"Airports as two-sided markets? A critical contribution"

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Abstract:

This paper critically assesses recent applications of the two-sided markets literature on airports. It is argued that airports are not two-sided platforms and that the connection between airlines, passengers and airports is better described by a vertical relationship. The role of non-aeronautical activities is also investigated and a case is made that the standard theory of a multi-product monopoly is best suited to describe the connection between the aeronautical and non-aeronautical business. The paper though acknowledges that the effects of the vertical relationship and the role of non-aeronautical revenues have implications that are similar if not identical to what the two-sided markets concept would have concluded if it was applicable to airports.

Keywords: Airports, airport economics, two-sided markets

JEL classification: D43, L52, L93

1. Introduction

In the past years there has been an increase in the literature on the concept of two-sided platforms. These are platforms in which two (or more) groups of consumers come together and receive utility from interacting with each other. A classic example is a heterosexual dating agency, which needs both women and men to work. Women only benefit if men join the agency and vice versa. The agency must bring both consumer groups "on board" to function properly. One could also say that there are network externalities present between the two groups. The utility of one member of group A depends on the number of members in group B. Yet the decision to join the platform at a given price does not reflect the impact this has on the utility of the other group members. The implication is that the dating agency needs to take these externalities into account when setting prices for these two groups. It might be for example that men gain more from having many women at the dating agency than the other way around. This might induce the agency to price women lower than men. Another often quoted example is credit card companies, which bring retailers, banks and shoppers together. A widely accepted credit card will be more appealing to shoppers, while a widely-used card is more likely to get accepted by retailers. The credit card company has to be astute in setting the prices for each group of "consumers" in order to get everyone involved and this will be determined greatly by the extent of the benefits each group enjoys from the participation of the other groups. The theoretic framework for this is laid in Roche & Tirole (2003 and 2006) and Armstrong (2006). Applications and criticisms can be found in Wright (2003) and Roson (2005).

Recently this concept of two-sided markets has been applied to the airport business. It is said that airports must bring together passengers and airlines in order to work. The more destinations, flights and airlines are offered at an airport, the more likely it is that passengers are going to fly from that airport, and the more passengers an airport can attract the more it will be able to attract new airlines. Gillen (2008) was one of the first to mention this connection explicitly and stressed some implications and fallacies that result from the application of the two-sided market concept for airports. Furthermore, as for example Morrison (2009) argues, airports factor the revenue streams from their non-aeronautical

activities into their pricing decision. It is argued that because of the complementarity between aeronautical and non-aeronautical revenues airports bring together passengers and airlines and thus function as a two-sided platform.

This article will critically assess whether airports really are two-sided platforms, whether the concepts can be applied and whether it matters from a policy perspective. The next section will point out that airports and airlines are in a vertical relationship, but that the way in which these two parties are connected leads to effects and externalities that are similar to the effects of two-sided markets. The third section discusses the role and influence of non-aeronautical revenues for airports and section four discusses the findings and explains policy implications. Section five summarizes and concludes.

2. Airports as two-sided platforms?

In an obvious way it is very tempting to conclude that airports are two-sided platforms. As said in the introduction airports bring together passengers and airlines. Passengers are attracted if they are offered a large number of destinations, frequencies, choices of different airlines, convenient schedules and so on. Airlines on the other hand are more likely to pick an airport as a point of operation if a lot of passengers can be attracted to fly to and from that airport. Both parties obviously gain from each others' presence. In models for two-sided platforms this has implications for the pricing of the two groups. What matters is, among other things, the relative size of the effects. Remember the example of the dating agency, where it was presumed that men over-proportionately benefited from the participation of women. This would lead to strong competition for women and thus ultimately high prices for men and low prices for women. It could also mean that it is profitable to let women in for free (maybe even subsidize them) and to make money on the participation of men. The yellow pages could be another example for this. The telephone book itself is usually distributed for free and the firms have to pay in order to be included into the yellow pages. Obviously the effect of being represented in the yellow pages outweighs the gains the group of users receives from having any particular firm in that book. Credit card companies sell financial services to consumers (credit cards) and merchants (transaction services). The respective utilities that consumers gain from merchants that

accept credit cards and that merchants gain from consumers having credit cards and using them as means of payment determines the price structure (usually consumers pay an annual fee and merchants pay a usage fee) and level of charges for both consumers of the credit card company.

Roche and Tirole (2003) define two-sidedness in such a way that the volume of transactions (output) fluctuates if the price structure (relative prices between the two groups) changes whereas the price level (defined as the total revenues from both sides of the platform) remains unaffected. If that does not hold true the market is said to be one-sided. It could be said that this is the case for airports. However one discovers an ambiguity about this definition if it is applied to airports. This is because passengers usually pay no entrance fee at the airport. They never have and it is likely that they never will. Just as shoppers do not pay any entrance fee when they want to go to the shopping mall, passengers pay nothing for entering the airport. Indirectly some airports charge a per passenger fee, but that is charged to airlines and it is up to them to pass the fee on to the consumers. It would be very unusual for a retailer in a shopping mall to break down the price for a product into the core product price plus any charges the shopping mall imposes the retailer. In the airline business this however is common practice. Yet, the passengers still bear any cost of using the airport through the ticket price just as the shopper bears cost for using the shopping mall through the prices the retailers set for their products. It could be argued that because of this two-sided markets theory for airports is valid.

However, there is a difference between not having to pay for something and not getting sold something. In the case of airports passengers pay no entry fee because they are not getting sold anything by the airport in relation to the aeronautical product, i.e. in relation to the actual flight. As Evans and Schmalensee (2007) point out in their definition of two-sided markets, that a platform arises in situations where there are externalities that the two parties could not have solved differently (or with lower transaction costs) than by using the platform as means of exchange. It is important to point out here that the platform sells both parties something that enables them to “come together” and to interact. With airports, this is not the case. When a passenger arrives at the airport to check-in usually the ticket is already purchased. The airport is not actively seeking to bring airlines and passengers together. Either the airlines already have a connection to the consumer (e.g. through their website) or a

ticket agent or online search and booking machines have brought airline and passenger together.[1] The airport is merely an input for the airlines. Notwithstanding it is an essential input, as the airport enables aircraft to land and organizes passenger flows on behalf of the airlines. Yet merely the fact that passengers need to go through an airport in order to fly is rather a technical requirement and has little to do with the lowering of transaction costs or internalizing cross-group usage externalities. In order to transport passengers from one destination to another airlines need passengers being processed through an airport. Accordingly they pay for such services. Hence, the relationship between passengers, airlines and airports is purely vertical. The only reason why airports might charge passengers directly in relation to the aeronautical product is when they charge passengers instead of airlines for any passenger related handling activities. This case is discussed below.

Having said that the connection between the three players airport, airline and passenger, is vertical does not have to mean that interdependencies do not exist. However, these are well known from textbook models and are called vertical externalities. For example, the effort level (a term frequently used in vertical models, c.f. Rey and Vergé, 2008) by the airlines has repercussions for the airport. Say airlines at a given airport and at given prices increased frequencies and number of destinations, which attracts additional passengers. This is costly for the airlines only. Obviously, it is of benefit to the airlines (since otherwise they would not have done it in the first place), but it is also beneficial for the airport due to the increased demand of airport capacity, but the airport did not incur any costs.[2] Likewise, airlines benefit from operating flights to and from regions with a high population. Hence they demand a lot of airport infrastructure in that region. The passenger numbers are generated by the airlines and thus the airport's large catchment area is not due to the airports doing. Clearly any increased passenger inflow also has positive effects on non-aeronautical revenues, but this is left for the next section. What was important in this section is to recognize that the vertical relationship between airports and airlines has implications that are similar to the cross-externalities between

[1] In this case the ticket agent really is the two-sided platform.
[2] This is however only true if the airport does not need to build additional capacity to accommodate the additional demand. In that case they airport would incur investment costs if the decision to expand capacity is taken.

different users of a two-sided platform, i.e. that the pricing and product decision of one firm have consequences for firms at other stages along the vertical structure.

Before turning to the non-aeronautical business of airports a question needs to be addressed that might arise in the context of vertical structures. What would happen if the airport charged passengers directly? Say for example, the airlines do no longer pay the airport for passenger handling processes, but that instead passengers have to pay themselves for being processed through to their aircraft. In this case, the basic vertical relationship remains the same, but the connection turns more into what Evans and Schmalensee (2007) call software platforms. Software platforms, like Windows or Apple, or videogame console developers are said to bring software developers and end users together, just as the airport is said to bring passengers and airline together. Yet that assessment fails to recognize that from the consumer's point of view the products are what can be called perfect complements. In these cases the consumer is forced to buy the input himself before buying the product that is actually consumed. Put differently, the connection between the alleged platform and software developer is not independent of the connection between developer and end-user, i.e. the connection between the two customer groups of the alleged platform.[3] Consider consumers would have to buy razors and razor blades from two separate companies, but the razor company additionally holds patent rights for the blade system. They charge for the razors and receive license fees from the blades producers. That kind of arrangement does not make the blades producer a two-sided platform. The reason is that the product the razor producer sells to blades producers is not to enable blades producers and end consumers to come together. For the blade producers, the license is merely and input factor. The costs for this input factor are (partly or completely) passed on to the consumers, which cannot happen in two-sided markets. Going back to the example of the dating agency, imagine a partnership established and men were to find out that they had paid more than their new partners. If men demanded compensatory payment from women both parties could internalize their usage externalities ex-post, thereby circumventing the platform's pricing scheme.

[3] Take for example EBay. EBay is a platform, because it does not care what connection buyers and sellers have on their website. It just cares that many transactions take place, but the connection EBay has to either consumer group is independent of the connection the groups have between themselves.

In setting their prices both blade producers and the razor producer must recognize that they sell complementary products. Whenever blades are bought, the need to purchase a razor will be anticipated and is therefore ex-ante internalized by the consumer. There could as well be one firm selling razors and razor blades, which actually is the case in reality, but that would not change the basic relationship between the products. In such an integrated case there would be no license fee for being allowed to sell the razor blades, but otherwise the connection between the products remains the same. The blades department acquires the input razor by the razor department and a general manager must set a price for the readymade razor system. Hence, the firms' price setting rationale must consider the vertical relationship between razor and razor blades departments and the complementarity between their products. Two separate firms would have to act in a similar way, the only difference being that coordination might be more difficult and more than two firms might be involved. About the same would be true if airports simultaneously charged passengers and airlines. In this case passengers and airlines would be required to buy the input factor "airport". However, there are no externalities (other than vertical externalities) present in this case. From the consumer's view, the decision to buy the input "airport" is already reflected and internalized by the decision to buy an airline ticket and thus the demand function for airline tickets already reflects the demand for the input "airport".

3. The role of non-aeronautical revenues

So far it was argued that airports are not two-sided markets, but that the relationship between airports and airlines is purely vertical. Any externalities that may arise are resolved or remain unresolved within this vertical structure. For example, it was argued that increases in the number of destinations offered by the airlines increases demand for airline tickets and therefore demand for airport slots, although the airport did not do anything for this increase in demand. This is a simple vertical externality and there are several ways to solve this coordination problem in the vertical restraints literature (see for example Rey and Vergé, 2008). Yet, additionally airports usually sell various non-aeronautical products to passengers, such as food and beverages or clothes. There exist different business models for non-aeronautical business. For example, some airports have their own shops while

other airports have contracted out such services and receive fees in the form of concessions. Either way, any increase in demand from the aeronautical side results in an increase in demand for non-aeronautical products. Viewed that way, could the airport be a two-sided platform?

It could be claimed that passengers have to pay indirectly a price at the airport by buying things inside the terminal. Revenues from the non-aeronautical side represent a major source of revenue in the today's airport industry. It is the revenue streams that stem from this part of the airport business and the complementarity between aeronautical and non-aeronautical revenues that, according to Starkie (2001), airports might not abuse their market power. The argument is that, because of the complementarity between the two revenue streams, airports have an incentive to lower the price on the aeronautical product in order to raise demand for the non-aeronautical product. If the resulting increase in profits is larger than the forgone profits by lowering the aeronautical price it would be profitable to do so. The question is however whether the aeronautical and non-aeronautical products are really complements in a strict microeconomic sense. In microeconomics two products are called complements if a price reduction (increase) in one good leads to an increase (decrease) in demand of some other (complementary) good. One also says that the cross-price elasticity must be negative. In other words, complements are products that "go together", such as hamburgers and cola, coffee and cream or fish and chips. The question now is whether flying and shopping at the airport are complementary products. One could also ask whether a negative cross-price elasticity between flying and shopping exists. Empirically one might find such a relationship, because as the price of the airline ticket goes down passengers might be more willing to shop at the airport. Even though statistically that might be detectable, it is still questionable whether this also works the other way around (i.e. would passengers fly more if the price of the representative non-aeronautical products would go down), and whether the two are "true" complements and do not just move together because of income effects.[4] The question is whether one can draw an indifference curve mapping flights on one axis and shopping

[4] Microeconomic theory distinguishes between gross and net complements. The aforementioned definitions were for gross complements. The problem with this definition is that there can indeed be an ambiguity with respects to the effects, i.e. one good can be a complement for the other, but not the other way around. This is because the gross definition of complements also takes income effects into account. Under the definition of a net complement utility is kept constant and thus income effects are left aside. Furthermore, there is no ambiguity with respect to the definition of complements. If one good is a net complement for the other then it unambiguously also works the other way around.

at the airport on the other axis. In this case one would have to be able to trade-off flying and shopping and still yield the same utility along one and the same indifference curve. It would mean for example that one is able to lower the number of flights and increase the amount of shopping at the airport and still get the same amount of utility. Such a construction would obviously be bizarre. This is because flying and shopping at the airport are a different kettle of fish. The two goods are not or at least very weekly linked through the underlying utility function. There is a utility function for flying and a utility to be gained from being able to shop at the airport. Adding the two together does not seem to make much sense because there is no trade-off between the two.

However, even if flying and shopping at the airport are not strictly speaking net complements (see footnote 4) the gross, or Marshall definition of complements allows the two to be complementary. This is because of the income effects that can accompany price reductions in one good and lead to an increase in consumption of the other good proportional to the share of the overall budget. Income and substitution effects can work in opposite ways. What matters is the overall effect of income and substitution effects. Thus, it could be possible that, although otherwise unrelated, passengers shop more at the airport if the ticket price is lowered. Although unintuitive, the reverse could also be true, that is that passengers fly more if they pay less for non-aeronautical products, albeit this is a highly theoretical case considering that the ticket price plays a bigger role in the overall budget. Therefore, a firm selling both aeronautical and non-aeronautical products considers the complementarity between these two products and the standard multi-product firm theory applies. This will be further elaborated in the next chapter.

Starkie (2001) discussed quite early the relationship between the two business streams, although he never explicitly argued that the two products are complements, rather that there are complementary revenues. Yet, the real question in the context of this section is whether this connection is an example of a two-sided market? Here again one must go back and look at the underlying utility function. When speaking about aeronautical and non-aeronautical products one must be aware that the former product is demanded by passengers and the latter by shopping passengers. Hence, the group of consumers is changed. Passengers simply come to the airport to fly, whereas the shopping passengers also buy at the

airport. Thus, all shopping passengers must necessarily be passengers, but not all passengers are necessarily also shoppers. Once a passenger decides to shop, this is done not for the sake of flying, but for the sake of shopping. Therefore, one moves to another utility function. There is obviously no relation between airlines and shopping passengers. Airlines do not benefit from the presence of shopping passengers and shopping passengers do not gain from having a larger range of destinations and airlines at the airport. Thus the utility function does not exhibit any cross relationships between the two groups. Shoppers gain from buying things, passengers gain from flying. Moreover, the previously mentioned definition by Roche & Tirole (2003, cf. section 2) does not apply. Even if the aeronautical output increased if the price of non-aeronautical products was lowered and the overall price level between the two was kept constant, still does not prove two-sidedness because the outputs are different (shopping passengers and passengers).

There is still one component of the non-aeronautical business that so far has been implicitly ignored and that is car parking. This is generally considered to be a non-aeronautical business arm of airports. Either they operate their own parking garages or they receive concessions. From the consumer's point of view however car parking charges are directly related to the product "flying". A passenger would not decide to park at the airport if it had not been for the decision to fly.[5] Passengers will anticipate any trip related fees such as the ticket price, car parking charges, waiting times etc. and form a decision whether or not the overall price is too high or not. Again, the airport is not internalizing anything, since the purchase of the ticket signals the willingness to pay all the trip related fees, including car parking. Thus, car parking charges create another vertical externality between airlines and airports. These charges are not a cost to the downstream airlines, but since they affect the passengers' full cost of flying (i.e. the ticket price plus car parking charges and all other charges) they have an effect on the overall demand and hence have an impact on airlines.

If the aeronautical and the non-aeronautical products are complements, but not an example of two-sided markets, there is unambiguously a connection between these two activities. Furthermore there

[5] The exception here are consumers that go to the airport for landside shopping, which also has implications for the non-aeronautical business itself. Compared to the passenger business however such effects seem negligible and only valid for some airports.

are vertical externalities that also have nothing to do with two-sided markets, but they are going to have an impact on the price setting rationale of airports either. The next section will elaborate on the effects of the complementarity between aeronautical and non-aeronautical products and the vertical coordination problems between airlines and airports.

4. Discussion and policy implications

Considering the standard economic model of a multi-product monopolist (see for example Lipczynski et at, 2005), it can be seen that depending on the cross-price elasticities and economies of scope there might be an incentive to charge a price for one of the products below that what would have been charged for the product compared to a situation in which only one product was sold. It could (theoretically) even be the case that one product is priced below marginal costs or even at a negative price. The same could therefore be true for airports and their aeronautical and non-aeronautical products. If there are scope economies - which seems intuitive since, for example, terminal space must be build anyway - and the main impact of the income effect works in such a way that a price decrease in the aeronautical product boosts non-aeronautical demand more than a price decrease in the non-aeronautical product would boost demand for the aeronautical product, there is an incentive to charge a lower price for the aeronautical product and a higher price for the non-aeronautical products. In other words, under the appropriate cost and demand assumptions, there would be an effect just as Starkie (2001) described, which means that there would be an incentive for the airport to lower the aeronautical prices (below the 'normal monopoly level) in order to boost non-aeronautical revenues to maximize profits.

That however does not have to mean the price for the aeronautical product is lower than the price for the non-aeronautical product. The described complementarity effects only affect the relative price levels compared to a situation where the monopolist would maximize profits for each product individually. The exact scope of the effects depends on the relative sizes of the demand functions, the cross-price elasticities and on economies in production. For example, if the cross-price elasticities are negligible and non-aeronautical demand relatively small there would be only a very small incentive to

lower the aeronautical price. On the other hand, in an extreme case it could be that the airport is selling the aeronautical product at a zero price and generates cash only on the non-aeronautical side.[6] The truth will be somewhere in between these extremes and the exact scope of the incentive to lower aeronautical charges will be different from airport to airport and is thus an empirical question. This implies that it cannot be taken for granted that all airports have a built-in incentive to lower aeronautical prices large enough to conclude that airports might not abuse their dominance in their aeronautical activities. Instead this should be considered from case to case.

There is an important condition that must be met, that is however often ignored in textbook models of multi-product monopolists. It refers to the second order conditions for finding a maximum in profits. Generally this states that the total second derivative of the profit function must be negative for a maximum to exist. The second partial derivatives of a profit function with two outputs essentially looks at the changes in marginal profits as prices are being varied. Assuming that the own second partial derivatives are always negative (since own price elasticities are negative) it must be true that the cross-partial derivatives cannot be bigger than the own second partial derivatives. In other words this implies that the cross-price elasticities must not be larger than the own price elasticities, since otherwise a maximum in profits will not be guaranteed.[7] This implies that there is a theoretical limit to the cross-price effects.[8] Considering that air travel demand is largely inelastic, cross-price effects might not be high in reality.

Earlier this paper argued that externalities might arise since airports and airlines are within a vertical structure. The downstream airlines pay charges to the upstream airport for the provision of infrastructure and passenger and baggage handling processes. Just as in any vertical structures this can

[6] In an even more extreme case the airport might decide to subsidize the aeronautical product with revenues from the non-aeronautical side. It would imply that the airport would make more money from shopping passengers than from flying ones. In this case passengers have a greater demand for shopping at the airport than for actually flying from A to B. Although theoretically interesting, this remains a hypothetical case.

[7] Formally it is required that $\frac{\partial^2 \pi}{\partial^2 p_i} \frac{\partial^2 \pi}{\partial^2 p_j} - \left(\frac{\partial^2 \pi}{\partial p_j \partial p_i}\right)^2 > 0$, with p_i and p_j being the prices of the two complementary goods in the profit function $\pi(p_i, p_j)$. The argument concerning elasticities holds true for profit functions with additively separable cost functions, i.e. with cost functions with constant marginal costs and to economies of scope. For general cases it is better to speak of own- and cross-price effects.

[8] This argument seems intuitive. If cross-price effects were larger than own-price effects, a change in one of the prices would have an over-proportional effect on the other good that perversely impacts revenue generation for that good.

give rise to double marginalization problems (cf. Rey & Vergé, 2008). This problem arises because both the up- and downstream levels maximize their profits individually instead of jointly. Compared to a situation with a vertically integrated monopoly, in the non-integrated case final consumer prices would be lower and quantities larger. Ideally the airport would charge a price that is equal to its marginal costs, but since it sets its price above marginal costs[9] the downstream airlines receive a price that sends the wrong incentives concerning their own price setting. The outcome is bad for airports, airlines and the consumers. Furthermore, efforts to increase demand by one party will also be beneficial for the other party, but the former will receive no compensation from the latter. Consider an airline at a particular airport increases its quality, network or reliability. Then more passengers are likely to use that airline and consequently more passengers use that airport, which will experience a windfall in profits (also through non-aeronautical revenues). Yet, the airline receives no compensation for its efforts from the airport. Another externality could arise in relation to parking charges. As said above, these charges are not a cost to the airlines, but to the passengers. The passenger will consider all related charges in advance and aeronautical demand will be affected by these charges accordingly. Thus, the decision to buy an airline ticket already reflects the willingness to pay parking charges. In other words: parking (or any other costs related to airport access) and flying are perfect complements. But since the airport is maximizing individual profits the parking charges could mean bad incentives for passenger demand. This implies that parking charges are likely to be too high from the airlines' point of view, since a vertically integrated company would keep these charges lower.

The implications for policy are that non-aeronautical revenues are important and should be taken into account concerning price regulation of airports. If for example only aeronautical revenues are subject to price regulation (and non-aeronautical revenues are not), this could have malignant effects on non-aeronautical prices, which might increase in the process and thus lead to distortions in demand. On the other hand Starkie's (2001) argument might be valid that price regulation is not at all warranted because the incentive to lower aeronautical prices might suffice for airports' not to exploit their market power. This would be true for airports with big non-aeronautical demand and strong cross-price

[9] Although the aforementioned complementarity effects could lessen and theoretically offset this effect.

elasticities between aeronautical and non-aeronautical demand. With respect to the vertical constraints of airports it should be kept in mind that in a free market environment the up- and downstream parties would have incentives to find optimal price structures (such as two-part prices) on their own. In the case of airports the usual practice is to have ex-ante posted, aircraft weight based landing charges, which are not able to avoid, for example double marginalization. However, this business practice is changing. At Sydney airport for example, light handed regulation has enabled the airport to change its pricing policy drastically and it now strikes individual and secret contracts with the airlines operating at that airport (see for example Schuster, 2009). Yet there are more and more airports that use contracts and negotiated prices as their dominant business practice to cooperate with airlines. Regulatory schemes should enable airports and airlines to find optimal price structures that help vertical coordination and oversight should prevent restrictive and abusive behavior.

5. Conclusion

This paper argued that airports are not examples for two-sided markets. Passengers benefit from airports that have a greater choice of destinations, airlines, better schedules and so on. Airlines on the other hand benefit from a large number of passengers in an airport's catchment area because that allows them to achieve higher load factors. It was however argued that this view does not deliver new insights, but is best described by a vertical relationship. Just as in a two sided market, the airport must recognize that its charges have effects that go beyond the airlines, but affect also passenger demand and thus, indirectly also the airport's profit position. However, a vertical structure is different from a two-sided market in the way that the passenger's decision to buy an airline ticket already reflects the willingness to pay airport charges. Hence there is nothing that the airport could internalize, which it would have to do if it were a two-sided platform. Instead the airport must realize that it faces a derived demand. Therefore, its pricing decisions will have effects on the airlines and thus ultimately on final consumer demand. Hence, the airport's individual actions might not be optimal from a vertically integrated perspective.

Problems that arise in vertical structures, such as double marginalization, are usually solved differently from industry to industry and, for example, non-linear tariffs are not uncommon. In the airport industry it is becoming practice to strike individual deals with airlines that establish the terms of use and the pricing system, which may include two-part prices (see Schuster, 2009). Airports and airlines should be allowed to find their own ways to internalize the vertical externalities that arise because of their business activities. Restrictive price regulation as well as public ownership that is not geared towards commercial practices potentially hinders such vertical coordination strategies.

Furthermore, it was argued that the connection between aeronautical and non-aeronautical activities is not an example of a two-sided market. Airlines gain utility from passengers, not from shopping passengers. It was argued that the two goods are complements, largely due to income effects. The implications from the standard model a multi-product monopolist are very similar, if not identical, to those by Starkie (2001) and Morrison (2009). They argued that profit maximizing airports have a built-in tendency to lower the price for the aeronautical product below the point they would have charged in the absence of the connection to the non-aeronautical side of the business. This paper pointed out that this is only achieved under certain assumptions (complementarity effects must work strongly in one particular direction and/or strong economies in production must be present) and that the scope of this effect could be different from airport to airport (depending largely on the demand parameters). If non-aeronautical demand is very low from the onset and very elastic the airport is not going to make much money from it and hence it will not lower the aeronautical price significantly. If, on the other hand, non-aeronautical demand is very large and rather inelastic the airport will reduce the price of the aeronautical product (at an extreme case below marginal costs or even to zero) and make more money from the non-aeronautical activity. Thus, although aeronautical and non-aeronautical activities of airports are not an example of a two-sided market, the connection between the two still has similar effects and has implications regarding the pricing of the two products.

The concept of two-sided markets does not seem to enrich the discussion regarding airport regulation and competition. Yet, the connection between aeronautical and non-aeronautical activities and the vertical coordination effects do matter and they matter in a way that is quite similar to what a two-

sided market analysis would have concluded if it were applicable, yet the concept itself is not needed for analysis. Instead the tools needed to analyze airport economics are already at hand, but they need to be applied in a correct manner. The arguments brought forward in the previous section indicate that the need for regulation can be very case-specific and should take into account vertical coordination effects.

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