

Social Impacts of Congestion Pricing at Airport Facilities.**David Allen,**

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Abstract:

The use of peak period pricing at airport facilities is a response to unacceptable delays caused by high levels of congestion. The imposition of peak period charges is a mechanism used to improve economic efficiency at congested airports. The impact of such a pricing policy is to alter the mix of aircraft that utilise the airport within the peak periods. This new mix of aircraft tends to favour the larger aircraft where high passenger loads reduce the unit cost of the peak period charge. The cost of such a pricing mechanism, however, rests with the smaller regional airlines which have to either pay proportionally more to operate in peak periods or have to cease flying altogether in the peak periods. This paper explores the social costs to regional airlines and the rural areas they service and examines other possible methods to reduce congestion levels. The paper will show that policy makers have ignored the social costs of such pricing mechanisms and have clearly made the trade-off in favour of economic efficiency.

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The logo consists of a stylized map of Australia composed of several overlapping, semi-transparent shapes. The text "ATRF94" is superimposed in a bold, sans-serif font across the center of the map.

1. INTRODUCTION

The use of peak period surcharges to control demand at airports and reduce congestion through peak periods, is based on the premise that transportation facilities need to be primed for economic efficiency. This is a valid assumption, and one that should be considered, but the basic premise does ignore associated elements that are indirectly affected by the imposition of such a surcharge.

Peak period pricing however, needs to be seen in a wider context than it is currently. In an era of deregulation of aviation services and the privatisation and corporatisation of previously publicly-owned facilities, there has been a shift from equalisation for broad benefit to maximisation of investment utilisation. As capital is limited for investment into airports the need to ration the available resource has become predominant.

The imposition of peak period surcharges at airports not only affects the airline but may also affect the community the airline serves. The loss of an airline service to a regional centre may cost the local community employment prospects and future investment.

In this paper an overview of peak period surcharges at airports will be undertaken. The current state of thinking concerning peak period pricing is covered, along with an overview of peak period pricing at Sydney's Kingsford Smith Airport (KSA). The paper will seek to clearly demonstrate the limitations of economic efficiency and the need for policy makers to consider factors outside the basic economic model.

2. OVERVIEW

As stated above, peak period pricing is used to reduce the demand through the peak hours at congested facilities. Airports are similar to other transport modes and experience highs and lows in demand over the course of a day cycle. At the times of high demand the airport may be at saturation point if the demand exceeds the supply. When this occurs, aircraft on approach are normally forced to enter holding patterns, while those aircraft departing the airport will form queues at runways for take-offs. This congestion generates its own social costs (Grander and Cox, 1986).

The imposed delays and subsequent gross costs assigned to each aircraft are however inequitable, with a Boeing 747-400 costing an airline \$117 and \$223 per minute of aircraft delay for departure and arrival delays respectively. For a Saab 340, this equates to \$13 and \$21 per minute of delay (PSA, 1993) - the different prices reflect the fuel consumption variation when an aircraft is in flight and when it is taxiing.

The cost of this delay is borne eventually by the passengers through higher ticket prices. An argument put forward for why rationing of congested airports is necessary, is put by Carlin and Park (1970).

"A marginal user imposes congestion costs on other users, but considers only those costs that he bears himself in deciding to use the facility. A charge equal to the marginal cost would internalise the external cost, so that individual decisions would lead to a socially efficient balance between use and congestion."

The delay cost imposed on all travellers is regarded as an inefficient allocation of costs, and one that promotes inefficiencies and poor capacity utilisation. Morrison (1985) describes socially optimal capacity as having occurred when the sum of capacity costs and delay costs are minimised.

Congestion pricing can be seen to have wider goals than just economic efficiency. Giuliano (1992) suggests that congestion pricing can be used for dealing with environmental concerns or provision of revenue for financing new investments. In the case of airport infrastructure, which requires a large amount of capital, diverting congestion revenues to a capital enhancement program to improve capacity would have significant direct and indirect social benefits.

The decision to implement congestion pricing is, however, the jurisdiction of the policy makers and the elected community representatives. For airport charging, the policy makers are fortunate in that they operate in an area where there is relatively little public pricing transparency and where costs are perceived to be minimal.

This concept is best demonstrated by considering congestion pricing in other transport modes. In some urban environments, car usage has increased to a level where existing road facilities have reached saturation point. The principles outlined above are equally valid for this problem. Pricing mechanisms could be introduced to ensure maximum efficiency for the road facility. The technology does exist at present for some type of electronic pricing but at present there are limited cases where it has been introduced. In fact Giuliano (1992) reports that Singapore is the only country to have implemented congestion pricing on the use of road facilities.

The reasons for this reluctance to introduce congestion pricing for road facilities rests with the transparency and simple understanding of the charge (Giuliano, 1992). In addition, such policies are deemed to discriminate against the lower socio economic groups which would be most affected by such an action. The political risks of introducing such a scheme would be high, and this is evidenced to some degree by the non-existence of such schemes. Even the Industry Commission, an organisation renowned for its objective of economic efficiency, has stated that it does not expect electronic pricing to be on the political agenda for a number of years (Industry Commission, 1994).

The policies that relate to road facilities differ with respect to airport facilities. It is regarded that for airlines the charge is relatively small in comparison to the total ticket price. This, however, dismisses those airlines which operate smaller sized aircraft, where there are fewer passengers in which to distribute the cost.

Clearly the political appreciations that are exhibited in relation to road facilities are not transferred to the management of congested airports. Part of the failure by regional airlines to resist congestion pricing lies in the relative powers of the different groups of airline. The larger airlines, and those with the largest degree of airport investment are in favour of peak period pricing. The cost of paying for the charges is minimal but the delay costs saved may be large. The regional airlines and general aviation aircraft do not favour congestion pricing as they are the main losers. The large airlines will have proportionally more political weight than the small regional airlines. This is further exacerbated by the links of many regionals with the larger airlines. Airlines that fly under the banner of the large airlines weaken the regional aircraft lobby group (Graham, 1993).

Another point to consider in this debate is the difference that exists between the two different modes in terms of choice. One objective of congestion pricing for road facilities would be to encourage a change in the modal split towards a greater reliance on public transport. For air transport, congestion pricing has two negative aspects that need to be considered by the policy makers. One is the lack of alternate facilities for aircraft to operate to. At many large cities there are more than one airport, but for the majority a single airport is the only choice. This may have some analogy with toll roads where social equity dictates there has to be an alternative free route. The second negative aspect deals with the fact that congestion pricing encourages regional commuters to revert to some form of transport (mostly the car). This in itself has social and investment implications that should be considered in any airport pricing implementation.

The fundamental problem, however, lies in the lack of capacity at airports to cope with high levels of traffic over significant time periods. Yue-Hong (1993) states that if capacity was sufficient there would be no need for congestion pricing as scheduling flexibility is directly related to nodal accessibility. This may over simplify the definition of economic efficiency, but there is no doubt that there is an under supply of airport capacity around the world. The lack of airport capacity at many international airports is the product of a multitude of factors that are characteristic of the airport industry. As Levine (1969) states "if demand is expected to continue high, why aren't investors beating down the doors of airport owners, trying to invest in increased airport capacity". The simple reason lies in the unique economic and social characteristics of airport ownership and the political sensitivity that exists in regard to airport development. These governing factors have had a significant impact on investment in airport infrastructure.

Governments have long been involved in the decision making process of determining capacity expansion and long term strategies for airports. Some of these decisions are based on short-term goals and lead to perverse outcomes in investment determinations (Levine, 1969).

A primary example of political intrusion in the decision making process has been in the need to increase the capacity of air transport into the Sydney area. There were two main paths to follow. One was to expand the capacity of the existing airport, the other

was to develop a new greenfield airport. The greenfield airport would have the advantage of not having the same operating limitations that are characteristic of KSA, which is in close proximity to the city centre. The government after more than a decade of considering the issues proceeded with the expansion of KSA through the development of a third runway. The government, however, recognising the expected growth, announced the staged development of a new airport to the west of the city (this has now been fast tracked).

The process involved in formulating such a policy decision involved consideration of:

- o environmental concerns
- o costs to local communities
- o benefit to wider community
- o political ramifications
- o airline interests and existing infrastructure investment
- o capital requirements and funding sources
- o future demand.

The decision making process is, therefore complex, with a matrix of factors for policy makers to consider. However, the problem lies in the impact the lack of long term decision making has had on the levels of congestion. The delay in reaching the decision, irrespective of the merit of the decision at Sydney, has meant that congestion is now a major problem at KSA, which operates as Australia's primary gateway, costing the airlines conservatively an estimated \$40m a year in delays (PSA, 1993).

With airports under pressure around the world from under-supply of capacity there has been a need to explore methods of improving performance and efficiency. The next section outlines some of these mechanisms.

3. POLICY CHOICES TO AIRPORT CONGESTION

Various solutions are used to reduce to the levels of congestion at airports. Peak period pricing is one such method. Peak period pricing is employed at KSA. Carlin and Park (1970) have outlined other possible directions for policy makers to consider:

- o no change in policy
- o full marginal cost pricing
- o proportional marginal cost pricing
- o restrictions
- o issuance of slots
- o proportional marginal cost pricing and administrative limits.

The first two policy alternatives, no change and full marginal cost pricing, where airlines would pay the full external costs, are at opposite ends of the spectrum. The no change policy would see an inefficient use of the facilities with no barrier existing to deter general aviation aircraft. The policy approach is non-discriminatory, as it does not

attempt to exclude any type of aircraft through a pricing mechanism, but there are social and financial costs associated with this decision as outlined in the beginning of the paper.

The implementation of full marginal cost pricing would effectively eliminate the mix of traffic, with only the large aircraft being able to operate. This would, in effect, provide pricing discrimination against all those smaller aircraft which have reduced capacity to pay. Carlin and Park (1970) argue against this policy based on the opposition such a policy would have from the airlines.

Moderating the approach to full marginal cost pricing through proportional marginal cost pricing is the third option. This still has its limitation in terms of being discriminatory, but in terms of actual imposed costs, it is favourable to full margin cost pricing.

An option considered at heavily congested airports is the banning of certain types of aircraft. The main recipients of any banning would be the general aviation aircraft and possible smaller commuter aircraft. Most airport authorities have small regard for general aviation aircraft as they contribute little in terms of costs and consume significant amounts of runway time. Smaller commuter aircraft increasingly fall into this category, as the airport becomes more congested. The option of outright banning, however, is tempered by the realisations that denial of access, at any price, is discriminatory. Airport authorities prefer to implement other options, such as pricing mechanisms, to achieve the same objectives.

The fifth option is the issuance of slots. The number of slots for each hour would be chosen administratively to ensure an efficient number. The slots would be a mix of large and small aircraft. These slots may be allocated by agreement with the airlines. The danger of issuance of slots is that they can become a property right with an attached value. The assignment of slots, may also open up the danger of political pressure (Geisinger, 1989). New entrants entering the airport may have difficulty obtaining attractive slots. However, a slot system that is not the property of an airline does offer a policy alternative that provides rights for commuter airlines to operate into airports at peak periods.

The final option is for a mix of proportional marginal cost pricing and administrative limits. This is a popular policy option as it is seen to provide continued access for most aircraft but at a cost. The prime failure of this option, and those that involve a pricing mechanism, is the failure to consider external social costs that may be inflicted on regional and rural communities served by the regional airlines. Denial of equal access through pricing is a policy decision that favours large aircraft over small aircraft in the interests of economic efficiency. It is this area that will be dealt with in the next section.

4. SOCIAL COSTS

The objective of peak period pricing is to control congestion and improve economic efficiency. With the implementation of any pricing mechanism to control congestion there is a down-side. Peak period pricing usually involves a flat charge that is imposed on all users during a certain period. The charge does not differentiate between different aircraft types or different users.

In Australia, congestion pricing is utilised only at Sydney's Kingsford Smith Airport. The history of implementation of pricing policies began in 1989 with a charge being placed on non-Revenue Passenger and Kilometre (RPK) aircraft. This was later expanded in 1991 to include all aircraft operations. The table below outlines the history at KSA.

Table 1 Peak Period Charges at Kingsford Smith Airport

Implementation Date	Time Periods	Movements to which Charges Apply	Charge Levels
1 April 1989	0730-1000	non-RPT landings	min \$200
	1630-1900		
1 April 1990	0730-1000	non-RTP landings	min \$220
	1630-1900		
1 Jan 1991	peak	all movements	\$250
	0800-0900		
	1800-1900		
	Shoulder	non-RPT landings departures	
	0730-0800		
	0900-1000		
1700-1800			
1900-1939			

Source: PSA (1993)

The pricing mechanism utilised can be described as adhering to the third option in the previous section

The PSA, in their report, recommended the doubling of the peak charge to \$500 and the introduction of a shoulder charge for all aircraft of \$250. In consideration of the objective the PSA (1993) stated that:

"... fundamental issues, such as whether aircraft operated by commuter airlines should have access at peak times, are more efficiently and equitably resolved by relying on the price mechanism".

The impact of these charges on regional airlines would be significant.

As an example of the impact, the current aircraft charges on a Saab 2340 aircraft for landing and taking off at peak time are currently \$574 - this includes the landing fee based on landing weight. The proposed charges would see the cost rise to \$1074, or an 87 per cent rise in cost. For a B747-400, it currently costs \$2757 for landing and take-off at peak times and it is proposed under the PSA recommendations that it be raised to \$3357 or 22 per cent. The differential impact is further reinforced when the different passenger complements and possible shoulder period charges are considered. As an example of the costs involved, the largest independent regional airline in New South Wales, Hazelton Airlines, paid to the Federal Airports Authority \$580,000 in peak period landing charges in 1993.

Why don't regional airlines just fly in non-peak hours? The need for regional airlines to remain flying to major airports at peak periods is based on the need to link with intrastate and international flights and to ensure full use of a business day. The removal of regional aircraft to other times outside peak and shoulders, either through pricing or regulative, would ensure reduced patronage and loss of profitability. The process of peak period pricing can be easily demonstrated by the simple diagram shown on the following page in Figure 1.

Airlines which serve rural areas provide critical links to the wider air network. For these links to be viable they need to be tied in with the schedules of the intrastate and international airline schedules.

The failure of an airline to provide attractive scheduling, limits the airline's marketing ability. Pushing a regional airline into slots outside normal peak and shoulder periods causes an inconvenient and unattractive service.

Passengers may choose alternate forms of transport to make their initial connection. Cars, buses and trains can provide transport in off peak periods (Murphy and Ilich, 1994). Rural areas require high quality airline services if they are to attract business and employment. Scheduled services to regional areas are generally accompanied by a boost in economic activity.

The PSA, in putting forward its recommendation has failed to consider the social implications to rural areas in its analysis. Social costs are considered as far as delay caused by congestion, but not the external social costs that flow on.

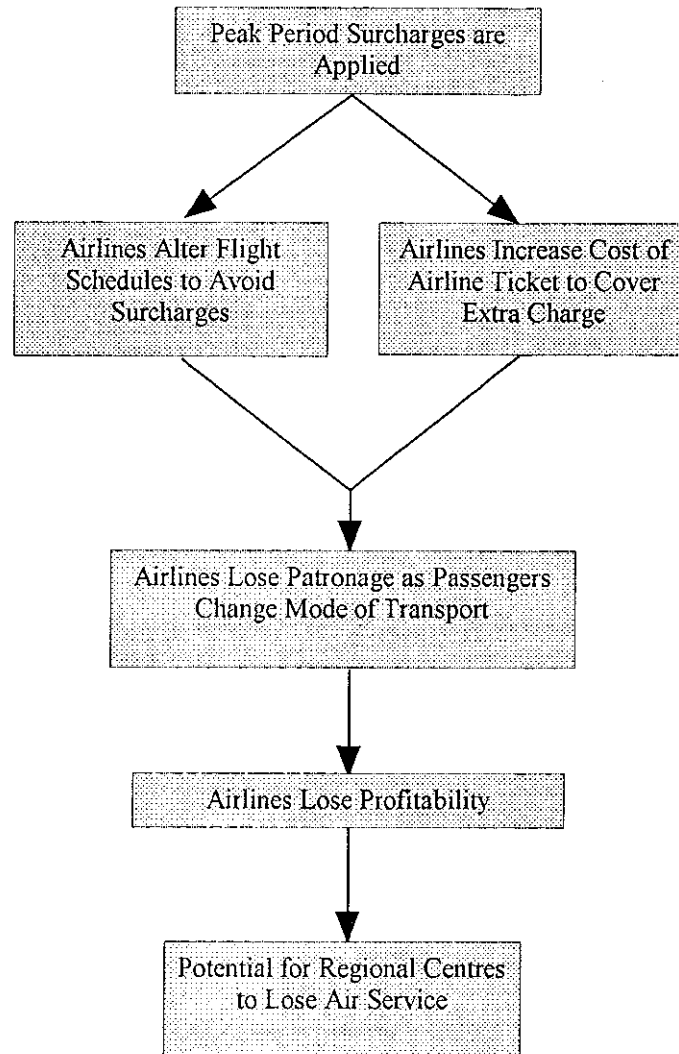


Figure 1 Impact of Congestion Pricing on Regional Airlines

The impact of the current peak period surcharges on regional airlines is shown clearly in Table 2 through a comparison of movements from 1990 to 1992.

Table 2 Movements during December quarter of 1990 and 1992

Sector	No of Movements (December qtr 1990)	No of Movements (December qtr 1992)	Total Change %
International	10	14	+40
Domestic	35	56	+60
Intrastate	37	16	-57
General Aviation	6	2	-67

Source: Kearney and Favotto (1994)

There was a drop of 57 per cent of intrastate flights through the peak periods at KSA. It is evident that the charges altered the scheduling arrangements of intrastate airlines significantly. It can be assumed that the majority of the regional airlines have re-scheduled to operate in the shoulder periods. Of equal interest is the increase in international and domestic movements through the peak periods.

The increase can be considered to be due to an increase in the number of flights through natural growth and possibly due to the vacant slots left available. This raises questions about the utilisation of the slots. As Geisinger (1989) demonstrates, the pricing mechanism favours those airlines which can best afford the slots rather than those airlines which would make best use of them.

The other point to consider is the likely effectiveness of further tightening of the charges. The change in movements during initial implementation indicates that the charges were instrumental in changing the behaviour of the airlines.

Further charges may see a minimal improvement in economic efficiency - based on anecdotal evidence from the FAC - but a significant cost to regional NSW through disintegration of air services. Regional airlines are able to modify their schedules to avoid the peak hours to some degree, but the introduction of shoulder charges will restrict further the scheduling flexibility of these airlines.

The decision concerning the degree of charges and the scope of these charges is now the province of the policy makers and the political process.

5. CONCLUSION

The trade-off is clearly between the social costs to regional areas and the social cost of overcrowding. The need exists, however, for policy makers to consider the indirect inputs and recognise that there needs to be continuing support for transport services to remote and rural areas.

In the literature, and in the public inquiries held into the aviation industry over the last few years, there is a general lack of consideration for the social costs to regional areas that come as a result of congestion pricing. The policy makers have considered the impact, to the lower socio-economic group, of congestion pricing on road facilities. Unfortunately this consideration is not extended to the use of airport facilities.

Other mechanisms to reduce congestion were briefly covered in the paper. It is interesting to note that many of the mechanisms involve pricing as the main instrument for removing the smaller, less efficient, aircraft from the peak periods. The Prices Surveillance Authority's inquiry into charges of the FAC ignored for the most part other available mechanisms (non-pricing ones) and paid little attention to the impact the recommended charges would have had on regional airlines. This paper has sought to raise some of these issues and detail some of the social costs associated with having a primary objective of economic efficiency.

The paper also clearly raises the need to undertake further research into the social impacts of different transport pricing regimes. For air transport the linkage is difficult to define precisely and even more difficult to quantify. Investigation of a region's socio-economic indicators over the period of time peak period charges were introduced may give some understanding of the impact. However, most operators have managed to shift their flights just outside the peak period - at present because it is only one hour duration - and any impact would be minimal. Some information could be gleaned from investigating the impact of air services to a centre being terminated. It appears, however, that in NSW, where operators have failed or pulled out of a service there has always been an operator prepared to take over the service. Further research will need to be carried out around Australia to obtain an example of a community that once had its air service withdrawn.

It is important, however, not to dismiss the regional airlines as marginal players, with little importance to the network structure. The major airlines should consider the benefits the smaller airlines provide through interline traffic and marketing alliances and work together to reduce delay and remove the problems of cluster scheduling.

Government and airport authorities should also consider the benefits of maintaining a viable and useful rural air network. The fundamental issue is that congestion pricing has significant social impacts, and as such needs to be considered in the broader context of the whole transport industry, and especially the government's commitment to provision of community services.

If governments wish to pursue a course of congestion pricing, then there needs to be a clear admission that the trade-off for this course of action, will be the loss of air access to regional centres and the future viability of regional airlines.

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