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EFFECTIVE REGULATORY INSTITUTIONS FOR AIR TRANSPORT: A EUROPEAN PERSPECTIVE

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" Member States shall guarantee the independence of the independent supervisory authority by ensuring that it is legally distinct from and functionally independent of any airport managing body and air carrier. Member States that retain ownership of airports, airport managing bodies or air carriers or control of airport managing bodies or air carriers shall ensure that the functions relating to such ownership or control are not vested in the independent supervisory authority." Article 11 (3) EU Directive on Charges

"As for Frankfurt Airport, the Hesse Ministry of Economics, Transport, Urban and Regional Development (HMWVL) – which is the responsible government entity for aviation – is clearly separated and acts independently from the Hesse Ministry of Finance, which represents the state's 30 per cent shareholder interest in Fraport. Stefan Schulte, 2009, p. 8)

1. INTRODUCTION

Self-evident things are usually taken for granted and people act on them without questioning their rationale. For example, no citizen of the European Union (EU) would question in principle the independency of law courts. Law courts are designed to judge independently and people have recourse to appeal if that is not the case. In regards to regulatory institutions, deciding on airport charges, this however seems to be different. It took the EU Commission about twenty years to put the EU directive on airport regulation into law. This law mandates member states to set up an independent regulatory authority for airports. The debate over this directive is not over though. The word 'independent' has yet to be clearly defined. Indeed it appears probable that the European Union might end up with regulators whose independence is so restricted that the true meaning of independence has been turned on its head.

The heated debate on the regulatory framework for airports, which if wrongly designed might lead to regulatory capture and regulatory failure, has highlighted the importance of creating good institutions for air transport in general. This is especially important, because airports are moving from public utility type of state owned organisations to an industry with a mixture of competitive and monopolistic elements, different forms of ownership and levels of commercialisation all influenced by different types of implicit and explicit regulatory regimes. To give a few examples of these changes:

- Airport privatisation began in the late 1980s with BAA and has lead to fully privatised industry in the UK with only a few exceptions. This differs remarkably from the rest of Europe where only a minority of airports are partially privatised. These changes were accompanied by changes in regulation. The UK has adopted an independent regulatory body while most continental states lack such an institution. Elsewhere Australia and New Zealand

have privatised some of their airports as well. Australia went initially through a phase of price cap regulation and changed later to a monitoring system. New Zealand abolished ex-ante regulation, but later re-regulated airports.

- Competition among airports, which hardly existed twenty years ago, developed due to the privatization and the liberalization of down stream markets. A consequence of this was the influence on the scope and method of regulation. Again, these challenges are best observed in the UK. The English Competition Commission directly influenced the market structure when it ordered the break up of BAA (which is currently disputed for different reasons in the courts). In turn the regulator initiated an inquiry into how to change regulation to encourage a more competitive environment. The positive effects of competition can replace regulation, which makes it necessary to decide which airports should or should not be subject to regulation. For example Manchester airport has been de-designated, while Stansted not, although the later decision remains controversial. In the Netherlands, the Dutch regulator assessed the market power of Schiphol and reached the conclusion that regulation should be continued, as changes in the market structure are currently not politically feasible. With growing demand for air transport and liberalization of the downstream market, more competition among airports will develop. This will call into question the necessity of airport regulation. Regulatory authorities will increasingly be faced with the decision which airports should be regulated and which should be left on their own.

- Privatisation of air traffic control (ATC) has also been an issue in Europe. The UK partially privatised NATS[1] and price-caped it. In Germany partial privatisation of ATC was stopped on legal grounds in 2006 but is still an option, although a rather political one.

- Liberalisation and privatisation of airlines have lead to intense competition in many parts of the world and have changed the vertical relationship between infrastructure providers and users. Access to and prizing of often scarce infrastructure becomes increasingly important for airlines as means to compete. In turn it is also crucial for airports and ATC providers to utilize given capacity and to finance new capacity. Scarcity and monopolistic rents are created and can be reaped by the stakeholders using increasingly sophisticated strategies.

- Air transport has always been subject to external shocks, but in a liberalised and (partially) privatised environment the question of who bears the risks is important. In particular the question arises how to design institutions that not only are capable of implementing cost based regulation, but also incentive based regulation with the risk of substantial losses for infrastructure providers.

- Finally, strategic behaviour of airlines and other stakeholders has become vital for profitability and competitive position. Hence policy makers will face substantial and increasing rent seeking behaviour of stakeholders. This will certainly not facilitate the task of developing effective regulatory institutions.

This paper addresses the following two research questions:

1. What parts of the value chain of air transport are ex-ante regulated?

2. Is this ex-ante regulation carried out by effective regulatory institutions or should the regulatory institutions be reformed?

Regulation here is defined as rules which inhibits the freedom of contract and thereby determines price, quantity, quality, investment and access. This might lead to a stalling of infrastructure expansions and high congestion costs. Environmental and safety regulations are not covered in this analysis, although they might lead to high safety fees and longer travelling times. Furthermore the coordination of competition policy is also not covered.

Given the wave of cross country alliances and mergers it is important to apply comparable regulations across nations. However, this paper confines itself to ex-ante regulation. The focus of the paper is entirely on the regulatory framework and not on its content, like specific methods of regulation.

The paper addresses the two posed questions in reversed order. Section 2 defines the concept of effective regulatory institutions. Section 3 describes the value chain of air transport and how the state intervenes with what type of regulatory institution. The final section summarises the results by highlighting the institutional reforms necessary to make regulation effective.

2. EFFECTIVE REGULATORY INSTITUTIONS FOR AIR TRANSPORT

There are two rationales, an economic and a political one, for an effective regulatory institution for public utilities applicable to air transport. The economic rationale is to ask how to effectively correct for market failure and how to develop instruments and institutions to correct for it. The political rationale asks if and how politics should delegate power to independent institutions such as a regulator or a commission. Both approaches are complementary and have much in common (Bartle and Vass, 2007). They view the problem of public utilities as a contracting problem with asymmetric information between principals and agents (Gomez Ibanez, 2003).

The *economic rationale* justifies ex-ante regulation if an industry has persistent market power and regulation increases economic welfare. The absence of any close substitute due to barriers of entry creates persistent market power. This might be due to legal and planning restrictions leading to a lack of attractive locations or to a production technology of a natural monopoly characterized by a combination of economies of scale and scope[2] and sunk cost. The latter is due to the fact that assets are highly specific and cannot be easily redeployed (Baumol *et al.* 1977, Forsyth, 1997).

Market failure can be corrected by a variety of different governance models, particularly by state ownership and by regulated, private monopolies. For the latter model the question arises how to encourage private investment in a regulated framework? Privatisation of such an industry is not straight forward. A major problem is how to write long term contracts for fixed investments, which have value only in a specific exchange relation. Asymmetric information makes it infeasible to write complete long term contracts that cover all contingencies. Hold-up problems due to opportunistic behaviour might occur so that markets and long term contracts fail. The central problem is to create discretionary commitment – a point summarized by Gomez-Ibanez (2003, p.3): *"The expensive, durable and immobile investments help make all parties – the company, its customers, and the government – vulnerable to opportunism and desirous of stability and commitment"*. In particular Levy and Spiller (1994), Stern (1997) and Stern and Holder (1999) argue stability and commitment can be best achieved by an independent regulator , an institution with limited discretionary power

which provides long term creditability and trust, expertise and flexibility without arbitrariness. Such an independent regulator should be part of a well designed and functioning legal system and it should prevent regulatory capture by either the regulated firm (Stigler, 1971) and/or consumer groups (Posner, 1971). With respect to airports Wolf (2004) argues that an independent regulator is a necessary condition for full privatisation. An independent regulator applying incentive regulation is necessary because airports might otherwise take hostages like partial government shares in order to protect their investment in a specific asset.

The *political rationale* argues that politicians should delegate discretionary power to an agency in order to avoid time inconsistent decisions and opportunistic behaviour. Both are relevant to the organisation of public utilities irrespective of the form of ownership because of the long term immobile asset specific character of these investments. Majone (1997, p.152) points out that "*independent agencies enjoy two significant advantages: expertise and the possibility of making credible policy commitments*". Democratically elected governments have only power for a short period of time and cannot bind future governments, but they can assign limited discretionary power to independent regulators which have expertise and are committed to long term political goals. Independent central banks, the European Commission and independent utility regulators are examples of these "*non-majoritarian institutions*" (Thatcher and Sweet, 2002), which exercise public authority in well-defined areas of public policy and which are neither elected nor directly controlled by politicians. This rationale is independent from the question of ownership and can be applied to publicly owned utilities as well. For example, instead of managing a public utility through a public bureau it might be better to form an independent agency or to corporatize a public utility regulated by an independent authority.

From both of these strands of theory it follows that an independent regulator with discretionary power is a good governance model for public utilities. This will become important when analysing the air transport sector, which is characterized by a variety of institutions, among them corporatized, partially to fully privatised public utilities.

These theories have also defined principles and criteria of effective regulatory institutions which have been adopted by the OECD[3] (1995, 1997) and by a number of high income countries (for example UK[4]) and low income countries (for example Brazil, Chile[5]):

- *Legislative mandate from elected legislature*. Regulators should have a well defined set of objectives from their parliament. These objectives must be clearly defined and separate the regulator from general policy making and from the management of public utilities. The legal framework should separate the roles and responsibilities and define principles of good regulation.

- *Independency and accountability to democratic bodies*. The independency can be undermined directly by the regulated firm and or by users, termed regulatory capture. For independency it is necessary to separate the function of regulation from the function of ownership and management of public utilities. The regulator must be separated from ministries owning or managing fully or partly public utilities. It must be an autonomous body with secure funding. Officers should not be dismissed unfairly by politicians and should not benefit personally from their decisions for example by being offered senior positions in firms they have regulated. Delegation of discretionary power to a regulator must be controlled by parliament. The regulator should exculpate to parliament for example with an annual report. The regulated firms and the users of public utilities (for example independent consumer bodies) must have the right to appeal against regulatory decisions by being able to take the regulator to court.

- *Fair, accessible and open process.* Public hearings and consultation should be part of any good regulatory approach. Results should not be predetermined. The results should be published and it should be made transparent why consulters' comments may have been adopted or rejected. Fair processes also provide for predictability and trust as changes cannot occur arbitrarily. Predictability and trust are especially important to avoid hold-up problems. Predictability should not be misunderstood such that processes should not be subject to adaptation through learning and evolutionary change. Vass (2006, p. 204) points out that this is one of the *"fundamental lessons"* for good regulatory governance: *"Achieving sound regulation and an effective regulatory state is an evolving process, where mistakes are made and lessons learned."*

- *Cost effective regulatory processes.* The legislative mandate should be effectively implemented avoiding high bureaucratic costs. Regulation is not an end in itself, but should serve the end to increase economic welfare. It should create a net benefit to society. This implies that the scope and method of regulation should be assessed by a third party in terms of benefits and costs (For an overview on various methods see ACCC, 2010).

- *Well targeted and temporary.* The causes for persistent market power are not natural in the sense that they do not change over time. Deregulation of at least parts of the value chain for public utilities has been successful in many jurisdictions. This raises the question which part of the value chain and which firms should be subject to regulation. The answer to this should be part of an inquiry in which the regulator and the stakeholders participate, but the final decision should be taken by a third party.

These principles can be applied to public utilities in general. In applying it, it is important to differentiate between vertical integrated and disintegrated public utilities. In vertical integrated industries such as the water industry the regulator becomes the key regulator between the regulated firms and the final consumers. Unlike the water industry the services of air transport industry are unbundled at least in those countries which have deregulated their airline industry. For such an industry the task of regulation includes not only price and quality of service but also access to the monopolistic bottlenecks.


3. VALUE CHAIN OF AIR TRANSPORT AND REGULATORY INTERVENTION

In this section, the value chain of air transport is described in order to provide an overview on how the industry is vertically organized and which parts of the chain are regulated. Then regulation is analysed in more depth and the question is addressed if regulation is in line with the criteria for effective regulatory institutions.

3.1. Value Chain of Air Transport

The nature of air transport is changing and in many countries different forms of organisation are used. Gomez-Ibanez (2003), building on Williamson (1985), differentiates between spot markets, private contracts, concession contracts, discretionary regulation, public enterprises and hybrid forms. In air transport almost all these organisational forms are practised. Interestingly there is no country which has organised air transport as a privatised vertically integrated public utility subject to regulation. Typically a disaggregated approach has been adopted consisting of regulated infrastructure and partly liberalised downstream market.

Figure 1. **Value Chain of Air Transport**
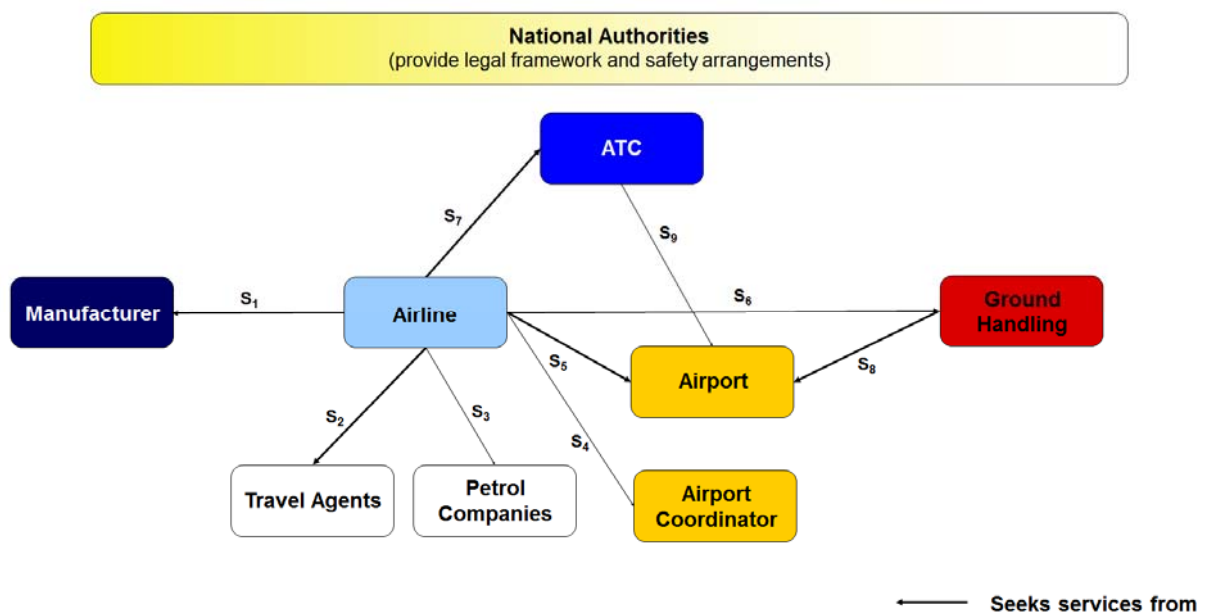
Purchase/ Leasing of aircraft
S_2: Sale of aviation services
S_3: Request for fuel and refueling of aircraft
S_4: Application for Airport slots (for fully coordinated and schedule facilitated airports only)
S_5: Request for Infrastructure
S_6: Request for Ground Handling Services (e.g. Cleaning, Catering, Push-Back)
S_7: Request for Airway slots and Air Traffic Control Services
S_8: Request for Ground Handling infrastructure
S_9: Request for office space

Demand for air transport is a derived demand stemming from the final demand for investment and consumption 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 substantially 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 down-stream markets are more or less competitive industries subject to competition law, but not to economic regulation.

Compared to international shipping the airline market is still a tightly regulated industry. The major markets in the US, Europe and Asia Pacific have been deregulated internally. Liberalisation 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)[6]. European deregulation is in line with the US experience. According to Arndt (2004) liberalization caused fares to fall by 31 to 35 per cent in real terms for the period 1989 to 2000. Passengers gained 311 US Dollar per trip in 1999 (in 1989 prices).

Since 2000 Low Cost Carriers have intensified competition gaining larger market shares. This is especially the case with Southwest in the US, where its entry forced fares down on direct routes, but to a lesser extent on adjacent routes. Morrison (2002) termed this the "*Southwest Effect*". 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 contestable (Borenstein, 1992). Although airplanes are still seen as 'capital with wings', part of airlines fixed costs are sunk like for example developing hub operations or the marketing of routes. Furthermore, incumbent airlines are not reacting slower to market entry than new entrants. They have developed sophisticated pricing strategies, but are nevertheless forced in times of crisis to short run marginal cost pricing. Airlines have difficulties to cover their high fixed costs and have a low profitability. 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 (Caves, et al. 1984, Brueckner and Spiller, 1994) subject to competition law regarding mergers and alliances, predatory pricing, cartels and price fixing (for an overview see Lee, 2006).

Regulation comes into force if airlines try to serve destinations in other countries. For these services they need traffic rights ('*freedoms of the air*'). Restrictive air service agreements allow for only a limited number of flights and carriers thereby artificially reduce supply and have fares above competitive levels. The rents are reaped by the designated airlines. Open skies agreements usually eliminate these regulations and the associated rents but some forms of ownership restrictions still prevent competing airlines to access markets (Doganis, 2002). The economic rationale for regulation is weak, but as a completely liberalised aviation market is not on the political agenda of even the most liberal countries like the US, regulation of air service agreements is analysed below.

Airlines acquire a number of inputs from upstream markets. Aircrafts are bought from manufacturers or are leased from specialised leasing companies (S_1). There is a functioning secondary market for leasing and buying aircrafts. Aircraft production is characterised by learning economies and state subsidies. There are only a few producers in certain market segments like large wide body aircrafts. Overall there is no need for economic regulation, but for competition and trade policy.

Airlines are buying fuel on the world oil market using different types of contracts including hedging against risk of oil price changes (see S_3). As refuelling can only be done on the ground, airports might create access problems for ground handling services (see below). Furthermore, airports have the opportunity 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 no problem at airports with ample capacity, but it creates access problems at busy airports. Outside the US, airlines apply for airport slots at schedule facilitated and fully coordinated airports (see S_4). The slot coordinator distributes slots following rules defined in line with the IATA rules. In the US busy

airports were rationed by a first come first served principles (grand-father rights). Only at a limited number of high density airports slot trading was practised. More or less ineffective forms of peak and congestion pricing have been practised only by a few airports notably Heathrow, Manchester and Stansted.

The way how scarce resources are allocated in air transport creates substantial welfare losses. Morrison and Winston (2008) estimate an annual welfare loss of US$ 6 billion for US-airports. Mott Mac Donald (2006) estimate that secondary trading of slots would lead to a gain in consumer surplus of + €31bn and producer surplus + €1.2 bn at current rates in 2025. Furthermore, the link between scarcity prices and investment is not working so that substantial welfare losses might occur due to a too low level of investment. Very often the runway is the constraining factor, but in some cases like for example Vienna and Bratislava ATC sets the limit. Slot allocation creates a number of access problems and regulation is analysed in more detail below.

Air traffic control (ATC) services (S_7) are another indispensable input for airlines. These services consist of local services at an airport and on route services in the upper[7] air space. ATC guides the air craft from the gate to the takeoff runway and controlling 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 on the ground and in the air so that air transport is safe and delays are minimized. Given the high fixed costs and that there cannot be two competing air traffic managing systems in the same flight corridor combined with safety concerns makes most of the ATC services a natural monopoly[8] regulated or controlled by the state in some way or the other (Oster and Strong, 2008). Large differences between different ATC organizations in terms of cost efficiency and delay management have lead to a variety of different forms of governance. In addition ATC systems have not adjusted their price structure if demand increases and peak and congestion problems occur. A reform of ATC will create win-win situations but also losers and winners.[9] Precise efficiency assessment is difficult due to the fact that as Button (2010, p. 22) argues ATC has to meet complex "*societal demands for safety and, security, and environmental protection*". … *There remains the challenge of moving towards best practices in terms of developing new institutional structures and technical standards*" .Part of these institutional structures will be regulation, which will be analysed below.

Airlines buy from airports a wide range from services (S_5) and airports supply direct and indirect services to both airlines and passengers. Airports provide aircraft movement facilities including aprons, run - and taxiways and passenger processing facilities consisting of aerobridges, baggage systems, check in, 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 (see below). Some airports provide local ATC others not (see below). Airports supply also non-aeronautical services such as car parking, restaurants, administrative office space and other commercial and retail services.

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 from the kind of services. 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[10] lack such good substitutes.

Airports with persistent market power do not necessarily have persistent 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 charges for business travellers, but the market power for parking is limited by a well functioning public transport system. Some of the profits an unregulated airport with market power reflect market power but can also reflect locational rents. The charges for aeronautical services are generally subject to some form of regulation (see below). Some airlines use long term contracts with airports. For example low cost airlines like Ryanair have long term contracts with low cost airports like Charleroi airport.

A few airports like Bordeaux, Bremen and Schiphol have differentiated their product and provide dedicated low cost terminals. Airlines and airports are usually not vertically integrated, but terminals are leased to airlines. In the US, Europe and Australia some airports have dedicated terminals. Lufthansa has a share in Fraport, its main hub and has a joined ownership agreement with Munich over a terminal building.

In the last 20 years airports have developed their non-aeronautical business on a large scale. The share of non-aeronautical revenues has risen up to fifty per cent of total revenues at some airports (Graham, 2008). This growth has happened although most of these airports are subject to a single till regulation, which indirectly taxes these activities. Furthermore, airports have voluntarily restricted their prices on non-aviation products and services to a high street level

Airports have chosen different contractual arrangements to organize commercial activities ranging from vertical integration to different forms of long term contracts. Dublin Airport Authority (formerly Aer Rianta) and BAA plc are the most notable exceptions for in-house production of the full range of commercial services. Other airports have usually outsourced many of these activities to specialised companies. Graham (2008) differentiates between concession contracts, management contracts and joint venture arrangements. This shows that many of these services involve specific investments, but there is little evidence for market failure (see below). An exception might be car parking, which generally is very profitable and airports located in cities with poor public transport might have gained substantial market power.

The heterogeneity of airport services makes is necessary to identify in which services airports have substantial market power. How regulatory institutions deal with this problem is analysed below. Before this ground handling, a service provided by airlines and airports, is described.

Ground handling consists of ramp, baggage, freight and mail, fuel and oil and central infrastructure services (see figure below). These services can be provided in-house by airlines themselves, 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 by five to seven years contracts or are produced in-house.

Figure 2. **Overview of the vertical chain for different ground handling processes**
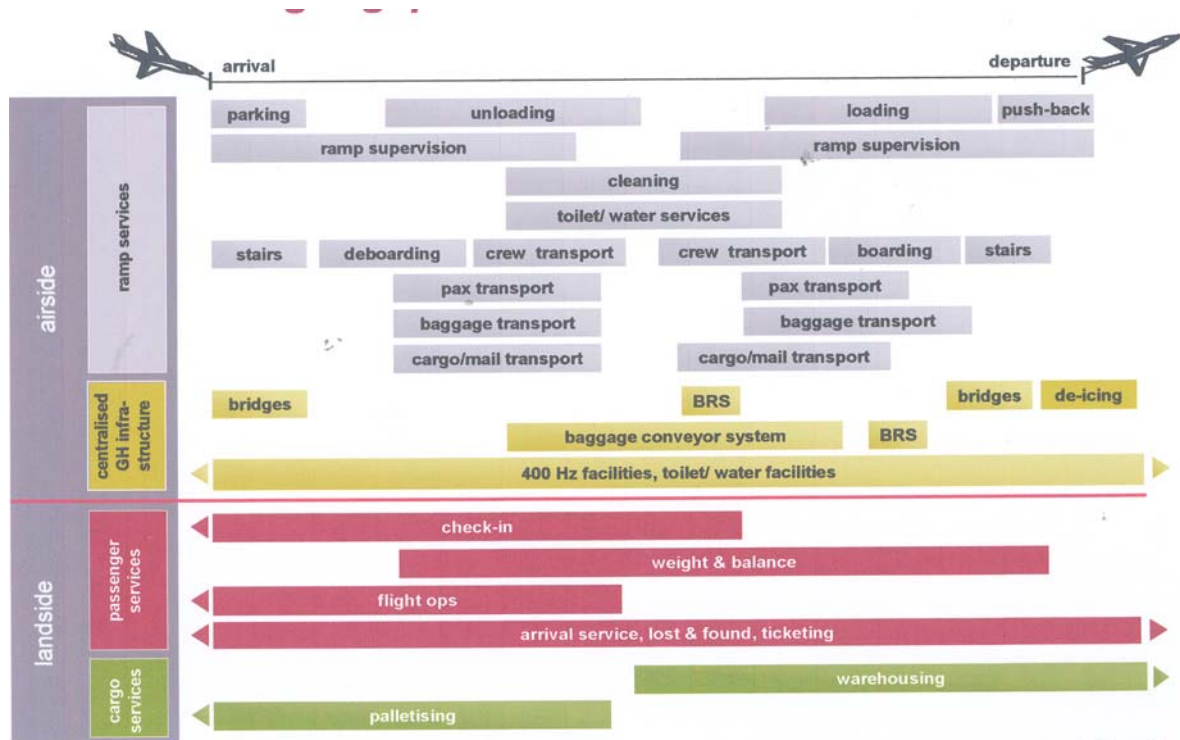
Source: Templin (2006).

In many European countries ground handling was traditionally either a monopoly of the airport or a monopoly of the flag carrier. But the rational for such monopolies has always been rather weak. Ground handling services do not need a high degree of specific investments and is therefore regarded as a contestable market (Templin, 2006) which can in principal be liberalized. This has been attempted by the EU Commission with the Directive 96/67. The directive faced a lot of resistance from various stakeholders in particular airports and labour unions. Nevertheless it has lead to substantial changes. More and more countries have liberalized ground handling (see figure below) and "*in general, prices for ground handling services decreased since the introduction of the Directive*" (Airport Research Center, 2009, p.18). However, opening up of markets faces a number of obstacles. The report of Airport Research Center (2009) on behalf of the EU Commission states that at "*airports where the airport operators stayed active, the market share of airport ground handling companies have decreased, but remained on a high level*" (ibid. p. 18). The report argues that incumbents still have substantial market power and that competition is less effective due to access problems. How access is regulated is analysed below.

Figure 3. **Types Liberalization of Ground handling Services in Europe**
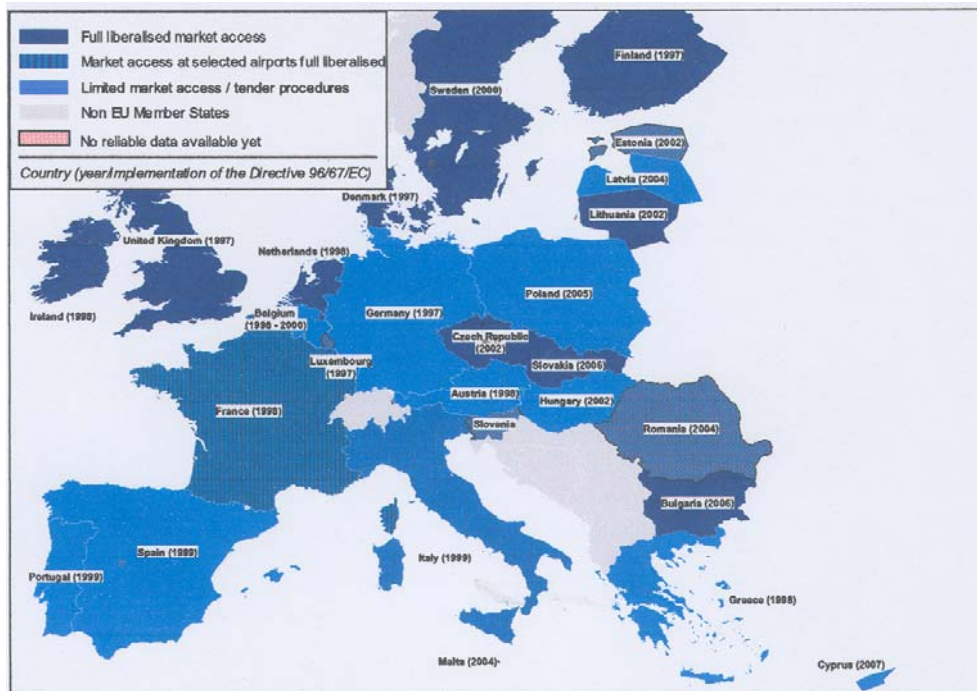
Source: Airport Research Center (2009).

3.2. Regulatory intervention

This part focuses on institutional problems of regulation in air transport. This is a wide field as regulation differs from country to country and in many countries regulation is not very transparent. Therefore this paper cannot provide a comprehensive overview, but gives examples how basic regulatory questions are addressed.

The questions to be answered are

- In which parts of the value chain is it necessary for economic or for overriding political reasons to regulate ex ante?

- Which institution is fulfilling this task?

- Is this institution well designed or could it become more effective?

These questions are answered in turn by analysing airlines (designation of airlines in restrictive ASAs), airports (charges and access to ground handling), ATC (regulation of charges) and slot coordination.

Airlines

Due to political factors air service agreements will hardly be abolished in the foreseeable future, but partial liberalization with the occurrence of Low Cost Carriers on international routes increasingly challenges the incumbent position create rents for designated carriers and creates political tensions. This raises three questions for regulation

- Who decides on air service agreements?
- Who designates which competing carriers?
- Who designates which competing airports?

In nearly all countries the Department of Transport and/or the Department of International Affairs negotiate ASA and thereafter designate airlines and airports. The only exception seems to be Australia (see below). Elsewhere politics dominates. Recent examples are the blocked entry of Air Asia X on the route from Malaysia to Sydney and of Emirates on the route Stuttgart to Dubai. In the case of Air Asia X liberalisation would undermine the monopoly of Malaysian Airlines fully owned by the government of Malaysia. The private airline Air Asia X is campaigning for this by painting the slogan "Liberate Sydney. End the Monopoly" on its newest aircraft backed by Sidney airport[11] (Associated Press, 2010). In Germany the ASA allows Emirates only to serve a limited number of airports. In the 1990's restrictive ASAs even named airports so that competition among large secondary airports was restricted. With growing demand and technological changes secondary airports become increasingly attractive to be served directly. As part of the privatization process the City State of Hamburg urged the Federal Government to liberalize restrictive ASA faster and give up restrictions on a number of airports. The initiative was based on a study by Gillen et al. (2001) that liberalization of ASA with Canada, Chile, China, Ghana, Japan, Russia, Thailand, UAE, and Ukraine increases consumer surplus by 20 per cent and producers surplus by 9 per cent. The German transport ministers of the 16 States and the Federal Department of Transport also approved the proposal, that negotiations should be guided by the principle of welfare maximization (cf. VMK, 2000). This initiative faced initially resistance from Lufthansa which was fully privatised in the period from 1994 to 1997 and from the Länder government of Hesse and Bavaria with the two hubs Frankfurt and Munich. Nevertheless, the initiative succeeded and led to further liberalisation until the emergence of Emirates in 2005. The "Inititative Luftverkehr für Deutschland" (German Air Transport Initiative) formed in 2003 by the two hubs, Lufthansa and the German ATC provider characterized the Emirates as a major challenge to Lufthansa and to the German economy. Full liberalisation with the Gulf States would cause yearly losses of 700,000 passengers and 2,000 jobs from 2012 onwards (Initiative Luftverkehr für Deutschland, 2007). The study was based on an input output model and did not address the question of economic welfare. Nevertheless the Initiative won in the cases of Berlin and Stuttgart although in the latter the prime minister of Baden Württemberg directly intervened by calling chancellor Merkel.

These examples show ASAs create substantial rents for which stakeholders are effectively lobbying. The arguments also show an important weakness. Instead of calculating the benefits and costs of liberalisation dubious effects are calculated on the basis of crude input-output models, which neglect substitution effects and treat the economy as being in a persistent state of unemployment. The result is a mercantilist policy preventing foreign carriers from entering the market, a decrease in competition and less international division of labour.

In Australia the Department of Infrastructure, Transport, Regional Development and Local Government of Australia is responsible for negotiating bilateral air service agreements and thereby determines the available capacity while the International Air Services Commission allocates the

capacity to airlines. The Commission was established under the International Air Services Commission Act 1992 as an independent statutory authority. Its overall objective is to promote *"economic efficiency through competition in the provision of international air services, resulting in:*

- increased responsiveness by airlines to the needs of consumers, including an increased range of choices and benefits; and

- growth in Australian tourism and trade; and

- the maintenance of Australian carriers capable of competing effectively with airlines of foreign countries " (International Air Services Commission, 2009, p.4)

The Commission assesses the proposals of competing carrier on public benefit criteria. It invites all interested carriers to apply and has made the process open and fair. It consists of a Chairperson and two other members. The Governor-General[12] appoints the members of the Commission usually for a period of 5 years and can re-appoint the members (International Air Services Commission Act 1992, Part 5). The Commission has substantial discretionary powers. It usually allocates the scarce capacity for a period of five years, but can shorten this period and can review its decisions if a carrier might not follow the rules, in particular if a carrier has not used the allocated capacity. It can hold public hearings for example on the development of specific routes. The authority communicates actively with stakeholders and interested parties. The Commission asks them to monitor its performance, which has been rated highly in particular its transparent and fair procedure. Also, the Commission advises the department on ASA in general. Both institutions consult each other on prospective new applicants. The Commission submits a yearly report to the DOT, which passes it on to Parliament (International Air Services Commission, 2009).

Airports

In most parts of the world airports are regulated in some form or another. This raises the following questions

- Are airports regulated by an independent body?
- Who decides which airports are subject to regulation?
- Who decides which airport services should be regulated?

The EU directive on Charges in article 11 (3) demands that *"Member States shall ensure that the independent supervisory authority exercises its powers impartially and transparently."* However, the problem with this is that independency is not clearly defined and allows member states to keep the status quo (see below figure). The discussion between airlines has been intense on the EU level and in the member states. German airlines have demanded that the DOT establishes an independent regulator because the regulator, the Obersten Luftfahrbehörden, of the Länder, faces a conflict of interest. They sit very often on the board of directors of the commercialised airports and are part of the government of federal states, which partially own airports. The regulator for network industries should also regulate airports. Airports claim that airport are a competitive industry and suggest not changing the *'well functioning regulatory system'*. They fear that a change might create a new bureaucracy. Furthermore, they claim that the function of ownership and regulation are separated if both functions are performed by two different ministries of one government. This is clearly ad odds with the concept of effective regulation and allows for regulatory capture (Beckers et al., 2010). In Austria these two

functions have been separated because the regulator, the DOT, is independent from the owner of airports. Airports are, as in the case of Vienna, partially owned by the Länder and other municipalities and fully in the case of regional airports. Nevertheless, airlines demand a reform and would like to set up a regulatory body which is more independent from the government.

Figure 4. **Regulation of European Airports**
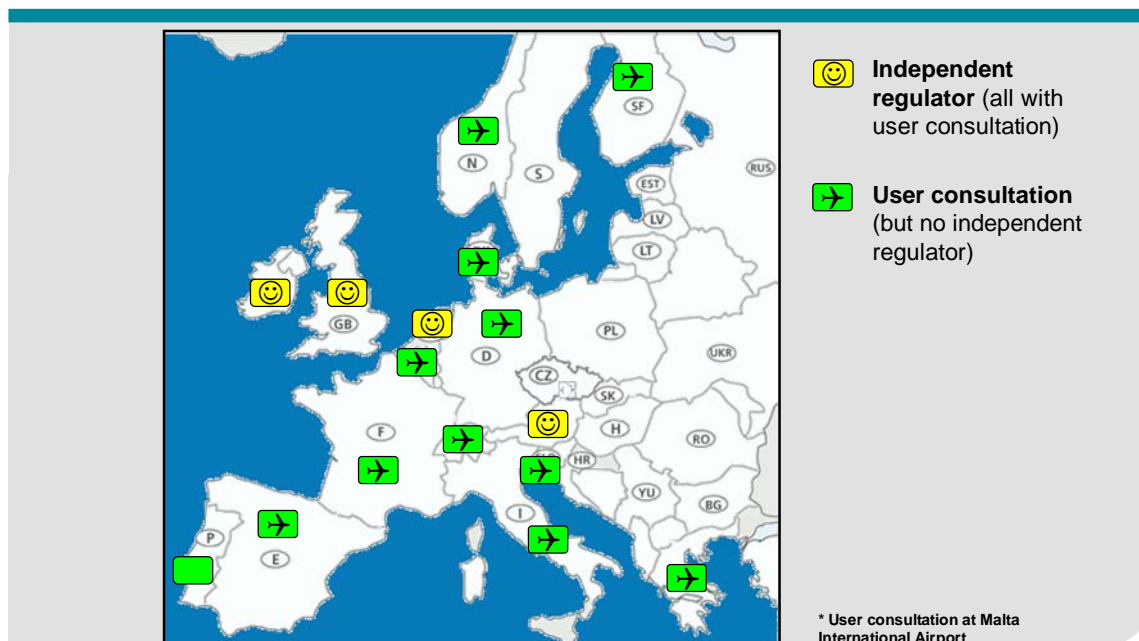
It is remarkable that the UK and Irish regulatory system have been copied in Australia but not in Europe with the notable exception of the Netherlands. Australia and New Zealand have independent regulators.

The EU directive on airport charges answers the question, which airports are subject to regulation by defining a threshold of 5 million passengers per year over which all airports are subject to regulation. This is a rather imprecise answer to a complicated question, which so far only some independent regulators have carefully analyzed. Only the UK, Netherlands and Australia have analysed the market power of individual airports in their studies (CAA, 2007; Competition Commission, 2003, 2008 and 2009, Bilotkach, 2010 Productivity Commission, 2002). These studies differentiate between the different services for aircraft movements, passenger processing and non-aeronautical activities. The next step is to define the relevant market in order to identify sources of substitution for the airport's services. The market definition is not an end in itself, but part of a more

comprehensive assessment using quantitative and qualitative analysis. The market power of an airport depends in particular on a number of demand and supply characteristics including capacity and slot allocation. The results of the inquiry of Productivity Commission (2002) into the market power of Australia airports in 2002 are reported in table 1.

Table 1. **Market power for particular airports**

Airport	Market segment	Destination substitution	Modal substitution	Airport substitution	Market power
Adelaide	Business, VFR	Low	Moderate	Low	Moderate
Alice Springs	Holiday	High	Moderate	High	Low
Sydney	Business, VFR	Low	Moderate	Low	High
Melbourne	Business, VFR	Low	Moderate	Low	High

Source: Based on PC (2002).

Australia has some geographical particularities and there is no effective competition from other transport modes. But even for this country it is obvious that a notion like the airport industry has substantive market power are misleading. European airports are facing more competitive restraints than Australians. Given this fact and that airports of a certain size must be regulated it is hard to explain why up to now in most countries neither departments of transport nor competitive commissions have assessed the market power of airports. For Europe it probably means that regulation is too narrow and to wide.

Similar the question in which airport services an airport has market power has been largely neglected. The answer depends in particular on the availability of substitutes at the airport or off airport as the results of the study of Productivity Commission (2002) show (table 2).

Table 2. **Market power in particular airport services**

Service	Market power	Assessment
Air craft movement facilities	High	Essential facility
Passenger processing facilities	High	Essential facility.
Lounge	Low	No evidence to constrain supply of space
Vehicle access facilities	High	Incentive to shift demand to car parking
Car parking	Low/mod.	Short term parking limited by other modes
Taxi facilities	Low/mod.	Charges limited by competing modes
Aircraft refueling	Mod./high	High switching cost for refueling
Aircraft light maintenance	Mod.	Access to side for third parties
Aircraft heavy maintenance	Low	Low switching costs
Flight catering facilities	Low	Good off airport locations available
Freight facility & storage sites	Low	Good off airport locations available
Waste disposal facilities	Low	Good off airport locations available
Administrative office space	Low/mod.	Incentive to constrain supply of space
Commercial & retail services	Low	Retail rentals reflect locational rent

Source: Based on PC (2002).

Ground handling

The directive 96/67/EC has slowly opened the market for ground handling services in Europe. The remaining regulatory questions to be answered are twofold.

- How to provide non-discriminatory access to central infrastructure?

- How to tender out the right to provide services at airports with a restricted number of providers?

Central Infrastructure. Article 8 of the directive defines the concept of centralised infrastructure explicitly as consisting of services like baggage handling system, de-icing facilities, passenger bridges, fixed power installations, toile services and check in systems. It is up to the member states to define these services in a transparent manner and to add other services to the list. The actual list is long and divers (See Airport Research Center, 2009, p.113). The centralised infrastructure should and must be used by all suppliers and provided to them without discrimination. It should be priced transparently

and fairly. The pricing has been criticized as too high by independent ground handling companies and by handling airlines (ibid p. 117). Airlines demand that "fees for the Centralised Infrastructure and the access to airport installation should be treated similarly to airport charges and included in the regulation" (ibid, p. 117). This demand indicates that the scope of regulation of airport charges at some European airports is too narrow (Niemeier, 2009, see above) and should cover central infrastructure.

Tender process. Member states may limit the number for baggage handling, freight, mail handling, ramp handling and fuel and oil handling to a certain number for airports of a certain size. For airports with more than 2 m passengers or 50.000 tonnes of cargo the number of third party providers may be limited to no fewer than two handling companies of which one of the third party providers must be independent from the airport and/or the dominant airline.[13] In case the airport operator is also providing ground handling an authority must select the limited number of independent suppliers.

There are several formal infringement procedures by the EC against Member States (e.g. Germany, Poland, Malta, Hungary) as these Member States may not have properly adapted the Directive especially with regard to the tender procedures, selection of suppliers, markets access barriers etc.

Effective regulation demands that at the very least the regulating authority should be separated from the owner and at best from the ministry in order to avoid regulatory capture[14]. Hence airports offering ground handling services and owned by the state or the national airline with a ground handling service monopoly should not decide on the tender. It is also unclear how the number of possible content is decided on the basis of transparent criteria. The following table summarizes how certain member states have established authorities for ground handling tenders. France and Germany have not separated the functions of regulation and ownership. In Germany the Oberste Luftfahrtbehörden decide on the tender, but either within the ministry or in a different ministry the political representative sits on the board of the airport and may give the ground handling company a competitive edge. Only in Austria the regulator is independent, but on a limited scale. Given this institutional setting which invites regulatory capture the claims of independent ground handling providers are plausible. They argue that "*the final selection seems not to be comprehensible and in some cases politically inspired*" (Airport Research Center, 2009, p.132).

Table 3. **Regulation at selected EU airports with tender for ground handling**

Country	Deregulation	Regulation
Austria	Market share of partially privatised Vienna airport decreased from 100% to 93 % in 1996 to 93 in2002 to 89 % in 2007.	DOT decides on tender. DOT is separated from owner
Belgium	Airport and Brussels Airline do not offer ground handling. Belgian law allows currently only for 2 handlers but is under revision (Avia Partner, Flight Care former Sabena Handling) and two self handlers (American Airlines).	DOT. No regulatory conflict as airport and airline do not offer services
France	ADP offers ground handling. AF self and third party handling. Penauille Serviscair is third part provider, but there are different limitations varying from terminal to terminal between two and three handlers. Market shares in 2004: AF 65 %, 13 % ADP, Serviscair 13 %, Others 8 %.	Regulatory conflict as DOT is part government with majority stake in ADP and a minority share in AF/KLM
Germany	All airports offer ground handling except Berlin airport and have a dominant position. The major shifts recently happened in Hamburg (0% share of independent handler); Düsseldorf up to 30% for independent handler and Munic up to increasing 11 % for independent.	Regulatory conflict as the respective Landesluftfahrtbehörde is part of government which has at least a majority share in airport
Greece	Olympic Airways has monopoly at airports less than 2 Mio passengers. Partially privatised Athens airport offers no services and has opened the market through tender processes	Regulatory conflict as Olympic Airways is state owned and Athens majority owned
Portugal	No detailed information available	Portugese Civile Aciation Adminstration is not an independent body
Spain	Tender process has increased competition and at some major airports 3 handlers have been allowed market access, whereas at most of the airports market access is limited still to two handlers. IBERIA with 21 has lost its dominant position as licences increased from 33 to 55. At Madrid IBERIA has one out of 8 licenses.	AENA is supposed to be independent, but has opened up the market

Sources: ARC (2009), Beyer (2010), Cross (2007) Lufthansa, Templin (2006),

Slots

Adopting a slot allocation system to ration demand raises two regulatory institutional questions namely

- How independent is the slot coordinator?
- And who sets slot limit?

In France the importance of the discretionary power of slot coordinators became important a couple of years ago (for an overview on other countries see table below). Since 1995 slots at Paris Charles de Gaulle (level 3), Orly (level 3), Lyon (level 3) and Nice (Level 2) have been coordinated by COHOR. COHOR is an independent coordinator but the organization has been subject to heavy criticism by Virgin Express[15] and EasyJet with regard to its information policy, the treatment of Low Cost Carriers and alleged preferential treatment of Air France. However, easyJet failed to prove these complaints in the European Court of Justice (2006). Nevertheless some doubts remain in particular because COHOR is not independent, but financed by its members. Any airport or airline can become a member, but the board of directors, which elects the coordinator, is appointed only by the founding members. No further complaints have been raised against the French or against any other European slot coordinator. Nevertheless the current institutional organization leaves some doubt about its effectiveness because the IATA guidelines for independency of slot coordinators (see below) have not worked well in the case of COHOR. Nevertheless the IATA guidelines can be interpreted as an attempt to change the old system where slot coordinators cooperate the dominant airline in the country. How much this attempt has achieved must be left open for further research.

Table 4. **Independence of Slot Coordinator**

	Best Practice Functional Independence	Best Practice Financial Independence
✓	The company employing the staff should be the coordination entity	Multiple parties representing various stakeholders share funding of the coordination entity
✓	An alternative employment arrangement is a clear secondment contract to the coordination entity	Single till' approach which allows some internal cross subsidy in the coordination entity
✓	Financial stakeholders review budget only	Not for profit organization (cost recovery primarily but allow for ICAO principle of reasonable margin)
✓	The Board of the coordination entity cannot influence coordination decisions	Revenue generation acceptable but must not affect the functional independence
✓	Separation of physical location or independent office facilities	Secondments from stakeholder organizations are acceptable but financial control of coordination staff through pay must not be in the hands of stakeholders
✓	Separation of coordination software systems and schedule data from other stakeholders e.g. airlines or airports	
✓	The coordinator must conduct business in an independent manner	
✓	No conflict of coordination role with other activities	
✓	No single stakeholder holds a majority interest	
✓	All stakeholders should be consulted in the appointment of a coordination entity	
✓	Separation of coordination role from sanctions role in order to maintain a 'balance of power'	
✓	Free from external direction	
	Poor Practice	**Poor Practice**
✗	Active employees of interested stakeholders are responsible for coordination (governments, airports, airlines)	One party fully funds coordination
✗	Dual role (coordinator/airline scheduler)	Coordination is subsidized by an interested party

Source: IATA (2010).

The importance of setting slot limits becomes obvious in a recent comparison between the US and Europe based on the 34 busiest airports in 2007 to 2008. Odoni and Morisset (2010, p. 1) summarises it as follows: "*In general, US airports achieve higher capacities, in terms of aircraft movements, than their European counterparts by using visual separation procedures when weather*

permits and by not placing slot constraints on the number of movements that can be scheduled at airports. European airports, on the other hand, limit air traffic delays and increase schedule predictability by using slot controls and by determining the number of available slots with reference to airport capacities under instrument meteorological conditions". The difference is not so much a technical one but signals two different ways to allocate scare resources (see below figure).

Figure 5. **Model of EU and US slot constrained airport**
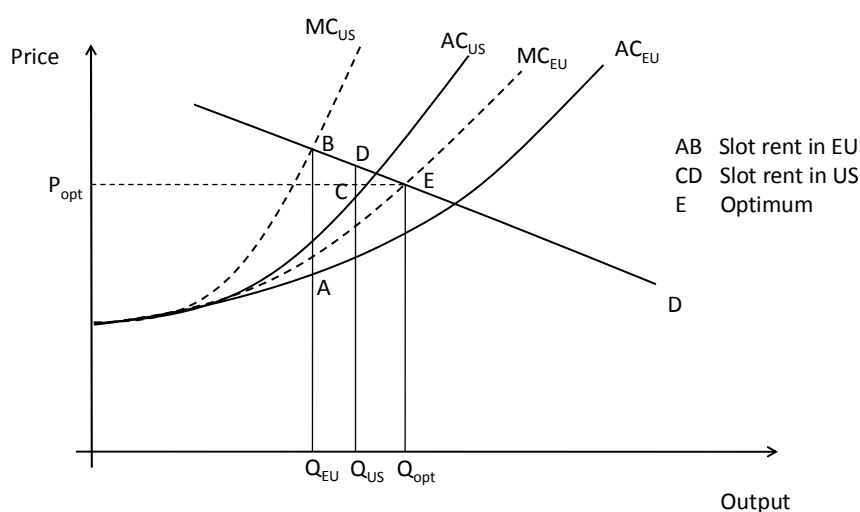
In the US the constraint is set more to the right (point Q_{us}) and by relying on queuing selects the upper congestion function (MC_{US}) while Europe sets a stricter constraint (Q_{EU}) and selects the lower congestion function (MC_{EU}). Ceteris paribus the slot rent reaped by airlines in the US (line DC) is lower than in Europe (line AB). This result depends both on the rationing device and the slot constrain. Rationing by coordination substantially reduces congestion, although the current system does not give the slot to the user with the highest willingness to pay[16]. Ideally the slot constraint should be set at a point (E) at which the marginal benefit (slot price) equals the marginal congestion cost (Forsyth and Niemeier, 2008). Most probably neither the US DOT nor the DOT of each European member state set the slot constraint at an optimal level. A reform of the system would also have to address the question which authority should set the constraint. Profit maximizing airlines have an interest in low congestion costs and reaping high slot rents. Profits maximizing unregulated airports with market power have an interest to limit output and reap scarcity and monopoly rents. Both stakeholders might not be the ones who should determine capacity. The question then is whether the DOT is independent from both stakeholders to make the welfare maximizing choice. This presupposes also knowledge and expertise. The current practise in Europe lacks an economic approach and is more driven by an engineering approach to determine technical and operational capacity of certain qualities. Therefore it might be better to shift the responsibility to the slot coordinator or to the airport regulator, but if and only if these institutions are truly independent.

ATC

Commercialisation and public private partnerships have raised hopes for stronger incentives towards cost efficiency but also concerns regarding the abuse of market power. Also public ATC systems face principal and agent problems. Delays, pricing and investment decisions become increasingly important. Some airlines have acquired a share in their national ATC. This puts even more weight on the question

- How independent is the regulator of ATC?

The table below provides an overview of selected ATSs. While historically ATS were organized as a state department an increasing number of countries have moved away from this form. The exception is the US which, rather late in 2005, formed the Air Traffic Organization (ATO) an organization within the Federal Aviation Administration. According to Oster and Strong (2007) the ATO suffers from organizational independency, lack of accountability and a disconnection between cost and revenues drivers. The ATO is financed through excise and general taxes while other countries rely on user charges. Most countries have separated management from regulation in some form. The EU Parliament (2004) has asked its members to separate these functions in a bid to develop a Single European Sky: "*The national supervisory authorities shall be independent of air navigation service providers. This independence shall be achieved through adequate separation, at the functional level at least, between the national supervisory authorities and such providers. Member States shall ensure that national supervisory authorities exercise their powers impartially and transparently.* (Article 4)" The separation creates problems for EUOCONTROL, which provides ATC services and assists the European Community in regulating ATC services. Oster and Strong (2007) criticize the dual role of Eurocontrol in the inevitable consolidation of a fragmented European airspace: "*The consolidation may well lead to competition among ANSPs to seek which will take on more airspace and which will take on less. In such a world, the ANSPs view EUOCONTROL as a competitor but one whose ability to shape regulation gives it an enormous, and arguably unfair, advantage*" (p. 68).

A unambiguous separation has been adopted in the UK. The partial privatisation of NATS with a minority share for a consortium of airlines was combined with a reform of regulation along the lines of British public utility price cap regulation. NATS is regulated by the CAA. This form of governance was also discussed in Germany in 2005. The German provider Deutsche Flug Sicherung (DFS), a limited cooperation fully owned by the federal state, was planned to be privatised and price capped in 2005/6 and a consortium of airlines was planning to bid for a substantial share of it. However, the privatisation law was not signed by the German President for legal reasons. Since then privatisation has been postponed although the management and the airlines are lobbying for it. In 2009 a new regulatory authority was implemented in accordance with the EU directive. The "*Bundesaufsichtsamt für Flugsicherung*" is a separate regulator, but not as independent from the DOT as the CAA (BGBL, 2009).

Australia and Ireland have also organized their ATC as a government owned corporation and have given the regulator a more independent status. Independency is clearly missing in France. The DNSNA is an autonomous entity and regulated by the DGAC, the French civil aviation authority, which belongs to the DOT.

Table 5. **Governance of selected air navigation service providers**

Country	ATC Name	Ownership	Regulator
Australia	Airservices Australia	Government corporation	Commission oversight
Canada	NAV CANADA	Not-for-profit private corporation	Legislated principles/appeals
France	Direction des services de la navigation Aérienne (DSNA)	State department	DGAC (French CAA) Approved by transport ministry
Germany	Deutsche Flugsicherung GmbH (DFS)	Government corporation	Bundesaufsichtsamtes für Flugsicherung (BAFG)
Ireland	Irish Aviation Authority	Government corporation	Regulatory commission
Netherlands	Luchtverkeersleiding Nederland (LVNL	Not-for-profit government corporation	Approved by transport ministry
New Zealand	Airways Corporation of New Zealand	Corporation	Self-regulating/appeals
South Africa	Air Traffic and Navigation Services Ltd.	Not-for-profit joint-stock corporation	Transport ministry committee
Switzerland	Skyguide	Not-for-profit government corporation	Approved by transport ministry
United Kingdom	National Air traffic System, Ltd.	Public/private partnership	Civil Aviation Authority Independent regulator
United States	FAA's Air Traffic Organization	State department	Financing from taxation

Source: Based on Button and Dougall, 2006. Updated from various ATC websites.

Other countries restrict the profit maximizing behaviour of their ATCs. This is the case in Canada where a club of airlines owns and manages ATC, as is the case in the Netherlands, Switzerland and South Africa. These countries aim at combining private management styles, but want to limit profit

maximizing motives by applying for example the non-for-profit principle. Interestingly this mix of motives can also be found in the privatisation of NATS. "*The choice of the Airline Group had other advantages. It has presented its bid as being on a 'not for commercial return' basis*." (UK House of Commons 2002 as quoted in Steuer, 2010, p 29). The objective of non commercial returns in itself does not eliminate the need for regulation. This is so because ATRS provider might still have incentives to discriminate among its users especially if a larges number of users is not represented in the group of share holders. In the case of NATS the CAA (2004) pointed out that the principle of not for profit making was not part of the contract and therefore not binding. The CAA concluded that "*in itself, this is not a basis for treating NATS differently from any other regulated company*" (ibid, p. 13). Giving a group of ATC users a share in ownership is akin to vertical integration. This might have positive and negative effects, which largely depend on what extend the interest of the share holders approximate the interests of the users as a whole. In case of NATS BAA is representing the interests of airports and a group of 8 airlines presents roughly 30 per cent of all airlines. The danger might be that users are discriminating against each other through the fee structure (although this is limited by the legal framework of EUROCONTROL which might also be discriminating) and by providing a sub- optimal trade off between cost and services. As the average cost of ATC services is in the range of 5 per cent of an airlines operating costs, service quality in terms of delays becomes relatively more important. Compared to a profit maximizing unregulated ATC provider NATS might provide a service quality with less delays. It might be a different way to internalize delay costs. However, regulation and ownership by users are going in the same direction as both prevent the management from providing too lower quality. Therefore the CAA concluded that ownership structure of NATS "*should be a positive force for users as a whole in setting the direction of NATS, but there is a need for these arrangements to be buttressed by effective regulation to help ensure a sharp focus on users' concerns.*" (CAA, 2004, p.12)

Overall, while there is a general trend to commercialise ATC services and to separate management from regulation only a few countries have given the regulator the necessary independence to achieve truly effective regulation.

4. SUMMARY: REFORM OF REGULATORY INSTITUTIONS

The analysis of the regulatory intervention in the value chain of air transport has shown a large variety of governance models with effective regulatory institutions. However the analysis found also that some regulatory institutions were allowing for both regulatory capture and mismanagement. From review a picture of best practice and a blue print for regulatory reform emerges (see table below).

Table 6. **Overview on regulatory institutional reform of air transport**

	Regulatory reform	**Country**
Air Service Agreements	First option Full liberalization. Second option ASA by DOT and designation be independent commission	Australia
Airports	Independent regulator for airports with market power. Designation of airports by DOT or commission	UK, Ireland
Ground handling	First option Full liberalization. Second option central infrastructure charge regulated by airport regulator and tender by independent airport or independent regulator	Denmark, Ireland, Netherlands, Sweden UK
Slot allocation	Independent slot coordinator with independent regulator on slot constraint	Australia
ATC	Independent regulator	UK

Countries with an Anglo-Saxon tradition have led the way towards regulatory reform. The UK has privatised its public utilities in the 1980's and 90's. It had to develop quickly regulation preventing monopolies from exploiting consumers and encouraging private investment into assets with sunk costs characteristics. Other countries have been more reluctant to reform regulation of air transport:

- Australia has an excellent system in allocating capacity determined by negotiations on air service agreements. The system could be improved if Australia adopts the first best option, namely full liberalization. In this respect it seems that Australia is less liberal than for example the US.

- The UK model of airport regulation and regulation of public utilities can serve as a blue print in the design of effective regulatory institutions in other countries. . The UK approach is not perfect and might be heavy handed, but at the very least independency of the regulator is guaranteed. Ground handling is a market that should be fully liberalized throughout EU countries. The tendency towards full liberalization should be enforced by the EU Com, but it faces resistance from countries like France and Germany where the airport regulator lacks independency. Regulatory capture leads to regulatory failure in the regulation of airports and in the access regulation to ground handling. Both effects are leading to substantial welfare losses: German airport regulation is cost based for partially liberalized airports, which sets incentives for high costs and gold plating (e.g. waste of resources and provision of excessive

quality). French airport regulation of partially privatised ADP airports is incentives based, but on a low scale. In both countries ground handling prices have not fallen as much as in comparable liberalized markets.

- The French and German airport regulatory systems do not set incentives for allocative efficient price structures. A point they have in common with most other European systems. Allocation is done by slot allocation consisting of the government decisions on the number of coordinated movements and the distribution of slots by slot coordinators. The system has lead to lower congestion than the US system of queuing, but could be improved if the slot constrain were determined independently to optimal levels and slots were allocated through secondary trading. Such a system should be organized by an independent institution. Unlike past experience, no complains regarding independency of slot coordinators have been raised lately. However national slot coordinators could be easily given a more independent role.

- The role of an independent regulator for ATC will become more urgent if the general trend to commercialise ATC services and to separate management from regulation gains momentum. So far only a few countries have given the regulator the necessary independent role to achieve effective regulation.

Environmental and safety regulation is not covered in this analysis. The former might lead to blockade of infrastructure expansions and high congestion costs. The latter might lead to high safety fees and longer travelling times. These are important problems for further research in particular because such interdependencies might only be effectively addressed if regulators are also more integrated in the state's governance by providing his knowledge and information (see Bartle and Vass, 2007)

The current regulatory institutions are far from being effective enough to increase economic welfare. This is the case for models in which air transport is organised as a mixed public utility with elements of competition for air transport services, public ownership and regulation for infrastructure on the one hand and for models which rely on private public ownerships on the other. Both models could be organized more effectively if ownership and regulation of monopolistic bottlenecks were clearly separated, because independent regulators provide long term commitment for immobile and specialised investment. The greatest tensions are created when downstream markets are liberalized and while the upstream infrastructure market remains regulated by dependent regulators especially if the functions of ownership and regulation are not clearly separated. This opens the door to regulatory capture. Even if regulators with a strong sense of public duty and inspired to work in the public interest are not captured, conflicts are created between the regulated firm and its users so that investors will demand safeguards against regulatory risks. Dependent regulators raise barriers to private investments in airports and ATC. Continental Europe has with a few exceptions only dependent regulators and typically partially privatised airports with minority private shareholdings. This weakens the incentives for cost and allocative efficiency in the short run, but in the long run it prevents the spreading of competition and therefore possible positive long-run competitive effects. Some parts of the value chain of air transport (e.g. ATC) are unlikely going to be subjected to effective competition. However some other elements of the value chain might, through growing demand and other technical changes (e.g. reduction of time and costs of alternative modes of transport), be subjected to effective competition. If and to what extend this potential can be realised depends largely on the ability attract private capital and entrepreneurship. Dependent regulators might effectively prevent competition by turning former natural monopolies into legal ones and by access discrimination. The latter is happening in ground handling at a number of large European airports (e.g. ADP and Fraport). The full price for such inefficiencies is difficult to detect. There is evidence of inefficiencies at airports, ground

handling, slot allocation, ATC and also in airlines (Button, 2010, Oum, et. al., 2006, Winston and de Rus, 2008). But these estimates are largely based on the status quo operating in markets which have fully explored the potential of efficiently organizing this industry. The full costs of inefficiency will become obvious if one imagines air transport to be organized as a well-functioning supply chain in a competitive industry.

NOTES

1. National Air Transport Services, UK's ATC.

2. For the case of multiproduct firm the condition is changed to a sub additive cost function (Baumol *et.al.* 1997).

3. The following principles follow from the recommendations of the OECD in 1995: "Good regulation should: i) serve clearly identified policy goals, and be effective in achieving those goals; (ii) have a sound legal and empirical basis; (iii) produce benefits that justify costs, considering the distribution of effects across society and taking economic, environmental and social effects into account; (iv) minimise costs and market distortions; (v) promote innovation through market incentives and goal-based approaches; (vi) be clear, simple, and practical for users; (vii) be consistent with other regulations and policies; and (viii) be compatible as far as possible with competition, trade and investment-facilitating principles at domestic and international levels." (OECD, 2005)

4. See the publications of the Better Regulation Task Force, in particular on the role of independent regulators. Better Regulation Task Force, 2003)

5. See APEC-OECD (2008)

6. In addition, liberalization led to increases in service provision and growth in number of markets served. The contribution to economic growth and tourism has also been large.

7. above twenty four thousand five hundred feet.

8. However, note that a lot of empirical questions are to be resolved as there is evidence of both increasing and decreasing returns. These studies are based on data collected on established ATC centers, which have been created by history not optimization. An economic interesting and highly political question concerns the optimally sized ATC area (Gillen, 2010)

9. All users will benefit from a lower price level due to cost reductions, but only some will benefit from higher peak and lower off peak prices.

10. Aéroports de Paris (ADP) owns Charles De Gaulle and Orly. It faces only mild competition from Beauvais Airport, situated 84 km in the north of Paris. Although the passenger numbers have risen dramatically, it is still marginal (2000: 0,38; 2005: 1,8; 2007: 2,2 millions) ADP- airports (2000: 73,5; 2005: 78,7; 2007 86 millions). Hub competition for Charles De Gaulle has been reduced by an alliance with Schiphol. Heathrow and Frankfurt have excess demand. There is some competition from other modes. The TGV is an important competitor for regional air transport and for the Paris London route (Forsyth et al. 2009).

11. Russel Balding (CEO of Sydney Airport) is reported to say "We look forward to welcoming AirAsia X. Fundamentally, airlines should be able to fly where passengers want them to go (Streetcorner, 2010).

12. The Governor-General is the representative of the Australian monarch (Elizabeth II). He or she exercises the supreme executive power, but acts only on the advice of the prime minister or other ministers.

13. Airlines with more than a share of 25 per cent of passengers.

14. In such a case the EU directive demands that the decision should be taken by "competent authorities of the Member States which are independent of the managing body of the airport concerned, and which shall first consult the Airport Users' Committee and that managing body" Art. 11

15. Commercial Director Sies comments: "It was a joke. First, we put in an offer to take over part of Air Lib's assets and staff to get slots-as the government had indicated-but then COHOR decided not to take the argument into account. Then Virgin Express, acting independently, was allocated a set of slots which were, for the majority, absolutely useless, at least for the economics of an LCC. With the slots that were allocated to us we would achieve a daily aircraft utilization of around seven hours while we target 11. Also, in order to use the morning slots to Rome we would have to station an aircraft overnight, which was, needless to say, not our idea of establishing a base in Orly." (Paylor, 2004, p.2).

16. Slots are traded in the UK and the market is regards as working fairly well. Elsewhere a grey market for slots does not exist.

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