airports seek some form of ex-ante protection for their quasi-rents.

[49] The International Civil Airline Organization (ICAO) recommends these three core principles in determining airport charges. These principles are, however, not legally binding.

Faced with these contracting constraints in their institutional environment, VBAs and base airports will hesitate to bring any contractual disputes to court. To a certain extent, they can expect reputation to serve as an informal safeguard that keeps the contract in a self-enforcing range. As quasi-rents and uncertainty become significant, however, complementary formal safeguards might be crafted as well to support the continuity of exchange.[50]

Proposition 3c: *Base airports and VBAs seek complementary formal and informal safeguards, as they are uncertain about the enforceability of their exclusive bilateral long-term agreements.*

Case study 3: Contracting practices between VBAs and their base airports

To substantiate these propositions, we investigate the contracting practices between VBAs and base airports in Germany and neighboring countries. As the contractual relations described are confidential and sometimes informal, detailed information on the spirit and terms of these agreements are generally not available to outside parties. The following case study is based on information gathered from a series of informal expert interviews and the limited publicly available information.[51] The contractual relations analyzed include both ongoing as well as prospective supply relationships between the base airports and VBAs. We have included these prospective exchange settings, when negotiations have already taken place, but contract execution hinges on blocked infrastructure expansion projects. *Table 2-2* displays the investigated base airport/VBA supply relationships in Germany, and shows the investment volume along with the size of the terminal capacity expansion. Although some of these airports have expanded terminal capacity, we have only included terminal projects that qualified as a terminal expansions dedicated to a single VBA. Regional airports are defined as airports with a passenger volume of less than 1 million passengers per annum prior to the VBA's expansion.

[50] Pioneering work in contracting under regulatory constraints has been undertaken by Palay (Palay 1985). In his analysis on the supply relationship between shippers and railroad carriers, it was shown that parties avoid regulatory constraints by crafting informal agreements to safeguard their idiosyncratic investments.

[51] We conducted expert interviews with senior management at these base airports, senior procurement managers for airport services at VBAs and HSCs, as well as with other industry experts.

Table 2-2: VBA – Base Airport Supply Relationships in Germany

Airport	VBA	Regional airport	Terminal Capacity Expansion (Passenger p.a)	Investment Volume
Berlin (SXF)	Germanwings/ Easyjet	No	2.5 mill.	12.5 mill. €
Bremen (BRE)	Ryanair	No	1.0 mill	10.0 mill. €
Hahn (HHN)	Ryanair	Yes	4.5 mill.	25 mill. €
Lübeck (LBC)	Ryanair	Yes	N/A	N/A
Stuttgart (STR)	Germanwings	No	None	None
Hamburg (HAM)	Germanwings	No	None	None
Köln (CGN)	Germanwings	No	None	None
Dortmund (DTM)	Easyjet	Yes	None	None
Neuhardenberg	Ryanair	Yes	1.0 mill.	5.0 mill. €

In the supply relationships analyzed here between VBAs and base airports, three types of contractual agreements have been identified: (i) Long-term bilateral agreements (ii) marketing agreements / structural changes in airport charges, and (iii) investment hostages.

In long-term bilateral agreements, VBAs and base airports set the number of airplanes stationed and passenger development. These contracts are of an either informal or formal nature.

> "Our new 10 year deal with Brussels Charleroi Airport commits Ryanair to invest $240M in new aircraft and deliver 2.3M passengers p.a." (Michael O'Leary, CEO Ryanair, Ryanair press release, 14 December 2005)

Embedded in these bilateral agreements, we find contractual types (ii) and (iii).

After a bilateral agreement has been reached to establish a new base airport, the airport will either heavily revise its airport charges and/or issue a tailor-made marketing program. These type (ii) agreements attempt to achieve two objectives: *first*, to provide a contractual safeguard to the base carrier for the fixation of prices in the long run, and *second*, to avoid legal disputes.[52] In the cases observed, the new charges resulted in a significant pricing decrease in comparison to the prior airport charge structures. Through volume clauses and other special provisions, base airports attempt to tailor the agreement to base carriers.

In some cases, we observed that VBAs were required to provide complementary formal safeguards in the form of investment hostages or financial hostages (type iii). Such

[52] In the past, these marketing agreements were usually not made public. However, this is changing in response to the latest court rulings and guidelines at the European level.

hostages in the form of "take-or-pay clauses" and/or (partial) provision of capital to finance terminal investments serve as credible commitments to support specific investments in terminal capacity. In conjunction with the new infrastructure expansion at its base airport in Frankfurt-Hahn, Ryanair stated the following:

> "Ryanair has committed itself to invest one billion euros in the form of stationed aircraft at Hahn Airport. … with over 50 routes and eight million passengers per annum, Ryanair will turn Hahn airport into one of the largest and fastest growing airports in Germany. Furthermore, Ryanair will provide 12.5 million euros or **50% of the capital to the investment in the new passenger terminal**. And on top of this, Ryanair will **invest in an aircraft maintenance facility at Hahn airport**." (Michael O'Leary, CEO Ryanair, Ryanair press release, 11 November 2005, emphasis added, own translation)

Another indication can be inferred from a statement by Infratil, a private airport operator that recently bought a 90% equity stake in Lübeck airport and intends to develop the airport as the Ryanair base airport for northern Germany.

> "Due to the adverse court ruling and [Lübeck] airport's resulting inability to extend the runway as planned, this agreement, in which Ryanair had **agreed to guarantee a minimum number of passengers** each year, starting at 1 million departing passengers in the year to October 2006, rising to 2.8 million departing passengers in year 10, has now lapsed" (www.infratil.com, emphasis added)

Parallel to its attempt to establish a new base airport in Lübeck, Ryanair has entered into a long-term agreement with publicly-owned Bremen Airport. Winning the airport's recent European tender, Ryanair commits itself to deliver approximately one million passengers per annum. An essential part of the agreement is a long-term lease of an existing warehouse facility, which will be refurbished into an exclusive Ryanair terminal. Using this dedicated facility, allows Ryanair to avoid paying the passenger service and the central infrastructure fees for the existing terminal-related assets at Bremen Airport.

Our expert interviews provided further evidence that small regional airports, in particular, seek a volume guarantee through a take-or-pay clause or through a financial or investment hostage. In cases in which idle terminal capacity was marketed, such complementary formal safeguards could not be found.

As base airports become well established in their networks, it can be expected that VBAs will seek even stronger safeguards. At its home base Dublin, for example, Ryanair entered a detailed proposal to fund and construct a terminal with a passenger capacity of ten million in response to the Irish government's call for investors in an independent

second terminal at Dublin airport.[53] Although the Irish Government decided against a competing second terminal, we regard Ryanair's proposal for a specialized vertical governance structure as a response guarding its quasi-rents arising from sunk investments in brand capital and site-specific investments.

2.4 Discussion

We have set out to explore vertical governance between airlines and airports with transaction cost theory as our analytical framework. Airport privatization and infrastructure expansion projects lead airlines and airports to re-evaluate their "*firm boundaries*" in the context of the liberalized European air transport market.

On the basis of five stylized airline/airport supply relationships in linear and hub-and-spoke networks, we have argued that in each of these relationships, differences in the attributes of the transaction *usage of infrastructure* result in different contracting problems.

The supply relationship *HSC and hub airport* in particular is characterized by high mutual dependency, high frequency, substantial uncertainty, and a high cost of performance evaluation. The HSC's quasi-rents are rooted in site-specific assets (slots, traffic rights, and maintenance facilities) and specificity of human capital assets in the scheduling process. While most of the airline's quasi-rents are built up continuously over the development of its hub-and-spoke schedule, quasi-rents at the hub airport are created through spot investments. New capacities in hub terminals are to a great extent specific in size and functionality to accommodate future growth in transfer passengers and to enable hubbing processes.

In contrast to the typical dyadic interfirm relationship analyzed in the TCE literature, the transaction *usage of infrastructure* is usually administered by a government regulator or governed by a (partial) public owner. We proposed that regulators with a high reputation mitigate the HSC's incentive to craft a parallel private governance structure. However, if the HSC does not expect the regulator to protect its quasi-rents sufficiently, it will seek (partial) equity ownership of its hub airport to access bilateral conflict resolution and enforcement mechanisms.

[53] See McLay and Aisling (2005) for an overview on the issues involved of a second competing terminal at Dublin Airport.

Prices administered by a regulator, however, do not safeguard the hub airport's quasi-rents arising from a specific spot investment. We argue that an investment in *hub terminal infrastructure* exposes the airport to potential hold-ups of the hub carrier. In particular, HSCs, which have yet to invest in the development of their hub-and-spoke schedule, can mount a credible threat to expropriate these quasi-rents by withholding volume growth in hub development. We suggest that hub airports require a credible commitment by the hub airline prior to investing in a specific hub infrastructure.

For the supply relationship between *VBAs and base airports*, we have argued that the base airport's dependency on a particular VBA arises from a spot investment in dedicated terminal capacity. The VBA's business model, on the other hand, requires significant investments in the development of a low-cost brand in the catchment area as well as at the route level. We have hypothesized that both parties will seek long-term agreements to safeguard both projected volume growth and prices for the transaction *usage of infrastructure*. We have argued – and presented initial evidence – that these contracts are supported by complementary safeguards (changes in airport fee structures, designated marketing programs). Smaller regional airports will furthermore require additional guarantees in the form of take-or-pay clauses or hostages prior to their investment decision.

Three case studies have been presented to support our proposition as well as to reveal further opportunities for a more in-depth exploration of the complexities in the governance decision.

First, airlines appear to be particularly concerned about the efficient provision of infrastructure in terms of cost as well as functionality in the *investment* stage. Transactions in the investment phase need to be analyzed at a more detailed level. Complementary theories, such as capability-based theory and organization theory, should be applied to reveal *how* different vertical governance structures facilitate the generation of innovation, that is, by building specific assets, in the first place.

Second, the governance modes of *regulation* and *(partial) public ownership* need a more in-depth analysis. In contrast to the structural perspective of TCE, we have argued in this paper that privately crafted governance structures can act as a complement to regulation. However, we need to develop a more thorough understanding of how different

forms of regulation, in combination with public ownership and different institutional environments influence governance decisions between airlines and airports.

Third, if our propositions hold, economic policy should design rules that allow for new vertical governance structures while keeping the potential for discriminatory practices to a minimum. Regulation has been shown to entail difficulties in dealing with hybrid organizational structures, as presented in our case studies (Ménard 1998). Given our findings, we argue that these new organizational solutions enhance welfare and are not designed to soften competition. However, the "rules of the game" may still need to be modified. Research on the interdependencies between the institutional environment and the level of governance will certainly inform any policy decision.

Finally, the evidence presented here needs to be supplemented by more in-depth studies. Upcoming privatization of airports and air traffic control, as well as new terminal expansion projects in the coming years, will provide further empirical evidence. In our view, detailed studies analyzing these specialized governance structures at the micro-analytical level will be especially informative. Furthermore, comparative studies on the differences in vertical governance between airports and airlines in the different European countries and the United States will generate further evidence on the influence of the institutional environment. Our paper presents a first institutional explanation for recently observed changes in vertical governance between airlines and their infrastructure suppliers, but further work along related lines of research is much needed.

3 Contracts, Financing Arrangements, and Public Ownership – An Empirical Analysis of the US Airport Governance Model

3.1 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.

3.2 Transaction Cost Assessment

3.2.1 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 framework[54] for the design of inter-organizational (supply) relationships. The theory makes the behavioral assumption of bounded rationality and opportunism[55], implying that contracting is

[54] 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.

[55] TCE assumes economic actors to be bounded in their rationality, i.e., "intendely 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).

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.[56] Such safeguarding and adaptation problems in exchange rest in the attributes of the transaction, namely *asset specificity* and *uncertainty* (Williamson 1985).[57]

The more *relationship-specific the assets*[58] 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).[59] 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.

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[56] 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).

[57] 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 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.

[58] 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).

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

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).

3.2.2 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 3-1* for a summary).

Table 3-1: Transactions Associated to an Airport Investment Project

Stage	Parties	Transaction	Time
Approval	Airport with governmental agencies, politicians, residents	▪ Siting and environmental approval ▪ Public and political support	up to 20 years
Planning and Construction	Airport with airlines, architects, engineers, and general contractor	▪ Planning and design ▪ Construction	up to 5 years
Operating	Airport with airlines and non-aviation companies	▪ 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 approval[60]. 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 during the

[60] 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).

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' (2006a) 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 arrangements[61], 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 2006a). *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 slots[62]). The simplified matrix presentation in *Figure 3-1* displays four generic types of dependency in the airline-airport supply relationships as a function of the amount of specific investment by the parties.

[61] The term *governance* is defined as "the institutional framework in which contracts are initiated, negotiated, monitored, adapted, enforced and terminated" (Palay 1984, p. 43).
[62] A *slot* is a time window in which the airline is entitled to use the runway of a congested airport.

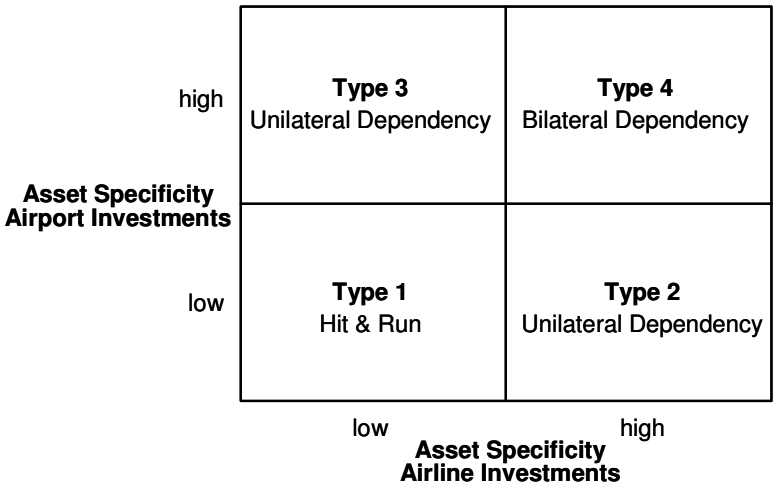

Figure 3-1: Typology of Airline-Airport Supply Relationships

Early advocates of US airline deregulation expected airlines and airports to incur negligible sunk costs, i.e., to incur non-specific investments.[63] 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 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

[63] 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"

and Beckers 2006a, Langner 1995) have argued that establishment of the hub-and-spoke business model[64] 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.

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,

[64] 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).

dispose over superior capacities for adaptation[65] 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 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 requirements[66]. 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).

[65] 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.
[66] 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).

3.3 Empirical Study

3.3.1 Governance Model of US Airports

Commercial airports in the United States are owned by municipalities and operated by special government agencies or departments.[67] 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 Aviation Administration (FAA)[68]. 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).[69]

US airports are constrained by rules tied to their federal funding sources, their airline agreements, and their obligations to bondholders. *Figure 3-2* 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.

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[67] 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).

[68] 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.

[69] 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.

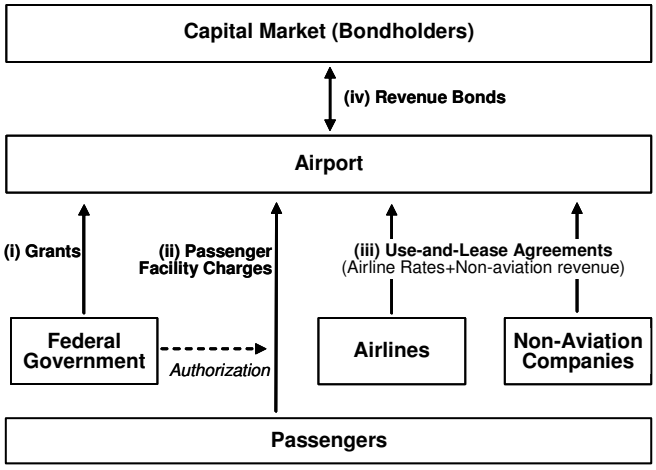

Figure 3-2: Revenue and Financing Sources of US Airports

(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 limited[70]. 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 fuel[71].

(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).[72] Airports must ask the FAA for

[70] 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)

[71] 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).

[72] 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)

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).

(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.[73] 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 determined by allocating the operating expenses and the pro rata share of debt

[73] 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.

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.[74]

- *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 gates to smaller carriers with the airport's approval[75]. A *preferential agreement* is similar to an exclusive arrangement but usually ties the airline's exclusivity right to a certain minimum gate usage.[76] 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

[74] 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).
[75] Some airports regulate subleasing rates by restricting mark-ups on the primary rate (FAA 1999, p. 47).
[76] 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).

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 repayment[77]. 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).[78] 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 financing[79] for specific projects (fuel farms, maintenance facilities, but also terminals). In these project finance arrangements, airports retain asset ownership but transfer the right for exclusive usage[80] 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.

3.3.2 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

[77] Bondholders have first claim to airport revenues after operating and maintenance expenses have been paid.
[78] Some smaller US Airports have issued general obligation bonds, which are backed up by 'the full faith and credit' of the issuing local municipality.
[79] The 'conduit' may be the municipality, the city, or a specific public agency so as to qualify for tax exemption.
[80] 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.

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.

Table 3-2: 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.[81]

[81] 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.

3.3.2.1 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 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 discretion[82]. 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 homogenously 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 SRFBs 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 gates[83].

[82] Concessions and parking revenues amounted to $132.0 of a total $341.0 million in airport revenues in 2004
[83] 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 today[84]. 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 facility[85]. *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 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

[84] 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.
[85] 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.

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 policy[86], 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.[87] 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 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.

3.3.2.2 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%)

[86] 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.

[87] 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.

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 assets[88]. 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.[89] 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 private investors[90], 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 FJK 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,

[88] 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).
[89] 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.
[90] 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.

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 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.[91]

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

[91] 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).

standards in the terminal's investment and operating stage (building standards, safety), (ii) providing support services (utilities, security, fire, police) and infrastructures (runways, apron, roads, light rail), and (iii) acting as a marketer for terminal capacity if private investments fail[92]. 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.

3.3.2.3 Case III: Portland International Airport

Since 1990, US legacy carriers have steadily decreased their presence at Portland International Airport (PDX).[93] 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 bonds[94], 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 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

[92] 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.
[93] 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.
[94] The PFC-approved project volume ($681.8 million) included the (i) terminal expansion south, (ii) terminal enplaning road, and (iii) the light rail extension to the airport and the light rail station at the airport.

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 foot[95]. 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.[96]

At present, the process of negotiation (by appointed representatives) as well as the contracting outcome (a homogenous contractual arrangement for all signatory carriers) indicates 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 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.[97]

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[95] 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.

[96] 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.

[97] 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).

3.3.2.4 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 investments have been financed with two general airport revenue bond series ($1.01 billion in 1998 and $508 million in 2005).[98]

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.[99] 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

[98] Other funding sources include PFCs, federal grants, and State of Michigan grants.

[99] 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.

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 DTW[100]. 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 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

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

the dedicated terminal facility.[101] For the operation of the terminal facility, Northwest Airlines and the airport have agreed to rely heavily on outside suppliers. The parties have, 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.

3.4 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.

[101] 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)

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.

4 (De)regulation of the European Ramp Handling Market – Lessons to be Learned from an Institutional Perspective?

4.1 Introduction

With the *Directive 96/67/EC on access to the ground handling market at community airports* (hereinafter referred to as the 'Directive') the European Commission aimed to introduce competition to national handling markets. At the time the Directive was passed in 1996, ramp handling in most member states was provided exclusively by either (public) airport operators (for example German airports) or by national flag carriers (for example Iberia Airlines in Spain). As a result of the decision to introduce competition only gradually (Soames 1997), heavy-handed governmental intervention continues in these countries to the present day. Since the number of entrants is still limited, incumbents often face no more than a single "new" handling competitor. Furthermore, new entrants are granted temporary licenses with a maximum duration of seven years to operate at the respective airport. Since 2003, the European Commission has been in discussion with interest groups on a revision of the Directive. While the airlines are advocating a pro-competitive shift in the revision, airports active in the handling market as well as labor unions are attempting to preserve the status quo.

Existing literature on the liberalization of the European ground handling market has focused on the question of whether new entrants have equal access to essential airport infrastructure facilities (Kunz 1999). Other authors have discussed the making of the Directive, that is the ex-ante political processes and the legal basis (Soames 1997), and its implementation into national laws (see Einem 2000 for an analysis of its implementation in Germany). More recent work has examined the Directive's impact on market structures, prices and quality levels at selected European hub airports (Templin 2007).

The present paper takes another course. Its main focus is on whether airlines have succeeded in implementing efficient contractual and organizational choices (for example long-term contracts or joint ventures) with their handling suppliers. Transaction Cost Economics (TCE) argues that both production and transaction costs are minimized when an

efficient alignment between (handling) transaction and governance structure[102] exists (Riordan and Williamson 1985). Partners in supply relationships will seek an efficient organizational solution of this kind in their pursuit of joint profit maximization (Ghosh and John 1999).

While the Commission has named "reduced operating costs" and "increased service quality" as its primary objectives in introducing competition, it has simultaneously introduced constraints on the contractual and organizational decisions between airlines and ramp handlers. Our objective is not to scrutinize the ex-ante political processes or the resulting Directive in its current form. Instead, we use transaction cost theory to develop propositions on the transactional efficiency of the existing rules pertaining to the award of temporary restricted operating licenses to new entrants.

Based on our empirical results, we argue that hub-and-spoke carriers and their ramp handling suppliers at the respective hub and large spoke airports choose long-term contracts and other specialized organizational forms to economize on transaction costs. Our review of 12 tender processes for operating licenses at German airports shows that the present institutional arrangement by which operating licenses are awarded is a source of considerable transaction costs. Additionally, licenses artificially constrain contractual choices between handlers and airlines, resulting in reduced investment levels for new entrants. We argue that the award of temporary licenses runs contrary to the Directive's aims.

Consequently, the contributions of this paper are twofold. First, it provides policy makers with an established and empirically tested theoretical basis – namely, transaction cost theory – to better understand the deregulation of the handling market. Second, drawing on a unique set of data, this work presents an empirical analysis of contract duration based on a sample of 42 ramp handling contracts within the European Union. The results are supplemented by recent experiences with the award of operating licenses at German airports.

The remainder of the paper is organized as follows. Section 2 outlines the contracting problem and the rules on licensing in the EU Directive. Our analytical framework and the

[102] The term *governance* is defined as a "short-hand expression for the institutional framework, in which contracts are initiated, negotiated, monitored, adapted, enforced and terminated" (Palay 1984, p. 43)

propositions derived are presented in Section 3. Section 4 introduces the empirical model on contract duration. The econometric results are supplemented with qualitative evidence on the award of operating licenses at German airports in Section 5. Section 6 concludes with a discussion of results and briefly outlines policy recommendations for an alternative licensing arrangement.

4.2 Contracting Problem and Licensing Rules

The market for ground handling services encompasses a range of services: (i) ramp handling, (ii) passenger handling, (iii) oil & fuel handling, (iv) mail & freight handling, and (v) baggage handling. Our analysis is restricted to the provision of ramp handling services, which continues to be the most heavily debated type of service in the revision of the Directive. Ramp handling services are primarily the (un)loading of the aircraft and the transportation of passengers and baggage.

Handling companies are involved in two major transactions, which are embedded in the European as well as the national institutional environment. The first of these takes place in the upstream market between ground handler and airport for the usage of central infrastructure facilities (CP#1 in *Figure 4-1*). The Directive describes the baggage sorting system, de-icing plant, and water purification system as essential facilities[103]. Discrimination-free access to these facilities in the presence of a forward-integrated airport handler has been discussed extensively (see Kunz 1999, Wolf 2003, pp. 284-298). It is fair to say that many of the regulations contained in the Directive are intended to deal with this issue.

[103] The Directive states that the complexity, cost and environmental impact of these assets prevents their division or duplication (Council Directive 1996, Article 8).

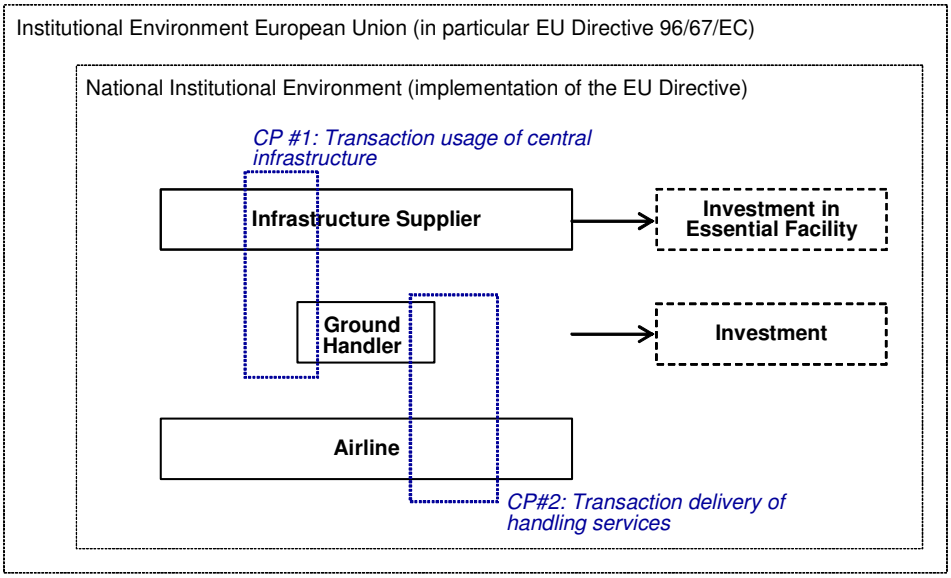

Figure 4-1: Transactions in the Vertical Supply Chain for Handling Services

The second transaction in the actual provision of handling services occurs between airline and ground handler in the downstream market (CP#2 in *Figure 4-1*). The variety of observed governance arrangements – ranging from short to long-term contracts and backward integration of airlines (self-handling) – renders this industry into an interesting subject for a TCE-based study. Since the development of transaction cost economics by Oliver Williamson and others (Klein, et al. 1978, Williamson 1971, 1983, 1985, 1991), classic applications include the make-or-buy decision of firms and the design of contracts or contract terms.[104] However, the specific nature of the European ramp handling market – that is, the influence of regulation on the dyadic governance decision – warrants some qualifications (more on this later). We first turn to a brief introduction of TCE's main predictions on economic organization.

At the theory's core stands the discriminating alignment hypothesis, to which the theory owes its predictive power. It states that "transactions, which differ in their attributes, are aligned with governance structures, which differ in their cost and competencies, in a discriminating (mainly transaction-cost-economizing) way" (Williamson 1991, p. 277).

[104] Groundbreaking empirical studies include those of Teece and Monteverde (1982) and Masten (1984) on the make-or-buy decision, Paul Joskow's (Joskow 1985, 1987) studies on the duration of coal contracts, and Crocker and Reynolds' (1993) study on contractual completeness. Furthermore, transaction cost theory has informed the discussion on franchising of natural monopolies (Williamson 1976), utility regulation (Crocker and Masten 1996), and public ownership (Williamson 1999).

The ideal transaction in law and economics is most efficiently managed in markets. Thus, Williamson (2002, p. 183) claims: "try markets, try hybrids, and have recourse to the firm when all else fails". Conditions of asset specificity[105] take on a dominant role in explaining efficiency differentials between these three generic governance structures. Investment in specific assets restricts their re-deployability to alternative uses and thus generates quasi-rents[106] in dyadic exchange relationships. As mutually dependent partners value continuity in their relationships, they design safeguards ex-ante to cope with contractual hazards ex-post. Besides the protection of quasi-rents, governance modes differ in their adaptive capabilities in the face of uncertainty, and in the costs of performance measurement they entail.

In anticipation of our empirical study, we follow the TCE logic applied to the example of long-term contracting. Handling agents and airlines investing in relationship-specific assets exploit gains from trade. Based on the assumption of bounded rationality and opportunism[107], economic actors are tempted to achieve individual gains in the relationship by influencing the distribution of quasi-rents. In consequence, gains from trade are wasted through the cost of ex-post bargaining and related responsive actions to opportunistic behavior. Farsighted actors avoid the cost of repeated bargaining by designing ex-ante contractual safeguards, among which duration has been shown to be key (Joskow 1987). An increase in contract duration (i) reduces exposure to opportunistic behavior of the contracting parties and (ii) saves on repeated negotiation costs. However, a longer-term contract results in "the information cost, the negotiation cost, and the 'potential mal-adaptation cost' or the 're-negotiation cost' of being trapped in a bad contract" (Saussier 1999, p. 6). Summing up, while asset specificity increases contract duration, uncertainty decreases contract duration. At some threshold point, the severity of contractual hazards and uncertainty turns the internal organization of the transaction (hierarchy) into the least-cost governance mode.

[105] 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) or contractual specificity (Pirrong 1993).

[106] Quasi-rents are defined as the excess of an asset's value over the value of its best alternative use or user (Klein, et al. 1978). This excess of returns keeps the asset in its current use, and can include pure rents as well (Holmstrom and Roberts 1998).

[107] Contingent claim contracts are not feasible, since economic actors are "intendely rational, but only limited to do so" (Williamson 1985, p. 45),. Incomplete contracts and opportunism, that is "self-interest seeking with guile" (Williamson 1985, p. 47), result in contractual hazards in the contract execution period.

A large number of empirical tests have corroborated TCE's predictions on the use of long-term contracting, hybrid modes, and vertical integration.[108] The great majority of empirical studies are indirect tests, linking observed governance forms to the transaction attributes asset specificity and uncertainty. These indirect tests are based on two major assumptions (Masten 1993, Yvrande-Billon and Saussier 2005).

(1) All observed organizational and contractual choices are efficient, since competition is strong enough to sort out inefficient governance modes.

(2) Parties are not constrained in designing contractual and organizational solutions.

These assumptions do not entirely apply to most of the European ramp handling markets prior to the Directive. Taking a TCE perspective on economic performance, deregulation should aim at providing an institutional environment which facilitates a (re)alignment between ramp handling transactions and governance structures in the European market.

We proceed as follows in this section. First, we discuss sources of mutual dependency and uncertainty, and the costs of measuring performance in the supply of ramp handing services. Then we introduce the set of rules in the Directive addressing the award of operating licenses.

4.2.1 Asset Specificity and Uncertainty in Ramp Handling

Mutual dependence and the resulting need for specialized governance structures depends primarily on the contracting location in the airline's network (Fuhr 2006a, Fuhr and Beckers 2006b, Langner 1995). In particular at hub airports – and to a minor degree at large secondary airports[109] – hybrid structures (complex contracts supplemented with arrangements aimed at enforcing the contracted quality levels and coordinating the transaction) or even hierarchical structures are employed by European hub-and-spoke carriers for the organization of ramp handling services. At smaller spoke airports, on the other hand, ramp handling is procured via standardized short to mid-term contracts.

[108] See Boerner and Macher (2002), Klein (2005), and Rindfleisch and Heide (1997) for an overview on the extensive empirical literature in TCE.

[109] The term secondary airport borrows from a classification by Hirschhausen, et al. (2004). Secondary airports are situated in large catchment areas, provide a large portion of the HSC network feeder traffic, and attract point-to-point traffic.

Alternative governance structures at these contracting locations are matched to the attributes of the local ramp handling transaction, which varies in the dimensions *frequency*, *uncertainty*, and *asset specificity*.

Frequency. As each aircraft turnaround triggers a ramp handling event, the transaction frequency from the perspective of a hub-and-spoke carrier (HSC) is clear: they carry out their most frequent transactions with handling suppliers at the central hub airports, moderately frequent transactions at secondary airports, and small number of transactions at typical spoke airports. The frequency of transactions, however, is of secondary importance for governance decisions. It acts as a threshold for strong hybrid and hierarchical modes, since high fixed transaction costs of specialized organizational forms are spread over a larger number of transactions.

Uncertainty. We propose that *environmental uncertainty* and the occurrence of contract re-negotiation is limited in the ramp handling market. Demand uncertainty is comparatively low, production technology is well established, and innovation is limited, due to safety and security regulations.

A second source of uncertainty arises in the form of *behavioral uncertainty* since measuring the handling agents' service quality and their provided level of effort[110] come at a cost. The costs of ex-post monitoring and the enforcement of the contracted quality levels are influenced by the complexity of the ground handling process at the respective airport. In a hubbing operation, for example, the causal assignment of the delay to the responsible party/source is more difficult, since ground processes are complex and many dimensions (for example air traffic control, fuelling services, catering) exist which might have contributed to the delay. The malperformance of suppliers at hub airports also has far more severe consequences, as it affects the entire network's performance. In consequence, HSCs negotiate both complex quality level agreements and install station management at these contracting locations to monitor and enforce contract performance.

Asset Specificity. Large market shares of hub-and-spoke carriers at their hub and secondary airports trigger investments in dedicated handling equipment and handling staff.

[110] Ghosh and John (1999) distinguish between two kinds of costs associated with performance measurement: the opportunity costs of failure to motivate the right level of effort, and the out-of-pocket costs associated with monitoring.

Although handling equipment is standardized, such large amounts of thereof cannot be readily re-employed by a different customer. Put differently, if a fictive airline with a market share of 40 percent were to switch its handling supplier, the new supplier would request special safeguards prior to investing in the equipment, hiring new staff, and expanding local maintenance facilities.

A second source of quasi-rents is the build-up of human capital assets via learning-by-doing. As handling agents accumulate know-how about the airline's processes and flight schedules at the resource disposition level and on the work floor, they are able to increase the quality of their operations and productivity. These human capital assets are lost, however, in case of a supplier change. At the usual spoke airport, such a loss in human capital asset is small and results in a temporary drop in handling performance. At large secondary airports, however, the quality drop is substantial and longer-lasting. A potential switch of a supplier at an airline's hub airport or a decision to outsource a self-handling operation would result in a substantial loss in handling quality, which would significantly impact overall network performance.

4.2.2 EU Directive: The Award of Seven-Year Licenses

A review of the entire Directive and its implementation at the national level is beyond the scope of this paper. Given our research question, we focus on the Commission's decision to establish a regime of temporary licensing. We examine the allocation of rights and the enforcing institutions[111] in the tender process.[112]

Under the current set of rules, member states must at least allow for two handling agents to operate at airports with a traffic volume greater than two million passengers per annum. At least one of the selected suppliers must be independent of the airport and dominant airline. In addition, the Directive grants airlines the right to self-handle, but allows the member states to limit the number of self-handling licenses.

[111] We use the term *institution* in a narrow sense, encompassing *formal* institutions such as laws and organizational entities (business firms, governmental bodies). *Informal* institutions, defined as "rules, norms, and strategies used by humans in repetitive actions" (Ostrom 2005, p. 824) are not subject to this analysis.
[112] Our discussion is based on the Directive itself, the Commission's consultation paper of 2003, and a recent draft proposal on the Revision of the Directive, dated December 2005.

The Directive distinguishes among three types of handling suppliers: (i) airport handlers, (ii) self-handling airlines, and (iii) independent or third-party handlers. While *airport handlers* have at their disposal a permanent license to compete in the handling market and are exempt from the award process, *self-handling airline*s are chosen in a selection process in case there are more interested parties than available licenses to self-handle. The Directive does not contain any explicit rules on the duration of these self-handling licenses. *Independent handlers*, on the other hand, are subject to a selection process, which allocates operating licenses with a maximum duration of seven years to the winning parties. The institutional arrangement for the selection process depends on various parameters and is displayed in *Figure 4-2*.

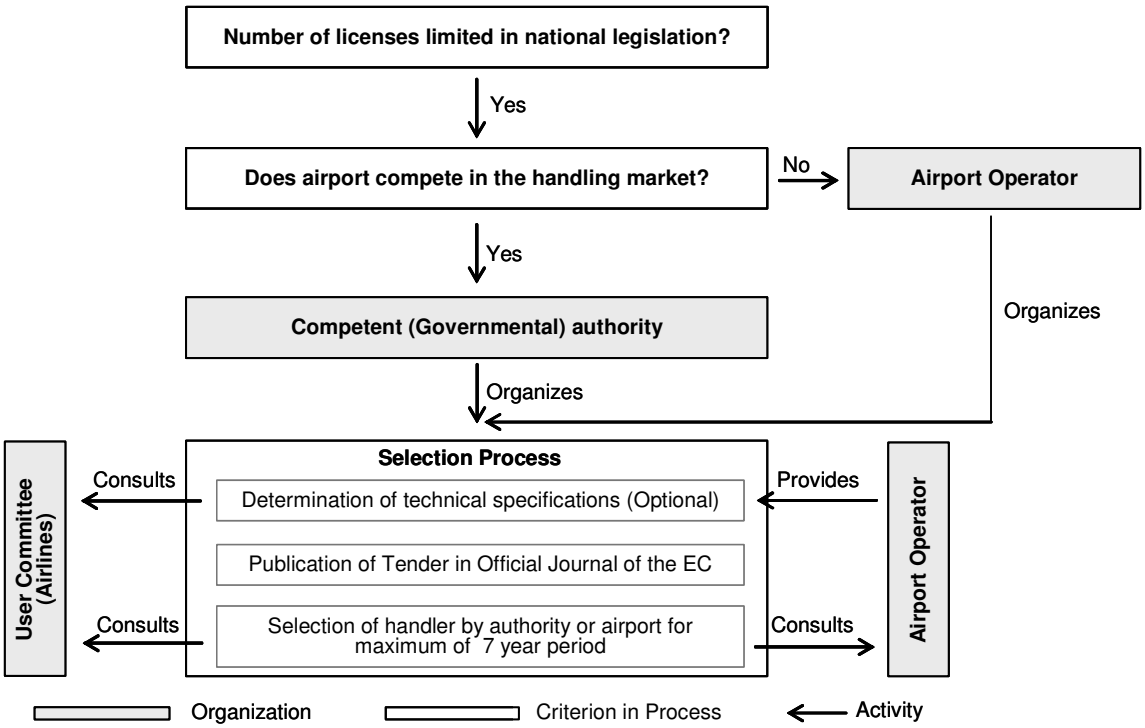

Figure 4-2: Criteria in the Selection Process for Independent Handlers

A process of awarding handling licenses is mandatory if the member state has decided to limit the number of operating licenses for new entrants (Article 11 of Directive). All member states, except for countries liberalized at an early stage (for example the United Kingdom, the Netherlands), have implemented such restrictions in their national

legislation.[113] In a second step, the Directive spells out which party may award the license: the airport is responsible if it does not compete in the downstream market, and otherwise, a "competent authority" is responsible for organizing the award procedure. The selection process itself takes place in three steps: (i) standard conditions and technical specifications for the license are determined (optional), (ii) the tender is published in the official journal of the European Union (obligatory), (iii) the license is awarded. The Directive states that the selection criteria must be non-discriminatory, transparent, and objective. However, the decision on how to structure the award process and what criteria to employ are left to the member states.[114]

In the award procedure, the airport or responsible authority are required to consult with a *user committee* consisting of the airlines operating at the respective airport. Given the decision to award a limited number of licenses, the decision rights on the selection of the handling provider are allocated to a governmental authority or the airport authority (if the airport does not compete in the handling market). The Commission has put forward three proposals regarding users' rights:

(1) to maintain consultation rights of users (status quo)

(2) to allocate decision rights to the user committee

(3) to allocate appeal rights to the user committee (explicit right to appeal decisions by the authority)

Questions naturally arise on the efficiency of such an institutional arrangement. In this paper, we are particularly interested in whether licenses with a maximum duration of seven years for third-party handlers are inferior or superior to alternative institutional arrangements. In a consultation document on the revision of the Directive, the Commission actually made a rare direct statement of its motivation for awarding licenses:

[113] Very recently, some authorities in these markets have started to grant free access to the local handling market, for example at Malpensa airport in Milan, Italy.

[114] Article 14 of the Directive allows member states to impose general obligations on ground handlers for operation at national airports. These obligations must not be discriminatory and must relate to criteria such as financial soundness, sufficient insurance, security and safety of equipment and persons, environmental protection, and compliance with social regulations.

> "the limitation [duration of license with a maximum of seven years] was initially introduced as a guarantee of sufficient competition in a market where the number of suppliers was artificially reduced to two" (Commission 2003)

The above statement suggests that the Commission's main motivation is also to promote 'competition for the market'. This is further confirmed, in our view, by the following discussion of whether or not to auction operating licenses to the highest bidder.

> "As an alternative, a more competitive and market-based system of the granting of licenses of service providers could be worth looking at. […] The point of reference for the preference of one supplier over another would then be the amount of money to be paid for the license." (Commission 2003)

The notion of competition for the market was initially proposed by Demsetz as an alternative to the regulation of natural monopoly (Demsetz 1968). However, as the intention of the Commission has been to peel away the layer of a potentially competitive handling market from the infrastructure assets of airports, this natural monopoly setting is not applicable.

An alternative explanation for introducing a licensing regime is to create a regulatory device to discipline the entrant. In this case, the withdrawal of the license could be used as a sanctioning mechanism to the licensee at the time of renewal.

In the same consultation document, the Commission indicates its belief in a functioning market for ground handling in the absence of licensing.

> "The usefulness of this provision [selection of handling agents for a maximum duration of seven years] may be questioned as it would lose its significance in case of further liberalization of the ground handling market" (Commission 2003)

The Commission comments further on the usefulness of the award regime.

> "[T]he licensing period might be maintained, although hardly any stakeholder has mentioned its usefulness or necessity. Ground handlers are unhappy with the provision as they consider the current seven year period too short to earn back their investments with an appropriate return thereon" (Commission 2003)

Despite the above qualifications on the benefits of licensing, the Commission is likely to maintain its requirement for temporary licensing. In a recent draft proposal, the Commission proposed to expand the licensing requirement to the incumbent airport handlers to guarantee a "level playing field". This suggestion was put forward in spite of the intention to raise the minimum number of licenses at larger airports within the European Community.

4.3 Analytical Framework: Some Propositions

We draw on the preceding discussion and recent theoretical and empirical work on the effects of institutional constraints on the organizational decision (Ménard and Yvrande-Billon 2005, Yvrande-Billon 2004, Yvrande-Billon and Saussier 2005) to develop propositions on two interdependent problems: (i) the costs and benefits of the license procedure and (ii) the effect of temporary restricted licenses on efficiency in contractual and organizational choice between handler and airline.

4.3.1 Licensing Procedure

Our review of the Commission's documents does not provide a clear picture of the motivation and expected benefits of awarding licenses to new entrants rather than to incumbents. Let us assume, however, that a benefit does exist in the form of a sanctioning mechanism. Differently put, if a given handling agent failed to perform in accordance with a set of objectives, he or she could be replaced by a competitor at the time of license renewal. From an institutional perspective, the following questions arise:

- Which organization(s) should determine the objectives?
- How should the objectives be operationalized?
- How should the handling supplier's performance be assessed with respect to the chosen criteria?
- How can the organization arrive at an objective decision that can be defended in a public court?

The qualitative criteria stated in the Directive are of little help in answering these questions. National legislation and enforcing bureaucracies have a great deal of discretion in how to carry out the award procedure. If we revisit the TCE-based challenges to the notion of competition for the market (Williamson 1976), the following appear to be of particular relevance in the case of ramp handling: (i) the cost of measuring an airline's preferences, (ii) the degree of idiosyncratic skills the incumbent handlers have acquired, (iii) the investment in specialized long-lived equipment, and finally (iv) the susceptibility of the political process to opportunistic representation. Each of these challenges is

discussed in relation to the current institutional arrangement for awarding handling licenses.

- Cost of measuring an airline's preferences: Airlines, as the buyers of handling services, are able to express their preferences within the user committee. Given the small number of airlines at an airport (compared to a consumer market), a vote on the preferred handling supplier in such a committee represents an efficient way to determine demand preferences, at least as long as strategic considerations are unimportant.

- Acquisition of idiosyncratic skills: We have argued that in particular for complex ground handling processes, for example hubbing processes, the handling supplier acquires substantial human capital assets. These assets are not transferable to alternative handling suppliers. Even if the majority of personnel are transferred to an alternative handling supplier, it takes time to develop and establish the organizational procedures[115] required to achieve the same level of productivity and quality in operations.

- Investment in long-lived handling equipment and maintenance shops: New entrants will need to invest in standardized handling equipment and maintenance facilities as they builds up their market share. These assets are characterized by a mixture of site specificity and dedicated asset specificity. A transfer of assets in case of a replacement of the current handling supplier will prove to be problematic given the persistence of asset valuation problems. Asset specificity and asset valuation problems will increase with the size of the handling market at the respective airport.

  Proposition 1a: *Idiosyncratic investments in human capital and equipment result in large transaction costs for awarding licenses at large secondary and hub airports*

- The susceptibility of the political process to opportunistic representation: A governmental authority is confronted with information problems in its decision on whether to replace an existing handler. The criteria and data used in its

[115] Tacit knowledge is embedded in organizational routines, which are specific to the organizational structure and culture.

decision will need to withstand appeal in court. Existing handlers will invest in opportunistic representation, claiming security, safety, social or operational reasons for maintaining their presence in the market. The qualitative criteria used in the selection process are, to a large degree, subjective. In markets with supernormal profits, handling agents are likely to respond in two ways: (i) invest in influencing the political decision makers, and (ii) challenge the selection process in court in case of an adverse decision.

Proposition 1b: *Governmental authorities will prefer not to intervene and to replace an existing handler as they face information and evaluation problems*

Proposition 1c: *Handling suppliers will invest in activities to influence the selection decision or challenge the selection decision ex post*

4.3.2 Contractual Constraint

The temporary limitation of seven years acts as an institutional constraint on the contracting decision of handlers and airlines. It is important to note that this constraint is only applicable to the supply relationship between independent handlers and airlines, since airport handlers dispose over a permanent license. *Figure 4-3* displays the different licensing arrangements between the governmental authority and handling suppliers.

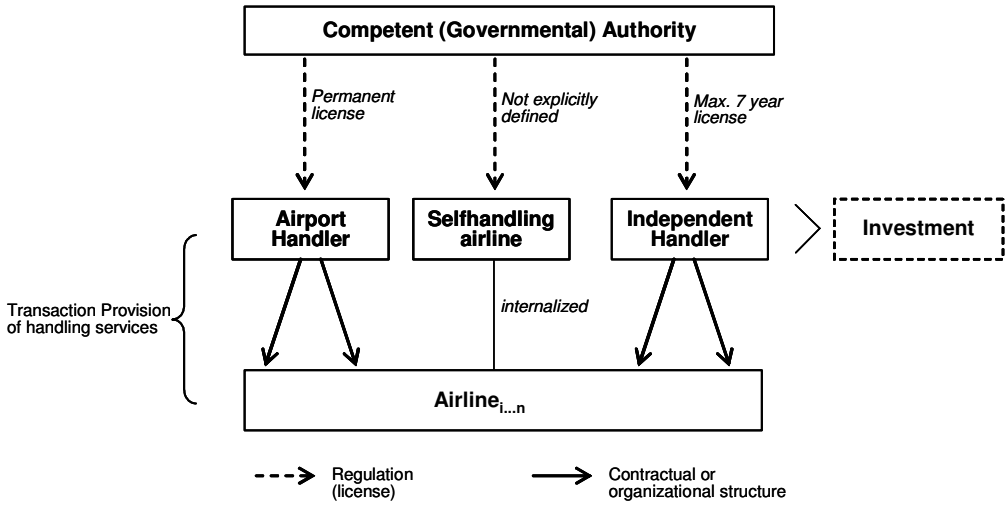

Figure 4-3: Licensing Arrangements

At the beginning of the licensing period, the constraint on contractual choice is moderate. It appears that the Directive does not consider strong hybrid governance structures, such as

long-term contracts beyond seven years' duration, or joint ventures between airlines and independent handlers to be of economic interest for handlers and airlines.[116] As the time on a handling license gradually runs out, the constraint on long-term contracting between independent handlers and airlines becomes increasingly severe.

To demonstrate this, we examine a fictive contracting situation from the perspective of an airline, an independent handler, and an incumbent airport handler. Assume that the airline's current handling contract with the incumbent (airport) handler expires in year five of a seven-year license. The *airline* approaches the market with a tender for its handling volume. As the airline disposes over a significant market share at the respective airport (for example, greater than 20 percent of all turnarounds), the *independent handling agent* needs to invest in dedicated assets to handle this volume. Based on the developed TCE logic, the supplier will require a contractual safeguard prior to investing in additional equipment, hiring new personnel and expanding the capacity of its maintenance shop. The *airline*, on the other hand, is interested in concluding a long-term contract supplemented with a complex quality agreement to (i) economize on ex-ante negotiation costs, (ii) allow for productivity and quality gains in handling operations, (iii) safeguard quasi-rents, and (iv) economize on ex-post monitoring costs. With two years remaining on a license, the airline and the independent handler will not be able to conclude a long-term contract.

Although the *incumbent airport handler* is able to offer an adequate long-term contract, the airline will be reluctant to enter into a long-term agreement with the incumbent given that more contractual choices will become available in two years' time. The risk of entering a "bad" (high-cost) contract with the incumbent causes the airline to choose a shorter contract than it normally would.

The basic proposition on the effects of such misaligned governance structures is one of inferior performance in terms of production and transaction costs (Yvrande-Billon and Saussier 2005). The dynamic propositions are that the transaction partner adapts to the institutional constraint in various ways. The handling agent will either (i) exit or capture

[116] The Directive does not rule out these contractual and organizational forms *per se*. However, it establishes a strong set of rules that make these governance structures, which lie somewhere on the continuum between mid-term contracts and self-handling, prohibitively expensive.

only a small part of the market, (ii) adapt itself to an inferior governance structure, or (iii) adapt the attributes of the transaction (seek less-specific investments).

Proposition 2a: *Independent handling suppliers prefer to contract with airlines with low-specificity transactions, while incumbent handlers contract both high and low specificity transactions.*

Proposition 2b: *Independent handlers seek to reduce the amount of specific investments, in particular towards the end of the licensing period.*

4.4 Contract Duration in Ramp Handling Contracts

4.4.1 Data and Model Specification

We have proposed that in the presence of specialized governance structures, for example long-term contracts, a licensing regime will result in inferior economic performance. Our line of argument, however, rests on the assumption that the contractual partners enter these agreements to economize on transaction costs. In the following, we seek to substantiate this assumption by analyzing whether contract duration is chosen in accordance with TCE's predictions. We focus on the dimension of contract duration, first, because of its importance for safeguarding quasi-rents, and second, because it is directly affected by the license. In our empirical study, we draw on a unique set of 42 ramp handling contracts in the European Union that were in effect between a large European HSC and its handling suppliers in December 2005.[117] The data was collected through a survey of airline procurement managers and handling agents, internal databases of the HSC, as well as external sources. Unlike other European HSCs, the particular carrier in question here has traditionally not been vertically integrated into the ramp handling market at its hub and large secondary airports. At both of these types of contracting locations in its national market, this carrier dealt with airport monopoly suppliers prior to deregulation. The carrier has maintained its 'contract interface' with its ramp handling suppliers up to the time of this study.

[117] The carrier maintained 72 contracts with its different ramp handling suppliers at airports in the European Union in December 2005. For the following reasons we have excluded 28 contracts from our review: 5 contracts were affected by prior disinvestments, 22 contracts were negotiated with monopoly handling suppliers, and for another 3 contracts we were unable to obtain reliable data.

In line with prior theoretical and empirical work, contract duration is assumed to be a linear function of asset specificity and uncertainty (Joskow 1987, Saussier 1999). Given the service nature of the ramp handling transaction, we distinguish between the two sources of uncertainty discussed in the TCE literature (Ghosh and John 1999, Williamson 1985, pp. 56-60). While *environmental uncertainty* determines the need for adaptation in an exchange relationship, *behavioral uncertainty* arises due to the airline's problem of observing and verifying the supplier's quality and its provided effort.

$$DURATION_i = b_1 Asset\ Specificity_i + b_2 Env\_Uncertainty_i + b_3 Beh\_Uncertainty_i + u_i$$

We expect *asset specificity* and *behavioral uncertainty* (Beh_Uncertainty) to increase contract duration (DURATION), while a rise of *environmental uncertainty* (Env_Uncertainty) is expected to decrease duration.

4.4.2 Explanatory Variables

Based on our qualitative assessment of the handling market in Section 4.2.1., we operationalize asset specificity with a proxy for dedicated and human capital asset specificity: the carrier's market share (MSHARE) and its percentage of transferring passengers (TSHARE) at airport i. DELAY is the proxy variable for behavioral uncertainty (cost of performance measurement), while the variable VOLATILITY approximates the degree of environmental uncertainty.

$$DURATION_i = a_0 + b_1 MSHARE_i + b_2 TSHARE_i + b_3 DELAY_i + b_4 VOLATILITY_i + u_i$$

The intuition behind the explanatory variables is as follows:

- <u>Specific investment in handling equipment and personnel (MSHARE):</u> Handling equipment is standardized and can be redeployed by an alternative airline using the same or a similar aircraft type. If a single airline has a large market share, the equipment used to handle its fleet becomes a dedicated asset. The higher the airline's market share (MSHARE) at airport i, the larger the mutual dependence between handling agent and airline. The volume of the carrier (VOLUME) is measured in take-offs per year, while the size of the local handling market

(APSIZE) is corrected for the volume of self-handling airlines (VOLUME_SELF).[118]

$$MSHARE_i = \frac{VOLUME_i}{APSIZE_i - VOLUME\_SELF_i} \times 100$$

- Carrier-specific human capital assets (TSHARE): The interaction of handling supplier and airline in the contract execution period results in an accumulation of human capital assets. Our proxy for this build-up at the resource disposition and work-floor level is the percentage of transfer passengers of the carrier's total number of departing passengers at contracting location i. The intuition behind this is that transfer processes are highly complex, and optimizing them results in an accumulation of human capital assets through learning by doing.

- Cost of Performance Measurement (DELAY): As is typical for services in general, production and consumption occur simultaneously in ramp handling. For an airline, the punctual departure of aircraft is one of the most important quality parameters. The performance of handling suppliers is judged not only by industry-wide safety standards and compliance with governmental security regulations, but also by the carriers' ability to handle the aircraft on time. However, it is not easy to measure or assign responsibility for delays due to the wide variety of factors influencing punctuality at a given airport. A higher level of delays incurred by the carrier at contracting location i increases the complexity of ground processes and thus the cost of performance measurement. The proxy DELAY is obtained by dividing the total minutes of delay incurred by the carrier at airport i (DELAY_TOTAL) by the number of take-offs (VOLUME).

$$DELAY_i = \frac{DELAY\_TOTAL_i}{VOLUME_i}$$

- Environmental Uncertainty (VOLATILITY): Demand uncertainty in the form of fluctuation in the airline's traffic volume will affect the handler's productivity level. For the computation of VOLATILITY, we draw on monthly data on the number of take-offs of the carrier at location i in the period 2004-2005. The

[118] The adjustment creates a more precise measure of the carrier's significance for the "contestable" market from the handling company's perspective.

variation coefficient for this period is obtained by dividing the standard deviation (VOLUME_STDEV) by the mean (VOLUME_AVG). This dimensionless measure allows us to compare the degree of the carrier's average traffic dispersion between different local airport markets.

$$VOLATILITY_i = \frac{VOLUME\_STDEV_i}{VOLUME\_AVG_i} \times 100$$

In addition to these determinants of contract duration, we introduce three control variables to our model:

- Countries liberalized at an early stage (EARLYLIB): The airports in our sample have been arranged into country clusters. At airports in countries that liberalized their ramp handling markets prior to the EU Directive, market access is not restricted. The variable EARLYLIB takes the value of 1 for these contracts.
- Licensing Constraint (LICENSE): If the contract was negotiated within three years of the renewal date of the license, we coded the dummy variable LICENSE with the value one. Each coding has been validated by the responsible purchasing manager for the respective account, who was asked whether the upcoming license renewal had been considered in the negotiation process.
- Airport Handler (VERTICAL): This dummy variable takes the value of 1 if a forward-integrated airport is the airline's contracting partner at location i.

In line with the propositions raised, we expect MSHARE, TSHARE, and DELAY to have an increasing effect and VOLATILITY to have a decreasing effect on DURATION. We have no prediction on the expected signs of LICENSE, EARLYLIB, or VERTICAL. *Table 4-1* summarizes the sample statistics (n=42) and the correlation coefficients of our dependent and independent variables.

Table 4-1: Descriptive Statistics

	Correlations							
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) *DURATION*[a]	1.00							
(2) *MSHARE*	0.62	1.00						
(3) *TSHARE*	0.51	0.53	1.00					
(4) *DELAY*	0.35	0.09	0.40	1.00				
(5) *VOLATILITY*	-0.14	-0.15	-0.13	0.18	1.00			
(6) *EARLYLIB*	-0.50	-0.26	-0.16	-0.04	-0.10	1.00		
(7) *LICENSE*	-0.15	0.05	0.09	-0.31	0.11	-0.34	1.00	
(8) *VERTICAL*	0.45	0.37	0.23	0.26	-0.15	-0.37	0.03	1.00
Mean	789	11.94	7.15	8.24	10.85	0.19	0.33	0.62
Minimum	60	0.34	0.00	2.50	2.67	0.00	0.00	0.00
Maximum	2,520	75.19	67.97	13.47	82.73	1.00	1.00	1.00
Std. Dev.	595	15.11	15.98	2.28	12.69	0.40	0.48	0.49
n=42								

[a] in days

4.4.3 Estimation Results

We use ordinary least squares (OLS) and TOBIT regression analysis to test the proposed relationships in the specified model.[119] In contrast to the OLS regression, the TOBIT model takes into account that contract duration in our sample of contracts cannot fall below the threshold of 60 days. This minimum contract length is set forth in the International Standard Ground Handling Agreement, a generally accepted standard contract in the handling market. In our sample, 12 out of 42 observations take on this left-censoring value. Three different model specifications have been tested with each method. A fourth specification including the variable VERTICAL has been dropped from *Table 4-2*. The type of handling supplier (forward-integrated airport handling company vs. independent handling company) shows a non-significant impact on DURATION and does not raise the explanatory power in terms of adjusted R^2.

[119] Assuming standard properties of the error term u_i, OLS will provide the best linear unbiased estimates. The degrees of multicolinearity (highest variance inflation factor at 1.92) and autocorrelation (lowest Durbin Watson coefficient at 1.85) are in the acceptable range.

Table 4-2: OLS and TOBIT Regression Estimates

	Coefficients, Standard errors in parentheses					
DURATION	(1) OLS	(2) OLS	(3) OLS	(4) TOBIT	(5) TOBIT	(6) TOBIT
C	-36.56	119.24	522.46*	-435.36	-129.59	380.27
	235.27	263.61	285.60	390.89	390.20	388.54
MSHARE	20.62***	16.89***	15.42***	24.61***	18.61***	16.81***
	4.02	3.99	3.91	5.10	4.13	3.90
TSHARE	3.85	2.94	6.38*	1.06	0.57	4.88
	4.08	3.60	3.22	5.46	4.55	4.02
DELAY	73.07**	77.01**	41.77	112.24**	108.45**	62.78
	31.15	30.93	30.99	47.71	46.63	44.91
VOLATILITY	-4.63	-7.35**	-4.87*	-9.88	-12.76**	-10.08*
	4.01	3.43	2.79	7.69	6.29	5.45
EARLYLIB		-565.3***	-705.21***		-966.8***	-1085.6***
		192.73	174.14		372.92	312.16
LICENSE			-360.4***			-422.52***
			127.54			150.07
Adjusted R^2	0.44	0.57	0.62	0.38	0.60	0.63
Log Likelihood	-313.24	-307.06	-303.53	-242.85	-234.60	-231.75
n=42						

Significance at 10%, 5%, 1% level (*, **, ***). White heteroskedasticity-consistent and QML (Huber/White) standard errors.

In the basic model specifications (1) and (4), MSHARE and DELAY are significant at the 1 percent and 5 percent level respectively, while TSHARE and VOLATILITY are not significant. All four explanatory variables display the predicted sign. When adding EARLYLIB and LICENSE, the adjusted R^2 increases by 0.18 to 0.62 in the OLS regression (3). In specification (3), both coefficients of the dummy variables and MSHARE are significant at the 1 percent level. The proxy for environmental uncertainty (VOLATILITY) and human capital asset specificity (TRANSFER) are significant at the 10 percent level. In the TOBIT estimation, we obtain similar results in terms of an increase in explanatory power (pseudo R^2) and in statistical significance of the coefficients. Exceptions are the constant term and TSHARE, which prove not to be significant in specification (6).

In order to compare the impact of the coefficient estimates, we have computed the observed partial effects at mean values in the TOBIT estimation. A unit change in MSHARE (one percentage point) increases DURATION by approximately 15 days in the OLS regression model and 13 days in the TOBIT model. A percentage point change in transfer quota (TRANSFER) will further increase DURATION by 6 days in the OLS regression. A unit increase in VOLATILITY, that is, a percentage point increase in traffic dispersion from the mean in the local market, decreases DURATION by 5 days (8 days in the TOBIT model). The dummy variables EARLYLIB and LICENSE decrease DURATION by 705 days and 360 days in the OLS regression model (749 days and 335 days in the TOBIT model). The constant term (in OLS regression 508 days) can be interpreted as the contract duration chosen in markets not liberalized at an early stage and with no licensing restrictions and in the absence of conditions of asset specificity and uncertainty.

Airlines and handling companies <u>mainly</u> choose contract duration as predicted in the transaction cost framework: quasi-rents rooted in investments in dedicated handling equipment and staff increase duration, while environmental uncertainty (approximated by traffic fluctuations at the respective airport) reduces contract duration. One potential explanation for the non-significant relationship between contract duration and the proxy for behavioral uncertainty is that performance measurement between airlines and handling companies is coordinated within a different contractual dimension than contract duration. Industry participants commented, for example, on substantial variation in the complexity of

the service level agreements attached to these contracts. In addition to the explanatory variables in our basic model, the impacts of the stage of liberalization (EARLYLIB) and the existence of a licensing constraint (LICENSE) are of interest. In markets with no market access restriction, contract duration tends to decrease. A broader choice of contracting partners at contract renewal seems to decrease the bilateral dependency in these markets. Put differently, shorter contracts are comparatively more attractive because the likelihood of encountering an adequate contracting partner at contract renewal increases. The existence of a license constraint, on the other hand, decreases contract duration. Here, both parties systematically design shorter contracts, taking into account upcoming license renewals.

4.5 The German Experience: The Award of Handling Licenses

Prior to the implementation of the EU Directive, forward integrated airports had been the exclusive providers of ramp handling services at German airports. The German market represents an interesting subject for analysis due to its economic importance in the European Union and since it continues to be a source of (formal) complaints by airlines to the Commission. Following the logic in the development of our propositions, the following case study is structured into two parts.

In a *first step*, we have reviewed 12 out of 17 tender processes for operating licenses for third party handlers at German airports since 1998. Our objective has been to collect information on the economic performance of the award regime in the light of our propositions 1a, b, and c. The qualitative discussion in this part draws on information from several sources: (i) the tender publications in the Official Journal of the European Union, (ii) results and criteria used in the selection process (iii) protocols of user committee meetings, (iv) legal challenges, and (v) expert interviews.

In a *second step*, we analyze the transaction between handler and airline in the downstream market. Being confronted with a lack of detailed data on the contracting decision itself, we have resorted to comparing investment levels in equipment and maintenance facilities between new entrants and established airport handlers. Furthermore, we assess whether new entrants have been able to contract transactions, which involve relations-specific investments (for example large-scale operations of the national HSC).

The information used was collected in a series of expert interviews with procurement managers of the national HSC and senior commercial managers of independent handling agents.

4.5.1 The Costs and Benefits of Licensing

Germany implemented the Directive into national law via the '*Gesetz über Bodenabfertigungsdienste an Flughäfen'*, 11 November 1997 and the '*Verordnung über Bodenverkehrsdienste auf Flughäfen'* (hereinafter referred to as 'BADV'), 10 December 1997.

In Germany, airports compete in the handling market; thus, the responsibility for the award of licenses is assigned to the local supervising authorities for the respective airport at the state level[120]. The BADV restricts the number of handling licenses for ramp handling to two at airports with a passenger volume greater than two million[121]. Since incumbent airports – as handlers – do not have to undergo a selection process and therefore are in possession of permanent licenses, the respective ministry is faced with the challenge of awarding the single remaining license to interested third-party handlers[122]. In Appendices 2 and 3 of the mentioned law, the structure and the criteria used in the selection process are spelled out in some detail. The law delineates two stages in the award process: (i) a pre-qualification stage and (ii) a selection stage. The criteria for the pre-qualification for the actual tender are as follows:

- Personal reliability of handling company management.
- Adequately qualified operating staff.
- Sound financial situation.
- Promise to retain all staff of the incumbent.
- Agreement to pay concession fees.
- Sufficient liability insurance.

[120] Due to the federal structure of the German government, the responsibility for air transport is assigned to the 16 state governments, usually to a department within the Ministry of Transport.
[121] In accordance with the EU Directive, the BADV does not mandate airports with a passenger volume below this threshold to open up their ramp handling markets to competition.
[122] The law requires both independent handlers and self-handlers to apply for a license with a maximum duration of seven years.

- General compliance with environmental, social, security, and safety regulations.

Once the applicants have passed the pre-qualification stage, they are asked to submit further details for the actual tender process. The BADV is not clear about the means by which the authority should arrive at its final selection, except that the criteria used must be non-discriminatory, transparent, appropriate, and objective. In addition, the law requires the authorities to consult with airlines (airport users), the respective airport operator, and the works council. Thus in accordance with the questions raised in Section 3.1, we investigate how the award of licenses has actually been organized. *Table 4-3* displays the tender processes conducted in Germany since 1998 for ramp handling licenses.

Table 4-3: Conducted Tender Processes at German airports since 1998

Airport	Incumbent	Selected Entrant	Duration Operating License		Change in Entrant	Special Observations
			First Term	Second Term		
CGN	Airport	Aviapartner	2001 – 2005	2005 – 2010	No	Both licenses with 5 years duration.
DUS	Airport subsidiary	Aviapartner	2001 – 2008		N/A	
FRA	Airport	Acciona/ LUG	1999 – 2006	2006 – 2011/13	No	Legal challenges by loosing applicants. Formal complaints by airlines to European Commission.
HAJ	Airport subsidiary	Aviapartner	1999 – 2006	2006 – 2013	No	Legal challenges by loosing applicant.
HAM	Airport subsidiary	Acciona[a]	1999 – 2006	2006 – 2013	No	
LEJ	Airport subsidiary	Aviapartner	2002 – 2008		N/A	Aviapartner has decided not entered market
MUC	Airport	Aviapartner	1999 – 2003	2003 – 2010	No	First license with 4 year duration. Legal challenges of loosing applicants.
NUE	Airport subsidiary	Aviapartner	2001 – 2007		N/A	Aviapartner has left the market.
STR	Airport	ServisAir	1999 – 2001	2003 – 2010	Yes (Losch GmbH)	Market exit of ServisAir in 2001. Replacement by Losch Gmbh in 2003.
TXL	Globe Ground Berlin	Acciona[a]	2001 – 2006	2006 – 2013	No	Legal challenges by loosing applicant.

[a]Operating license had been granted to the company Checkpoint B, which was acquired by Acciona.

Decision Criteria. In the 12 tender processes reviewed, approximately seven handling agents applied on average, of which on average five submitted final applications for the license. All tenders respond explicitly to the standard pre-qualification criteria, as spelled

out in the appendix of the BADV. In the first period of awarding licenses, prior to the ruling of the European Court of Justice[123], the commitment to retain all personnel of the incumbent as well as to pay a concession fee for market access was included in every tender as a pre-qualification requirement. Since 1998, the following selection criteria have been employed by the authorities in the tender processes:

- Existence of a quality management system, for example ISO 9000.
- A calculation of resource requirements (personnel and equipment) and prices based on a standard flight week at the respective airport.
- A start-up, operations, and "employee transfer" plan at the respective airport.
- References.
- Compatibility of the handling agent's business plan with airport's long-term goals.
- Votes by the user committee, works council, and airport operator.

Operationalization and Measurement. Due to the subjective nature of most of the criteria listed above, their operationalization and measurement has proven to be difficult for the authorities. In many cases, the decision makers applied a ranking logic, that is Applicant A submitted a more persuasive application than Applicant B. In other cases, the authorities developed a scorecard, assigned different weights to the criteria, awarded scores, and chose the applicant with the highest overall score. In yet other cases, the authorities identified a group of equally qualified applicants based on the criteria employed, and then followed the vote of the user committee, airport operator, or works council to decide among them.

The apparently most objective parameters – price and resource requirements on the basis of the standard flight week – are especially intriguing. The results of the calculation have been challenged frequently as not feasible and thus discarded. In other cases, the

[123] The European Court of Justice (ECJ), has ruled the requirement that the entrant accept a transfer of staff or pay a compensating fee to the incumbent in the German implementation (BADV §§8(2) and 9(3)) to violate Article 16 and 18 of the Directive (ECJ, C-386/03, 14 July 2005). The right to levy a (non-cost-based) concession fee for market access has been declared as inadmissible by the ECJ decision of 16 October 2003.

applicants' calculations were simply not comparable from the outset due to different assumptions and reporting formats.

The role of the prices submitted in the application is not clear. In most cases, the authorities asked for maximum prices (list prices) and in rare instances for minimum prices as well. Whether these list prices are binding during the licensing period is questionable. If this were the case, submitted list prices would act as an artificial price ceiling and result in strange incentives for the parties in the consultation process. Users most likely prefer applicants with low pricing levels, while incumbent airport handlers and the works council have the opposite interest in their vote on the new entrant. In the absence of an uni-dimensional and objective criterion, new entrants are faced with a large degree of uncertainty regarding the basis upon which their application will be evaluated.

Consultation and Selection. In the German institutional setting, the user committee votes on its preferred supplier in the presence of the ministry and the airport operator. We have analyzed how the past voting behavior of users on their preferred handling suppliers compares to the voting behavior of airport operators, the respective works council, and the final decision of the authority. In the 12 tender processes reviewed, airport operator and works council voted for the same applicant ten out of 12 times. The airlines in the user committee, however, only voted in accordance with the airport operator and the works council five out of 12 times. On ten occasions, the authority followed the airport operator's recommendations.

Reviewing the seven award processes in which licenses were up for a second licensing term, we noted that the authorities did not replace an existing handler on any occasion in spite of divergent votes by the user committee on six occasions. In all seven instances, the authorities named the avoidance of operational disturbances and the superior implementation plan as key award criteria.

Special Observations and Legal Challenges. In handling markets with the potential for supernormal profits, for example at Frankfurt airport, incumbents and applicants have a particularly strong incentive to influence the authority's decision or to challenge an adverse decision in court. Various legal challenges have occurred in the context of award decisions

since 1998. At both German hub airports, Munich and Frankfurt, legal challenges have been raised and formal complaints to the European Commission have been filed[124].

Leaving the details of these challenges and rulings aside, the major claim they share is that the award process and the decision have not been based on objective, non-discriminatory criteria. However, in the first licensing term, all legal challenges against the authorities were withdrawn by the new entrants prior to the final rulings. The basis for the decision was an informal agreement among the independent handlers, seeking to avoid a deadlock in the face of ongoing legal battles[125]. A continuation of legal challenges would have prevented or at least delayed the start of operations of the selected handlers at the respective airports.

From a transaction cost perspective, legal challenges indicate large (direct) transaction costs associated with the tender process. The opportunity cost of a pending selection decision might, however, exceed these direct transaction costs. Given the uncertainty that results from challenging a selection decision in court, economic performance in the respective market will suffer because independent handlers and airlines are not able to enter into contracts to support specific investments.

Two more observations are worth mentioning. *First*, on some occasions, the authority has decided to limit the license's duration to four or five years and thus below the maximum of seven years. These limitations have been imposed at both German hub airports and at one large secondary airport. In the recent tender process in Frankfurt, for example, the licensing period was restricted to five years, with the option for the airport operator to prolong the period by another two years. According to our proposition, a shortening of the licensing period will render contractual constraints even more severe.

Second, at two small airports, the selected ramp handler has stopped servicing the market, while at a fairly large secondary airport, the handler has exited the market.

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[124] Legal challenges addressing the award processes reviewed in the current study include BVG (20 AS 99.40032, July 21, 1999), OVG Lüneburg (12 M 2094/99, June 24, 1999), HVG (2 Q 4634/98, May 27, 1999), VGH (12 Q 132/06, 12 Q 114/06, May 2, 2006). Furthermore, British Airways, KLM and Air France issued formal complaints to the European Commission in the licensing process for Frankfurt in 1998/1999. Recently, the losing applicants for the license at the airports Hannover and Berlin-Tegel have filed suits against the authorities' selection.

[125] The selection decision by the authority falls under administrative law in Germany, which tends complicate and lengthen legal challenges in Germany (Bauer 1999)

Apparently the new entrants did not have confidence in their ability to recoup the investments at these airports. In the case of the insolvency of ServisAir, the authority had decided against the airlines' vote in the selection process. As a result, the handling agent was only able to win contracts with two individual airlines and was thus forced to exit the market (Nauke 2001).

4.5.2 Contractual Choices and Misalignment

We have proposed that due to the contractual constraint set by the temporary license, independent handlers will prefer to contract low-specificity transactions and adapt their investment strategies accordingly.

Contracting Practices. Having reviewed the contracting practices of the national hub-and-spoke carrier, we see that only on two individual occasions the carrier has entered into a contract with a new entrant since 1998. At both airports, a portion of the total traffic volume – the handling of the regional jet fleet – was awarded to the independent handling agent. The handling of regional jets is highly labor intensive and requires only small amounts of (specific) investments in loading equipment. At all airport locations in its national market, the carrier has so far maintained its contractual relations with the incumbent airport handlers.

Investment Strategies. In our expert interviews, independent handling agents stated that the majority of their handling equipment is their own property. In one case, the new entrant shares an equipment pool with the incumbent airport handler. The handling agents further confirmed that the acquisition of new airline customers becomes increasingly difficult as the license period gradually runs out. In their pricing decisions, some entrants artificially assume a shorter depreciation period for their equipment in the face of a seven-year license. Apparently they are not confident that they will recoup any value from a sale in the secondary market for handling equipment. Thus new entrants are willing to accept a competitive disadvantage compared to the incumbent airport handler, which uses longer depreciation periods for their equipment.

Turning to the organization of the transaction 'maintenance of ramp handling equipment', we observed substantial differences among handling agents. Handling

companies are able to choose between three generic options for the organization of their equipment maintenance work:

(1) Investing in their own on-airport facilities and hiring staff (make option).

(2) Contracting with an on-airport supplier (usually another handling agent).

(3) Contracting with an off-airport supplier.

While all incumbent airport handlers have invested in on-site airport maintenance shops, new entrants have shown a preference to contract out their maintenance work to the incumbent airport handler. Since the opening of the market in 1998, none of the new entrants has pursued the 'make option' nor sought an off-airport source for their maintenance work. While off-airport maintenance is possible *per se*, it entails direct transportation costs and the opportunity costs of extended equipment downtime. Furthermore, independent handlers claimed that contracting with the incumbent airport handler allows them to mitigate the risk associated with safety and security certification of their equipment in the licensing process.

The downside of contracting maintenance with a competitor is the dependency and the limited capacity. Both act as restraints to competition as well as to the independent handler's capability to handle customers which require these relationship-specific investments (airlines with large market shares). Facing the licensing constraint, independent handlers are not willing to invest in site-specific maintenance equipment and facilities (depreciation of approximately 15 years). In consequence they are not able to compete for carriers with substantial market shares in the local market.

4.5.3 Lessons Learned

Given the evidence on the award of licenses at German airports, we feel that propositions 1a, b, c are supported. We arrive at this conclusion in spite of the fact that none of the handling agents has been replaced so far. On the basis of the problems observed with the initial award of licenses and with the renewal thereof, one can imagine that legal challenges in case of a withdrawal of a license will be of an even larger scale.

The indirect costs of the current institutional arrangement in Germany surface in the national HSC's and the new entrants' inability to craft appropriate governance safeguards. The licensing constraint causes handlers' investment levels to be artificially reduced. Handling agents refrain from investing in specific assets and thus do not compete in market segments which require these relationship-specific investments. Although we are not able to estimate the costs of the reduced investment level and misaligned governance structures, these indirect costs are likely to be particularly large at hub and large secondary airports. We consider the evidence presented to be supportive of our propositions 2a and b.

4.6 Discussion

We have set out to analyze the obligation to award operating licenses in the European ramp handling market, applying transaction cost economics as the lens of analysis. The evidence presented corroborates our basic research proposition that granting only temporary operating licenses to new entrants to ramp handling markets distorts the contract design decision, causes underinvestment by new entrants, and leads to inferior economic performance. While licensing offers only negligible benefits (in the Directive's current form), its direct and indirect transaction costs are substantial. Our qualitative evidence from the German ramp handling market indicates that new entrants show reduced investment levels and hence do not compete for airlines that require relationship-specific investment in handling equipment and staff. Our econometric results, based on a sample of 42 handling contracts in the European Union, underpin this result. Contract duration varies not only with the amount of relationship-specific investment and uncertainty, as predicted in past industry studies, but also with the stage of liberalization and the existence of a licensing constraint in the local market. Our evidence supports recent propositions on the impact of misaligned governance arrangements. In our empirical context, handling companies and airlines alter the attributes of the transaction (new entrants only contract/compete for low-specificity transactions) and adopt sub-optimal governance structures by 'artificially' shortening contract duration.

These findings should be taken carefully into consideration by policy makers currently debating a potential revision of the Directive. Even if full liberalization is not attainable given the political constraints in the European Union, changing the licensing requirements

is likely to yield superior economic performance. Permanent licenses or licenses with longer duration, for example, will economize on direct transaction costs and allow for efficiency gains because handling companies and airlines will be able to tailor governance structures to their investment requirements. Following the transaction cost logic presented above, the comparative benefits of such a reform will be highest at sites with substantial contracting hazards between handling companies and airlines. We would expect the emergence of hybrid structures (for example, medium to long-term contracts or joint ventures) addressing hold-up and coordination problems for hub operations, and to a minor degree for large operations at spoke airports. For medium to small-sized airline operations, on the other hand, short-term contracts will work better at disciplining current suppliers and at taking short-term advantage of competition between handling companies.

Future empirical work should seek to collect more detailed data on bilateral contracts between airlines and handling companies and on the performance of licensing in other European markets. If detailed data can be obtained, researchers should attempt to directly estimate the loss in performance in the presence of misaligned governance structures.

5 Contractual Design and Functions – Evidence from Service Contracts in the European Air Transport Industry

5.1 Introduction

The variety of empirical studies drawing on Transaction Cost Economics (TCE) is impressive. Driven by the archetypical question of vertical integration, early studies explored the make-or-buy decisions of firms (Masten 1984, Teece and Monteverde 1982). Since then, hybrids – the third generic governance mode conceptualized in TCE – have received increasing attention, both in qualitative and quantitative industry studies (Ménard 1996, Oxley 1997, Powell 1996). Within this third generic governance mode, research on contracts in dyadic supply relationships has a tradition of its own. Early studies focused on single contractual terms such as contract duration (Joskow 1985, 1987) or the occurrence of take-or-pay provisions (Masten and Crocker 1985). Subsequent research has addressed contract design in its entirety by exploring the link between the attributes of the transaction and the level of contractual completeness (Crocker and Reynolds 1993, Saussier 2000). A key question in this research context continues to be how prior interactions between buyer and supplier impact the transaction cost trade-off in the contract design decision.

Given the mixed results of past empirical studies, recent research has put forward two interrelated propositions. On the one hand, researchers have suggested that different contract provisions serve distinct functions and are included in contracts for different purposes. According to this point of view, the unidimensional measurement constructs of contractual completeness employed in the majority of empirical studies mask the distinct contractual functions by individual terms and may thus perform poorly in explaining the parties' contractual design decision (Eckhard and Mellewigt 2006, Reuer and Ariño 2007). On the other hand, learning in repeated buyer-supplier interactions has been proposed to impact the transaction cost trade-off in the contract design decision, allowing contracting parties to employ previously tried and tested contract terms (Argyres and Mayer 2007, Mayer and Argyres 2004). We seek to contribute to the evolving literature on contractual functions and learning in the contract design decision by focusing on two interdependent aspects in our empirical study. *First*, we explore the alignment between contract terms in

distinct functional dimensions (safeguarding, coordinating, and contingency adaptability) and the attributes of the transaction (asset specificity, environmental uncertainty, and behavioral uncertainty). *Second*, we analyze how learning impacts the design of provisions within these functional dimensions. The empirical study draws on a sample of 42 service contracts between a European network carrier and its ramp handling suppliers at European airports.

Our assessment reveals that among all contract provisions, contract duration (*safeguarding dimension*), the inclusion of price adaptation provisions (*contingency adaptability dimension*), and the complexity of the attached service level agreements (primarily consisting of *coordinative* elements) are the primary sources of variation in our sample of contracts. Based on the estimation results presented, we conclude that conditions of asset specificity constitute the major determinant explaining the variations in these provisions/attachments. In contrast to the raised proposition, the data used here does not support that individual transaction attributes drive the contractual design of provisions in distinct functional dimensions. It does, however, reveal that transaction costs are strongly affected by the parties' use of standardized contract terms and that standardization depends on the specific function of the contract provisions. In the industry context of the present study, contracting parties make use of a "learning arrangement" at the *industry level* to develop standard provisions with a safeguarding and contingency adaptability function. Coordinative terms in the attached service level agreement (SLA), on the other hand, are standardized at the *firm level* across transactions with comparable coordination requirements.

The paper proceeds as follows. Section 2 summarizes key findings from the literature on contractual design and presents the propositions of the present study. Section 3 provides both a qualitative and quantitative assessment of the observed variations in contractual design. Section 4 concludes with a discussion of results.

5.2 Contractual Design and Functions

Central to empirical studies in TCE is the "discriminating alignment hypothesis"[126], to which the theory owes its predictive power (Williamson 1991). TCE hypothesizes that market coordination of a transaction results in a comparative cost disadvantage when the following problems in exchange relationships arise (Rindfleisch and Heide 1997):

(1) Safeguarding problem in the presence of asset specificity

(2) Adaptation problem in the presence of changes in the external environment

(3) Performance evaluation problem in the presence of behavioral uncertainty

TCE argues that each generic governance mode – market, hybrid, and hierarchy – possesses distinct attributes. Each mode relies on a different type of *dispute resolution mechanism*. Transactions in markets are supported by classical contract law (court enforcement), hybrid arrangements are governed by neoclassical contract law, and hierarchies rely on the 'law of forbearance'[127]. Other governance attributes include *incentive intensity* and *adaptation type* (Williamson 1985, 1991). The two dimensions are interdependent: autonomous adaptation via the price mechanism is a prerequisite for high-powered market incentives, while cooperative adaptation within hierarchies requires administrative controls and results in low-powered incentives. Hybrid arrangements lie between the polar modes and share attributes of both markets and hierarchies (Williamson 1991).

While the governance decision occurs at an aggregate level and primarily addresses the question of firm boundaries, research on contractual design explores the economic rationale of buyer and supplier in the establishment of a contract's terms of trade (James 2000). The design features of a contract determine its position on the market-hierarchy continuum, i.e., whether it shares more or less attributes of market or hierarchical

[126] The discriminating alignment hypothesis states that "transactions, which differ in their attributes, are aligned with governance structures, which differ in their cost and competencies, in a discriminating (mainly transaction-cost-economizing) way" (Williamson 1991, p. 277)

[127] Common elements found in neoclassical contract law are (i) the contemplation of unanticipated disturbances, (ii) definition of absorption tolerance zones, (iii) information disclosure and substantiation, and (iv) arbitration. In hierarchies conflict resolution is enforced by (management) fiat, as courts "forebear" to hear internal conflicts within organizations such as business firms (Williamson 1985, 1991).

governance.[128] Efficiently designed contracts allow the parties to exploit gains from trade, while economizing on transaction costs.

5.2.1 Static Propositions

The transaction cost trade-off in the design of a contract, that is, its level of completeness/complexity[129], can be expressed as follows (Saussier 2000, p. 193):

> "Setting aside the cost of writing the agreement, the main cost incurred in the search for a more complete contract (as against an incomplete one) will be the information cost, the negotiation cost, and the potential 'maladaptation cost' or 'renegotiation cost' of being trapped in a bad contract [...] the principal gains from a more complete contract (as against an incomplete one) are (i) for the contractant that has developed specific assets, a reduced exposure to the opportunism of the other party; (ii) savings on repeated re-negotiation costs"

Contracting partners seek stronger safeguards in the form of more detailed contracts, as conditions of *asset specificity* increase their bilateral dependency. At the margin, the cost of designing a more complex contract equals the marginal benefit from the additional protection of quasi-rents[130]. Disturbances in the transaction environment (*environmental uncertainty*), e.g., changes in technology or shifts in demand preferences, result in a potential 'renegotiation cost' and the 'maladaptation cost' of being locked into a bad contract. In consequence, parties value the flexibility to fill in the gaps of a less specified contract. *Behavioral uncertainty*, operationalized as the cost of performance measurement (Rindfleisch and Heide 1997), is predicted to increase the contract's level of complexity. Problems of observability and verifiability of a supplier's output quality allow for strategic behavior of the contracting partner. In order to reduce behavioral uncertainty, contracting

[128] Bajari and Tadelis (2001), for example, explore the choice between fixed price and cost-plus procurement contracts. They argue that cost-plus contracts share more attributes of hierarchical governance, i.e., low powered incentives and cooperative adaptation, and thus economize on transaction cost for highly complex (specific) transactions, which entail a high probability for ex-post renegotiation.

[129] Similar to Saussier, most researchers use the construct of contractual completeness as their latent dependent variable. Ariño and Reuer (2004) criticize this approach and argue that in the absence of detailed information on the transaction, contractual complexity, rather than completeness, is in most cases a more appropriate construct. In their perspective completeness represents a measure relative to the attributes of the governed transaction, while complexity is a contract design feature per se. 'Contractual complexity' is defined as "a design feature of firm's contractual agreements that reflects the number and stringency of provisions employed" (Ariño and Reuer 2004, p. 6).

[130] Quasi-rents are defined as the excess of an asset's value over the value of its best alternative use or user (Klein, et al. 1978). This excess of return keeps the asset in its current use, and can include pure rents as well (Holmstrom and Roberts 1998).

partners incur the cost for specifying a more detailed contract that outlines the measuring, monitoring, and penalty procedures.[131]

Proposition 1a: *Asset specificity increases the complexity of contracts*

Proposition 1b: *Environmental uncertainty decreases the complexity of contracts*

Proposition 1c: *Behavioral uncertainty increases the complexity of contracts*

Most empirical studies that test these propositions either approximate the contract's level of completeness/complexity by the type of pricing provision employed in the contract (Class 1 in *Table 5-1*) or by forming an index based on the number of occurrences of certain contract terms (Class 2).[132] Unidimensional measurement constructs of contractual complexity as employed in studies of Class 1 and 2 have been criticized in the recent literature. Researchers employing econometric tests (Class 3 in *Table 5-1*) and qualitative case studies (Class 4), argue convincingly that contract terms fall into distinct functional dimensions and are designed to address different problems in supply relationships. In these studies, multiple dependent variables are used, each measuring contractual complexity for provisions within a functional dimension. In this emerging stream of literature, several contractual functions besides the classical safeguarding function have been proposed[133]. In the present study, we adopt the terminology advanced by Eckhard and Mellewigt (2006), who distinguish between contracting terms with a *safeguarding*, *coordinating,* or *contingency adaptability* function. Their primary proposition is that the complexity of contract terms in each of these functional dimensions has unique antecedents: terms with a *safeguarding function* are aligned with asset specificity, terms with a *coordination function* are aligned with task interdependency, and terms with an *adaptability function* are aligned with environmental uncertainty.

Proposition 2: *Contractual design depends on the alignment between provisions with distinct functions and the corresponding transaction attributes.*

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[131] Early work in the agency literature makes this proposition (Holmstrom 1979). Gibbons (2005), elaborating on how incentive theory informs contractual design in interfirm relationships, states similar conclusions for performance measurement in the presence of observability problems.

[132] See Eckhard and Mellewigt (2006) for an excellent review of this stream of literature.

[133] Examples include Anderson and Dekker (2005), distinguishing between the dimensions assignment of rights, product and price terms, after sales service, and terms of legal recourse; Ariño and Reuer (2007), identifying provisions with either an enforcement or coordinating function; Argyres et al. (2007), assigning provisions to the dimensions task description or contingency planning.

Table 5-1: Empirical Studies on Contractual Design

Dependent Variable	Example of Empirical Studies by Class
Class 1: Type of pricing provision	Crocker and Reynolds (1993) identify eight distinct contract types based on the price provision as their dependent variable in sample of aircraft engine procurement contracts: (1) Fixed price incentive (successive targets); (2) Fixed price incentive (successive targets) with target ceiling; (3) Fixed price incentive (firm target); (4) Not to exceed price with economic price adjustment; (5) Not to exceed price; (6) Fixed price with economic price adjustment; (7) Fixed price with partial economic price adjustment; (8) Firm fixed price. Other studies distinguish between cost-plus and fixed-price contracts (Corts and Singh 2004), or introduce contracts with hybrid price provisions as a third alternative (Kalnins and Mayer 2004).
Class 2: Number of provisions contained in contract	Parkhe (1993) approximates the dependent variable contractual completeness by the number of observed contracting terms in a sample of alliance contracts: $Contractual\ Safeguards = \frac{1}{36}\sum_{i=1}^{8} D_i,\ D_i = i\ if\ provision\ i\ exists;\ otherwise\ D_i = 0$ Provisions D_i accounted for: (1) Periodic written reports of all relevant transactions; (2) Prompt written notice of any departure of agreement; (3) The right to examine and audit all relevant records (4) Designation of certain information as proprietary and subject to confidentiality provisions of the contract; (5) Non-use of proprietary information even after termination of agreement; (6) Termination of agreement; (7) Arbitration clauses; (8) Lawsuit provision. Example for other studies using either weighted or non-weighted measurement constructs by Parkhe (1993) are Deeds and Hill (1999) and Reuer et al. (2003). Saussier (2000) employs a similar measurement construct, but uses a different set of provisions.
Class 3: Number of provisions within distinct functional dimensions	Eckhard and Mellewigt (2006) propose three dependent variables for complexity of provisions within distinct functional classes: <u>Complexity of terms with a safeguarding function:</u> (1) (Intellectual) property rights; (2) confidentiality; (3) unilateral early termination; (4) dispute resolution. <u>Complexity of terms with a coordinating function:</u> (1) description of responsibilities and tasks; (2) reporting procedures; (3) project schedules/milestones; (4) designation of specific persons as project managers. <u>Complexity of terms with a contingency adaptability function:</u> (1) mutually accepted tolerance zones for dealing with unexpected events or procedures on how to handle changed circumstances or overcome conflicts; (2) price adjustment; (3) engineering change procedure. Studies using a multi-dimensional construct of contractual complexity/completeness are Luo (2002), Ryall and Sampson (2003), Anderson and Dekker (2005), Reuer and Ariño (2007), and Argyres et al. (2007).
Class 4: Qualitative Case Studies	Avadyniak et al. (2001), Dekker (2004), Argyres and Mayer (2004), Klein-Woolthuis et al. (2005).

5.2.2 Dynamic Propositions

The multi-dimensional construct of contractual complexity proposed here might also reveal how learning in repeated interactions between buyer and supplier influences the design of provisions within distinct functional classes.[134] Contracting parties, which 'learn to contract' over time, will achieve transaction cost savings as they become able to rely on standardized contract terms and gain a deeper understanding of the relevance of excluding/including certain provisions (Argyres and Mayer 2007, Mayer and Argyres 2004).

Safeguarding provisions, e.g., unilateral termination rights or variations in contract duration, are designed to restrict opportunistic behavior and outline procedures, e.g., penalty payments, in case of contract breach. *Contingency adaptability provisions* outline procedures and responsibilities in case of unanticipated states of nature. The subtle distinction between these two functions is that safeguarding provisions allocate rights and obligations at a more general level, while contingency provisions explicitly outline actions in case of a specified contingency (Eckhard and Mellewigt 2006). One would expect contracting parties to rely on previously and successfully used terms as long as contractual hazards and environmental disturbances do not change dramatically.

Proposition 3a: *Contract terms with safeguarding and contingency adaptability functions are repetitively used if contractual hazards and environmental disturbances are well-known from prior experiences.*

Terms describing tasks, responsibilities and timelines but also referring to attached business plans take on a *coordinating function* in contracts. Common attributes of coordinating terms are their informational character, their objective of aligning expectations ex-ante, and their limited enforceability in court. Furthermore, these contractual elements tend to be fairly technical, requiring detailed knowledge of the people, e.g., managers or engineers, designing these terms (Argyres and Mayer 2007). For a novel transaction, e.g., a new supplier contract in the context of a product innovation,

[134] In the context of repeated interactions between buyer and supplier, most of the existing literature stresses the role of informal safeguards such as trust ("shadow of the past") and reputation ("shadow of the future") as low-cost substitutes for formal contracts. Based on their review of the empirical literature on open-end alliance contracts and contracts with a pre-specified duration (Luo 2002, Parkhe 1993), Ariño and Reuer (2004) conclude that reputation effects decrease contractual complexity. A recent discussion on the role of trust in supply chain contracts can be found in Klein-Woolthuis et al. (2005)

coordinating provisions have presumably little overlap with existing experiences. For recurring transactions with fairly comparable coordination requirements, we would still expect the emergence of standardized terms.

Proposition 3b: *Contract terms with a coordinating function are repetitively used in the case that transactions are comparable in their coordination requirements.*

5.3 Empirical Study

The qualitative and quantitative analysis of contractual design presented here draws on a sample of 42 ramp handling contracts between a large European Network Carrier (hereinafter referred to as NC) and its ramp handling suppliers[135]. The transaction 'ramp handling services' primarily includes the (un)loading of the aircraft, the operation of handling equipment, and the transportation of passengers and baggage from the aircraft to the terminal. The variety of governance arrangements in the European handling market ranges from short-term to long-term contracts and backward integration of airlines (self-handling). The set of contracts in the following empirical analysis offers a unique research opportunity given that NC maintained contracts with all ramp handling suppliers in its network at the time of this study. Give the proposed transaction cost reasoning of the parties, we expect contract design to correspond with variations in contracting hazards and coordination requirements at the different stations in the carrier's network. In the remainder of this section, we provide a qualitative assessment on the contracting hazards and corresponding contract design (Section 3.1), prior to presenting the econometric results (Section 3.2).

[135] The data has been levied via expert interviews and a survey with NC's procurement managers and handling suppliers. In the data exploration stage, we employed a three-step approach to improve the accuracy of these retrospective reports (Huber and Power 1985). In the *first* stage, we developed and pre-tested the survey by conducting semi-structured interviews with airline purchasing managers and handling agents. Incorporating the insights; we modified the questionnaire and re-checked for accuracy with the interviewees. In a *second* step, we distributed the questionnaire to the airline purchasing managers in charge of the account. All purchasing managers of the NC can be assumed to be knowledgeable of the transaction and the contract as they are involved in the development and maintenance of the supply relationships on a regular basis. The level of personal influence on the contracting decision was confirmed with a control question (mean at 5.80 on a seven-point Likert scale). From 70 initially distributed surveys, each covering a ramp handling contract in the European Union, we excluded 28 contracts from the review: 5 contracts were influenced by prior disinvestments, 22 contracts were negotiated with monopolist handling suppliers, and 3 were invalid. In a *final step*, we interviewed a second group of handling agents and two senior purchasing managers of alternative European network carriers, applying a slightly adapted survey design. The intention was to contrast the handling agents' evaluation with the perspective of the purchasing manager. The perspectives corresponded, pointing to a small bias of the sole inclusion of the procurement side in the survey.

5.3.1 Qualitative Assessment

5.3.1.1 Contracting Hazards and Coordination Requirements

a) Asset specificity

A network carrier disposes over significant market shares at its hub and important spoke airports, as it exploits economies of density and scope via its hub-and-spoke network structure[136]. Large market shares at specific airports in its network result in an asymmetric local demand for ramp handling services and trigger investments in *dedicated* handling equipment and staff. Although handling equipment is standardized, a handling supplier cannot readily redeploy all of its equipment for a different airline customer. According to industry participants, secondary markets are only able to absorb a limited amount of equipment. Following TCE's predictions, a handling supplier would request special (contractual) safeguards prior to investing in dedicated equipment, hiring new staff and expanding its local maintenance facilities.

Along with dedicated asset specificity, quasi-rents are generated over time through the build-up of *human capital assets* through formal staff training and learning-by-doing. As handling agents accumulate know-how about the respective airline's processes and flight schedules at the resource disposition and work floor levels, they are able to increase their operational quality and productivity. These human capital assets will be lost in case of a supplier change. For operations at a small spoke airport, the drop in handling performance is only temporary since the human capital required to support the productivity level is small. At an airline's larger stations, however, a supplier change or the outsourcing of a self-handling operation would substantially threaten handling quality as it takes time for a new supplier to accumulate carrier-specific human capital assets. Quality problems at these central airports in the airline's network (in particular delays incurred in handling processes) have far-reaching consequences impacting the overall network performance.

[136] In a hub-and-spoke network, economies of density and scope are exploited by bundling traffic at a central hub airport (Brueckner and Spiller 1994, Caves, et al. 1984).

b) Uncertainty

Environmental uncertainty and the need for cooperative adaptation, e.g., contract re-negotiation, appear limited for ramp handling transactions. Both airline procurement managers and handling agents stress that renegotiation of entire contracts is the exception rather than the rule. When renegotiations did occur, NC's commercial managers indicated that changes to the contract had been minor and hardly affected the perceived value of the contract. In contrast to other, more dynamic environments, in the handling market, the necessity to adapt to external disturbances seems limited as demand uncertainty is comparatively low, production technology is well established, and strong safety and security regulations limit innovation.

A second source of uncertainty arises in the form of *behavioral uncertainty* since measuring the quality level provided comes at a cost. A key quality dimension is the performance of the ramp handling service in the pre-specified time frame set according to the airline's schedule. Furthermore, network carriers expect the handling agents to make an extra effort to compensate for delays of incoming aircraft. Costs of ex-post monitoring and enforcement activities of the contracted quality level are influenced by the complexity of ground handling processes at the respective airport. At hub airports and large spoke airports, for example, the assignment of delay to the handling supplier is difficult. Ground handling processes are strongly interdependent and many dimensions exists in which things can go wrong, e.g., air traffic control, fuelling services, weather conditions, and special transfer processes. Failure to motivate the right level of effort on the part of the ramp handling supplier at these stations has major consequences; in particular since delays propagate through the entire network.

5.3.1.2 Contractual Design

In the following, we explore how NC and its handling suppliers have responded in terms of contractual design to the variations in transaction attributes outlined. A first striking observation is the significance of standardized contracting elements in this industry. Standardization is achieved through a worldwide contracting standard: the Standard Ground Handling Agreement (SGHA). The SGHA provides the basis for most contracts in

the industry and is developed between handling agents and airlines under the sponsorship of the International Air Transport Association (IATA)[137].

> "The Aviation Ground Services Working Group […] is responsible for the Aviation Ground Services Agreement (SGHA), which forms a "model" contract for the provision of ground handling services […] The Members of the AGSA/WG are highly seasoned managers representing IATA carriers and ground handling companies. The agreement is changed every five years and the working group meets on a regular basis each year in preparation for this change. As part of its work programme, the working programme liaises with other industry activities e.g., IATA Legal Advisory Committee and Risk and Insurance Managers Panel. Changes to the SGHA must be approved by the full IATA Ground Handling Council and IATA Airport Services Committee" (www.iata.org)

Industry participants have created a sophisticated institutional arrangement that allows them to incorporate past learning experience and adopt standard terms at an industry level. As a result of an accepted contracting standard, handling agents and airlines are able to economize on transaction costs as (i) contracting takes place between commercial managers with limited interference of legal staff and (ii) standard terms establish mutually accepted parameters based on prior experience. In order to understand the motivation for NC and its suppliers to deviate from the industry standard terms, we briefly outline the purpose of the different contracting documents used in a standard contracting process:

(1) The *Main Agreement* states the standard contracting terms.

(2) *Appendix A* lists a coded menu of services and sub-services.

(3) In *Appendix B* parties agree on the sub-services subject to the contract (based on the coding in Appendix A), state the prices per handling event for each aircraft type, fix deviations from the standard contracting terms, and include custom contract clauses.

(4) The *Service Level Agreement (SLA)* is usually attached to Appendix B and describes the contracted quality level for services and sub-services. In addition, a description of measurement processes, a quantification of penalty payments, or an outline of local procedures between the local airline station manager and the handling manager might be included.

[137] The International Air Transport Association (IATA) was founded in 1945 and represents 260 member airlines. In contrast to its early role of coordinating tariffs, it seeks to act as a facilitator in the air transport industry today.

Contract design occurs exclusively in Appendix B and within its attachments, in particular within the service level agreement.[138] All contracts in the sample have been reviewed for provisions suggested in previous studies (Eckhard and Mellewigt 2006, Parkhe 1993, Ryall and Sampson 2003, Saussier 2000). The provisions encountered include (i) arbitration / lawsuit provision, (ii) contract duration provision, (iii) unilateral termination provision in case of supplier underperformance, (iv) confidentiality clause, (v) auditing rights for process standards, (vi) monitoring rights in the form of supervision of supplier's operations, (vii) bilateral renegotiation rights in case of change in the airline's schedule, (viii) price indexation, and (ix) price adaptation provisions for changes in traffic volume or aircraft mix. In a *second step* we have assigned either a safeguarding, coordinating or contingency adaptability function to each individual provision. *Third*, we have classified the provisions according to degree of standardization: industry-level, firm-level, or transaction-specific. If the standardization occurred at the industry level, we state either the year when either the provision was adopted by the SGHA or the year when the standard provision was changed significantly. All provisions contained in the standard contract prior to 1993 are designated with the year 1988.[139] *Table 5-2* summarizes our findings.

[138] The contracting parties state this in the preamble of the Annex B: "This annex B is prepared in accordance with the simplified procedure whereby the parties agree that the terms of the Main Agreement and Annex A of the SGHA of AHM810 January 2004 as published by the International Air Transport Association shall apply as if such terms were repeated here in full. By signing this Annex B, the parties confirm that they are familiar with the aforementioned Main Agreement and Annex A"

[139] According to the expert interviewed from the IATA Working Group, the year 1988 marked a landmark change in the standard's history. European national flag carriers, most of which were monopoly handling suppliers, initiated the standard in 1958 with the objective of facilitating the reciprocal exchange of handling services. The liberalization of air transport and a large shift toward outsourcing handling activities resulted in independent handlers gaining significant market shares in the 80s. Thus, starting with the year 1988, independent handling suppliers joined the currently existing institutional arrangement for standard-setting under IATA sponsorship.

Table 5-2: Standardization and Contractual Function of Observed Provisions

Observed Provisions	Main Function	Standardization (Industry-Level)	Standardization (Firm-level)	Specific to Contract
Arbitration/Lawsuit	Safeguarding	X (2003)		
Contract Duration	Safeguarding			X
Unilateral Termination	Safeguarding		X	
Confidentiality	Safeguarding	X (1988)		
Monitoring Rights	Safeguarding	X (1993)		
Auditing Rights	Safeguarding	X (1998)		
Bilateral Renegotiation	Contingency Adaptability	X (1998)		
Price Indexation	Contingency Adaptability			X
Price Adaptation provision	Contingency Adaptability			X
Service Level Agreement	Coordination/ Safeguarding		X	X

a) Safeguarding function

Among the provisions with a safeguarding function, *contract duration* is the main source of variation in NC's contracts. While the SGHA standard term on contract duration permits the parties to terminate the agreement with prior written notice of 60 days, this right is waived in the majority of cases and replaced with a fixed duration (mean at approximately 2 years, minimum at 60 days, maximum at 7 years). A second deviation from the SGHA terms is the inclusion of a standardized term, granting NC the *unilateral right for early termination.*

> "if in the opinion of the carrier the handling company fails to provide a consistently satisfactory level of service, the Carrier reserves the right to provide the Handling company with written notice to the effect that correction is required within 30 (thirty) days. If the handling company fails to correct the situation within 30 (thirty) days, the carrier may terminate the Agreement upon an additional 30 (thirty) days prior written notice."

All remaining safeguarding provisions (*confidentiality*, *monitoring rights*, and *auditing rights)* are standard industry terms and have been left unaltered in NC's contracts. These terms were developed in the standard setting arrangement and included in the revision of the standard contract in 1993 and 1998. The development of the *arbitration and lawsuit provision* has followed a contrary development. Prior to the 2003 SGHA revision, the standard arbitration provision obliged the parties to seek arbitration and outlined in detail the procedure for doing so. Since airlines and handlers waived the arbitration term in the great majority of contracts, the provision was changed in 2003 (now arbitration is named as an optional alternative to addressing a public court).

b) Contingency adaptability function

Within the standard contract, a *bilateral renegotiation right* is granted in the case that the carrier's traffic volume or schedule changes. The term has formed part of the standard contract since 1998 and has not been waived in a single one of NC's contracts. A few contracts contained customized *price adaptation provisions* (similar to a take-or-pay provision) stating a threshold value in terms of flight movements or revenue volume. Some contracts (14 out of 42) included *price index provisions,* tying prices to RPI development. This term is included in the majority of revolving short-term contracts, presumably with the intention of economizing on renegotiation costs.

c) Coordinating function

While provisions with a *coordinating function* have not been encountered in the contract's main body, the attached service level agreements (SLAs) display contractual elements to facilitate coordination. The SLAs encountered in the sample of contracts displayed a variation in scope and term specificity in the following dimensions:

- Objectives and a mutual understanding for designing the SLA.
- Process description, quality levels, and qualification of staff and equipment.
- Measurement process, frequency of spot checks, and data sources.
- Penalty payment scheme for underperformance.

- Roles, responsibility and timelines for the measurement process, the agreement on penalty payments, and the resolution of quality problems.

The primary function of the SLA is to achieve an ex-ante alignment of expectations between the parties and an ex-post coordination of quality control procedures, e.g., to define the course of joint action in case of quality problems. The fact that a significant number of SLAs go through an initial pilot phase and are finally negotiated after the handling contract has been signed supports this proposition. Besides this *coordinating* function, one might also argue that SLAs take on a *safeguarding* function. Describing performance parameters in combination with penalty payments creates safeguards (incentives) that restrict shirking by the handling agent and/or unjustified claims for quality improvements by the carrier.

Based on the complexity of SLAs, the function of their provisions, and their degree of standardization, we allocated them into the following three classes.

(1) *Short and highly standardized SLAs* were encountered at smaller spoke airports in the NC's network. Negotiation on the SLA takes place between the handling supplier, procurement manager, and the local airline station manager. The quality parameters listed in these short agreements are standardized and expressed in highly technical language. Only very few elements in the agreement are adjusted to reflect local production processes. Roles, responsibilities, and data sources in the measurement process are not outlined in detail. The SLA requires local station managers and handling suppliers to meet on a quarterly basis to determine penalty payments for underperformance. Some SLAs state a tolerance zone in which the handling company is permitted to resolve quality problems.

> "The monetary settlement will be done quarterly. It is possible to suspend the quality penalty payment and to agree on measures between NC's station manager and the Handling Company to improve the compliance rate of the service delivery standard within one month up to the target degree"

According to the procurement managers interviewed, NC's station managers and the local supplier coordinate their activities on an ad-hoc and autonomous basis. The SLA only comes into play if quality problems are persistent. NC's manager stated that the standard SLA template used at spoke airports is discussed and

revised at regular intervals. The objective of this standard-setting procedure is to define the key performance criteria while limiting the local resources required for monitoring.

(2) *Long and moderately standardized SLAs* were attached to contracts negotiated at airports with a significant traffic volume of NC (mostly large spoke airports). In comparison to the first class of agreements, SLAs in the second category span up to 20 pages. The mutual understanding and purpose for crafting a detailed agreement are usually outlined in the agreements.

> "Major goal of this program is to mutually secure a quality standard laid down in this annex and ensure a continuous improvement throughout the entire ground handling process […] in case of discrepancies between the agreed degree of compliance and the fulfilled degree of compliance during the pilot phase both parties agree to mutually investigate the handling process […] both parties agree to mutually evaluate the framework of the programme at the end of a contractual year in order to avoid disproportions."

NC and its handling suppliers align their mutual expectations by describing the measurement process, specifically naming their (i) data sources, (ii) responsibilities for measurement, (iii) criteria for validity of measurement, and (iv) intervals for joint meetings and participants in discussions of weaknesses and joint measures for improvement. Based on the information collected from designated data sources, a standard formula is specified to compute the penalty payments. Compared to the simple parameters based on subjective performance measurement outlined in short SLAs, contracting parties rely heavily on spot checks and data obtained from their IT systems. Although the actual parameters and procedural aspects are fixed in the negotiation process, NC and its supplier rely on a template outlining standard dimensions. NC's procurement managers stated that since the development of the current SLA standard, it has not been subject to review on a regular basis.

(3) *Customized SLAs* are attached to contracts negotiated at hub airports. These documents range from 20 to 35 pages and describe in detail the entire handling process chain at the respective airport. Performance parameters are specified in the form of time tags for each sub-process. In addition to the parameters stated in the previous class of SLAs, input factors, e.g., staff per sub-process or aircraft,

are named and measured via spot checks. Strong references are made to IT systems for coordinative requirements between the parties as well as for measurement purposes. At both hub airports, penalty schemes are complex, describing in detail the validity conditions and procedural aspects.

It is interesting to note that the variation in the SLAs' contractual designs is strongly correlated with the organizational arrangements supporting quality enforcement and coordination. At *smaller spoke airports* in the NC's network, NC station managers take on a central role in enforcing the contracted quality level and resolving coordination problems. Procurement managers stated that a high-quality relationship between station managers and local handling managers suffices in most instances to address quality problems on an ad-hoc basis. At *larger spoke airports* in the NC's network, local functional teams – supported by dedicated staff at the NC headquarters – are involved in monitoring the respective handling agent's quality level. In these arrangements, handling quality is enforced and joint action is coordinated in regular reviews, in most cases on the basis of jointly collected performance data. At NC's *hub airports*, coordination and contract enforcement occurs in more formal organizational arrangements. At these airport locations, dedicated departments of the NC organization have been established to monitor quality, to coordinate actions with the handling supplier, and to serve as knowledge repositories. In contrast to the remaining contracting locations in its network, the NC and its handling suppliers have created a joint organizational unit at the hub airports – a hub control center (HCC). At the HCC, NC employees and handling suppliers share a joint location and joint access to the different parties' operational IT systems. This arrangement has three main objectives: (i) anticipation of potential quality problems, (ii) ad-hoc coordination of action to resolve quality problems, and (iii) assignment of delays to the responsible party.

5.3.2 Quantitative Assessment

5.3.2.1 Methodology and Model Specifications

Building on our qualitative assessment, we test the proposed relationships between transaction attributes and three distinct dependent variables: (i) contract duration (safeguarding function); (ii) occurrence of price adaptation provisions (contingency adaptability function); and (iii) complexity of the SLA (coordinating and safeguarding function).

a) Contract duration (DURATION)

In line with prior theoretical and empirical work, contract duration is assumed to be a function of asset specificity and uncertainty (Joskow 1985, 1987, Saussier 1999). The dependent variable DURATION is measured by the number of days for which NC and its ramp handling supplier have fixed the contract at airport i. The proposed relationship is tested with a TOBIT model as the minimum contract duration is set at 60 days in the standard contract (12 out of 42 observations take on this left censoring value). We expect that *asset specificity* and *behavioral uncertainty* will increase contract duration, while a rise of *environmental uncertainty* will decrease DURATION.

b) Price adaptation provision (CONTPROV)

The majority of contracts in the sample rely on a standard industry clause granting bilateral renegotiation rights in case of significant traffic fluctuations. A few contracts contained customized price adaptation provisions linking prices or a fixed payment to the NC's traffic development. The binary variable CONTPROV is coded 1 for contracts containing a customized provision.

c) Complexity SLA (COMPLEXITY_SLA)

In our qualitative assessment, we have identified three subgroups of SLAs. For our empirical study, we form a binary variable (COMPLEXITY_SLA), which takes on the value of 0 for short and highly standardized SLAs and the value of 1 for more complex

SLAs.[140] The impact of the explanatory variables on the binary variables COMPLEXITY_SLA and CONTPROV are tested with a probit model.

5.3.2.2 Explanatory Variables

Asset specificity is operationalized with a corresponding proxy variable for dedicated and human capital asset specificity (MSHARE and TSHARE). DELAY is the proxy variable for behavioral uncertainty (cost of performance measurement), while the variable VOLATILTIY approximates the degree of environmental uncertainty. The measurement and the intuition for the explanatory variables are as follows[141].

- Specific investment in handling equipment and personnel (MSHARE): Handling equipment is standardized and can be redeployed by an alternative airline using the same or a similar aircraft type. If a single airline has a large market share, the equipment used to handle its fleet becomes a dedicated asset. The higher the airline's market share (MSHARE) at airport i, the larger the mutual dependence between handling agent and airline. The volume of the carrier (VOLUME) is measured in take-offs per year, while the size of the local handling market (APSIZE) is corrected for the volume of self-handling airlines (VOLUME_SELF).[142]

$$MSHARE_i = \frac{VOLUME_i}{APSIZE_i - VOLUME\_SELF_i} \times 100$$

- Carrier-specific human capital assets (TSHARE): The interaction of handling supplier and airline in the contract execution period results in an accumulation of human capital assets. Our proxy for this build-up at the resource disposition and work-floor level is the percentage of transfer passengers of the carrier's total number of departing passengers at contracting location i. The intuition behind this is that transfer processes are highly complex, and optimizing them results in an accumulation of human capital assets through learning by doing.

[140] We have also tested an alternative variable, which distinguishes between all three identified types of SLAs. The results are almost identical, as the third class (customized SLAs) only contains two observations.
[141] The discussion on the explanatory variables draws on Fuhr (2007)
[142] The adjustment creates a more precise measure of the carrier's significance for the "contestable" market from the handling company's perspective.

- Cost of Performance Measurement (DELAY): As is typical for services in general, production and consumption occur simultaneously in ramp handling. For an airline, the punctual departure of aircraft is one of the most important quality parameters. The performance of handling suppliers is judged not only by industry-wide safety standards and compliance with governmental security regulations, but also by the carriers' ability to handle the aircraft on time. However, it is not easy to measure or assign responsibility for delays due to the wide variety of factors influencing punctuality at a given airport. A higher level of delays incurred by the carrier at contracting location i increases the complexity of ground processes and thus the cost of performance measurement. The proxy DELAY is obtained by dividing the total minutes of delay incurred by the carrier at airport i (DELAY_TOTAL) by the number of take-offs (VOLUME).

$$DELAY_i = \frac{DELAY\_TOTAL_i}{VOLUME_i}$$

- Environmental Uncertainty (VOLATILITY): Demand uncertainty in the form of fluctuation in the airline's traffic volume will affect the handler's productivity level. For the computation of VOLATILITY, we draw on monthly data on the number of take-offs of the carrier at location i in the period 2004-2005. The variation coefficient for this period is obtained by dividing the standard deviation (VOLUME_STDEV) by the mean (VOLUME_AVG). This dimensionless measure allows us to compare the degree of the carrier's average traffic dispersion between different local airport markets.

$$VOLATILITY_i = \frac{VOLUME\_STDEV_i}{VOLUME\_AVG_i} \times 100$$

In addition to these determinants, we introduce three dummy variables to control for prior interactions and institutional constraints in the handling market.

- Early liberalized countries (EARLYLIB): At airports in countries that liberalized their ramp handling markets prior to the EU Directive, market access is not restricted. The variable LIBERAL takes the value of one for these contracts.

- Licensing constraint (LICENSE): In some institutional environments, handling suppliers are obliged to apply for an operating license in revolving seven-year intervals. If the contract was negotiated within three years of the renewal date of the license, we coded the dummy variable LICENSE with a value of one.[143]
- Prior relationship (EXISTING): We coded this variable with a value of one if the current contract at location i had replaced a previous contract with the same supplier.

Table 5-3 summarizes the sample statistics (n=42) and the correlation coefficients of the dependent and independent variables.

[143] Each coding has been validated with the responsible purchasing manager for the respective account, who was asked whether the upcoming license renewal was considered in the negotiation process.

Table 5-3: Correlation Coefficients and Descriptive Statistics

	Correlations Coefficients and Descriptives									
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) *DURATION*[a]	1.00									
(2) *CONTPROV*	0.53	1.00								
(3) *COMPLEXITY_SLA*	0.51	0.52	1.00							
(4) *MSHARE*	0.62	0.42	0.61	1.00						
(5) *TSHARE*	0.51	0.47	0.44	0.53	1.00					
(6) *DELAY*	0.35	0.19	0.00	0.09	0.40	1.00				
(7) *VOLATILITY*	-0.14	-0.14	-0.20	-0.15	-0.13	0.18	1.00			
(8) *EARLYLIB*	-0.50	-0.27	-0.24	-0.26	-0.16	-0.04	-0.10	1.00		
(9) *LICENSE*	-0.15	-0.04	0.21	0.05	0.09	-0.31	0.11	-0.34	1.00	
(10) *EXISTING*	-0.14	-0.39	0.03	0.16	-0.13	0.11	0.05	0.11	0.12	1.00
Mean	789.21	0.24	0.36	11.94	7.15	8.24	10.85	0.19	0.33	0.79
Minimum	60.00	0.00	0.00	0.34	0.00	2.50	2.67	0.00	0.00	0.00
Maximum	2,520.00	1.00	1.00	75.19	67.97	13.47	82.73	1.00	1.00	1.00
Std. Dev.	594.69	0.43	0.48	15.11	15.98	2.28	12.69	0.40	0.48	0.42
n=42										

[a] in days

Table 5-4: Estimation of Coefficients

	Coefficients, standard error in parentheses					
Dependent Variables	(1) DURATION (TOBIT)	(2) DURATION (TOBIT)	(3) CONTPROV (simple Probit)	(4) CONTPROV (simple Probit)	(5) COMPLEXITY_SLA (simple Probit)	(6) COMPLEXITY_SLA (simple Probit)
Independent Variables						
C	380.27	359.02	-0.55	-0.44	-2.8*	-2.8*
	(388.54)	(374.16)	(1.04)	(1.28)	(1.53)	(1.57)
MSHARE	16.81***	20.21***	0.02	0.06***	0.16***	0.16***
	(3.90)	(3.69)	(0.02)	(0.02)	(0.05)	(0.05)
TSHARE	4.88	0.96	0.03*	-0.01	0.19***	0.17**
	(4.02)	(3.04)	(0.02)	(0.01)	(0.07)	(0.07)
DELAY	62.78	85.46**	0.05	0.24*	0.08	0.12
	(44.91)	(36.84)	(0.12)	(0.13)	(0.13)	(0.13)
VOLATILITY	-10.08*	-10.46**	-0.08	-0.17*	-0.09	-0.10
	(5.45)	(5.20)	(0.06)	(0.09)	(0.08)	(0.09)
EARLYLIB	-1085.6***	-1018.09***	-11.69***	-8.07***	0.05	0.23
	(312.16)	(330.46)	(0.49)	(0.65)	(0.71)	(0.65)
LICENSE	-422.52***	-323.5**	-0.55	0.33	0.60	0.81
	(150.07)	(153.51)	(0.61)	(0.65)	(0.81)	(0.73)
EXISTING		-281.37		-2.24***		-0.38
		(223.62)		(0.63)		(0.74)
Log Likelihood	-231.75	-230.67	-15.44	-11.43	-10.65	-10.57
Adjusted R^2	0.63	0.62				
Pseudo R^2 (McFadden)			0.33	0.50	0.61	0.61
n=42						

Significance at 10%, 5%, 1% level (*, **, ***). QML (Huber/White) standard errors.

5.3.2.3 Estimation Results

Table 5-4 displays the results of our estimations. In line with previous work on *contract duration* in the ramp handling market (Fuhr 2007), the control variables for institutional constraints (LICENSE) and the stage of liberalization (EARYLIB) are significant and raise the model's explanatory power in specification (1) (from 0.38 to 0.63 in the adjusted R^2). Our estimation results corroborate the findings of past studies on contract duration (Joskow 1985, 1987, Saussier 1999): asset specificity (MSHARE, which approximates the extent to which handling equipment and staff is dedicated) increases contract duration, while volume uncertainty (VOLATILTIY) decreases contract duration. Computing the average partial effects at mean values in the TOBIT model reveals that a unit change in the airline's market share increases DURATION by 13 days, while a unit change in VOLATILITY (a percentage point increase in traffic dispersion from the mean in the local market) decreases DURATION by 8 days. The dummy variables EARLYLIB and LICENSE decrease DURATION by 749 days and 335 days. Adding the control variable for prior interaction between airline and supplier at airport i (EXISTING) in specification (2) decreases the model's explanatory power. There is thus no support for the idea that prior interaction results in the use of weaker safeguards, that is, in shorter-term contracts.

In specifications (3) and (4) we estimate the relationship between the explanatory variables and the probability of observing a *price adaptation provision* (CONTPROV). In contrast to our model of contract duration, the inclusion of EXISTING in (4) raises the model's explanatory power (McFadden R^2 increase from 0.33 to 0.50). In specification (4) the coefficients for MSHARE, EARLYLIB, and EXISTING are significant at the 1 percent level, while the proxy variables for behavioral uncertainty (DELAY) and environmental uncertainty (VOLATILITY) are significant at the 10 percent level. Again, computing the average partial effects, one sees that a unit change in both MSHARE and DELAY increases the probability of observing *customized price adaptation provision* by 0.01 and 0.04. On the other hand, the probability of including such a provision decreases (i) if the contract has been negotiated in a market liberalized at an early stage (-0.44), (ii) if volume uncertainty increases (-0.03 per unit change in VOLATILITY), and (iii) if the current contract replaces a previous contract with the same supplier (-0.44). In the light of these results, we can conclude that new handling suppliers who face investments in dedicated handling

equipment and staff are likely to incur the costs of negotiating such provisions. Contrary to proposition 2, however, we cannot conclude that any one single transaction attribute (for example environmental uncertainty) is a unique antecedent to CONTPROV (*contingency adaptability provisions)* in our empirical context.

Specifications (5) and (6) display almost identical results. The proxies for asset specificity – the carrier's market share (MSHARE) and the percentage of transfer passenger (TSHARE) – are significantly related to the *SLA's level of complexity* (COMPLEXITY_SLA). A unit change in both the airline's market share and its transfer quota increases the probability of including a complex SLA by 0.03. The proxy for repeated interactions (EXISTING) is not significant and does not increase the model's explanatory power. One explanation is that EXISTING approximates the impact of prior interactions only at the transaction level but not at the firm level. As discussed in our qualitative assessment, however, standardization of coordinative terms in the SLA occurs at the firm level across ramp handling transactions at different airports.

5.4 Discussion

Design of provisions within functional dimensions and the impact of learning on contractual design are evolving fields of research. Our aim has been to contribute to these streams of literature by discussing recent propositions and by presenting evidence from 42 service contracts in the air transport industry. Both the exploration of provisions/attachments in their entirety and the usage of standardized contracting terms revealed the subtle transaction cost trade-off in the contract design decision.

Our main results corroborate the findings of earlier TCE studies on the relationship between contractual completeness/complexity and the level of relationship-specific investments. *Contract duration* has been shown to vary with investment in dedicated assets, the level of volume uncertainty, and constraints within the parties' institutional environments. Further, the likelihood that the parties will negotiate a *customized price adaptation provision* is highest when a new supplier faces relationship-specific investments. Third, while our qualitative assessment shows that SLAs contain primary coordinative elements, the *SLA's level of complexity* varies with the amount of relationship-specific investments. Since asset specificity displays a dominant impact on the

observed variation in all analyzed provisions/attachments, the proposition that individual transaction attributes drive the contractual design of provisions in distinct functional dimensions (safeguarding, coordination, and contingency adaptability function) is not supported. Furthermore, a clear separation based on functionality proved to be difficult in one instance – more complex terms in the SLA to facilitate coordination but also serve as a stronger safeguard against opportunistic actions. It is important to note that a purely static analysis of the observed variation in the contractual design would have provided a distorted picture of the transaction cost considerations in the parties' contract design decision. Well-known contractual hazards and a stable transaction environment in the industry examined here result in the heavy use of "off-the-shelf" contract terms at most airport locations. A unique institutional arrangement for standard setting in the handling industry allows both airlines and suppliers to economize on transaction costs. The standardized contractual elements at the industry level suggest that in particular, provisions with a *safeguarding* and a *contingency adaptability* function are adequate for standardization in stable transaction environments. *Coordinating elements* in the attached service level agreements displayed less standardization. Still, NC's procurement managers attempted to rely on standardized templates and terms for transactions with comparable coordination requirements.

Caution should be exercised in the interpretation of these results since the empirical study draws on a small number of contracts. Further research in related empirical settings – (service) contracts in supply chains with a stable transaction environment – would be especially informative, and could potentially challenge the findings presented here. The impacts of informal safeguards (trust and reputation), which were excluded from this study, need to be incorporated to make further qualifications on the net effect of prior interactions on contractual design. In our empirical study, we found preliminary support for a trilateral alignment between transaction attributes, the parties' contract design decision, and complementary organizational arrangements. The observed interdependencies between contract and supporting organizational arrangements (in which contracts are enforced and transactions coordinated) merit further exploration.

6 References

Abramowitz, A. D. and S. M. Brown (1993) "Market Share and Price Determination in the Contemporary Airline Industry," *Review of Industrial Organizations*, 8: 419-433.

Aghion, P. and P. Bolton (1987) "Contracts as a Barrier to Entry," *American Economic Review*, 77: 385-395.

Albers, S., B. Koch and C. Ruff (2005) "Strategic Alliances between Airlines and Airports-A Theoretical Assessment and Practical Evidence," *Journal of Air Transport Management*, 11: 49-58.

Anderson, S. W. and H. C. Dekker (2005) "Management Control for Market Transactions: The Relation Between Transaction Characteristics, Incomplete Contract Design, and Subsequent Performance," *Management Science*, 51(12): 1734-1747.

Argyres, N. S., J. Bercovitz and K. J. Mayer (2007) "Complementarity and Evolution of Contractual Provisions: An Empirical Study of IT Services Contracts," *Organization Science*, 18(1): 3-22.

Argyres, N. S. and K. J. Mayer (2007) "Contract Design as a Firm Capability: An Integration of Learning and Transaction Cost Perspectives," *Academy of Management Review*, 32(4): 1292 - 1295

Ariño, A. and J. J. Reuer (2004) "Alliance Contractual Design," IESE Business School Working Paper No 572, http://www.iese.edu/research/pdfs/DI-0572-E.pdf.

Armstrong, M. and D. E. M. Sappington (2006) "Regulation, Competition and Liberalization," *Journal of Economic Literature*, 44(2): 325-366.

Avadikyan, A., P. LLerena, M. Matt, A. Rozan and S. Wolff (2001) "Organisational rules, codification and knowledge creation in inter-organisation cooperative agreements," *Research Policy*, 30: 1443-1458.

Bajari, P. and S. Tadelis (2001) "Incentives versus transaction costs: A theory of procurement contracts," *The Rand Journal of Economics*, 32(3): 387-407.

Barnard, C. (1938), *The Functions of the Executive*, Harvard University Press: Cambridge, MA.

Barney, J. B. (1991) "Firm Resources and Sustained Competitive Advantage," *Journal of Management*, 17: 99-120.

Barrett, S. D. (2004) "How Do the Demands for Airport Services Differ between Full Service and Low Cost Carriers? ," *Journal of Air Transport Management*, 10: 33-39.

Bauer, I. (1999) "Die Zuständigkeit der Luftfahrtbehörde nach §7 Abs.1 S.4 der Verordnung über Bodenabfertigungsdienste auf Flugplätzen: Eine verpasste Chance zur Deregulierung im Luftverkehr?," *Zeitschrift für Luft- und Weltraumrecht*, 48: 179-186.

Berry, S., M. Carnall and P. T. Spiller (2006) "*Airline Hubs: Costs, Markups and the Implications of Customer Heterogeneity*," pp. 183-213 in: D. Lee (Ed.), *Advances in Airline Economics (Volume 1): Competition Policy and Antitrust*, Elsevier: Amsterdam.

Boerner, C. S. and T. M. Macher (2002) "Transaction Cost Economics: An Assessment of Empirical Research in the Social Sciences," unpublished, http://faculty.msb.edu/jtm4/Papers/JLEO.pdf.

Brenck, A., C. Hirschhausen, M. Holzhey, L. Hübner, B. Peter, T. Schulin, S. Schultz and J. Siegmann (2004) "SYNETRA - Synergien zwischen Bahnnetz und - transport: Praxis, Probleme, Potentiale," Gutachten im Auftrag des Bundesministeriums für Bildung und Forschung.

Brousseau, E. and J.-M. Glachant (2002) "*The economics of contracts and the renewal of economics*," pp. 3-30 in: E. Brousseau and J.-M. Glachant (Eds.), *Economics of Contracts*, Cambridge University Press: Cambridge.

Brueckner, J. K. and P. T. Spiller (1994) "Economies of traffic density in the deregulated airline industry," *Journal of Law and Economics*, 37(2): 379-415.

Burghouwt, G. and J. De Wit (2005) "Temporal configurations of European Airline networks," *Journal of Air Transport Management*, 11: 185-198.

Carter, R. and G. M. Hodgson (2006) "The impact of empirical tests to transaction cost economics on the debate on the nature of the firm," *Strategic Management Journal*, 27(5): 461-476.

Caves, D. W., L. R. Christensen and M. Tretheway (1984) "Economies of Density versus Economies of Scale: Why Trunk and Local Service Airline Cost Differ," *Rand Journal of Economics*, 15: 471-489.

Coase, R. H. (1937) "Nature of the Firm," *Economica*, 4: 386-405.

Commission (2003) "Issues to be addressed in the review of Council Directive 96/67/EC on access to the ground handling market at Community airports," Consultation paper of the Directorate for Energy and Transport.

Corts, K. S. and J. Singh (2004) "The Effect of Repeated Interaction on Contract Choice: Evidence from Offshore Drilling," *Journal of Law Economics & Organization*, 20(1): 230-260.

Council Directive (1996) "Council Directive 96/67/EC on access to the ground handling market at community airports," OJ L272/36 of 25 October 1996.

Crocker, K. J. and S. E. Masten (1988) "Mitigating Contractual Hazards: Unilateral Options and Contract Length," *The Rand Journal of Economics*, 19(3): 327-343.

-- , -- (1996) "Regulation and Administered Contracts Revisited: Lessons from Transaction-Cost Economics for Public Utilities Regulation," *Journal of Regulatory Economics*, 9: 5-39.

Crocker, K. J. and K. J. Reynolds (1993) "The efficiency of incomplete contracts: An empirical analysis of Air Force engine procurement," *The Rand Journal of Economics*, 24(1): 126-146.

CRS (2003) "CRS Issue Brief IB10026: Airport Improvement Program."

Czerny, A. I. (2006) "Price-cap Regulation of Airports: Single-till Versus Dual-till," *Journal of Regulatory Economics*, 30(1): 85-97.

David, R. J. and S.-K. Han (2004) "A Systematic Assessment of the Empirical Support for Transaction Cost Economics," *Strategic Management Journal*, 25(1): 39-58.

Davis, L. E. and D. C. North (1971), *Institutional Change and American Economic Growth*, Cambridge University Press: Cambridge.

Deeds, D. L. and C. W. L. Hill (1999) "An examination of opportunistic action within research alliances: Evidence from the biotechnology industry," *Journal of Business Venturing*, 14(2): 141-163.

Dekker, H. C. (2004) "Control of inter-organizational relationships: evidence on appropriation concerns and coordination requirements," *Accounting, Organizations and Society*, 29(1): 27-49.

Dempsey, P. S. (2002) "Predation, Competition & Antitrust Law: Turbulences in the Airline Industry," *Journal of Air Law & Commerce*, 67: 685-840.

Demsetz, H. (1968) "Why Regulate Public Utilities?," *Journal of Law and Economics*, 11: 55-66.

Dresner, M., R. Windle and Y. Yao (2002) "Airport Barriers to Entry in the US," *Journal of Transport Economics and Policy*, 36(2): 389-405.

Eckhard, B. and T. Mellewigt (2006) "Contractual Functions and Contractual Dynamics in Inter-Firm Relationships: What We Know and How to Proceed," Working Paper 2006-04, Universität Paderborn, Fakultät für Wirtschaftswissenschaften, Neue Folge Nr. 88.

Einem, A. v. (2000), *Die Liberalisierung des Marktes für Bodenabfertigungsdienste auf den Flughäfen in Europa*, Lang: Frankfurt.

Eisenhardt, K. M. (1989) "Agency Theory: An Assessment And Review," *Academy of Management. The Academy of Management Review*, 14(1): 57.

FAA/OST Task Force Study (1999) "Airport Business Practices and their Impact on Airline Competition."

Fuhr, J. (2006a) "Contractual Design and Functions – Evidence from Service Contracts in the European Air Transport Industry," unpublished working paper, presented at the Annual Conference of the International Society of New Institutional Economics (ISNIE), Boulder, Colorado.

-- , -- (2006b) "(De-)regulation of the European Ramp Handling Market – Lessons to be learned from an institutional perspective?," CNI Working Paper 2006-08.

-- , -- (2006c) "Governance of Services – Empirical Evidence on Contracting Practices in the Ground Handling Market," unpublished working paper, presented at European School of New Institutional Economics, Cargèse.

-- , -- (2007) "Liberalization of the European Ramp Handling Market - A Transaction Cost Assessment," Re-submitted Version to the Journal of Transport Economics and Policy.

Fuhr, J. and T. Beckers (2006a) "Vertical Governance between Airlines and Airports – A Transaction Cost Analysis," *Review of Network Economics*, 5(4): 386-412.

-- , -- (2006b) "Vertical Governance between Airlines and Airports – A Transaction Cost Analysis," CNI Working Paper 2006-04.

GAO (1990) "Airline Competition - Passenger Facility Charges Represent a New Funding Source for Airports," Testimony Before the Subcommittee on Aviation, Committee on Commerce, Science and Transportation, U.S. Senate.

-- , -- (2003) "Airport Finance: Past Funding Levels May Not Be Sufficient to Cover Airports' Planned Capital Development," Testimony Before the Subcommittee on Aviation, Senate Committee on Commerce, Science and Transportation.

-- , -- (2005) "Federal Aviation Authority - An Analysis of the Financial Viability of the Airport and Airway Trust Fund," Testimony Before the Subcommittee on Aviation, Committee on Commerce, Science and Transportation, U.S. Senate.

Geyskens, I., J.-B. E. M. Steenkamp and N. Kumar (2006) "Make, Buy, or Ally: A Transaction Cost Theory Meta Analysis," *Academy of Management Journal*, 49(3): 519-543.

Ghosh, M. and G. John (1999) "Governance value analysis and marketing strategy," *Journal of Marketing*, 63: 131-145.

Ghoshal, M. and P. Moran (1996) "Bad for practice: a critique of the transaction cost theory," *Academy of Management Review*, 12: 13-47.

Gibbons, R. (2005) "Incentives Between Firms (and Within)," *Management Science*, 51(1): 2-17.

Goldberg, V. P. (1976) "Regulation and Administered Contracts," *The Bell Journal of Economics*, 7(2): 426-452.

Grossmann, S. J. and O. D. Hart (1986) "The Cost and Benefits of Ownership: A Theory of Vertical and Lateral Integration," *Journal of Political Economy*, 94: 691-719.

Hardaway, R. M. and P. S. Dempsey (1992) "Airlines, Airports and Antitrust: A Proposed Strategy for Enhanced Competition," *Journal of Air Law & Commerce*, 85: 455-507.

Hart, O. and J. Moore (1990) "Property Rights and the Nature of the Firm," *Journal of Political Economy*, 98(6): 1119-1158.

Hartmann, M. E. (2006) "*Access to Airport Facilities: Its Impact on Market Competition*," pp. 369-384 in: D. Lee (Ed.), *Advances in Airline Economics (Volume 1): Competition Policy and Antitrust*, Elsevier: Amsterdam.

Hayek, F. (1945) "The Use of Knowledge in Society," *American Economic Review*, 35: 519-530.

Hirschhausen, C., T. Beckers, A. I. Czerny and S. Müller (2004) "Privatisation and Regulation of German Airports," Studie von DB Research und des FG Wirtschafts- und Infrastrukturpolitik (WIP) der TU Berlin.

Holmstrom, B. (1979) "Moral Hazard and Observability," *Bell Journal of Economics*, 10(1): 74-91.

Holmstrom, B. and J. Roberts (1998) "The boundaries of the firm revisited," *The Journal of Economic Perspectives*, 12(4): 73-94.

Hu, C. M., A. Whiteman and M. Francoeur (1998) "Project finance alternatives to airport infrastructure development," *Journal of Project Finance*, 4(2): 29-38.

Huber, G. P. and D. J. Power (1985) "Retrospective reports of strategic-level managers: guidelines for increasing their accuracy," *Strategic Management Journal*, 5: 171-180.

Jacobides, M. G. and S. G. Winter (2005) "The co-evolution of capabilities and transaction costs: explaining the institutional structure of production," *Strategic Management Journal*, 26(5): 395-413.

James, H. S. (2000) "Separating contract from governance," *Managerial and Decision Economics*, 21(2): 47-61.

Joskow, P. L. (1985) "Vertical Integration and Long Term Contracts: The Case of Coal Burning Electric Generating Plants," *Journal of Law, Economics and Organization*, 1(1): 33-80.

-- , -- (1987) "Contract Duration and Relationship-Specific Investments: Empirical Evidence from Coal Markets," *American Economic Review*, 77(1): 168-185.

-- , -- (2005) "*Vertical Integration*," pp. 319-348 in: C. Ménard and M. M. Shirley (Eds.), *Handbook of New Institutional Economics*, Springer: Dodrecht.

Kalnins, A. and K. J. Mayer (2004) "Relationships and Hybrid Contracts: An Analysis of Contract Choice in Information Technology," *Journal of Law Economics & Organization*, 20(1): 207-229.

Klein-Woolthuis, R., B. Hillebrande and B. Nooteboom (2005) "Trust, Contract and Relationship Development," *Organization Studies*, 26(6): 813-840.

Klein, B., R. A. Crawford and A. A. Alchian (1978) "Vertical Integration, Appropriable Rents, and the Competitive Contracting Process," *Journal of Law and Economics*, 21: 297-326.

Klein, P. G. (2005) "*The Make-or-Buy Decision: Lessons from Empirical Studies*," pp. 435-464 in: C. Ménard and M. M. Shirley (Eds.), *Handbook of New Institutional Economics*, Springer: Dodrecht.

Klenk, M. (2004) "*New Approaches in Airline/Airport Relations: The Charges Framework of Frankfurt Airport*," pp. 125-140 in: P. Forsyth, D. Gillen, A. Knorr, O. Mayer, H.-M. Niemeier and D. Starkie (Eds.), *The Economic Regulation of Airports: Recent Developments in Australasia, North America and Europe*, Ashgate: Aldershot.

Klingenberg, C. and S. Klingelhöfer (2003) "*Private Infrastructure Financing: The Case of Terminal 2 at Munich Airport*," pp. in: C. Hirschhausen, T. Beckers and K. Mitusch (Eds.), *Trends in Infrastructure Regulation and Financing- International Experience and Case Studies from Germany*, Edward Elgar: Cheltenham.

Kunz, M. (1999) "Entbündelter Zugang zu Flughäfen: Zur Liberalisierung der Bodenverkehrsdienste auf europäischen Flughäfen," *Zeitschrift für Verkehrswissenschaft*, 70(3): 206-232.

Langner, S. (1995) "Contractual Aspects of transacting in slots in the United States," *Journal of Air Transport Management*, 2(3/4): 151-161.

Levine, M. (1987) "Airline Competition in Deregulated Markets: Theory, Firm Strategy, and Public Policy," *Yale Journal of Regulation*, 4(363): 393-495.

Lufthansa (2006) "Annual Report (Manuskriptfassung)," http://www.lufthansa-financials.de/lhir/pdf/de/pk_manuskriptfassung_d.pdf.

Luo, Y. (2002) "Contract, cooperation, and performance in international joint ventures," *Strategic Management Journal*, 23(10): 903-919.

Macher, J. and B. D. Richman (2006) "Transaction Cost Economics: An Assessment of Empirical Research in the Social Sciences," Duke Law School Legal Studies Paper No. 115.

Masten, S. (1984) "The organization of production: Evidence from the aerospace industry," *Journal of Law and Economics*, 26: 403-417.

-- , -- (1993) "Transaction Costs, Mistakes, and Performance: Assessing the Importance of Governance," *Managerial and Decision Economics*, 14(2): 119-129.

Masten, S. and K. J. Crocker (1985) "Efficient Adaptation in Long-Term Contracts: Take-or-Pay Provisions for Natural Gas," *American Economic Review*, 75: 1083-1093.

Masten, S., J. Meehan and E. Snyder (1991) "The Costs of Organization," *Journal of Law, Economics and Organization*, 7: 1-25.

Masten, S. and S. Saussier (2002) "*Econometrics of contracts: an assessment of empirical literature in contracting*," pp. 273-292 in: E. Brousseau and J.-M. Glachant (Eds.), *Economics of Contracts*, Cambridge University Press: Cambridge.

Mayer, K. J. and N. S. Argyres (2004) "Learning to Contract: Evidence from the Personal Computer Industry," *Organization Science*, 15(4): 394-410.

McLay, P. and R. Aisling (2005) "Competition Between Airport Terminals: The Issues Facing Dublin Airport," *Geary Discussion Paper Series*.

Ménard, C. (1996) "On Clusters, and other Strange Forms: The Case of the French Poultry Industry," *Journal of Institutional and Theoretical Economics*, 152(1): 154-196.

-- , -- (1998) "Maladaptation of regulation to hybrid organizational forms," *International Review of Law and Economics*, 18(4): 403-417.

-- , -- (2004) "The Economics of Hybrid Organizations," *Journal of Institutional and Theoretical Economics*, 160(3): 345-376.

Ménard, C. and A. Yvrande-Billon (2005) "Institutional Contraints and Organizational Change. The Case of the British Rail Reform," *Journal of Economic Behavior & Organization*, 56(4): 675-699.

Monroe, L. K. (2002) "New construction awards: New destinations," *Buildings*, 96(10): 40-41.

Morrison, S. A. and C. Winston (2000) "*The Remaining Role for Government Policy in the Deregulated Airline Industry*," pp. 1-40 in: S. Peltzman and W. Clifford (Eds.), *Deregulation of Network Industry: What's next?*, Brookings Institution Press: Washington D.C.

Nauke, J. (2001) "Servisair gibt Bodenservice auf dem Flughafen auf," Stuttgarter Zeitung, 8.2.2001.

Nickerson, J. A. and T. R. Zenger (2004) "A Knowledge-Based Theory of the Firm-The Problem-Solving Perspective," *Organization Science*, 15(6): 617-632.

Notes (1990) "The Antitrust Implications of Airport Lease Restrictions," *Harvard Law Review*, 104(2): 548-568.

Ordover, J. A., G. Saloner and S. C. Salop (1990) "Equilibrium Vertical Foreclosure," *American Economic Review*, 80(1): 127-142.

Ostrom, E. (2005) "*Doing Institutional Analysis - Digging Deeper Than Markets and Hierarchies*," pp. 819-848 in: C. Ménard and M. M. Shirley (Eds.), *Handbook of New Institutional Economics*, Springer: Dordrecht

Oum, T. H., N. Adler and C. Yu (2006) "Privatization, corporatization, ownership forms and their effects on performance of the world's major airports," *Journal of Air Transport Management*, 12(3): 109-121.

Oum, T. H., A. Zhang and Y. Zhang (2004) "Alternative Forms of Economic Regulation and their Efficiency Implications for Airports," *Journal of Transport Economics and Policy*, 38(2): 217-246.

Oxley, J. E. (1997) "Appropriable Hazards and Governance in Strategic Alliances: A Transaction Cost Approach," *Journal of Law, Economics and Organization*, 13(2): 387-409.

Palay, T. J. (1984) "*Comparative Institutional Economics: Governance of Rail Freight Contracting*," pp. 43-63 in: S. Masten (Ed.), *Case Studies in Contracting and Organization*, Oxford University Press: Oxford.

-- , -- (1985) "The Avoidance of Regulatory Constraints: The Use of Informal Contracts," *Journal of Law, Economics and Organization*, 1(1): 155-175.

Panzar, J. (1989) "*Technological Determinants of Firm and Industry Structure*," pp. 4-56 in: R. Schmalensee and R. D. Willig (Eds.), *Handbook of Industrial Organization*, North-Holland: Amsterdam.

Parker, D. (1999) "The performance of BAA before and after privatisation - A DEA study," *Journal of Transport Economics and Policy*, 33(2): 133-146.

Parkhe, A. (1993) "Strategic alliance structuring: A game theoretic and transaction cost examination of interfirm cooperation," *Academy of Management Journal*, 36(4): 794-829.

Peteraf, M. A. (1993) "The cornerstones of competitive advantage: A resource-based view," *Strategic Management Journal*, 14(3): 179-191.

Pirrong, C. P. (1993) "*Contracting practices in the Bulk Shipping Market: A Transactions Cost Explanation*," pp. 130-162 in: S. Masten (Ed.), *Case Studies in Contracting and Organization*, Oxford University Press: New York.

Powell, W. W. (1996) "Inter-Organizational Collaboration in the Biotechnology Industry," *Journal of Institutional and Theoretical Economics*, 152(1): 197-215.

Reuer, J. J. and A. Ariño (2007) "Strategic alliance contracts: dimensions and determinants of contractual complexity," *Strategic Management Journal*, 28(3): 313-330.

Reuer, J. J., A. Ariño and T. Mellewigt (2003) "Entrepreneurial Alliances as Contractual Forms," IESE Business School Working Paper No 527, http://www.iese.edu/research/pdfs/DI-0527-E.pdf.

Reynolds-Feighan, A. (2001) "Traffic distribution in low-cost and full-service carrier networks in the US air transportation market," *Journal of Air Transport Management*, 7: 265-275.

Richman, B. D. and C. Boerner (2006) "A Transaction Cost Economizing Approach to Regulation: Understanding the NIMBY Problem and Improving Regulatory Responses," *Yale Journal on Regulation*, 23(1): 29-76.

Richter, R. and E. G. Furobotn (2003), *Neue Institutionenökonomik*, Mohr Siebeck: Tübingen.

Rindfleisch, A. and J. B. Heide (1997) "Transaction cost analysis: Past, present, and future applications," *Journal of Marketing*, 61(4): 30-54.

Riordan, M. H. and O. E. Williamson (1985) "Asset Specificity and Economic Organization," *International Journal of Industrial Organization*, 3(4): 365-378.

Ruiter, D. W. P. (2005) "Is Transaction Cost Economics Applicable to Public Governance?," *European Journal of Law and Economics*, 20(3): 287-303.

Ryall, M. D. and R. C. Sampson (2003) "Do Prior Alliances Influence Contract Structure? Evidence from Technology Alliance Contracts," Simon School of Business Working Paper No. FR 03-11.

Saussier, S. (1999) "Transaction Cost Economics and Contract Duration: An Empirical Analysis of EDF Coal Contracts," *Louvain Economics Review*, 65(1): 3-21.

-- , -- (2000) "Transaction costs and contractual incompleteness: The case of Electricite de France," *Journal of Economic Behavior & Organization*, 42(2): 189-206.

Schulte, S. (2005) "Capex Program Frankfurt: Lift to the Future," http://www.fraport.de/cms/investor_relations/dokbin/67/67831.investor_day_2005_presentation_dr_schult@de.pdf.

Serebrisky, T. (2003) "Market Power: Airports," *Public Policy for the Private Sector*, Note Number 259(March 2003), http://rru.worldbank.org/PapersLinks/Open.aspx?id=2002.

Shelanski, H. A. and P. G. Klein (1995) "Empirical Research in Transaction Cost Economics: A Review and Assessment " *Journal of Law, Economics & Organization*, 11(2): 335-361.

Shy, O. (2001), *The Economics of Network Industries*, Cambridge University Press: London.

Simon, H. (1961), *Administrative Behavior*, Macmillan: New York.

Soames, T. (1997) "Ground Handling Liberalization," *Journal of Air Transport Management*, 3: 83-94.

Starkie, D. (2002) "Airport Regulation and Competition," *Journal of Air Transport Management*, 8: 63-72.

Teece, D. J. and M. Monteverde (1982) "*Suppler switching costs and vertical integration in the automobile industry*," pp. 179-187 in: S. Masten (Ed.), *Case Studies in Contracting and Organization*, Oxford University Press: Cambridge.

Teece, D. J., G. Pisano and A. Shuen (1997) "Dynamic capabilities and strategic management," *Strategic Management Journal*, 18-42(7): 509-533.

Templin, C. (2007), *Bodenabfertigungsdienste an Flughäfen in Europa - Deregulierung und ihre Konsequenzen*, Kölner Wissenschaftsverlag: Köln.

Thompson, D. and D. Helm (1991) "Privatised transport infrastructures and incentives to invest," *Journal of Transport Economics and Policy*, September: 231-246.

Tirole, J. (1988), *The Theory of Industrial Organization*, MIT Press: Cambridge.

Tsang, E. W. K. (2006) "Behavioral assumptions and theory development: the case of transaction cost economics," *Strategic Management Journal*, 27(11): 999-1011.

Wernerfelt, B. (1984) "A Resource-Based View of the Firm," *Strategic Management Journal*, 5(2): 171-180.

Whinston, M. D. (2003) "On the Transaction Cost Determinants of Vertical Integration," *Journal of Law Economics & Organization*, 19(1): 1-23.

Williamson, O. E. (1971) "The Vertical Structure of Production: Market Failure Considerations," *American Economic Review*, 61(2): 112-123.

-- , -- (1975), *Market and Hierarchies: Analysis and Anti-trust Implications*, The Free Press: New York.

-- , -- (1976) "Franchise Bidding for Natural Monopolies - in General and with Respect to CATV," *Bell Journal of Economics*, 7(1): 73-104.

-- , -- (1979) "Transaction-Cost Economics: The Governance of Contractual Relations," *Journal of Law and Economics*, 22(2): 233-261.

-- , -- (1983) "Credible Commitments: Using Hostages to Support Exchange," *American Economic Review*, 73(4): 519-540.

-- , -- (1985), *The Economic Institutions of Capitalism*, The Free Press: New York.

-- , -- (1991) "Comparative Economic Organization: The Analysis of Discrete Structural Alternatives," *Administrative Science Quarterly*, 36(2): 269-296.

-- , -- (1996), *The Mechanisms of Governance*, Oxford University Press: Oxford.

-- , -- (1998) "Transaction cost economics: How it works; where it is headed," *De Economist*, 146(1): 23-58.

-- , -- (1999) "Public and Private Bureaucracies: A Transaction Cost Economics Perspective," *Journal of Law, Economics and Organization*, 15: 306-342.

-- , -- (2002) "The Theory of the Firm as a Governance Structure: From Choice to Contract," *Journal of Economic Perspectives*, 16(3): 171-105.

-- , -- (2005) "The Economics of Governance," *American Economic Review*, 95(2): 1-18.

Wolf, H. (2003), *Privatisierung im Flughafensektor - eine ordnungspolitische Analyse*, Springer: Heidelberg.

-- , -- (2004) "*Airport Privatisation and Regulation: Getting the Institutions Right*," pp. 201-212 in: P. Forsyth, D. Gillen, A. Knorr, O. Mayer, H.-M. Niemeier and D. Starkie (Eds.), *The Economic Regulation of Airports: Recent Developments in Australasia, North America and Europe*, Ashgate: Aldershot.

Yin, R. K. (2003), *Case Study Research - Design and Methods*, Sage Publications: Thousand Oaks.

Yvrande-Billon, A. (2004) "*Franchising Public Services: An Analysis of the Duration of Passenger Rail Franchises in Great Britain*," pp. 174-191 in: G. Cliquet, G. Hendrickse, M. Tuunanen and J. Windsperger (Eds.), *Economics and Management of Networks*, Springer.

Yvrande-Billon, A. and S. Saussier (2005) "*Do Organization Choices Matter? Assessing the Importance of Governance through Performance Comparison*," pp. 71-87 in: H. S. James (Ed.), *New Ideas in Contracting and Organizational Economics Research*, Kluwer Academic Publishers: Norwell, MA.