Dealing with Demand Forecasting Games in Transport Privatization

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Abstract

Privatization has increased the number of players in the decision-making process for major transport investment decisions. The main argument of this paper is that this fragmentation is creating opportunities for strategic decision-making by each actor and that this is particularly obvious in the context of demand forecasting. This paper explores some of the specific causes and consequences of this new situation, including the perverse incentives, linked to the diversity of the objectives across the actors and to the risk allocation induced by the regulatory regime. It illustrates the issues and possible solutions from a wide range of modal and country experiences. In particular, it discusses the role of the newly independent sector regulators in reconciling these diverse goals and their limitations in view of the major information asymmetries problems they face.

Keywords

Traffic forecasting; privatization, regulation; investment appraisal.

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1. Introduction

Demand forecasting techniques have improved a lot in the past years.[2] Economic research has generated new, more reliable, methods which are increasingly used in "real world" investments projects but not as much as initially expected.[3] The field still suffers from bad reputation as many analytically advanced traffic studies continue to disappoint, leaving significant wedges between realized and forecasted traffic. The perception among casual observers is that many errors and a lot of uncertainty are still pervasive in this field. Moreover, in spite of its very practical relevance, demand forecasting still appears to be reserved to highly specialized analysts, and to remain more of an art than a science for others, especially for decision-makers.

The recognition that many practitioners are still reluctant to rely on the best method is probably not really new to most transport economists but the fact that its practical importance has sharply increased with the growth of privatization in the sector and, subsequently, the fragmentation of the decision process, continues to be ignored by many. In the past, projects were designed, funded, implemented and operated by the same entity, generally a public institution. Privatization is shifting the responsibility for some of these tasks, most obviously the implementation, operation and as much as possible of the funding, to private investors and operators. Since this shift includes the transfer of demand risks associated with the operation from the public to the private sector, traffic studies tend to be done by each private firm in preparation for their bids to operate a service. Government-provided traffic studies are often viewed as unreliable by the private operators since they may be "overselling" the potential business with a view to extract the highest possible fiscal gains as part of their privatization efforts.

This new emerging conflict between operators and government is one of the reasons why most privatizations are isolating the regulatory role from the Ministries and creating independent regulators. Among other things, these are expected to assess the traffic studies built-in the bidding documents put together by the privatization units of the government or in the business plans proposed by the bidders. Increasingly also they are asked to contribute to assess demand forecasts in the context of contract renegotiations since these are reaching

[2] Starting with for examples Ben-Akiva and Lerman (1985)

[3] For a brief review of the evidence on the type of demand studies used in transport projects in developing countries see Estache (2001) or Guasch (2001). It may be worth to point here however that during the 1990s, demand forecasting in railways, road and port projects put up for "privatization" were essentially based on

close of 50% in LDCs. This implies that the regulators should be familiar with the methods, and in particular should understand their limits and uncertainties, to ascertain the magnitude of the results and to be able to counter the possible strategic biases introduced; otherwise improper decisions based on false demand forecasting could jeopardize the efficiency of privatization or renegotiation processes. The experience of the 1990s suggest that they are far from having the appropriate knowledge.[4] The purpose of this paper, which gives a special attention to the experience of developing countries, is both positive and normative: its aims are first to analyze the underlying strategic behaviors built around the demand forecasting exercises and their consequences, and, second, to provide guidelines to the regulators as to how to assess them and to deal with them.

The rest of the paper is organized as follows: Section 2 looks at the ex-ante sources of information asymmetry created by the privatization process. Section 3 focuses on the sources of uncertainty which exacerbate the information asymmetry problem. The next two sections discuss how to cope with these two issues. Section 4 examines the effects of uncertainty and justifies the need for accuracy. Section 5 analyzes the possible strategic actions of the actors. Section 6 concludes.

2. The changes due to privatization: more players and information asymmetries

The main changes brought by privatization stem from the fragmentation of the actors of the decision process in the sector. Before privatization, the decision-maker for all stages of any investment project was an integrated public entity. Of course, the various tasks were implemented by different units within the public administration, and these divisions had sometimes conflicting interests but the fragmentation was clearly less significant than when these tasks are divided between a public and a private actor. Moreover, the risks associated with demand were not a major source of concern since taxpayers would eventually pick up the tab which implied that the need to be concerned with demand was probably not as constraining as it is under a privatization scheme.[5]

This fragmentation creates information asymmetries which in turn promote strategic behavior in the interactions between the new actors. After privatization, the interactions

extrapolation of recent trends corrected by the privatization teams in generally quite ad-hoc ways (e.g. exogenously assessed traffic leakages for toll roads resulting from the introduction of tolls).

[4] Estache, (2001)

surrounding the investment decision process after privatization involve four main groups of players rather than two: in addition to the users and the government (which represents the taxpayers and the voters), there are also the operators (including sponsors and financiers), and the regulator, the new autonomous off-spring of the government. Each cares about demand. Yet, their concerns may differ. Moreover, not all of these concerns are public since many of the actors tend to have private agenda.

Users will generally worry about prices, service quality and reliability and of course, all those factors influence demand. But there is not much change in terms of the assessment of the effects of their concerns for demand. The only difference brought by privatization is that the incentive for client orientation tends to be stronger for the private operators than for the public operators. If some degree of competition prevails or if the regulators are effective in mimicking a competitive environment, the user's concerns drive demand and hence stand a better chance of being taken into account.

Governments, and this tends to mean the Ministers of Finance, are often the dominating players in the context of the privatizations.[6] They generally want to please tax payers by cutting taxes and respond to their voters with environmental and distributional concerns.[7] Besides these published objectives, the Government has also often some concerns about the electoral agenda and the synchronization of the re-election and reform adjustment timing. Overall, the developing country experience suggests that governments are likely to favor an overoptimistic forecast because it leads to more profitable auctions (e.g. high fiscal gains) with high political payoffs. Moreover, even if recent research suggests that a renegotiation is likely to result from an overoptimistic forecast, it does not seem to moderate the temptation of the privatization units to be optimists.[8] Indeed, the privatizing team is seldom still in place when the renegotiation takes place and is hence not held accountable.

The operators typically care about profits, risks and market power.[9] All their concerns are influenced by demand. Indeed, the value of the business is driven by demand and the ability to recover the costs from this demand while maximizing the possible rent if competition is limited

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[5] The construction of the Concorde is an interesting illustration of what the lack of concern for willingness to pay can do to investment decisions and its implications for taxpayers. The plane has not been that lucrative, has been paid by all taxpayers and mostly benefited rich travelers!

[6] Estache (2001)

[7] They are sometimes as well concerned with the need to deal with unions as the restructuring of these sectors often result in labor redundancies.

[8] Guasch (2001)

[9] Most regulators would argue that the concerns of the financial advisors and of the operators do not always coincide The advisors mostly care about getting the deal signed and this requires very good demand prospects . The operator wants to have a longer term view and is typically more cautious about the prospects.

in the sector. The evidence available suggests that competition for the market is in fact not working that well in most developing countries. Typically the number of serious bidders for a major concession or a greenfield project in transport is not much higher than 2-3. This does not seem to be enough to ensure that every auction attracts the interest of many bidders and hence the rents continue to be high in many segments of the sector. Most bidders will consider any action that gets them closer to the opportunity to get a major rent (including a strategic use of the demand forecast). In particular, many of the potential operators keep in mind the possible renegotiation of their contract which provide opportunities for further rents not necessarily related to demand, and strategic bids.[10] This is why in practice, the bids will not provide clear cut information on the actual demand forecasts of the bidders.

The freight railways contract renegotiation in Argentina that took place during the end of the 1990s shows that many of the bids were strategically excessive bids. They were not necessarily consistent with the real forecast made by the operators but aimed at getting into the business with some cushion allowed by matching assessed overestimates in demand with the expected increase in productivity.[11] More generally, the experience suggests that low-balling by bidders, which implies overestimations of demand or underestimation of costs, is quite common in infrastructure privatizations to improve the odds of winning an auction.[12] This suggests some implicit collusion between the government actor and the operators. Users will not care if the incidence of this collusion is on the future taxpayers and it is to avoid this inter-generational consequences of collusion for future taxpayers that its is important to have independent demand assessments.

Regulators are supposed to be independent-- but often happen to be political appointees and are hence likely to have multiple agenda. They are supposed to want to balance everybody's concerns fairly. This must be done while accounting for many aspects of demand typically ignored in the privatization process. It includes a reasonable comparison of willingness and ability to pay to avoid, in particular in the case of passenger transport, possible exclusion of some segments of the population who may not be able to afford tariff increases that may result from the privatization. The main challenge for the regulator is that it is the least informed of the players, both ex-ante and ex-post. The actors benefiting from this information asymmetry can use it to manipulate the demand forecast in their favor at the privatization stage. One of the responsibilities of a regulator is to reduce the sources of information asymmetries

[10] Guasch (2001)
[11] Campos, Estache and Trujillo (2001)
[12] Gomez-Lobo and Hinojosa (2000)

and one way of doing so is to increase its understanding of not only the techniques but also of the possible strategic uses of these techniques.

3. The sources of discrepancy in demand forecasting

Many texts provide large audience presentations of the main methods of traffic forecasting now available (e.g. Small and Winston (1999) in English, Quinet (1998) in French) and several comprehensive textbooks are devoted to this subject (Ortuzar and Willumsen (1994) in English or Ortuzar (2000) in Spanish). What none of these texts do is relate explicitly these methods to their potential use by regulators. Table 1 links the most relevant features of the classical stages of the identification of transport demand to the issues a regulator is likely to have to deal with.

<Insert Table 1>

The main problem from the viewpoint of a regulator arises from the fact that, in spite of the major progress achieved in this field, traffic forecasting is still far from being an exact science. There are many uncertainties not only with respect to the methods to be used but also with respect to the reliability of the results these methods will generate. Only the best experts are able to audit and attest to the quality of a specific study. It is then quite normal to expect and observe that this uncertainty tends to be used strategically by the actors of the regulatory games. We first analyze the sources of scientific uncertainty, then discuss how this uncertainty is used in a strategic way by the actors.

3.1 Scientific uncertainty of the forecasts : Overshooting and undershooting demand

It is not unusual to encounter forecasts which differ from the reality by 20 to 30% as documented by many authors.[13] Since mistakes do happen and there is enough experience to document them, it seems to make sense to try to categorize them.

In this context, Quinet (1998) drawing from the French experience, distinguishes three sources of inaccuracy: the inadequacy of the model structure, the inaccuracy of the current data and the uncertainty of prediction of the future value of exogenous variables. As far as model structures is concerned, many specialists remember the battle between Gaudry

[13] see Skamris and Flyvbjerg (1997) or Estache (2001) for instance.

and Wills (1978) and some other authors (Mandelet al.,1996), against the rest of the world for or against a linear or a non-linear specification of logit models. But for developing countries, the accuracy and availability of data is probably the main ongoing concern. This is particular important in view of the fact that it is not uncommon to find out that models with specifications well adapted to the situation to be analyzed cannot be implemented by lack of data or to the costs and delays needed in collecting the data.

The effect of pure scientific uncertainty can be approached in situations where strategic biases are low. Such a situation happened in France around the 80's and the 90's for intercity toll motorways; in this period the system of toll motorways was almost fully integrated; the operators were public firms very close to the state; besides the traffic modeling procedures have been improved by experience; for both reasons the chance of strategic bias was reduced. Quinet (1998), quoting ex-ante-ex-post studies of intercity motorways and mass transit traffic forecasting in France, for which the French administration had a good knowledge, shows that, on the whole, forecasting errors are almost evenly distributed between over and under forecasting the median error being about 20% of the average in absolute value.

Although scientific uncertainty should be, a priori, evenly distributed between under and over-estimation, there are at least two reasons to support the idea that under-estimation should prevail, independently from any strategic behavior on behalf of the actors of the process: (i) privatization changes the perceived transport services, changing the nature of the demand and (ii) the reformers have failed to recognize the network aspects of the demand.

The first effect is quite well documented in several of the suburban rail concessions in Latin America where demand was underestimated quite significantly.[14] Most policymakers were concerned that the potential passengers of the privatized services would be reluctant to pay for a service that used to be essentially free. The source of the underestimation was the failure to recognize the existence of a rationed demand for quality. The passengers are actually buying a different transport product because they now get a safer, timelier and more reliable service. This has been the experience with the Argentinean passenger suburban train where willingness to pay and to use had been completely underestimated.[15]

Second, underestimation may happen because a forecaster at the project level does not take in account the interactions with a much wider transport network, it is easy to underestimate the derived demand stemming from the network characteristics of a transport system. Since the network externalities can go either way, the sign of the correlation between

[14] For the case of Argentina, see Campos and Estache (2001) and for Brazil, see Rebelo.(1999)
[15] Campos and Estache (2001)

the various modes is not always the same. An improvement in a bus system may improve the demand for train or for subways if it functions as a feeder as in many of the Brazilian Northeastern large cities. If these characteristics are not accounted for, demand will generally be underestimated and under-investment or under-pricing are the likely outcome. Implicit subsidies are created which can be addressed through changes in pricing strategies which account for the complementarities of transport services and infrastructures.

3.2 Discrepancies due to strategic forecast manipulation

Despite what should result from pure scientific uncertainty, a quick review of the major concession projects of the last decade suggests that while both overshooting and undershooting happen, overshooting tends to prevail (see Estache 2001). The reason is that, even when implemented by an "unbiased" expert, traffic forecasts are subject to uncertainty. This imbedded uncertainty induces the possibility of manipulation of the forecasting exercise by the actors of the privatization process, and this possible manipulation is exacerbated by the consequences of the information asymmetry between the operator and the regulator discussed earlier. This is why a major step in reducing this information asymmetry is an effort to understand the sources of uncertainty and to understand when and why overshooting and undershooting arise.

The most famous demand driven failure stories circulating among privatization experts are indeed all built around over-optimism. For instance, traffic forecast for some of the most publicized toll roads projects overshot actual traffic from 25% (Cuernavaca-Acapulco in Mexico) to as much as 60% (M1-M15 Highway in Hungary or the average for the Mexican toll road program). Most of Asia's BOTs projects for toll roads were based on very optimistic growth assumptions pre-dating the fallout at the end of the 1990s.[16] The same story line prevails for other modes as confirmed by a detailed review of the main urban rail projects in 8 US cities by Pickrell (1992). It shows that the forecast that led local governments to advocate 10 rail transit projects over less capital intensive competing options grossly overestimated rail transit ridership construction and underestimated rail construction costs and operating expenses.[17] In 7 out of 8 cities, actual ridership was less than half of its forecast level.

But the story is not only one that applies in developing countries. The Skamris and Flyvberg (1997) survey relates overoptimistic forecasts to cost overruns in large infrastructure

[16] Estache (2001)
[17] Pickrell, (1992)

projects in OECD countries. Their conclusion is that traffic forecasts that are incorrect by 20-60% compared with actual developments are common in large transport infrastructure projects in a sample of countries including developing countries and the UK, Denmark and Sweden and are associated with cost overruns.[18]

Undershooting, while less common in the general context of transport privatization, also happens as in the case of suburban passenger rail in Argentina. It matters because its main outcome is a lack of transport capacity and hence congestion. It may happen either from uncertainty of forecasting and from common errors independent of strategic behavior, such as the ones quoted in the previous section. But strategic behavior may sometimes also lead to undershooting. For instance, when a candidate operator does not encounter much competition and is aware that the franchiser is keen to have the service run for environmental or other reasons, announcing a lower demand forecast than expected , and hence less cost recovery, may often be a rational option since it may lead to subsidies as a source of guaranteed income. More generally, in competitive tendering, the competitors' best strategy is often to overestimate the subsidy they demand (the overestimation being larger the smaller is the competition), and this overestimation of subsidy to meet construction costs is easily justified by an underestimation of demand.

The real potential value of a business as approximated by the willingness or ability to pay, is seldom analyzed very precisely by politicians in these strategic contexts. The uncertainty of demand forecasting leaves enough room to choose, among the acceptable outcomes, the one which best fits the objectives of the political decision maker. The political gain for a politician to announce a new infrastructure today is generally much higher than the political loss of having to increase taxes at a later date. Furthermore, as mentioned earlier, these concerns and the eventual renegotiation of the deal is left to their successors since they generally imply political costs. But it is clear that private operators happily play this game. For many of the best deals, their main concern is to get the contract signed by the government, knowing quite well that there is generally significant room for renegotiation. Patience in this field is often rewarded once the contract is won.

These examples are clearly due to the fact that several actors are strategically induced to play overshooting or undershooting vis-à-vis the most probable forecast. A typology of these strategic behaviors will be driven by many characteristics : the preferences of the actors, which are often hidden; the information structures and especially the information

[18] Skamris and Flyvbjerg (1997)

asymmetries; and the possible actions which are themselves fixed by the institutions (for instance the rules of franchise attribution), or limited by the constraints of indirect actors such as the users, who can influence the behavior of the administration.

There are so many variables to take into account that it is difficult to achieve a comprehensive typology. The benchmark case is the following one: an administration launches a franchise through auctions and provides traffic forecasts to the bidders who have their own traffic forecasts to support their bid; the regulator has to choose the operator through the quality of its submission and the level of the franchise fee it is ready to pay. Within these fairly reasonable rules, it is possible to establish the following partial typology of under and over estimations :

For the administration :

- Underestimation of traffic if :
    - The risk is borne by the administration
    - The administration is risk-averse
    - The budget constraint is high
- Overestimation of traffic if :
    - The administration has a strong motivation to have the project implemented
    - The administration is myopic (its discount rate is high)

For the operator :

- Underestimation of traffic if :
    - Low competition (the optimal auction is lower, the fewer the competitors)
    - Better information about traffic than the regulator
    - Risk aversion and risk borne by the operator
- Overestimation of traffic if:
    - Renegotiation is easy and may be profitable for the incumbent
    - The administration has better information than the operator
    - The uncertainty of the business is high and the winner's curse plays an important role
    - The operator want a renewal of the franchise and is likely to obtain it

4. How to cope with uncertainty

What can be done to cope with uncertainty due to lack of knowledge? An obvious solution for a regulator is to develop an independent full expertise in demand analysis. This is what the French urban toll road regulator has done to assess the financial soundness of the bids of the concessions tendered out. It has developed several tools to forecast traffic on new infrastructures. These are classically built on a four steps basis. Demand data are drawn from household surveys (16 000 households) updated every 5 years, and provide trip matrices for several purposes of travel. The traffic model is run first to reproduce the current situation, and its parameters are calibrated so as to minimize the sum of the square differences between present and reckoned traffic on each link. Then the model is run with the new planned infrastructure, and it is run several times, for different values of toll. During the negotiation process with the bidders, the model is used as a tool to discuss the offers of the bidders and to run sensibility tests on tolls or subsidies.

This is not easy to replicate, the trend in many countries is to reduce the government size and hence the capacity to put together permanent teams capable of running an operation like the one run by the French toll road regulator. There are alternatives but this section shows that the steps to be taken before or after the privatization decision are often different.

4.1. How to induce accuracy in demand forecasting ex ante?

Two main ideas are developed: first a better quality of the studies achieved under the authority of the regulator and a better expertise on its behalf for auditing the studies of the operator, second a regulatory device to induce the operators to “tell the truth”.

4.1.1. Improved Forecasting Techniques

The most quoted failure in developing countries is probably still the extreme overshooting of the demand for the Mexican toll road program at the toll level that resulted from an auction awarded to the operator promising the shortest cost recovery for its investments. Mexico paid a very high reputation price initially and learned from that lesson. The way Mexico handled its 1998 preparation for a private investment in a commuter rail line to reduce pollution and congestion in Mexico city is a text book case. Because over 70 percent of the Mexico city transportation market traveled exclusively by road in 1994, the main

concern was to forecast how effective the commuter rail would be in capturing a sufficient share of this market.

The data available was reasonable although not perfect: a 1994 survey of trip origins and destinations in Mexico city; data on the characteristics (trip times, costs, frequency, reliability…) of bus, commuter rail and metro travel in Mexico collected by a local consulting firm; a couple of traffic counts at key locations in the corridor. The forecaster improved the available data, by conducting a stated preference survey of potential commuter rail users to estimate users preferences for alternative public transportation modes. The results were then introduced into a model generating trip volumes for the commuter rail. The specification of the modal choice model is a nested logit structure and is calibrated to allow the reproduction of time and cost in 1998 for buses and metro. This study was "best-practice". The fact is that its outstanding quality comes from the fact that it was sub-contracted [19] to a consultant firm which was both independent from the actors (very far from the Mexican world) and with a very good expertise in traffic forecasting.

As seen in this example, subcontracting these studies to an independent firm and complementing them by a good training of the regulators as to how to use the results is often likely to be the way to go in countries with weak governance structures. If the regulator is not willing or unable to follow the Mexican lead because of the costs associated, or because it has not yet gained experience in the field, there are a number of actions it can take to reduce the risks of uncertainty and hence increase accuracy.

To begin with, it is generally useful to reduce the sources of uncertainty by systematically collecting all the relevant information including a simple look at the past trend. However, in the process of privatization, effective tariff levels and structures often tend to change and when this happens, historical price elasticities can be misleading.[20]

A second somewhat more complex step is finding out more about the economic context in which the transport project under regulatory scrutiny is operating. This can help all the players decide if time is pressing to implement the project as well as giving a feeling for the extend to which the market is actually competitive which will influence the project specific demand. In West Africa, Senegal, Mali, Ivory Coast and Guinea currently have a portfolio of competing rail and road projects for which the rate of return and hence the possibility of

[19] Mercer Management Consulting (1998)

[20] Although, it is often useful to review surveys of the studies of the elasticities of traffic to prices and cross-price elasticities when substitutes or complements are involved. In this context, conventional wisdom can also help and surveys can be consulted to provide a feeling for the potential issues that can emerge, for instance Oum, Water and Yong (1992) and Small and Winston (1999).

attracting private financing is directly related to the speed with which the governments will make the decision. The most successful contracts in terms of capturing the regional demand are going to be successful because they were signed first and hence got the traffic going faster with longer term commitments by the shippers.

For some projects, it is useful to complement this trend and market analysis with the identification of potential peak demand resulting from exceptional circumstances which may justify faster increases in capacity than these trends would require. A city trying to sell itself as a great host for conferences must have the supporting transport infrastructure to deal with associated peak demand. It will often have the option of considering the introduction of congestion pricing.

Next, the regulator must ensure that technology developments are not interfering with demand forecast. For instance, the introduction of *post panamax* ships with a larger capacity to carry containers changed many investment decisions in ports since new technological constraints were appearing.

Moreover, many of the transport service companies interested in these deals have at least preliminary forecasts with good insight on the real prospects of a project. It may be worth it for regulators to find out more of these through systematic interactions with potential operators/investors and to have them audited independently. Finally, complementary industries such as the aerospace or automotive industries also make their own forecasts for obvious reasons. All these are useful in educating a regulator in an initial stage.

4.1.2 Regulatory Devices

An effective complementary option to minimize the consequences of a poor ability to forecast on the part of the regulator is to shift around the incentive of the key players to try to get good forecasts ex-ante. One often underestimated instrument is in the design of regulation. It is possible to pick a mechanism aimed at increasing the incentive to minimize error on the part of all players. Most specifically, in designing the regulatory regime, the regulator must chose who bears the technical and commercial risks—among other risks the current actors cannot influence much such as political and exchange rate risks. This means picking between “fixed price” contracts (e.g. toll price caps based and lump-sum construction cost contracts) which pushes the operators to minimize cost) and “cost-plus” type contracts (which

guarantees that the operator recovers at least cost and make a minimum rate of return on the business) in which both risk types are passed on to the operator.[21]

If the concern for efficiency dominates and business risks are minor, fixed price type contracts would dominate all other forms of regulation. Under this regime, demand would mostly be the operator's problem since it is supposed to decide autonomously the risks it is willing to take. The operator would be rewarded from the quality of its forecast as it will reap the whole benefit from its management. These types of contracts are then strong inducements to improve the demand forecast quality.

But this goal is achieved through a risk premium which is paid by the government/taxpayer or the user to the operator which bears the risk. This premium is higher the higher is the risk and the risk aversion of the operator. When overall risk levels are high and risk aversion excessive, some type of cost-plus form of regulation which allows better risk sharing should generally be preferred. But the inducement to accuracy is lowered. This paves the way to strategic behavior from the operator, the government and the regulator. The main concern under this regulatory regime is that operators will cheerfully endorse the overshooting of actual demand by the government at the time of privatization since it justifies larger investments to be included in their asset base. If tariffs are set and demand is overshot, operators are simply likely to get more time to recover the costs or if renegotiation is a possibility, they will try to get a higher tariff.

This little incentive for the operator to minimize risk and hence improve demand forecasting accuracy in cost-plus regulation is compounded by a perverse effect on the government behavior. In cases in which the government structures the privatization around some payment to the public sector by the operator, it becomes concerned with maximizing the fiscal payoffs of this privatization. In this context, the payment to the government will be highest when the potential value of the business is highest. This is why the calculation of the minimum price a government is willing to accept for a "privatized" asset is such a strategic variable. Since for a given asset value, the valuation of the business is essentially driven by a demand forecast, both the operator and the government have an incentive to overestimate demand.

[21] See Crampes and Estache (1998) for a longer discussion

4.2. How to deal with a wrong demand forecast ex post?

Once the privatization contract has been signed and the contract duration is fixed—i.e. cannot be changed without penalties or full renegotiation—, the main option to correct the consequences of a wrong demand forecast is to act on tariff (and/or subsidies to the operator). This is limited by the specific pricing rules built in the contracts but if there is some scope to achieve the desired mix between efficiency and financial goals, getting the prices right in view of the new information available may be a good idea but it is not that easy to implement. Theoretical solutions are well known : short run marginal cost, or, if there are financial concerns, two parts tariffs or Ramsey-Boiteux pricing.

The main problem with these solutions is in fact not technical but political. The politicians will not hurt commuters, who are likely to represent its electorate, to make life easier on tourists. For most politicians, a good tariff design is often like a good tax design: it exports the burden to non-voters. There are many episodes in which toll or fare increases have lead to riots and regulators or politicians are thus reluctant to engage in pricing changes that are too sensitive politically.[22]

The idea of exporting fees is quite widespread in the sector in fact. Consider how airport services are being priced by the Spanish airport regulator, which is typical for a modern tourist oriented airport systems. Most of its pricing strategy depends on its demand forecast. The regulator has been quite successful at forecasting average air traffic with horizons of 5, 10 and 15 years but it has paid less attention to forecasting peak demand. [23] When you look at the underlying incentives, it is not irrational. Indeed, the airlines, the key direct client, are not too concerned about it. Besides the fact that the share of airports costs in total costs is quite small for most airlines, for airports with a strong tourist clientele, the demand in general and the peak demand in particular is quite insensitive to price. Moreover, the incidence of rationing resulting from poor forecasting of peak demand is on tourists…who do not vote in Spain!

An alternative to playing directly with prices is to consider guarantees. The traditional solution to overcome the obstacles that traffic risk pose for a concession program is to give government income, traffic or debt guarantees. However, many authors have pointed out the potential risks associated with these guarantees.[24] One of the most underestimated effects of

[22] See Estache (2001) for examples in Argentine and Brazil of local rejections of toll roads.
[23] AENA (1999)
[24] See Irwin, Klein, Perry and Thobani (1997).

these guarantees is their compounding effects from a fiscal perspective. A simultaneous downturn in usage across a multitude of concessions can be very costly. Note however, that if a government decides to rely on guarantees, it is always useful to rely on the symmetry of the principle which implies that above a certain level of traffic, profit sharing may be imposed to get the government to reduce the costs of uncertain traffic levels.

A more general solution to minimize the risk of post contractual conflicts related to poor demand forecasting is to avoid fixed term contracts with variable fares and to award variable term contracts with set fares or fares subject to minimal changes. Under a flexible duration contract, if the demand is stronger than expected and capacity increase is needed, the operator keeps the business for a duration that is consistent with the investment recovery time at a given fare or toll level. This approach, proposed by Engel et al. (1997and 1998)[25] is increasingly popular in the transport sector and is the de-facto outcome of many renegotiations in Latin America as discussed in Estache (2001).

5. How to deal with strategic behaviours

It is clear that the means through which it is possible to achieve a better accuracy of the forecasts are also means to reduce the strategic behaviors. There are of course other ways of hedging against strategic bids and in particular low balling. In Chile for instance, as a reaction to the low bidding problem, starting with the Route 5 Temuco-Rio Bueno project, The Ministry of Public Works (MOP) introduced the following method.[26] The tendering mechanism is now based on a lexicographic scheme whereby bidders first compete based on the lowest toll offered. However, tolls are restricted to within a band set by MOP. This band is set with reference to the possible impacts of toll levels on traffic diversion and the economy of the project. Ties at the floor or ceiling of the allowed band are resolved by the length of the concession demanded. What matters to reduce the risks of low-balling is that the floor of the band is set sufficiently high to guarantee a certain revenue stream to the concessionaire. Because the concession company is a sole purpose firm that has to be capitalized by the sponsoring firms, setting this minimum toll level and the duration of the contract effectively puts a floor on the expected earnings of the company. Therefore, the risk of future financial distress for the concession firm—which would force the government to renegotiate the contract—is minimized. In effect, this bidding

[25] But also see Tirole (1997) and De Rus and Nombela (1999) on possible areas of concerns and improvement.

mechanism significantly reduced the chances of re-negotiation, without lowering the competitive pressure of the process. It is possible that sponsors may still try to renegotiate the contract *ex-post,* but they will not have one of their main bargaining chips at their disposal; namely, that the concession firm is effectively in financial distress.

In addition to the games between operators and regulators, games also result from information asymmetry between the regulators and the operators on one side and the users on the other. These games emerge when the demand forecasters forget that the willingness to pay is also a political factor which gives users some degree of control over the information set. Consider the case of TEO in France. TEO is a toll motorway lying inside the city of Lyon, which has been franchised through an auction. Actual traffic was not far from the forecasts, but the tolls levels while consistent with the ability to pay were deemed unacceptable on political grounds, in particular in view of the near closure of the competing road, which was toll free. Strikes of users and riots took place which led the public local authorities to cancel the franchise and to give large compensation to the concessionaire. Here, the input data of the traffic study were politically infeasible, though the traffic study was by itself correct. As mentioned earlier, similar cases have been recorded throughout Latin America. The upshot is that in addition to willingness and ability to pay studies, political willingness to pay may be quite important and this must be managed through an active political marketing of the projects.

The diversity of possible sources of information asymmetry implies that the recommendations can only be limited to sound general advice which is, in fact, not that new for those working on regulation:

- The regulator cannot ignore the existence of the various hidden agenda
- Since there are many hidden agenda, the regulator must be endowed with the proper independence and accountability for its successes and failures in meeting the objectives of public interest which are defined in its mission.
- And the regulator should invest in developing regulatory tools to minimize its own information gaps and increase the accountability and transparency of the regulatory process this covers rigorous demand studies, one of the main instruments to include in the regulators' toolkit.

[26] For more details, see Gomez-Lobo and Hinojosa (2000)

6. Conclusions

Forecasting has long been a challenge. It will continue to be one for the foreseeable future. But the analytical instruments and the data processing capabilities provided by the latest technologies and softwares should allow much better forecasting than generally found in transport ministries or regulatory agencies. Privatization induces new needs for demand forecasting; it leads to paying more attention to risk than when investment is publicly financed. Furthermore the regulator has to be able to judge the traffic study made by the operators, and to find out the strategic behavior which influence these studies. For many governments and regulators the decision to avoid good demand modeling continues to be driven by a lack of conviction that theory and models can do better than the "old-hands" of the sector. But this is particularly dangerous in situations in which the nature of the business is changing as a result of privatization. Another argument is that it is too costly. The fact is that for projects adding up to over US$100-200 million, a cost of US$100-200,000 should not be a reason to reject some effort to do reasonable modeling. In the United States, some forecasting firms are willing to sell their forecast with an insurance in case of significant gaps between forecasts and occurrences! These recent developments have to be balanced against the fact that bad forecast can result in rationing of or excess capacity which are not costless either, and can ruin the credibility of a whole concession program: a much costlier but often underestimated consequences of demand forecasting failures.

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Table Caption

Table 1. The "classical"stages of the identification of the demand for transport

Stage	Transport decisions	Policy and Regulatory Issues in the context of privatization	Modeling
Trip generation	How many trips does the user based in some specified location wants to take in day/week/month?	Is there an obvious unmet willingness to pay for improvements in services which could be met by a new project or a concession to improve existing services?	Land planning and zoning
Trip distribution	Where is the user going with each trip among all possible destinations of interest to the transport service provider?	What would be the optimal size of the project to be packaged for private sector participation?	Origin-Destination matrix
Modal distribution	Which transport mode does the user adopt for each trip? What are the factors influencing that decision and to what extent	What price-quality combination should the privatization commission aim at and how much margin should the regulator give to the private operator to adjust price and quality given the overall objectives of the "privatization" Also, how much coordination is needed between different modal regulators (if these are at different government levels for instance)	Demand models -Agreggated -Disaggregated
Route allocation	Which route between the origin and the destination does the users pick under various types of service packages? (most important for roads and rail)	How do pricing (including access pricing) and quality rules influence the efficient use of the transport infrastructure?	Network simulation models

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