

Assessment of the regulatory philosophy of Airports Economic Regulatory Authority of India (AERA)

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Executive Summary

The report has a high quality and discusses the main issues of regulation. The overall aim is that it reflects best practice regulation. Furthermore, AERA is an independent regulator accountable to democratic bodies. Also in that respect the regulatory institutions in India are well designed and superior to the majority of European countries which have dependent regulators open for regulatory capture.

While the Authority is clearly heading in the right direction, there remain a number of important conceptual and technical issues which we recommend to be taken up either, with the price cap for first regulatory period, or at a later price cap review in the near future. Good regulatory systems learn from their past experience and adjust to new challenges. In that respect it is important to strengthen further the incentives for cost and allocative efficiency, to reduce the costs of regulation and to rely on threats to reregulate and to encourage competition if possible. Our main concern is that the current price cap regulation has still too many elements of traditional cost based regulation. We therefore recommend reforming the current concept further towards incentive regulation in the second period.

- AERA is an independent regulator accountable to democratic bodies. This should give AERA the authority to judge competently on matters of regulation and to act as an arbitrator. This independence should also help AERA to develop further its regulatory philosophy, which is a first step in developing a stable and effective system of incentive regulation.
- The current structure of the regulation is still very much cost based. This is compatible with good incentives for cost reduction *for the first regulatory period* but only the first. Incentives for cost reduction will only be achieved if airports are permitted to keep profits for the whole of the period. The structure of the regulation for the second and subsequent periods will be crucial- if the current structure is repeated, the regulation will become a form of cost based regulation with poor incentives for cost reduction.
- Ideally, to maximise incentives for efficiency, the price cap should be set with no reliance on current costs.
- The Authority should be aware that it is regulating both private and public airports. Price-caps were designed to regulate private profit seeking firms, not public firms, though they have been applied to them. The objectives and behaviour of public firms are different from private firms, and price-caps may not have the same effects on efficiency.
- Benchmarking can be used in the setting of X, as well as other aspects of regulatory assessment, but airports are very difficult to benchmark and so far this has not used to set X. The initial emphasis should be in developing measures of Total Factor Productivity, which seek to measure how cost efficient the airports

are, and how much productivity can be increased by. It would help if the Authority were to develop a data base so that Indian airports can be compared, and performance of Indian airports can be compared to airports of other countries.

- Unlike cost based regulation, price cap regulation regulates only the level of charges, not their structure. Therefore we recommend that after the initial period, AERA should not regulate the structure of charges, but leave the decision to the airports which have a better knowledge of the relevant cost and demand parameters to develop an efficient price structure.
- The price structure is an important factor at congested airports. Much of the task of allocation of scarce capacity depends on the slot system, and it is critical that this performs efficiently – in particular, slots need to be freely traded and the number of slots need to be set carefully. With airports which are congested, there is no longer an efficiency case for weight based charges- thus the regulator should ensure that congested airports have the freedom to adjust their charge structures.
- There are many arguments for single tills and many arguments for dual tills- thus there is no clear case for one or the other. In particular situations one or the other may be best for an airport in India. Thus the issue needs to be kept alive and further evaluated in future regulatory decisions.
- The regulation of 12 airports by a hybrid price cap with quality regulation is a relative costly process. This might be a good starting point for the first regulatory period, but for the second period there is a strong case for de-designation of several airports in the system. All but the large airports or airports for which there are some problems (e.g. congestion) can be regulated indirectly, and they can be monitored and subjected to the threat of re-regulation should their performance not be satisfactory.
- The 150 km rule increases the market power of the airports- if the objective of regulation is to reduce market power, it should be abolished. It is recognised that contracts already entered into constrain the ability of the Authority and the GOI to enable airports in a given city to compete. We recommend that future privatizations should not increase market power of incumbent airports in this way, and should facilitate competition.
- After a first period of rate of return regulation ATC should be price capped as airports in order to set incentives for efficiency. The fee structure should be left unregulated.

General assessment:

The report has a high quality and discusses the main issues of regulation. The overall aim is that it reflects best practice regulation. Furthermore, AERA is an independent regulator accountable to democratic bodies. Also, in that respect, the regulatory institutions in India are well designed and superior to the majority of European countries which have dependent regulators open for regulatory capture (Niemeier, 2010).

While the Authority is clearly heading in the right direction there remain a number of important conceptual and technical issues which we recommend to take up, either with the price cap for first regulatory period, or at a later price cap review in the near future. Good regulatory systems learn from their past experience and adjust to new challenges. In that respect it is important to strengthen further the incentives for cost and allocative efficiency, to reduce the costs of regulation and to rely on threats to reregulate and to encourage competition if possible.

Overall the regulatory institutions are well developed and the role of regulator, parliament and government are clearly defined.

1. Incentivizing Regulation of airports

We welcome very much the reform of airport regulation towards incentive regulation. Reforms are usually piecemeal work and this is also the case with the current regulatory approach. Therefore there remain a number of problems to be addressed in the near future.

So far a lot of emphasis has been put on the topic of cost efficiency, but the topic of allocative efficiency has received less attention. Cost efficiency will be achieved if the output of an airport is produced with minimum costs. Allocative efficiency demands that those users with the highest willing to pay (which means also with the highest ability to make good use of airport services) will receive service. Regulation tries to achieve both

these goals, and both goals are important, especially in India with a fast growing demand of air transport creating scarce capacity at some airports.

One of the key problems of achieving these goals is that the airport regulator has asymmetric information about the demand and cost functions of the regulated airport. While the management of the regulated firms are supposed to act on behalf of the regulator, the management has no direct interest to do what the regulator demands. Managers pursue different interests and have little incentive to disclose all the required information. In the case of airports, it is quite likely that the managers may be under pressure from local governments to advance other than profit objectives, especially if the airports are not privately owned. Even if the regulator engages in a time- and cost-consuming process to scrutinize the cost of an airport, it will not be able to know the minimum cost or the relevant elasticities. Well-designed consultation processes are certainly helpful and provide the regulator with useful information thereby reducing the information gap, but consultation cannot completely eliminate the asymmetry. Facing the information asymmetry, the regulator must design a contract to set incentives for the regulated airport. Cost based regulation has traditionally overlooked this problem and therefore it sets rather low incentives. Incentive regulation addresses this problem directly and tries to design contracts that set incentives for cost reductions and an efficient price structure. However, given the information asymmetry, the regulated airport will provide the regulator with the information only if it can keep some of its informational rents or the profits which accrue to the firm as a result of it having superior information (Newberry, 2002). This information asymmetry has some far reaching implications. One of them is that the notion that charges should be equal to the minimal cost of providing this service including a normal rate of return for the factors becomes meaningless. Such prices cannot be achieved as a long term result of regulation because the regulator must leave then informational rent to the regulated firm.

Incentive regulation has developed a number of different models, among them price cap regulation, which has been tried out by an increasing number of regulators. It is useful to differentiate between pure and hybrid price caps. Pure price caps (or the original form of price caps) determine the X irrespective of the cost of the regulated firm. This has the advantage that the regulated firm cannot behave strategically and be a high cost firm at

the period of setting the next price cap. Hybrid price caps have an element of cost regulation because they set the price cap at with some reference to the cost level of the firm at the beginning of the regulatory period. Airports (e.g in London) have been regulated by hybrid price caps. However, there remains the danger that price cap regulation adopts too many elements of cost based regulation and sets rather mild incentives for efficiency.

Another very important qualification is the Authority is regulating both private and public firms which differ in their objectives and behaviour. Price caps were originally designed to control the use of market power by profit seeking private firms. They have also been used to regulate public firms (for example, in Europe and Australia). The incentive properties of price-caps *assume* that the regulated firm is a profit maximising firm. If the firm has other objectives, it will not behave in the same way, and there is no certainty that the firm will maximise efficiency when regulated by a price cap. It is likely that public firms such as the Indian airports typically do not seek to maximise profits although they are encouraged by the government to behave similar to private companies. This is especially true in the Indian airport case, given that there is no pressure to perform from competition. While imposing a price-cap on a public firm may stimulate greater efficiency, as has been done in a number of cases overseas, the behaviour if the public firm will probably be different from that of a private firm, and it may not be as efficient as a private firm. To this extent, there will be a greater call on benchmarking (see below) to monitor efficiency¹.

Thank you again for this interesting information. We have clarified the text and think that we agree. It would be interesting to study the behaviour of privatised and public airports which are incentivised by the government and see if there are any differences in performance. Therefore we recommend benchmarking, but not different regulatory regimes.

¹ Please, note that we do not recommend adopting different regulatory regimes for private and public airports. Both should be subject to the same incentive based system.

In this respect there are a number of ways to sharpen the incentives provided by price cap regulation:

- A) Incentivizing behaviour of the regulator
- B) Benchmarking
- C) Freeing up the price structure

- A) Incentivizing behaviour of the regulator

Looking at regulation as a contractual problem, the behaviour of the regulator in relation to the airports becomes crucial. The structure of the regulation proposed to be applied to airports in India is a hybrid form of price cap regulation, with many elements of cost based regulation. It does have the *form* of a price cap however. Thus, in this approach, a revenue target is established, and the expected costs, including the cost of capital, are projected. The parameter “X” is determined as the escalation factor which achieves the revenue target consistent with expected costs. In this sense, this is very much cost based regulation.

This can be contrasted with the original view of price caps. Under price cap regulation, the parameter “X” is determined exogenously, and is not determined by the costs of the firm. Thus the regulated firm is permitted to increase its prices each period by CPI – X- this could be a tight or slack constraint.

In spite of this, for incentive purposes, it is still possible that the hybrid form of regulation can create strong or weak incentives for cost regulation. The key thing in the initial period is not so much how the X is set as how the regulator responds to the fortunes of the regulated firm. If the regulator sets a price cap and rigorously adheres to it over the price period, there will be a strong incentive given to the firm to keep costs down. If the firm achieves high profits, or sharp losses, and the regulator does not change the price cap, the firm will face a strong incentive to be cost efficient. Further, if the regulator does not ratchet down prices, and the firm is permitted to keep the profits in subsequent periods, there is a strong incentive for it to be efficient. On the other hand, if the

regulator allows the firm to raise prices above the cap if it is unable to achieve its target profit, or if the regulator forces the firm to reduce its prices should it be more profitable than expected, then the firm will not face a strong incentive to be efficient. If the firm is not allowed to keep its profits and the regulator insists that prices be lowered as costs are lowered, there will be poor incentives for cost reduction. Put differently, if the price is simply set at the existing cost level and changed each year by an escalation factor, this will really be forward looking cost plus regulation, and not real incentive regulation.

This is correct- under incentive regulation if the airport has achieved low costs it will be allowed to keep the profits which come about. User groups may oppose this, - incentive regulation is difficult to sell sometimes. Indeed there have been cases when the government *of* the day has forced the regulator to reduce the prices of the regulated firms. In the longer term this weakens the incentives to reduce costs, since cost reductions must be passed on to users.

Thus, in terms of how strong the incentives are, the issue is not so much how the X is determined, *in the first period*, (though this will affect how much profit the firm gets), but rather how the regulator behaves. If the regulator tries to keep prices close to actual costs, weak incentives for cost reductions will result. Alternatively, if the regulator adopts a-hands off approach, and allows the firm to keep high profits, or refuses to compensate it for losses, good incentives for cost reduction will result. The regulator will, however, come under pressure to keep prices close to costs. Good incentive regulation emphasises keeping costs down, not keeping prices close to costs.

There is a fundamental difference between cost based regulation and incentive regulation – it is not possible to have both at the same time. Under incentive regulation, the rate of return that the airports achieve depends on a host of factors and is uncertain. If the airports are able to achieve lower costs, they will be the main beneficiary of this, not the end user. Incentive regulation means that the airports have a greater stake in cost reduction On the other hand, if the ultimate objective is to ensure that the airports achieve a fair rate of return and that the end user is offered reasonable prices, incentive regulation will not achieve this. Instead, cost based regulation will be needed. The problem with cost based regulation is that the airport does not have a strong incentive to

minimise costs, since its costs will be covered by revenues, even they are high (and the airports are well aware of this). To achieve minimum costs, the regulator must give up the objective of keeping prices close to costs. Instead, the regulator must take a risk—that costs could be quite high, or that profits could be negative (see table below).

In the second and later periods, this changes. The firm's performance in the first period should not affect the revenue target for the second period. If that happens, the firm will have an incentive to lower its performance in the first period to get the regulator to set an easier target for the second. Thus it is important that the regulator does not base the target on the firm's cost, but in the basis of other objective information. Thus there is a case for benchmarking.

A hybrid price-cap is a system which combines elements of incentive and cost based regulation. There are systems which combine these elements in a formal or ex ante way. These include various forms of profit sharing and sliding scale regulation. (see Baldwin and Cave, 1999, and Mayer and Vickers, 1996). With these, the price that the firm is permitted to charge is determined as a weighted average of its expected costs and an exogenously “X” factor, set by the regulator. This gives some incentive for efficient performance, but it also reduces the risks faced by the firm.

Another approach, which has been used by regulators, (such as the Essential Services Commission of Victoria, in its regulation of electricity) is to employ an “efficiency carry over” mechanism. With this, when the regulator sets a new price-cap, the firm is not required to reduce its prices immediately. Rather, there is a tapering off period, during which it is able to reduce gradually its prices to the level set by the price-cap. This means that the firm is able to capture more of the benefits that its cost reduction efforts have achieved—this will give it a stronger incentive to reduce its costs. In addition, the firm has less of an incentive to allow its costs to rise in the lead up to a new price-cap being set.

Some of the properties of different types of regulation can be summed up in the table below. We contrast incentive regulation (e.g. yardstick based price caps) with cost based regulation (e.g. rate of return regulation, cost based price caps), while recognising that actual regulatory systems typically embody elements of both.

Table 1 Properties of regulatory systems

	Incentive Regulation	Cost Based Regulation
Prices close to Cost?	No	Yes
Variability of Profits	High	Low
Incentive to Minimise costs	High	Low
Incentive for Efficient Pricing	Moderate	Low
Incentive for Service Quality	Low	Moderate to High
Investment Incentives	Difficult to determine	Some evidence if excessive investment

As discussed, incentive regulation gives rise to prices which can be well above or below cost, and thus it can give rise to considerable profit volatility. Its main benefit is that it creates strong incentives for cost minimisation. In addition, it has moderate encouragement to the firm to price efficiently. One of the downsides of incentive regulation is that it gives the firm an incentive to downgrade quality (which may be addressed through monitoring²). Finally, both types of regulation have ambiguous impacts on investment.

It is correct to say that the efficiency carry over mechanism postpones the rachetting down of prices. In so doing it gives the airport a greater incentive to keep costs down, as it gains a larger share of the profits from its efforts in keeping costs down. If the

² A useful study of the pros and cons of quality under price caps is contained in the Productivity Commission Report on Price Regulation of Airport Services (2002). The ACCC did monitoring and it provided incentives for airports to undertake investment to increase quality- it recognised the problems which price caps create. However the airports considered that the mechanism for getting approval for new investment to improve quality was very cumbersome.

At Hamburg Airport quality monitoring was part of the reform of establishing a price cap. Quality was not monitored under cost based regulation. Both airport and the airlines shared the view that quality monitoring was useful and an improvement (Niemeier, 2002)

carryover is short, there will be a smaller incentive effect than if the carryover lasts for a longer time.

B) Benchmarking

Another option to incentivise price cap regulation is to move towards a pure price cap in which the X is set through benchmarking. The advantage is that airport has no incentives to behave strategically and that the incentives for efficiency are strong. The disadvantage is that it is difficult to implement in the airport industry because of the heterogeneity of airports and data problems. As in other public utilities benchmarking has been successfully used by regulators benchmarking is an interesting option (Reinhold et al., 2009)

We encourage the Authority to do so and are happy that the Authority will study the Indian situation in order to create effective benchmarking. This would make the Authority a front runner and encourage other regulators. Other regulators such as the Dutch regulators are also currently discussing the role of benchmarking.

In order to develop this option a stepwise approach should be taken. There are four interesting applications:

1. Benchmarking can be used as a performance analysis without direct application for regulation. It answers the question how airports are performing over time and relative to others. Important policy questions such as whether productivity of the regulated airports increased over time can be addressed. These performance analyses can provide answers to major policy questions on the effects of regulation, and privatization. They can be used to evaluate regulation, as well as provide objective measures which might be important if regulation becomes controversial and its effects on efficiency are debated. Such use of benchmarking does not directly incentivize price cap regulation, but might have a positive effect on the stability of regulation as the general public is better informed.
2. Benchmarking of *specific* processes help to improve the performance directly in regard of the specific processes where performance differences are being observed.

In The UK the CAA has successfully used this type for benchmarking of specific process in their regulatory proceedings (CAA, 2006 and Bush, 2007). It has benchmarked the management of trolleys, check in desks and passenger security screening. This has been done in close cooperation with BAA and Manchester airport. Even if overall benchmarking (see below) cannot be applied to regulation, it might be still possible to benchmark specific processes to detect potential technical and cost efficiencies and indirectly signal the management that the regulator targets efficiency. For these reasons this type of benchmarking should be part of any good system of incentive regulation.

3. Benchmarking as an informal tool. Even if it is not used to determine the level of charges regulators are increasingly using benchmarking in an informal way to add to the quality of regulatory decisions on the cost base of the regulated firm. Benchmarking is informing the regulator if an airport has the strategy to allow high costs at the time of regulatory decisions. Benchmarking it is a useful to check the plausibility and validity of cost data
4. Benchmarking can, in principal, be developed as a yardstick to regulate charges, as in other industries. It can be used to determine the X in price cap regulation so that charges cannot be influenced by strategic behavior of airports. However, currently the data problems, especially of an international sample, are significant, especially in overcoming the external exogenous and endogenous heterogeneities³ as well as the internal heterogeneities. The latter are due to managerial decisions which might be due to special factors like lumpiness of investment. These factors do not reflect inefficiencies.

What type of Benchmarking AERA should adopt must be analysed more in detail. Currently it is certainly not appropriate to start with the fourth form, but the first three forms can be applied and should improve regulation. The initial emphasis should be in developing measures of Total Factor Productivity, which seek to measure how cost

³ Airports are subject to exogenous heterogeneities such as geographical constraints and demographic differences which are caused by the environment and which influence costs but which the management of airports does not have any control over. Endogenous heterogeneities, on the other hand, are due to national differences in the regulatory framework an airport faces. This is relevant if Indian airport have to be compared to, for example, European airports (see appendix).

efficient the airports are, and how much productivity can be increased by (see appendix). It would help if the Authority were to develop a data base so that Indian airports can be compared, and performance of Indian airports can be compared to airports of other countries. Price and productivity data as well quality data (in particular on delays and congestion) should be collected. The important thing here is to develop the method carefully and set in place a system which provides good data. AERA could certainly play an important role in both respects.

It is important to state, in advance, what the results of this benchmarking will be used for. Often benchmarking is not used in any systematic way, and it can be an exercise in data collection with no set purpose. Benchmarking can be used in the regulatory process, including the setting of the "X". If some airports are to be de-designated, it can be used in the determination of which airports should be de-designated, and afterwards, whether an airport will continue to be de-designated. It can also be used in analysis of the performance of the airports- for example, to determine why the performance of an airport appears to be performing particularly well or badly.

The benchmarking that the Authority imposes will be of both private and public airports. Profit seeking private airports have a clear incentive to be efficient, since they will maximise their profits by being so (though even private firms do not always maximise their efficiency). Public airports may have broader objectives, and there is no certainty that they will minimise their costs. Thus an important role of benchmarking is to determine to what extent the private and especially public, firms are minimising their costs and maximising their efficiency. Merely setting a price-cap is not enough to guarantee that the Indian airports are efficient.

C) Freeing up the price structure

One of the important advantages of price cap regulation compared to cost plus regulation is that a well defined price cap sets incentives to rebalance the fee structure of an airport. This aspect is sometimes neglected by focusing on the effects of price cap

regulation in reducing costs. However, this aspect is positive for achieving allocative efficiency, in particular at busy airports (Forsyth and Niemeier, 2008 a). Furthermore, it reduces the cost of regulation substantially, because the regulator does not have to micro manage and allocate costs. Given the information asymmetry the regulator is not able to allocate common costs and should better leave this to the price capped airport.

An airport with a well-designed price cap can rebalance the historic determined fee structure to gain more traffic and revenue. It is useful to distinguish between non busy, busy and extremely busy airports. At non busy airports with ample capacity, the standard approach of weight based charges for runway use and passenger based for terminal usage has a structure which is fairly efficient because larger aircraft with lower price elasticity pay more than small price sensitive aircraft (Morrison 1982). However, there remains the problem that the historic division of common costs might be inefficient and that weight based charges do not reflect damage costs of runway usage (Hogan and Starkie, 2003).

At busy airports where peak demand exceeds capacity, either for some hours or all day long, the price structure becomes more important. Much of the task of allocation of scarce capacity depends on the slot system, and it is critical that this performs efficiently – in particular, slots need to be freely traded and the number of slots need to be set carefully. With airports which are congested, there is no longer a case for weight based charges- thus the regulator should ensure that congested airports have the freedom to adjust their charge structures. Price capping does set those incentives but typically these incentives are not strong enough to overcome the resistance of airlines which oppose peak pricing (even though they practise it themselves). With public airports there are even less incentives.

In order to allocate scarce capacity efficiently, an airport facing a growing demand should lower off peak charges and increase peak charges. If there is a slot system in place, and the peak charges are below the market clearing level, slots will ration demand. In such a case it is important that a) the level of slot coordinated movements is set at such a level that the marginal costs of delays is equal to the marginal benefits and b) that the weight based charges should be abolished for a movement charge otherwise

large aircraft are discriminated against. The first condition assures that given capacity is used at an optimal level and not at a technically feasible level or at an arbitrary level. The second condition has the rationale that time is the scarce factor- small and large aircraft impose the same cost on the airport. With weight based charges, large aircraft are paying more than small aircraft. This should not be the case, and with a movement charge all aircraft pay the same for the scarce factor, time on the runway, irrespective of size. If demand grows further and the airport becomes busy all day the excess demand should be rationed by an efficient slot system combined with per movement charges set at an optimal capacity level (Forsyth and Niemeier, 2008 b).

It is important to monitor how airports price scarce capacity, but with a price cap the incentives for efficient pricing are there. Even if private or public airports are not reforming their price structure, it is better not to regulate and prescribe the price structure because, given the information asymmetry, the regulator can hardly do better than the airport itself.

In general, leaving the price structure unregulated reduces the cost of regulation because the regulator does not have to micro manage and allocate costs. Given the information asymmetry the regulator is not able to allocate common costs and should better leave this to the price capped airport. With private airports the airport has incentives to price according to price elasticities.

There may be a case for pricing airport services to LCCs differently from full services carriers, though this issue needs to be examined. While on the one hand, lower prices may result in greater utilisation of the airport, on the other hand it may create a problem of competitive imbalance. A number of airports in Europe are developing Low Cost terminals and price these services lower than their other terminals. As long as these differences reflect cost differences there is no need to regulate.

The Central Government has suggested that, besides determining the price cap for the control period, the Authority should also approve individual tariffs. While this might be an understandable request it should be definitely limited to the first regulatory period and by no means extended. An extension has negative effects on incentives for efficiency and furthermore it makes regulation unnecessarily heavy handed.

For the first period it is further recommended that AERA plays a more passive role and observes the proposals of the airports. It can also encourage airports to develop new pricing strategies Like the CAA of UK it could actively recommend the use of peak pricing at busy airports. If necessary, AERA can act as an arbitrator between airports and airlines.

2. Scope of regulation and single till

The discussion on AERA's regulatory philosophy has focused very much on the issues single versus dual till⁴. There are many arguments for single tills such as additional welfare gains from incorporating non-aeronautical services in Ramsey type pricing, and many arguments for dual tills such as regulation should not be extended to contestable markets. In our view, there is no clear case for one or the other. In particular situations one or the other may be best for an airport in India. For example, if there are no good substitutes for parking at an airport a single till might be preferable. Similar, if for legal reasons, a pure dual till is not possible, gains from a mixed till might not outweigh the costs of allocating costs to the two tills. If an airport is very busy, a dual till leads to a higher level of charges so that charges are closer to market clearing prices. Thus the issue needs to be kept alive and has to be assessed in future. In these future assessments it is crucial that rate of return considerations should be avoided. In many

⁴ The debate on single versus dual till has been well documented in the report. The single till has the advantage that it is easy to implement as activities do not have to be separated into the two categories which involves among other things the problem of how to allocate common costs. Furthermore, it increases the base for Ramsey type pricing although the additional welfare gains from a better optimization are probably not large. The disadvantage is that it regulates activities indirectly which in principle are competitive although at some Indian airports these activities are local monopolies due to legal restrictions. This is certainly the advantage of the dual till which might be superior if common costs are correctly allocated. Furthermore, in the case of imperfect regulation the dual till gives more scope to productivity gains as these activities are unregulated. We are aware that decisions on the form of till have financial implications for the airport and for different groups of users and stakeholders, but a complete assessment goes beyond an evaluation of the regulatory philosophy of AERA. From our viewpoint it is more important to focus on incentive regulation and how to implement this effectively, because this determines the overall performance much more than decisions on single versus dual till.

cases it has been argued that the level of charges should be reduced or slower increased by taking a certain percentage of non-aeronautical revenues and profits to cross subsidize charges so that airlines and tourism is less negatively affected by higher charges. However, adjusting the percentage of non aeronautical revenues in such a way that the level is acceptable is arbitrary and neglects that the airport has fewer incentives to develop non aeronautical activities which like for example car parking and rental services are part of total transport costs.

3. Reduce cost of regulation

Compared to other countries with established incentive regulation, such as UK and Ireland, AERA's concept of regulation is relative heavy handed. The regulation of 12 airports by a hybrid price cap with quality regulation might be a relative costly process. This might be worthwhile at a first step, but after the first regulatory period AERA can develop the reputation of an independent regulator with high expertise in airport regulation. This gives AERA and the Ministry the ability and opportunity to pursue the following options:

- Certain airports could be regulated with a simpler price cap, while others can be regulated fully. For example, AERA could use a more aggregate approach to estimate the regulatory asset base,-that is, using less detailed information on costs and revenues, and with less intensive consultation. Another option would be to regulate certain airports only if airlines and airports disagree on the level of charges.
- The current law defines the number of airports and has no scope to de-designate airports. Given the small size of some of the airports, there is a strong case for de-designation of several airports in the system. All but the large airports or airports for which there are some problems (e.g. congestion) can be deregulated directly, though

they can be monitored and subjected to the threat of re-regulation should their performance not be satisfactory.

- Regulation by the threat of re-regulation is a very powerful and cost efficient approach. AERA could focus on a few airports, and regulate them effectively by incentive regulation based on benchmarking. For the other airports, it could gather the same data on cost efficiency and quality of service and analyse their performance. Under such a regime, airports should have a very limited interest to abuse market power because they would try to avoid being regulated. The experience with the Scottish airports largely reflects this and that such a form of "shadow" regulation should be part of comprehensive package of incentive regulation.
- The Authority together with the Department of Transport should develop some criteria and methods to decide on de-designation. Size per se is not a sufficient criterion. It is simple and the cost of market power rise with size, but market power does depend on the lack of good substitutes. Ownership is also not a good criterion, because not only private but also public airports can behave in a monopolistic manner. If airports are not pricing up to the cap, this might indicate that the airport does not behave in this way. For instance, Manchester airport did not price up to the cap perhaps because of growing competition from neighbouring airports. Congestion and excess demand might be symptomatic of monopolistic behaviour as a monopolist has the incentive to produce less than a competitive firm, though there might be other reasons, like noise and other externalities, why capacity has not been extended. A better criterion is persistent market power. Market power might change over time, in particular if market entry occurs and access times and costs to airports are reduced. Australia, UK, and the Netherlands have analysed the market power of airports- this is usually be done by standard competition analysis. In the first step the relevant market is defined, and then the degree of market power is estimated. The key question is whether or not good substitutes are available (Productivity Commission Australia, 2002). Such inquiries have has lead to the de-designation of Manchester Airport the UK (CAA, 2007) In the Netherlands-Schiphol remained regulated (Müller et. al., 2010).

- De-designation should not be regarded as a permanent status. From time to time, the Authority should review the performance of the de-designated airports, and only continue the status if performance has been acceptable. This can be done in conjunction with the benchmarking of the airports, which can provide a data base for performance analysis. Clearly, the criteria for good performance will be important and will be needed to be spent out clearly. If airports are de-designated without meeting these hurdles, there will be little incentive for them to perform well in the future.

4. Competition and Regulation

Currently there is little scope for direct competition between airports as catchment areas do not overlap. Competition from new entrants will also be rather ineffective. This is due to the policy of the Government of India not to allow any new airport to be built within 150 kms distance of an existing airport. Furthermore, in the case of so called Greenfield airports at Hyderabad and Bangalore, the Government has closed existing airports. This gives only room for hub competition and competition for base of aircraft. While these types of airport competition might develop in the future, they are most probably insufficient to reduce the market power. From our point of view the 150 km, the rule increases the market power of the airports- if the objective of regulation is to reduce market power, it should be abolished. Furthermore, it is recognised that contracts⁵ already entered into constrain the ability of the Authority and the Government to enable airports in a given city, such as Mumbai, to compete. We recommend that future privatizations should not increase market power of incumbent airports in this way, and should facilitate competition. In the UK, dominance of BAA in the London airport market

⁵ Given the State Support Agreement, it is recognized that the existing operators have some advantages over other bidders when a new airport is developed (3.4). Granted this, it is important that these conditions are interpreted in a way which has the effect of promoting competition as much as possible, in terms of the development of the airport and in terms of competition for the various services (e.g. baggage handling) at the airport. It would be desirable that the Airport Coordination Committees promote rather than hinder competition when allocating airport capacity (5).

has been reduced by the divestiture of Gatwick, and probably soon, Stansted, airports (Forsyth and Niemeier, 2010).

5. Regulation of ATC

Unlike airports, ATC is not to be subject to a price cap but to a rate of return regulation. AERA wants encourage the Airports Authority of India to improve technology and adopt improved procedures. While price cap might be associated with cost cutting this does not have to be the case. Price cap regulation does not generally reduce safety. Safety standards should be clearly defined independently of the form of regulation. Furthermore, AERA plans to adopt a five year tariff structure within which the individual tariffs would be reviewed on an annual basis with ex-ante framework put in place for such a review.

From our point of view this very detailed approach might be acceptable as a first start given the special circumstances and concerns for safety. We recommend strongly adopting a price cap regulation, along the lines of airports focusing on the price level without regulating the price structure. This can be combined with appropriate safety standards. The objective is to set incentives for cost efficient investments and management.

6. Summary

AERA is an independent regulator accountable to democratic bodies. This should give AERA the authority to competently decide on matters of regulation and to avoid regulator capture. The independence should also help AERA to develop further its

regulatory philosophy, which is a first step in developing a stable and effective system of incentive regulation.

The structure of the regulation is very cost based. This is compatible with good incentives for cost reduction *for the first regulatory period*, but only the first. The structure of the regulation for the second and subsequent periods will be crucial- if the current structure is repeated, the regulation will become a form of cost based regulation with poor incentives for cost reduction.

It is critical for incentive regulation for there to be no scope for the airports to affect future prices or target revenues through current cost levels. In reality, it is very difficult to ignore current levels of costs when setting price caps for the future- however, there are ways of lessening the reliance of current costs, e.g. by having efficiency carry-over provisions. Ideally, to maximise incentives for efficiency, the price cap should be set with no reliance on current costs.

Given that the Indian airports include both private and private firms, it is important to remember that price-caps were designed for regulation of private firms, and the incentive properties of them do not necessarily carry over to public firms. Price-caps are no guarantee of efficiency with public firms. For this reason, benchmarking of efficiency is particularly advisable for public airports.

Benchmarking can be used in the setting of X, but airports are difficult to benchmark and so far this has not been done. The initial emphasis should be in developing measures of Total Factor Productivity, which seek to measure how cost efficient the airports are, and how much productivity can be increased. It is recommended that the Authority develops a data base so that Indian airports can be compared with each other, and performance of Indian airports can be compared to airports of other countries.

In future, the price structure should not be regulated. Weight based charges are generally regarded as quite efficient for non busy airports, but there might be ways to improve the structure of charges. With airports which are congested, there is no longer a case for weight based charges- thus the regulator should ensure that congested airports have the freedom to adjust their charge structures - for example by introducing a movement charge and/or peak charges. With capacity constrained airports, much of the

task of allocation of scarce capacity depends on the slot system, and it is critical that this performs efficiently – in particular, slots need to be freely traded and the number of slots need to be set carefully.

There are many arguments for, single tills, and many arguments for dual tills- thus there is no clear case for one or the other. In particular situations one or the other may be best for an airport in India. Thus the issue needs to be looked at regularly in future reviews.

In future regulation should focus on a few airports with persistent market power. The other airports can be monitored and be subjected to the threat of re regulation should their performance not be satisfactory.

We recommend that future privatizations should not increase market power of incumbent airports in the way the 150 km rule does, and should facilitate competition.

After a first period of rate of return regulation the level of ATC charges should be capped and the structure should be left unregulated in order to set incentives for efficiency.

Appendix : Benchmarking of Airports

There has been considerable interest in, and research into, the benchmarking of airports over the past decade or two. There are different benchmarking techniques which might be used, depending on the objective of regulation and on the required data (for a general overview, see Coelli 2005, and for a review on benchmarking literature on airports see Forsyth, 2008, as well as Liebert and Niemeier, 2010). From the perspective of regulation, benchmarking should provide information on technical and economic efficiency. Benchmarking of efficiency can be expanded to include benchmarking of prices and profitability. An airport is operating technically efficiently if it produces a given level of output with minimal inputs. This concept is very relevant to monopolies and regulation because very often airports with market power use more resources than necessary. Furthermore, technical efficiency differs from economic efficiency, because airports might produce technically efficiently, but might not chose the mix of inputs which minimizes costs given factor prices. Technical efficiency is a requirement for overall economic efficiency.

Both partial and total benchmarking methods can be applied for benchmarking. Managers have so far preferred partial indicators like labour productivity or average costs per passenger. Such data have been collected for a large sample of international airports by Jacobs (former TRL). Partial measures have the advantage that they are easy to understand but disadvantage that they are, by their very name, partial and incomplete, and may disregard key inputs to the productive process. Partial measures should only be applied if data for total measures are not available (Forsyth et al., 1986).

In most cases, enough data can be generated to use total measures. The most prominent are:

- Total Factor Productivity (TFP),
- Data Envelopment Analysis (DEA), and
- Stochastic Frontier Analysis (SFA)⁶.

⁶ It is useful to differentiate between frontier and average approaches. Frontier methods like DEA and SFA estimate the efficient production or cost function where an airport that deviates from the frontier appears to be inefficient.

TFP measures changes in the level of output and the associated changes in inputs- it is a ratio of total output to total input. For multi- product firms like airports, it is necessary to construct price index-based numbers to measure the total factor productivity. It is necessary to aggregate inputs and outputs using, for example, prices as weights. However, often price data are sometimes difficult and costly to get or not publically available (see for example the ATRS Airport Benchmarking Report (2010) which includes Chhatrapati Shivaji International Airport and Indira Ghandi International Airport).

DEA is less data demanding and do not need price information. DEA is a non-parametric approach which uses linear programming to construct a piece-wise linear frontier which is determined by the efficient airports of the sample. DEA optimises the weights without the need of price information. An advantage of this approach is that it can handle multiple inputs and outputs - for example aeronautical and non-aeronautical services.

The SFA approach is a parametric method which requires the specification of a production or cost function. In contrast with DEA, SFA not only explains deviations from the frontier with inefficiency, but also accounts for errors.

All methods can be used to determine the relative technical and allocative efficiency of airports and have different strengths and weaknesses. A central problem of benchmarking is the heterogeneity of airports, which must be taken account. These heterogeneities can be classified as external exogeneties, external endogeneties and internal exogeneties. Airports are subject to exogenous heterogeneities which are caused by the environment for example, geographical constraints⁷, or social particularities⁸. Over these factors airport management does not have any control. Endogenous heterogeneities are due to national differences in the regulatory framework. This is particularly relevant for benchmarking of airports of different countries, where airports have to meet different national regulation requirements. Airport performance

⁷ Airport grows might be constrained by limited space and any extensions leads to higher costs.

⁸ In many European countries like Finland, Sweden, and Spain airports are publicly owned by one national airport company. Typically small airports are cross subsidized.

might differ because of different safety and security regulations. These heterogeneities cannot be influenced by management and need to be adjusted for by including these particular characteristics in the benchmarking analysis. Internal heterogeneities across airports are due to managerial decisions. For these effects benchmarking should not be adjusted with the exception of capacity utilization which differs widely over the life time of investment due to lumpy character of airport investments.

In principal, any relevant factor can be included in a benchmarking study. Some techniques, such as SFA, are open ended in the sense that any factor considered to be of potential relevance can be included as a determinant of efficiency, just as any variable can be included in a regression analysis. By contrast, a TFP study is limited to inputs and outputs- it does not allow for other relevant factors such as size or traffic mix. However these factors can easily be allowed for in subsequent regression, which can determine the effect of these factors on efficiency. Thus, for example, the effect of size or traffic mix on efficiency can be calculated.

Benchmarking techniques are improving over time, and several of the problems handling airports are being resolved. The current focus of research is to work with more disaggregated data, and incorporate negative externalities such as noise or delays.

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