

THE DISAGGREGATED ORGANISATION OF AIR TRANSPORT: PROBLEMS FOR COMPETITION AND REGULATION

KARSTEN FRÖHLICH, JÜRGEN MÜLLER, ADEL NEMETH, HANS-MARTIN NIEMEIER*, ERIC TCHOUAMOU NJOYA AND ROMAN PASKIN

Over the last 30 years the governance structure of air transport has changed. Typically a disaggregated approach has been adopted. Doubts however arise, because of the vertical relationships. This paper addresses the following two research questions: By what type of organization is which part of the value chain organized? What are the main problems of this organization from the point of competition and regulation policy? The first question will be analyzed with transaction cost theory, the second by reviewing the literature. Finally, policy recommendations will be drawn.

* Corresponding author, Hans-Martin.Niemeier@hs-bremen.de, University of Applied Sciences Bremen, Werderstr. 73, 28199 Bremen / Germany, +49-40-8119377

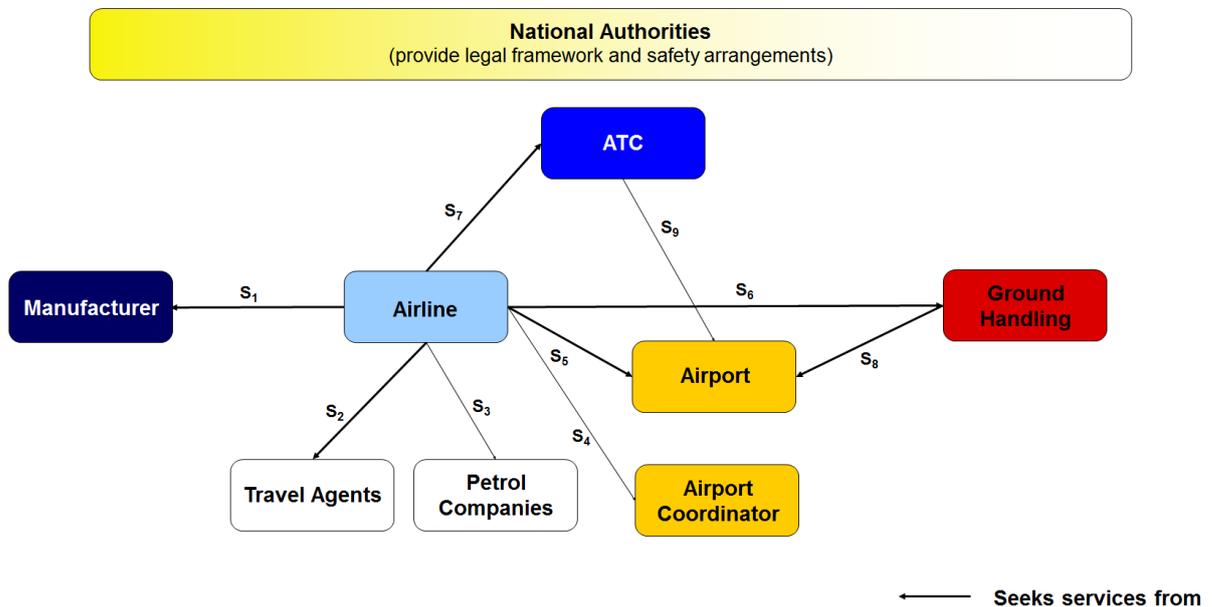
1. Introduction

Over the last 30 years the governance structure of air transport has changed substantially in many parts of the world. Air transport was traditionally organized as a heavily regulated public utility. Airlines, Airports, Air Traffic Control (ATC) and other providers were state owned with the exception of US which had private airlines strictly regulated. Airlines and airports were in some countries integrated, but in most separated public firms. Starting in the USA in the late 1970s more and more countries liberalized the downstream airlines market and thereby caused a reorganization of the whole value chain. Today, typically a disaggregated approach has been adopted consisting of regulated infrastructure and a partly liberalized downstream market. But doubts remain if this approach works well, because the vertical relationships in the aviation industry resembles in no way the textbook versions of a perfect supply chain. The rules that determine the quality, quantity and price of airport and air traffic control services are in particular heavily debated among practitioners and academics. This paper addresses the following two research questions: By what type of organization is which part of the value chain of air transport organized? What are the main problems of this organization from the point of competition and regulation policy? The first problem will be analyzed with transaction cost theory in section 2. The second question will be addressed by reviewing the literature in section 3. Finally policy recommendations will be drawn.

2. The Value Chain for Air Transport

The nature of air transport is changing and in many countries different forms of organization are used. Gomez-Ibanez (2003) differentiates between spot markets, private contracts, concession contracts, discretionary regulation, public enterprises and hybrid forms. In air transport almost all these organizational forms are practiced. Interestingly there is no country which has organized air transport as a privatized vertically integrated public utility subject to regulation. Typically a disaggregated approach has been adopted consisting of regulated infrastructure and a partly liberalized downstream market.

Figure 1. Value Chain of Air Transport



Purchase/ Leasing of aircraft

S₂: Sale of aviation services

S₃: Request for fuel and refueling of aircraft

S₄: Application for Airport slots (for fully coordinated and schedule facilitated airports only)

S₅: Request for Infrastructure

S₆: Request for Ground Handling Services (e.g. Cleaning, Catering, Push-Back)

S₇: Request for Airway slots and Air Traffic Control Services

S₈: Request for Ground Handling infrastructure

S₉: Request for office space

Demand for air transport is a derived demand stemming from the final demand for investment and consumption of goods and services. Airlines sell their final products consisting largely of seats and freight transport directly via the internet or indirectly through travel agents and freight agents to consumers and firms (see figure above, S 2). The internet has effectively decreased the market power of booking systems and has reduced the market share of travel agents over the last ten years. Air fares are traded on spot markets, part of packages with holiday services or other services like car rental, hotel rooms, travel insurance and so on. In the business segment airlines sell their tickets at a discount to large companies. These downstream markets are more or less competitive industries.

The airline market is still a tightly regulated industry when airlines try to serve destinations outside their home countries. For these services airlines require traffic rights ('freedoms of the air'). Restrictive air service agreements allow for only a limited number of flights and carriers on many international routes, thereby artificially reducing supply, with the result that fares are above competitive levels. Open skies agreements usually eliminate these regulations and the associated rents but some forms of ownership restrictions still prevent access to these markets (Doganis, 2002). The economic rationale for this kind of regulation is weak, but complete liberalization is not on the political agenda.

Overall, liberalization has been a success story (Morrison and Winston, 1992). In the US air fares decreased in real terms by 40 per cent from 1976 to 2001 and about 60 per cent of this drop can be attributed to deregulation (Morrison, 2002). European deregulation is in line with the US experience. Since 2000 Low Cost Carriers (LCCs) have intensified competition. This is especially the case with Southwest in the US, where its entry forced fares down on direct routes, and to a lesser extent on adjacent routes (Morrison, 2002). Similar effects are observed in Europe when Ryanair enters a market. It appears though that direct competition is the main driver, while potential competition has a rather weak effect. Therefore aviation markets are seen as not fully contestable (Borenstein, 1992). Although airplanes are still seen as 'capital with wings', part of airlines fixed costs are sunk in, for example, developing hub operations or the marketing of routes. The network character of air transport has posed two interesting problems for competition policy, namely the occurring of hub premiums and the development of alliances and mergers (see section 3.1). Hub premium is the phenomenon when one dominating airline charges a higher fare for flights from the hub airport. This might be due to market power, but could also be explained by economies of scale and scope, higher frequency, more destinations and frequent flyer program. According to Tretheway and Kincaid early estimates were relatively high with 12 per cent Borenstein (1989), 27 per cent GAO (1990) and 18.7 per cent DOT (1990). Later Abunassar and Koford (1994) found only 10 per cent and Morrison and Winston (1995) 5.2 per cent, which completely stems from the higher quality of services. As LCCs have emerged at the beginning of the century this discussion lost its importance.

Overall, the welfare gains of deregulation are so large that re-regulation is not a serious policy option. It is a market with imperfections driven by economies of scope and density subject to competition law regarding mergers and alliances, predatory pricing, cartels and price fixing (for an overview see Lee, 2006).

Airlines acquire a number of inputs from upstream markets. Aircraft are bought from manufacturers or are leased from specialized leasing companies (S1). There is a functioning secondary market for leasing and buying aircraft. Aircraft production is characterized by learning economies and state subsidies. There are only a few producers in certain market segments like large wide body jets. Overall there is no need for economic regulation, and the issues are addressed through competition and trade policy.

Airlines buy fuel on the world market using different types of contracts including hedging against the risk of oil price changes (see S3). As refueling can only be done on the ground, airports might create access problems for ground handling services. Airports can also have opportunities to cross-subsidize fuel for certain carriers or certain destinations.

Airlines need the right to start and land at the airport they intend to serve. This is not a problem at airports with ample capacity, but there are access problems at busy airports. Outside the US, airlines apply for slots at busy airports (see S4). The slot coordinator distributes slots following rules defined in line with IATA rules. In the US, access to busy airports is rationed on a first come first served basis (grandfather rights). The lack of market based slot allocation and of off peak and congestion pricing by airports has been criticized for a long time (Levine, 1987). The welfare losses are estimated to be in the range of several billions a year (Morrison and Winston, 2008; Mott Mac Donald, 2006). Lately however, the issue of congestion pricing has been completely revised taking into account the vertical structure of airport and airlines (see 3.2).

Air traffic control (ATC) services (S7) are another indispensable input for airlines. These services consist of local services at the airport and en route services in the upper air space. ATC guides the aircraft from the gate to the take-off runway and controls the flight within a certain radius of the airport. Then it is handed over to the en route manager who guides it to the final destination and hands it to the local ATC provider. ATC is responsible for coordinating flights so that air transport is safe and delays are minimized. Given the high fixed costs and the fact that there cannot be two competing air traffic management systems in the same flight corridor makes most of the ATC services a natural monopoly (Oster and Strong, 2008), regulated or controlled by the state in some way or the other (see 3.4.)

Airlines buy a wide range of services from airports (S5). Airports provide aircraft movement facilities including aprons, runways and taxiways and passenger processing facilities consisting of aerobridges, baggage systems, check in facilities, public areas in terminals, flight information displays and landside roads. At some airports, terminals are

leased to airlines and ground handling is performed by the airlines or third party providers. Some airports provide local ATC others do not.

Airports also supply non-aeronautical services such as car parking, restaurants, administrative office space and other commercial and retail services. In organizing retail, airports face a make-or-buy decision. On the one extreme, airports sometimes have their own retail divisions while on the other all non-aviation activities will be outsourced to a private developer. There are also a number of options in between these two extremes (Freathy and O'Connell, 1998). We outline these options in turn.

The ***fully-integrated approach*** might be a suitable option if these activities require limited skills or involve high level of investment. Thus, parking tends to be provided by many airports themselves, while retail “remains embryonic and tends to be implemented by airports themselves only in airports with critical mass and established retail operations (staff, logistics, etc.)” (Bamberger et al, 2009). The advantage of this approach is the centralized operation and control of various commercial aspects. The main disadvantage is most likely insufficient non-aeronautical knowledge of airports' staff.

Management company. To avoid the problem of insufficient commercial knowledge, a specialized management company can be hired. The airport pays the company monthly fees and a percentage of the net operation incomes derived from corresponding operations. Usually the airport authority is in charge of financing, providing space, facility design, developing operation standards, keeping inventory, tenant relationship, and financial accounting of profitability.

Private developer. A private developer can be hired to design and develop commercial facilities. The developer provides the required financing and administration of all phases of retail or parking facilities' operations as well as subleasing of developed space. The advantages of this approach are the know-how of the developer and unified equity controlled development of facilities. The biggest disadvantage is that the airport loses direct control over commercial operations.

Multiple prime retail operators. The commercial space is to be leased to multiple retail operators (or concessionaires), who obtain the right to sell goods and provide services. Their lease terms are reassessed after a certain period of time. Airports usually offer contracts for particular categories of concessions, so that different retail operators develop and run a substantial amount of the space. The airport collects rental fees in term of fixed or stepped percentage rates based on gross retail sales of operators or based on leased commercial space.

Prime retail operator. The airport contracts to one prime retail operator (or master concessionaire), who takes responsibility for the sale of goods of all categories. This decreases inventory costs and leads to economies of scale in purchasing. However, according to Knight (2009) this structure leads fewer choices, uniform retail outlets and higher prices.

Hybrid structure. Airports may also implement a combinations of governance structures for different areas of responsibility (e.g. for different categories of goods, for terminals with different characteristics, etc.) in attempt to build optimal hybrid structure, which combines advantages of separate structures.

All disintegrated management structures imply a number of common drawbacks: compromised coordination, private information leakage, quasi-rents loss (if the counterparty deviates from initial agreement) and the holdup problem. Regarding retail activities Bamberger et al (2009) note that in the past airports preferred retail operators with local know-how and the possibility to pay higher fees. But today along with good performance, other factors have become first-priority, namely, financial robustness, a wide-ranging brand portfolio, a great flexibility concerning available offers and international know-how.

It is difficult to assess these different in governance structures empirically, as little data is publically available. While Bourdou (2010) favors direct airport development Pashkin (2011) argues for private developer.

Airports have been depicted as natural monopolies due to their asset specificity and economies of scale. The empirical evidence for the latter is not conclusive as studies show that economies of scale run out at levels in the range of 3 to million 90 million passengers (Niemeier, 2009). The sunk costs character of airport investment is unanimously acknowledged, but differs with the kind of services involved. The runway can be redeployed to uses creating only marginal value but office space in a terminal can be used for other value creating uses. The market power of an airport depends in particular on the available substitutes. This differs from airport to airport and for the type of service. For example, there are good substitutes available for Manchester airport because nearby Liverpool airport offers good services for origin and destination traffic and Heathrow is the more attractive hub for connecting traffic. Other airports such as Dublin or the two Parisian airports (under common ownership) lack such good substitutes.

Airports with persistent market power do not necessarily have market power across all services. Some have market power for local origin and destination traffic in specific market segments and hardly any market power in the freight market. Some have market power in the provision of aeronautical services but only limited in the non-aeronautical services. For

example Schiphol airport has market power in the provision of aeronautical services for business travellers, but the market power for parking is limited by a well-functioning public transport system. Some of the profits of an unregulated airport with market power reflect market power but they can also reflect locational rents.

Dedicated low cost carrier terminals (LCCTs) are a relatively new concept. According to the Centre for Asia Pacific Aviation (2009), approximately eight dedicated LCCTs have been developed across Europe. The emergence and rapid growth of the low-cost carrier (LCCs) market has been influential in encouraging airports to differentiate their positioning. In fact, these relatively new airports' customers have a range of concerns about comfort, convenience, costs and ambience that in some airports does not match with existing facilities. In case of terminal design, LCCs require simple terminal facilities capable of minimizing aircraft turnaround time (see Barrett, 2004; Echevarne, 2008). In order to ensure future airport growth, some airports have integrated differential levels of quality in their strategies by developing the concept of dedicated LCCTs. Compared with conventional terminals, LCCTs offer fewer facilities to airport users.

The decision of an airport to develop a LCCT may also be based on whether economies of scope can be identified. This raises the question of the minimum passenger number above which an airport can differentiate its products and remains profitable. While there are not yet enough studies in this area to be sure about the conclusions, product differentiation strategy, such as the design of LCCTs can help airports secure business volume and improve their competitive positioning (O'Connell, 2007, Kazda and Caves 2008; Tchouamou Njoya and Niemeier, 2010). In general, it is expected that the simplified design will have a significant impact on airport cost structure. The impact of LCCTs on non-aeronautical activities on the one hand, and on other airport users on the other hand are the two broad areas that need more research.

Product differentiation of airports can also be seen as a strategy to circumvent the European Union Directive on airport charges. Charlton (2009) examines airport-airline legislation concerning charging practices, highlighting anti-competitive behavior. The author points out some examples where airlines took airports to court: Virgin Blue against Sydney airport's charging practices or Air France against Geneva airport's plan to build a low cost terminal.

Closer relationship between airports and airlines, such as airline ownership or control of terminal facilities allows airports to share the risks and costs faced when offering new facilities. Likewise, the ownership of airport facilities may help airlines to optimize terminal operations (Albert et al. 2005; Kuchinke and Sickman, 2007). While common ownership of airport facilities may reduce competition, it is also interesting to note that, although the number of airports in commercial service continues to grow, government ownership and interest in an airport is significantly more wide-ranging than that of airlines, showing the importance of an airport to a local community. In most cases, the need for infrastructure expansion, such as the development of LCCTs, are enforced by governments, whose objective is regional economic development. The development of regional airports has been in most cases dependent on the incentives they can offer to LCCs (Francis et al. 2003).

Ground handling services can be differentiated between land and air side services. On the air side it consists of ramp, baggage, freight and mail, fuel and oil and central infrastructure services. These services can be provided in-house by airlines themselves, which would be backward integration, or by airlines as third party handlers, by independent ground handling companies and by airports. Ground handling services are not bought on a spot market but under a long-term (1-7 year) contracts or are produced in-house. The monetary value of ground handling services accounts for 5-8% of the airline ticket.

The vertical supply chain in ground handling starts with the airport, continues with the handler, and ends with the airline. What kind of market organization and governance structure is chosen by airlines, airports and handlers for this vertical supply relationship will normally be determined by transaction cost economics. But as we will see below it is also influenced by the regulatory framework set by the governmental authorities and the market structure in each activity level.

3. REGULATORY AND COMPETITIVE PROBLEMS OF VERTICAL INTEGRATION: A SURVEY

The changing nature of the vertical organization of air transport offers as many new opportunities for all firms in this industry as it creates problems competition and regulation policy. In this section we give an overview of the main problems. Given the complexity of the value chain we have selected those competitive and regulatory problems which are related to

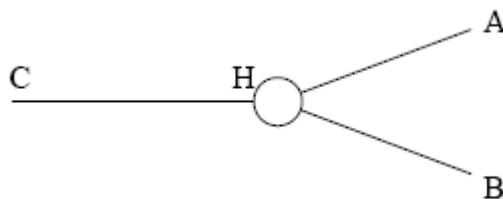
the vertical structure of the industry. On these problems we have reviewed the literature. Going upwards in the value chain we discuss the following four problems

- vertical structure of networks creating a complexity to assess mergers
- airport-airline relationship, namely deregulation of airports and market environment, airport congestion pricing and regulation, vertical integration of airports and airlines and implications for competition policy.
- restructuring of ground handling
- reorganisation and regulation of ATC

3.1 NETWORK EFFECTS OF AIRLINES AND COMPETITION POLICY

Vertical relationships exist not only between different stages of production (like airlines and airports), but within airline networks. Airline network effects are one of the drivers of integration in the form of airline alliances and mergers and at the same time are difficult to assess by competition authorities. . Integration can create substantial economies of density and avoid double marginalization. According to Brueckner and Spiller (1991) integration can create economies of density which are lost if competitors enter the market. Exhibit1 depicts a monopolist who serves the destinations C, H, A and B. H is the hub.

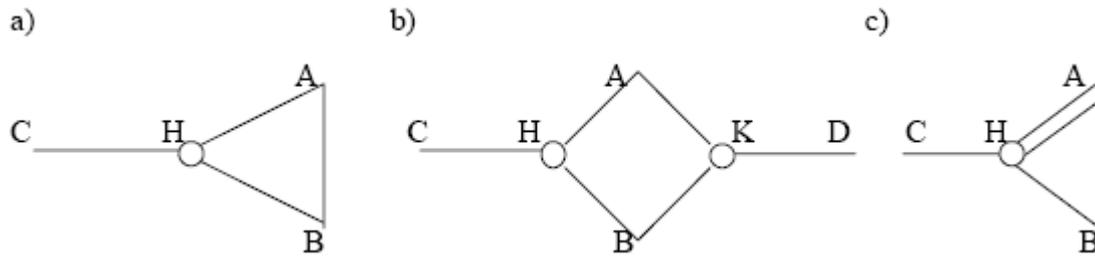
Exhibit 1: Hub and spoke-network



Source: Brueckner, Spiller (1991)

If a competitor enters the market and connects directly the spokes A to B (see 4.2. a) fares will fall in this market, but due to the lost economies of density prices will increase in the other markets. Competition on the spoke to hub connection A to H (see 2.) lowers prices and increases output, but creates higher marginal costs for the monopolistic routes. Competition between the hubs (see 2.) leads to lower fares in this market, but to higher costs and fares at the other connections.

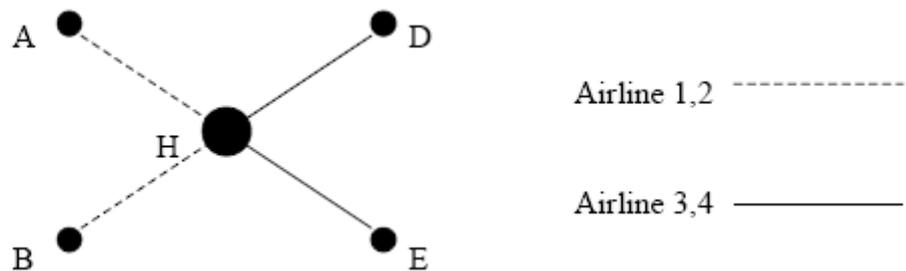
Exhibit 2: Brueckner-Spiller-models



Source: Brueckner, Spiller (1991)

Building on this model Brueckner and Wahlen (2000) analyse the effects of alliances. Initially the network is served by four independent airlines (exhibit 3.) then airline 1 and 2 and airline 3 and 4 form an alliance, respectively.

Exhibit 3: A Network with four airlines



Source: Brueckner, Whalen (2000)

Firstly, each alliance enlarges the network. Secondly, the alliance can avoid double marginalization. For example, prior to the alliance airline 1 could offer the flight to B by interlining the passenger. The service of airline 2 is an input to this service. As in this vertical chain airline 1 and airline 2 are monopolist each separately would chose the monopoly price output combination. Compared to a vertical integrated monopoly the two independent airlines chose a higher price and a lower output which leads to lower profits. An alliance would chose the cooperative solution for example by code-sharing and jointly monopolize the market which leads to a lower fare and higher output hence to an increase of economic welfare.

In general complementary alliances which enlarge networks and increase economies of density are welfare enhancing and pure parallel alliances might decrease welfare (Park, 1997). However, in the real world mergers and alliances have both elements and have to be assessed case by case (Laaser, 2001). However, the EU COM still considers „origin and destination“

routes as relevant market in merger cases (Nemeth and Niemeier, 2010) and does not take network effects with double marginalization or cost efficiency issues into account. The US antitrust policy has taken over part of the recommendations; however the result might be questionable. Horan (2010) criticizes the DOT's 'copy/paste' antitrust methodology, namely avoiding double marginalization 'automatically create 15-25 per cent price reductions in connecting markets, in each and every case irrespective of market or competitive conditions' (Horan, 2010, p.259).

3.2 AIRPORT-AIRLINE RELATIONSHIP

In the past, airports have been investigated in isolation and little attention has been paid to the vertical structure of the air transportation business. Since airports are input providers for airlines, standard models of economic textbooks cannot be applied to airports as easily as some articles might have suggested. This is because airports do not deliver to the final consumer, but provide an intermediate good. The economic effects of the vertical relationship between airport and airlines have been studied quite extensively in recent years and can be summarized into the following categories:

- Deregulation of airports and market environment
- Airport congestion pricing and regulation
- Vertical integration of airports and airlines and implications for competition policy

These topics are investigated below.

3.2.1 DEREGULATION OF AIRPORTS AND MARKET ENVIRONMENT

In a world of public aviation ownership structures were predetermined. In a liberalized market environment different constellations became reality. In the airline market this meant the move from a point-to-point network to hub-and-spoke systems and later the rise of LCCs). For airports it implied the development of non-aviation business. Gillen (2011) provides an overview of the changing governance structures and forms of regulation of airports. Fuhr and Beckers (2006) analyze the changing airline-airport relationship from a transaction cost perspective. This perspective helps analyzing why certain parts of the value chain are organized the way they are and it provides reasoning for certain outsourcing decisions. They find for example that hub-and-spoke airlines are likely to develop a different relationship with their hub airports than LCCs will develop with their (base) airports. Albers et al (2005)

consider the scope for a deeper integration between airports and airlines from a business perspective. Pitt (2001) argues that due to the “inherent inflexibility of buildings in the short term” (p. 153), airports are inapt to react to the dynamism of the airline industry, regardless of ownership form. He sees strategic alliances and vertical integration, or more generally, “vertical co-operation” (p. 155) as possible solutions to the problem. Schuster (2009) argues, that light-handed regulation in Australia has enabled Sydney airport to use contracts and new pricing schemes instead of posted tariff structures.

Privatization of airports has raised concerns that unregulated airports might abuse their market power and charge prices that decrease economic welfare. Starkie (2011) however argues that the use of long-term contracts between airlines and airports is beneficial for passengers and that application of competition law should be favored over sector specific regulation. Fu et al (2011) provide an overview of some important effects of the airport-airline vertical relationship and explain policy implications. They see various forms of cooperation, such as sharing of non-aeronautical revenues between, as potentially dangerous. Their overall conclusion is that the beneficial effects of vertical cooperation need to be weighed against the negative effects. That in itself is a daunting task, because vertical relations can be very complex and are difficult to analyze.

3.2.2 AIRPORT CONGESTION PRICING AND REGULATION

Conceptually the simplest vertical model would involve two successive monopolies, with the airport being the upstream provider and an airline being the downstream producer with a homogenous product market and uniform prices. However, to draw a more realistic picture the airline market would need to be modeled as an oligopoly market with product and price differentiation. This needs to be coupled with an airport market. This can be done by modeling a profit maximizing monopolist or an oligopolistic market structure. Furthermore, two-part tariff structures could be included. The usual way to model successive stages of production is to assume that the upstream providers choose their quantities/prices first. Downstream stages observe and set their prices in response. Gillen and Morrison (2003) were among the first to recognize the vertical relationship in a formal model. Basso and Zhang (2008) show in their paper that a vertical view of airport pricing would be unnecessary if the airline market was a perfectly competitive market, if however airline markets are imperfectly competitive, downstream competition has impacts on airport pricing.

Another concern of airport privatization is how airports deal with congestion. In contrast to road congestion airports do not face atomistic users. Brueckner (2002 and 2005) and Brueckner and Van Dender (2008) make clear that findings from the road pricing literature cannot be easily applied, since dominant airlines at an airport would (at least partly) self-internalize congestion costs. Thus, in order to derive optimal congestion prices one would need to model an oligopolistic airline market and an airport that tries to charge for the congestion externality. Basso (2008) concentrates on the effect of monopoly pricing of congested airports. He finds that an unregulated airport monopoly would overcharge for the congestion externality, but also finds that stronger collaboration between airlines and airports helps improving the situation as well, although it might distort downstream airline competition. Zhang and Zhang (2006) reconsider the scope of self-internalization. They distinguish between airports that receive a subsidy and those that do not. For the former case they find that market structure has no effect on capacity decisions and congestion, but the latter case they find that airports will over-invest in capacity. Basso and Zhang (2007) do not just model the airline market, but also introduce upstream competition. They find (among other things) that the airport's capacity and quality decisions will not be socially optimal if the airline market is imperfectly competitive. In a later paper Zhang and Zhang (2010) additionally consider the role of non-aeronautical revenues in relation to the congestion problem and also find that generally airports would tend to over-invest in capacity.

3.2.3 VERTICAL INTEGRATION AND IMPLICATIONS FOR COMPETITION POLICY

A specific form of vertical cooperation is vertical integration. Other forms might include exclusive dealing and special contracts with particular airlines or more generally, all types of vertical collusion. Currently some countries like Australia have specific rules prohibiting vertical integration between airlines and airports and a maximum of five percent of the shares of an airport may be bought by an airline (Serebrisky, 2003). Serebrisky (2003) also concludes that vertical separation is to be favored over vertical integration. Kuchinke and Sickmann (2007) also come to the conclusion that vertical integration should be prohibited, but the authors also point out that hub airports could be handled differently. Barbot (2009 and 2011) considers the scope for vertical integration and its economic effects with formal models. Her findings are that, depending on exogenous factors, airlines and airports do have an incentive to collude and that different forms of vertical contracts are indeed anti-

competitive, but that they can also increase welfare and hence there is a trade-off between welfare and competitiveness. In a similar fashion Nastasi and D'Alfonso (2010) find out that a dominant airline and its airport have an incentive to collude. They confirm that this would be undesirable for social welfare.

3.2.4 CONCLUSIONS

A major conclusion for policy is that the vertical relationship between airlines and airports matters and must be taken into account. The continuous privatization of airports makes it important to look at these aspect very carefully since there can be negative as well as positive features to vertical relationships. Weighting them against each other will be task of governments in order to determine the extent of regulation. Congestion poses another important problem for regulation as congestion charges of private monopoly airports will not be welfare optimal. Finally, competition authorities will have to decide whether joint ownership of airlines and airports should be allowed or anticompetitive behavior can be monitored and administered.

3.3 RESTRUCTURING SERVICES IN EUROPEAN GROUND HANDLING

Most ground handling services do not need a high degree of specific investments. The economies of scale with respect to the relevant market are also not very large. GHS are therefore regarded as a contestable market (Templin, 2010) and can in principal be liberalized. However, the EU Directive 96/67 which aimed to open up this market; faced a lot of resistance from various stakeholders: In particular airports and labour unions were opposed, so they could provide the service themselves. Many airports had used the control over access to restrict entry to the market. The implementation of the directive thus led to substantial change in the market structure, both horizontally and vertically, moving from an artificial market structure to a more market-driven one. More and more countries have liberalized ground handling which led to a reorganization of the market, with important performance effects: *"in general, prices for ground handling services decreased since the introduction of the Directive"* (Airport Research Center, 2009, p.18).

As a consequence of liberalization, independent GHS companies are now able to expand their business operations because they can enter new markets across Europe, achieving further economies of scale and scope. The major competitors in the German and European market are

international service providers like Acciona, Swissport, Avia Partner, Securicor, Menziees, or local service providers, such as Losch, or specialized regional cleaning services. The international service providers are often parts of a larger conglomerate, active in the logistics sector, and can obtain benefits of scale and scope by enlarging their presence in this sector. They also have the scale benefits of multi-plant economies and network effects through multiple station operations. This allows them to make one contract with an airline that is active at several German airports.

Self-handling has been mainly applied by the dominant airlines at their own hub Fuhr (2005). Within airline alliances, this service will then be offered by the ground handling company of the home carrier to their alliance partners.

Opening up of markets faces a number of obstacles as some entry barriers remained. *“Where the airport operators stayed active, their market share have decreased, but remained on a high level”* (Airport Research Center (2009, p. 18). Incumbents still have substantial market power and competition is less effective due to access problems, as can be seen from the experience in Germany. The market share for independent service providers ranges between 10 and 20 percent of the liberalized airside market.

It seems that the airlines, by using the potential threat of competition, mainly aim to get better service conditions, rather than trying out independent service providers, so their market share remains low. Still, what we observe at the moment is only a transitory phenomenon. For airport operated GH services surviving the increased competitive pressure means requiring significant adjustments in wages and labor flexibility. There is still some cross subsidization going on from other airport services to cushion this effect, but this will not be tolerated by the owners forever. Those airports, which have early pursued a policy of creating separate subsidiaries in order to get better wage conditions and working flexibility, find now, that these subsidiaries could be sold off or can enter into a joint venture with a logistics company. They are no longer seen as part of the core business. So the German airport model of high vertical integration may come to an end. In the long run it is very likely that we see a similar organization arrangement of the value chain as in the other countries.

Market entry at airports above 2 mill passengers is controlled through administrative rules on obtaining GHS licenses. The regional regulator, who also owns the airport, decides on the license advised by the airport user council.

We argued above, that GHS can be regarded as a contestable market. The policy of the EU has helped to open up this market and to move it towards a market structure that is that is determined by competitive forces. Still there remains problem for competition policy,

because in some countries entry is still difficult and the efforts of the European Commission concerning the Second Service Directive were not supported politically. Also, cross subsidization by some airports may hinder a faster adjustment of market shares.

3.5 LITTLE VERTICAL DISINTEGRATION FOR AIR TRAFFIC CONTROL

Despite liberalization ATC has remained essentially unchanged in its horizontal and vertical organization. One reason for the slow move to market solutions may have to do with natural monopoly elements for the production of these services. The cost per controlled flight tends to fall as Area Control Centres cover more flights and a larger area. However, it is not clear if this applies to the whole value chain of ATC, or if some elements could be unbundled and restructured in such a way, so competitive markets could be allowed to work, or at least through the bidding process competition for parts of the ATC market could be created (Eurocontrol Performance Review Commission, 2003; 2009)

Within ATC Button (2005) still finds significant institutional differences between the different operators ranging from services provided by state bodies to corporatized state bodies relying on private funding and to companies with public / private shareholders:

- The French provider DSN is a state run entity that, with parliamentary approval, may seek funds from the private market and raise revenues from user fees.
- Similarly, the Turkish provider DHMI is also a state run company. But DHMI is also responsible for the management and regulation of airports.
- AENA, literally 'Spanish Airports and Air Navigation, is the Spanish state department that owns and manages most airports in Spain, but is also responsible for Air Traffic Control throughout Spain. Like DMHI in Turkey it is moving up the value chain, but thereby also monopolistically controlling a much larger segment of the value chain
- The FAA in the US is also the state run company responsible for providing ATC services.
- NAV CANADA, the Canadian provider, is run as a private non-profit entity.

- The Australian provider Airservices Australia, is also a federally owned authority.
- The German provider Deutsche Flugsicherung GmbH (DFS) is federally owned company that is already corporatised and was to be privatized in 2006, but the privatization has been postponed for legal reasons.
- Skyguide, the Swiss ANSP, is a joint-stock, not-for-profit corporation financed by private banks with no debt guarantee from the government.
- The UK NATS provider is a public-private partnership (under a five-yearly price-cap regime), where seven airlines hold 41.94% of the capital and BAA 4.19%.

Commercialization has already taken place, with some ATC providers having access to more diverse capital sources, thereby allowing some market influences to take place. Monopoly unions are faced with a more cost-conscious governance structure. Still, we observe large differences in the cost of the ATC provision¹. Such comparisons must be interpreted with care, since the condition of traffic under the control of an ANSP and differences in the quality of service provided will have a considerable impact on the productivity..

One reason for unrealized scale effects are national borders and the geographic range of national air traffic control centres. As the national level ATC providers have mainly been left intact, the scale benefits of horizontal integration that were originally envisaged with the establishment of Eurocontrol has been barely realized. Just to indicate the scale of unexploited horizontal specialization, the USA has 3 ATC Area Control Centres while Europe has 22 ATC centres.

The concept of the “Single European Sky” is the European Commission’s key initiative to eliminate the fragmented approach to ATC provision. Important elements are the planned integration of European air space and alignment with traffic requirements (Functional Airspace Blocks), and the harmonised processes and systems to obtain the benefits of scale.

There will also be the separation of regulatory and operational competencies / duties that could be crucial for opening up some of the vertical links to more market-driven processes. For example the separation between assignment (nomination) of tasks and the operation of

¹ International comparisons of the cost per controlled flight-hour (continental) or for gate-to-gate costs (excluding cost of capital) also show large differences. According to Helios (2010) European operating costs per controlled flight-hour were on average €499, the American costs were only 246 € for the FAA and 199€ for NAV CANADA and Airways NZ .

services could eventually lead to more subcontracting to certified ANSP and create a more competitive market structures around the monopoly core, which could be further reduced by new ATC technology.

In summary, the problems for competition policy and regulation are still substantial. While some privatization has taken place and some market influences are being felt through the funding side, much remains to be done to open up markets and to improve regulation. First, the value chain has not been unbundled, so that competitive services at least for some activities could be pursued. Secondly competition for the market has hardly been utilized, except for procurement policies. The task for improving ATC performance rests therefore very much on the regulatory institutions. However, as the very large cost differences indicate, these institutions are not very effective. More important however is the issue that fragmentation defined by national borders blocks gains from economies of scale.

4. CONCLUSIONS

Deregulation of air transport has not only brought competition into the airline market but has fundamentally changed the vertical structure of air transport. It has created an increasing number of specialised markets thereby leading to a much more effective division of labour. We have detected a number of such markets (e.g. travel agents) in our analysis of the value chain. Perhaps the most important change is the provision of commercial and retail services at airports. Airports have become very entrepreneurial and have tried out different forms of organization. This innovative management is to some degrees developing at major airports for example with the supply of low cost terminals. However, product and price discrimination are still rarely seen in particular at busy airports which do practice any type of peak or congestion pricing which they use in car parking. Airports differ also very much in their approach towards GHS. While some have left the market or have outsourced it completely other have combined a strategy of erecting barriers to entry with minor reorganizations. Rent seeking and regulatory capture as well strong unions are slowing down the process in particular in Germany. This leads finally to cross subsidies – perhaps one of the main factors to reduce the productivity of airports.

Network effects are driving the partially liberalized airline market. With these economies perfect competition is incompatible and market power will be created. Sometimes this market

power is only temporary. The hub premium is an example. While in the nineties hub airlines were able to monopolize markets the LCC eroded also these rents. Of concern is another effect of networks. Integration in form of alliances and mergers are difficult to assess for competition authorities and the traditional approach to define relevant markets ignores systematically the wider network effects.

The vertical structure is also important relationship between airlines and airports matters. Economists have made good progress analyzing these problems systematically and governments must take them into account for example whether joint ownership of airlines and airports should be allowed. In particular congestion poses another important problem for regulation as congestion charges of private monopoly airports will not be welfare optimal.

The specific and long term character of investment is at the heart of reorganisation of ATC and airports. The welfare losses in ATC due to the lack of political reform in Europe are still high relatively to the US. Markets forces are just beginning to develop. With commercialisation and privatisation the need for effective incentive regulation will be growing, but an independent regulator is missing here as well as in most European countries with airports. The general concern is that rent seeking and regulatory capture might prevail and prevent policy from establishing independent authorities to regulate the monopolistic bottle necks. Overall, such strategies stabilize market power and creates hold up problems thereby reducing the efficiency of the whole value chain of air transport.

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