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Airport Subsidies and Congestion in North America : the Need for Accounts and a Regulator within Virtual World Trade Organisation Rules

by

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ABSTRACT

We examine the potential role of airport slot trading as a congestion internalization mechanism in North America. We argue that the air transportation system is massively subsidized both in Canada and in the United States and that the imposition of prices that recover full direct costs, including environmental costs, would severely reduce the potential need for any slot trading scheme. We also argue that in many airports a severe problem of monopoly regulation would arise if current pricing control institutions were modified, as Canada has started to do. Slot values are a buffer that would also residually reflect true demand driven scarcity not captured by carrier hub dominance, landing fees and airport passenger charges.

Keywords : airport competition, Canada, United States, air transport subsidies, slot trading.

RÉSUMÉ

Nous analysons le rôle éventuel d'un marché de créneaux aériens comme remède à la congestion aérienne en Amérique du Nord. Nous prétendons que la suppression des subventions cachées très importantes dont bénéficie le transport aérien et l'imposition de prix qui recouvrent tous les coûts directs de l'aviation, y compris les coûts environnementaux, réduirait l'utilité d'un tel marché, tant au Canada qu'aux États-Unis. Nous prétendons aussi que des réformes institutionnelles affaiblissant la régulation des prix des services aéroportuaires, comme on peut en déceler la trace au Canada, pose de sérieux problèmes de régulation de nombreux aéroports aux caractéristiques monopolistiques. La valeur de créneaux transigés sur un marché est une valeur tampon ou résiduelle qui incorporerait la partie de la rente de rareté négligée par les transporteurs dominants des hubs ou les tarifs aéroportuaires imposés aux aéronefs ou aux voyageurs.

Mots-clés: concurrence inter-aéroports, Canada, États-Unis, subventions aériennes, marché des crénaux aériens.

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1. Introduction : trade, transport and airports

Bringing transportation into trade. Transport costs have impacts on resource allocation that can be formulated and thought about in the same way as taxes and subsidies: they affect the (c.i.f.) relative prices that determine apparent spatial comparative advantage. As transport costs can represent a large proportion of the delivered price of goods, and incorporate large subsidies, they could be expected to be a proper object of World Trade Organization (WTO) discussions and at the core of discussions on the liberalization of particular modes, such as those pertaining to air liberalization.

But this is not the case yet. Countries, such as the United States and Canada, will have serious quarrels about stumpage fees on lumber exports (perhaps 2-3 % of the total cost of delivered lumber) but will ignore the potentially much larger implicit transport subsidy received by the 62-ton 8-axle trucks carrying this wood on roads for which they might not be paying their due share of fully allocated costs, for instance in Canada (Lawson, 1993). Similarly, service industries are entering the WTO arena, but no mention is made of the fact that many such industries, such as head-office or consulting services, depend much on the availability of underpriced airports and air traffic control services.

All transport system layers matter. If one thinks of the three-layer construct of the air transport system, consisting in carriers, air traffic control and airport infrastructure, there is a clear need to deconstruct it and to ask the right questions about each layer, as each poses distinct problems of regulation. In terms of competition, deregulating carriers is one thing, because a strong case can be made for the presence of competition subject to the normal anti-trust regulation. But deregulating natural monopolies such as air traffic control systems and airports is another.

It is not sufficient to desire efficiency for a particular layer : obtaining « economic » prices for a layer, while neglecting the others, might move us further away from optimal spatial comparative advantage. For instance, trucking deregulation in North America led to sharply lower charges but accelerated the destruction of roads—yielding very ambiguous results : in the United States, the recent decision to spend 230 billion $ coming mostly from the Highway Trust Fund, to rebuild the interstate network almost certainly involves a disproportionate contribution by the lighter vehicles that caused very little destruction of the road pavements. Similarly, some will whine about carrier subsidies at the OECD discussions on air liberalization (Michalski, 1999) but simultaneously remain totally silent about huge hidden airport infrastructure and air traffic control subsidies (including tax expenditures).

From carrier to airport competition. The *prima facie* presence of large (capital) subsidies or tax expenditures, combined with large sunk costs, relatively long planning times and significant spatial monopoly power at airports makes it difficult to disagree with Panzar's wrap up comment (Panzar, 1999) at a conference we organized to take stock of 20 years of air liberalization that « airport competition is going to replace flag carrier competition as the national rivalry. The European Union is going to have to engage in some serious thinking about airport anti trust policy for want of a better term. »[1].

Slot prices : the straw, the beam, or the shock absorber ? All layers matter for the full price. The same applies to congestion or peak usage charges in any form, for instance in the form of slot prices of particular interest to the organizers of this Lecture. Slot and gate charges can be thought of as « value buffers » reflecting in part both relatively high consumer demand and

[1] A French version of the papers presented at that conference is in press (Gaudry et Mayes, 2001).

relatively low landing and terminal charges and their structure. Their value will depend on infrastructure capital subsidies, landing fee price structure for various aircraft types and services, such as general and commercial aviation, and capture any uncaptured pure location rent associated with the zoning authorizations (the value of the permit to operate an airport) minus any market power rent associated with any local asset dominance of a hub-dominant carrier.

Cost, demand and the slot price buffer as residual. If one excludes time-varying landing charges—they would function as peak-load charges and be substitutes for slot costs— in any form, the value of slots is a sort of buffer or residual varying within two implicit boundaries defined primarily by the answer to two questions: (a) are the airports recovering their full direct costs ? (b) if airports were privatized, would the permit to operate (the zoning designation) without a regulatory cap be worth much ? Positive slot prices may be less a straw, compared to the beam of infrastructure subsidies, than a global measure of governement failure to balance supply and demand at prices that both recover costs and reflect full spatial scarcity rents.

We treat the « slot price buffer » as a scarcity fee, analogous to high season, day-of-the-week or other existing time-of-day airline surcharges. As airlines already extensively practice peak charging on many forms, they could be accused of hypocrisy if they refused time-varying landing charges in order to protect the local component of hub-dominance rents.

Peak charges and efficiency. Such peak charges are easier to understand, specify and implement than optimal short-run marginal cost charges but are clearly positively correlated with them. Indeed, we will not formally discuss optimality and the links between peak charges and classical externality taxes aimed at the difference between short run average and marginal costs. This classical point of view consists in representing, for each link of a network, the congestion characteristics of this link : in Figure 1, the average and marginal times increase beyond point H and a system optimal assignment required to obtain a marginal cost assignment at q_2 implies an «externality tax» equivalent t_3t_2. This theory, stated *ad nauseam* by economists, for instance again by Mohring (1999), has had no implementation success except in the guise of a peak load surcharge.

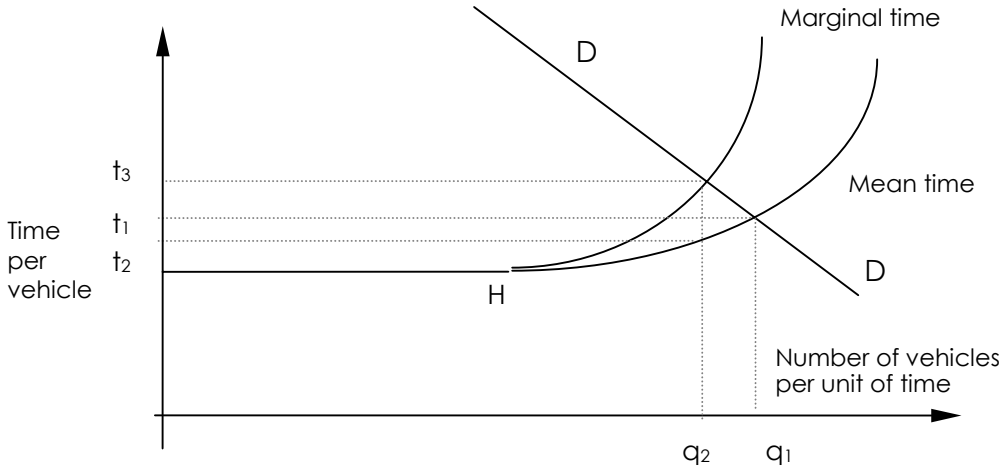

Figure 1. Volume-delay curve

But peak charges differ from externality charges conceptually based on short run marginal cost calculations. And not only in the case of congested facilties. Many believe that airports benefit from economies of scale that, in the presence of congestion, require subsidization if prices are to be equalized with marginal costs.

Necessary cost recovery. We believe that this view of economies of scale is neither true, nor warranted if true, and that full cost recovery is, as a rule, always desirable for airports : we believe that eficient prices provide for full financing as well.

In this context, we want to ask two questions about slot charges, defined as a buffer or residual : (i) to what extent are they an implicit function of public subsidies ? (ii) would they frequently exist if all airports were privatized under a «licence to steal » regime ? Our suspicion on the first issue is that full direct cost recovery by North American airports would considerably reduce room available for such charges because current prices would have to rise significantly for existing subsidies to be discarded. Our suspicion concerning the second is that, were the complicated institutional restraints on airport pricing to be lifted, many locations with considerable « theft » potential could extract spatial monopoly rents in one form or another, including the sale of slots.

We shall try to provide an intutitive answer to each question in turn. The first question requires a system of accounts. The second some quantitative measure of spatial maket power. Both are missing, in an analytical sense, but some guesses can be made.

2. Virtual air system accounts

Public sector accountability without accounts. Congestion is associated both with the capacity of the Air navigation system and with the capacity of commercial airports, but we focus here on airport congestion and on its relative worth. So, do commercial airports pay their way ? In the United States and Canada, there is no complete set of accounts allowing a fair answer to this question by a proper accounting of aviation-side revenues and resource costs in all forms. It is more difficult still to compute cost recovery for commercial and general aviation or to obtain such measures by aircraft type. And it even more difficult to estimate the costs of noise, pollution and, if appropriate, of excess congestion—of the amount of congestion beyond the optimal amount.

In Canada, this situation might soon change : *The Canada Transportation Act, 1996* (Section 52 (a, b and c)) obliges the Minister to report to Parliament on the financial viability of the modes and on all resources provided directly or indirectly at public expense to all carriers and modes of transportation. This revolutionary obligation of accountability requires the development of accounts. And a broad view of subsidies should include externalities. We are not aware of similar obligations in the European Union. This means that the 1995 European Commission Green Paper on Fair and Efficient Transport Pricing (Commission, 1995), intended to be an essential reference for the development of the Common Transport Policy, has no hands. To have hands—even if a little dirty, accounts are necessary. For this reason, no doubt, the European Union's 5th Framework Program for transport (DG VII), available since March 1999, includes Task 2.1.1/2 « Transport network accounts and marginal costs in relation to fair payment for infrastructure use ».

Large air system subsidies in Canada. Fortunately, the Canadian Royal Commission on National Passenger Transportation (Hyndman, L.D. *et al*., 1992) has elaborated a first set of such «virtual » accounts for the year 1991, in order to provide a rough measure of the cost recovery of commercial aviation making use of the 98 airports in which Transport Canada has a significant interest. This set includes almost all airports with scheduled services and excludes the hundreds of small community airports in Canada. The results, for the system as a whole, and for the Montreal-Toronto link, are shown in Table 1 where « others » designates the population in

general in the case of environmental costs and designates government in the case of other types of costs and fees. The infrastructure line includes all approriate costs, including the oportunity cost of capital, depreciation, administration, etc. for both the infrastructure and the traffic control layers of the air system. It appears from these figures that users pay about 82 % of all costs of the system as a whole, including environmental costs but excluding any excess congestion costs, and a lower proportion (70 %) of the same costs on the largest market route. A major element of this subsidy is due to the tax expenditures implied by the relatively small rents paid by users to taxpayers for land and terminals. Although these numbers can be disagreed with in their specifics, as is true of all estimates, and clearly vary across airports, their order of magnitude is reasonable.

Currently, both Vancouver and Toronto airports are said to be significantly congested. But they are also the airports with the highest tax expenditures on the value of land and terminals : in the calculations of Table 1, the value of land for these two airports is conservatively estimated at 1 250 million $ (1991). Only a small part of the congestion is due to general aviation (excluded from Table 1 calculations) currently generating costs estimated at 200 million $ per year at these two airports. So, if airports were obliged to recover all costs, perhaps by raising the landing fees by 20-30 %, and without special provisions for general aviation, how much congestion would remain in equilibrium? In Canada, not very much. The « residual buffer » size will clearly depend on the specifics of the cost-recovery formula, such as the relative roles of per movement, per passenger and gross weight charges. Of course, a 30 % increase in fee income is compatible with the simultaneous introduction of time of day peak charges, or slot prices in their absence, but the buffer might be very thin.

Table 1. Annual Costs of Intercity Domestic Air Travel,
Paid by Users and Others, 1991, in 1991 Dollars, Canada and Toronto to Montreal

Totals : $ millions						
	System-wide (25 billion pass km)			Toronto-Montreal Route		
Type of cost	**Users**	**Others**	**Total**	**Users**	**Others**	**Total**
Infrastructure	556	845	1 401	22	20	42
Environmental	0	247	247	0	6	6
Accidents	25	0	25	0	0	0
Special trans. tax/fee	149	-149	0	3	-3	0
Vehicle/carrier	3 595	0	3 595	111	35	146
Total	**4 325**	**943**	**5 268**	**136**	**58**	**194**

New local airport authorities or stronger local monopolies in Canada? In Canada, the answer is even more difficult to give than implied above because the devolution of federal airports to non-profit local airport authorities (LAA), announced in 1987 and effected principally since 1992, and the creation in 1998 of a separate self-funded organization for air traffic control, called NAV Canada, has removed the clear « essential services » classification of many of these airport and air navigation employees that effectively prevented them from striking since 1982. The consequences of this have not yet unravelled. In the absence of a similar new mechanism mimicking to the extent possible a solution that reflects the opportunity costs of these employees, they may well use this sudden gift of monopoly power to extract remunerations and working conditions well in excess of their social opportunity cost, as happened generally in urban transit systems. This extraction of a new pound of flesh, over and above the new pension plan and employee benefit packages offerred shortly after devolution (for instance in Montreal) would further increase the average cost of air travel and reduce the available pure peak load buffer space of interest here.

Probably comparable air system subsidies in the United States. How different would comparable figures be for the U.S. system ? In 1989, there were about 400 primary airports in the U.S., accounting for over 95 % of air passenger emplanements on scheduled domestic air carriers and over 99 % on certified air carriers. But the system of « public use » airports had 5 680 members, including about 1 700 privately owned and the rest generally the property of local and state administrations (« Authorities »).

It is possible that the implicit capital subsidy in American airports is of the same order of magnitude as in Canadian airports, because these airport authorities: (i) generally finance investments with State-garanteed tax-free revenue bonds—an advantage that can be equivalent to about a one third capital subsidy, as Bombardier calculated for the Texas High Speed Rail project; (b) receive direct capital subsidies from state, local and federal administrations.

Consider for instance federal grants. For the Airport Improvement Program (AIP), in 1989, 3 272 airports (as well as 412 proposed new airports) were listed as eligible for these federal capital improvement grants and included in the National Plan of Integrated Airport System (NPIAS); and about half of the federal capital subsidies available under that AIP program went to the primary commercial airports. As for the National Airspace System (NAS), including air traffic control, federal funding covers almost all capital and operating costs. In toto, between 1982 and 1989, only 57 % of all federal funding for aviation came from the Airport and Airways Trust Fund, a revenue account supported by various aviation user fees and charges : the rest (43 %) was covered by the General Fund of the U.S. Treasury (U.S. D.O.T., 1990).

This basically means that both subsidies and tax expenditures are pervasive and very large. So the other costs of airport operations, however complicated (for a summary, see Langer, 1996) and varied their financing, are to be understood on a beam of capital and operating subsidies, from all levels of government.

Other considerations that would affect slot prices. As also well explained by Langer (*op. cit*.), the two forms of attainment of budget equilibrium in U.S. airports (called the compensatory and the residual structures), involve varied arrangements on landing fees (often the object of long-term 30-year contracts), gates (often rented by firms for 40-year contracts, and sub-let afterwards to other firms) and ticket counters (92 % of which are on long-term exclusive rental basis). Her description of the management of U.S. airports gives a proper summary of each element of this multi-layer problem, with many interesting tables showing the frequency distributions of the various long-term arrangements.

Concerning slot trading, Langer's summary of the history, monitoring and prices of slot trades and their values at the four « slot coordinated » high density airports in the U. S. (O'Hare in Chicago, La Guardia and J.F. Kennedy in New York, and Washington National in Washington, D.C.), based on the available information, suggests that air fare might increase 5-10 % after the introduction of generalized slot trading. These estimates, based on CD Scicon (1991) study for the United Kingdom, do not precisely take into account the fact that air fares at high density airports already reflected the scarcity of slots even before the implementation of slot trading at those airports in 1986.

Full cost direct recovery at all primary U.S. airports might therefore easily imply 20-40 % increases in air ticket prices, sharply reducing the possible share of peak load charges.

3. The value of the franchise

Trends in demand and supply. But surely, the evolution of demand, and the spatial monopoly power of various locations, are also important in making our guesses. Over the last 20 years, air travel has grown considerably, driven in particular by tourism that has grown faster than international trade, itsef growing about 60 % faster that Gross World Product. All forecasts, for instance those of the Airports Council International (ACI) representing 523 authorities running 1300 airports in 160 countries (25 % in developing countries), for the next 15 years suggest a doubling of demand from current levels, with passenger growth around 4,9 % worldwide and freight about 8,4 % per year (or, as usual, about 50 % faster than passengers). Aircraft movements are expected to grow by 3,2 % per year, due to the shift to larger aircraft. On the freight side, for instance small packages, representing almost 0 % of freight 20 years ago in the U.S., now account for more than 60 % of total freight : similar developments at the world scale can be expected. On the supply side, about 350 billion $ of large airport capital investments are planned during the same period. This will barely suffice to meet the expected demand. Generally speaking then, the market power of individual airports is not expected to fall. But how large is it now ?

Competition among airports. Although many researchers have studied air demand, the most sophisticated work on airport competition is perhaps that of Mandel (1999a, 1999b) for Germany. His models take into account time-of-service and airline choice, choice of access/egress mode to/from airports, choice of airport and choice among air services at airports, mode choice and destination choice. As all networks in Germany are well developed, market power estimates for Germany should underestimate market power in countries with less dense networks and longer distances.

In consequence, we draw from one of his many scenarios, « Local pricing strategy », dealing with a potential increase in passenger fares at an international airport—the « passenger facility charge », in U.S. jargon, increasing to 50 DM at Hamburg airport. And we draw from his figures to illustrate the results. Figure 2 depicts the simulated market share losses for that airport and Figure 3 summarises the passenger shifts among the competing alternatives, with 197 000 passengers shifting to other airports and 638 000 to other modes.

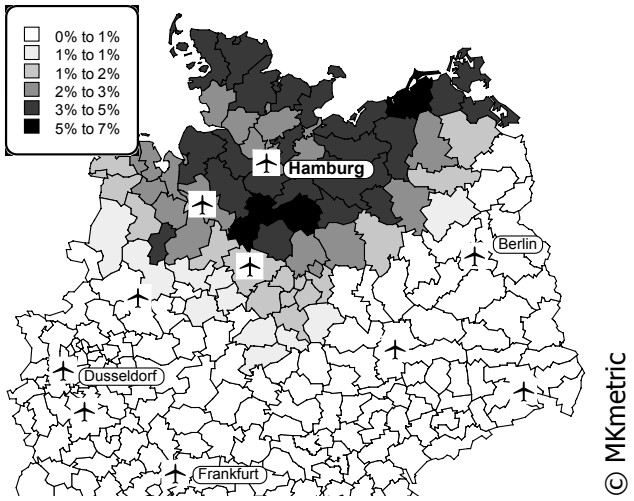

Figure 2. Market share losses Hamburg 1991: all destinations

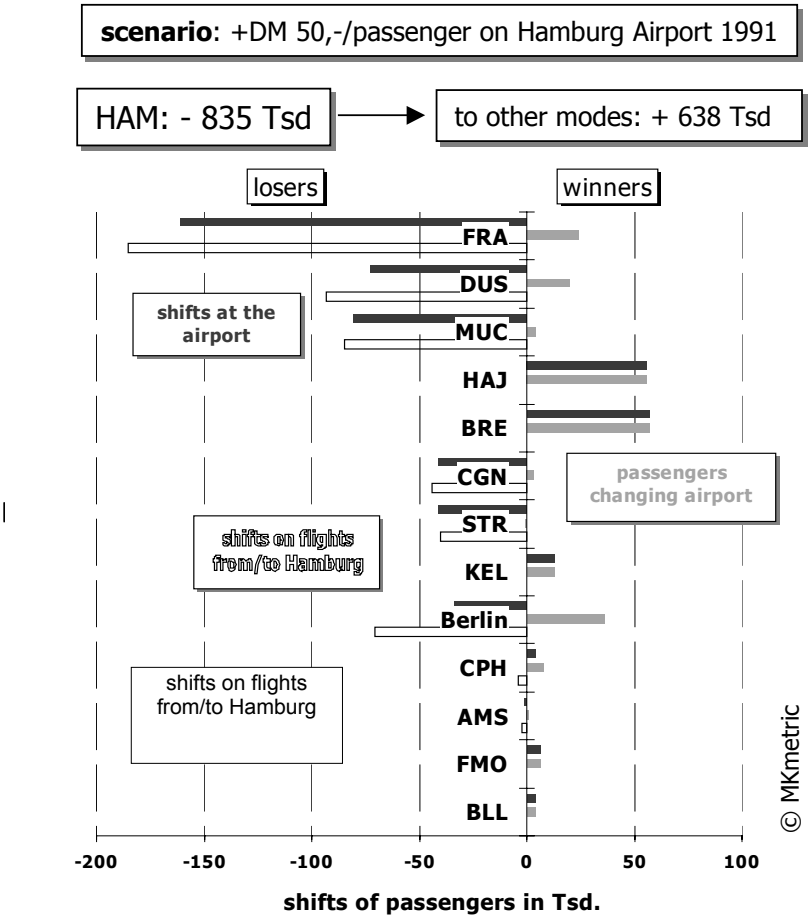

Figure 3. Passengers shifts

Mandel further analyzes the changes by trip purpose, destination, etc. as well as the derived demand for the different aircraft types (Figure 4) and, finally, the changes in airport revenues (Figure 5) as the passenger « tax » is increased, without the other airports or modes changing their prices. Although Mandel does not explicitly introduce the formal measures of market power

found in the industrial organization literature, for instance the ability of an airport to raise charges by 10 % and not suffer more than a 5 % loss in market share, this and other measures are all derivable from his refined models.

In Europe, airport rates and charges account for about 15-18 % of total airline operating costs. In this context, privatization with a « licence to steal », i.e. without anti-trust rules, could clearly lead to unusually high location rents associated with the relative scarcity of airport franchises. In North America[2], such charges represent about 4-6 % : there is therefore even more room for increases before elasticities of demand increase much.

In the U.S., both the Federal Aviation Administration (FAA) and the Airport and Airways Trust Fund play an important role in controlling prices, over and above the role of the local administrations : for instance, FAA approval of peak charges is necessary if an airport has used money from the Fund, and courts have forced airports like Boston and Los Angeles to cancel peak charges. These institutional constraints currently limit the exercise of spatial monopoly power. But in many locations the power is there.

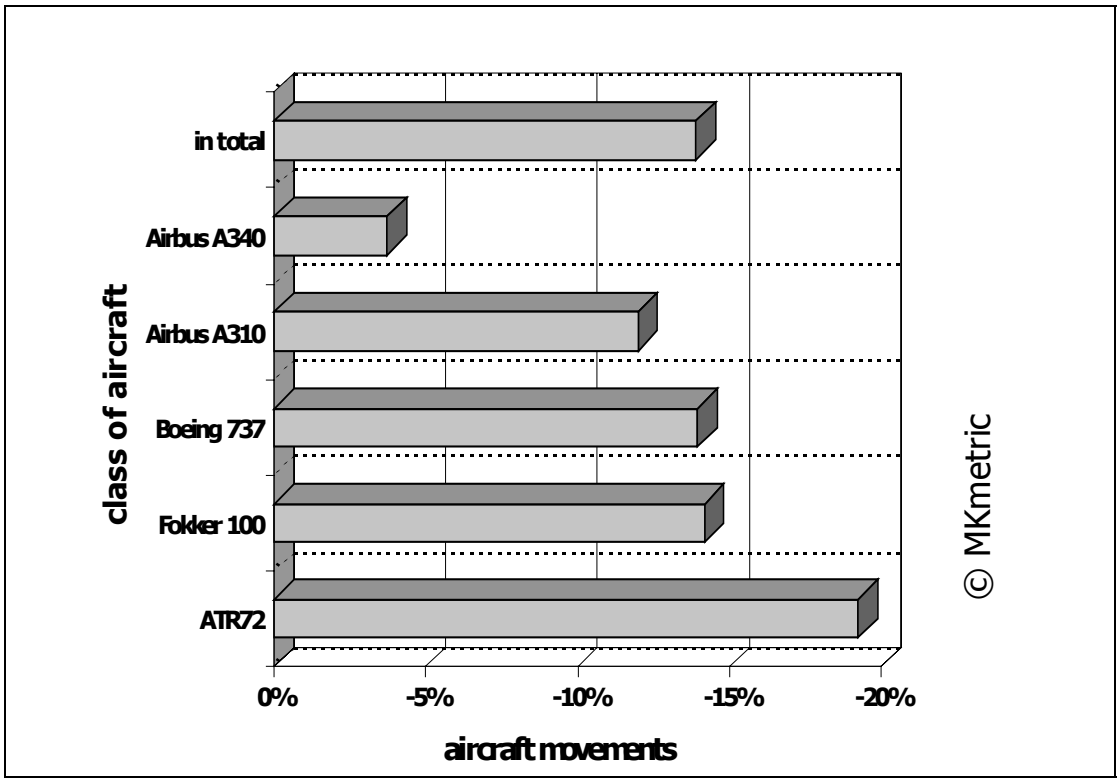

Figure 4. Aircraft movements Hamburg Airport 1991 (percentages)

[2] This was pointed out by David Gillen.

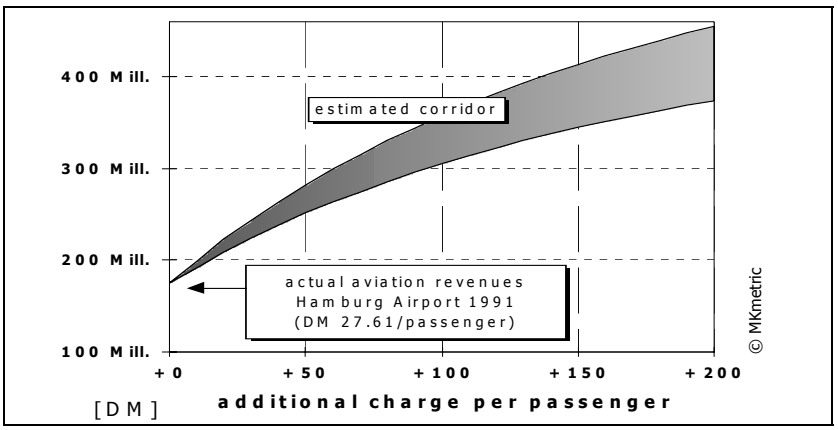

Figure 5. Aviation revenues depending on passenger charges

4. Conclusion

We must conclude that the imposition of full direct airport cost recovery would significantly increase air prices in North America and reduce opportunities for residual slot trading. However, it is also clear that the considerable location rents could be extracted from many locations if the control over airport pricing was reduced, and that slot prices can capture such rents.

Conversely, we can conclude that air network accounts and airport monopoly regulation are both relevant to any transport policy and that airport and air traffic control devolution in Canada raise monopoly control issues that have yet to be fully addressed. Overall, generalized slot trading without such reforms would deal more with a symptom than it would solve a problem.

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