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Processes, Information, and Accounting Gaps in the Regulation of Argentina's Private Railways

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1. INTRODUCTION

Almost a decade after its privatization experience started, Argentina has achieved a lot of improvements in the delivery of most of its infrastructure services. Argentina is way ahead of many countries in the regulatory learning curve and continues its efforts to build up its regulatory capacity. However, the change has not been problem-free. The reform of the transport sector in particular has not been as smooth as many had expected or at least hoped for at the beginning of the reform process. Most rail concessions and toll roads have been renegotiated or are up for renegotiation. This adjustment is not unusual in itself and is somewhat expected for a precursor in a sector in which many stakeholders – unions, truckers among the most vocals – have never really stopped questioning the process. The resolution of the conflicts, in particular the tensions between the regulators, the users and the operators is however somewhat slower and more difficult than expected by many of the observers of Argentina's privatizations.

This paper argues that many of these conflicts are the result of a failure to create a set of rules of interactions between the key stakeholders – government, regulators, users, unions and the media. Most concession **contracts** proved to be **incomplete** in terms of the information requirements needed to anticipate pricing and investment related problems. Moreover, the necessary autonomous but accountable regulatory capacity has never been fully developed for this sector in Argentina. In particular, as the level of private participation increases in the sector, Argentina's problem was every regulator's problem: how to regulate monopolies when the actual cost and production information is directly controlled by these monopolies. To be effective, any regulatory agencies has to be granted access to a minimum level of consistent information. It must also be given instructions on the mechanisms it needs to follow to use this information and how to tailor them to the regulatory commitments. It must also be given the necessary enforcement power when any of the players fails to comply. The big questions are: how and to what extent? Argentina's transport sector has not yet been able to answer these questions and many of the tense situations observed over the last 2 to 3 years are the product of this incomplete regulatory capacity.

In practice, the main information channels between transport operators and regulatory agencies are the firms' accounting statements. Because the operators have only a limited capacity to generate the appropriate information, regulators end up relying as much as possible **on standard accounting data** to describe the past and the present of the regulated company, and to make inference about its **future performance**. The poverty of Argentina's standard accounting information is such that it limits the ability of any regulator to deliver on many of its most basic obligations and points to the clear need for the regulator to better use its leverage on the firms to get them to generate more of information relevant to the **regulatory accounting needs**.[1] Which information to ask, how

[1] Several recent papers have dealt with the issue of regulatory accounting. Carey *et al.* (1994) provide a detailed account and examples of the relationship between accounting practices and regulatory process in the UK. The overall relationship between information and accounting is studied in Burns and Estache (1998), whereas an example of regulatory accounting for Brazilian railways can be found in Alexander *et al.* (1999).

to ask for it and how to use it are the main topics covered in the paper. The discussion is built around specific on-going regulatory issues in Argentina's railways including efficiency measurement, access tolls, price-setting, renegotiation – where the availability of adequate regulatory accounting procedures could make an essential difference.

To address these issues, the structure of this document is as follows. Section 2 discusses in some detail the main regulatory functions and information needs in contexts where concession contracts are in use, adapting general well-known principles to the Argentine railways case. Section 3 identifies *efficiency measurement* as one of those particular needs in the Argentine case and provides elements for regulatory accounting on this issue. Section 4 analyzes *access prices* as a second example of what regulatory accounting can and cannot do. Finally, Section 5 deals with two other important issues for Argentina's railways: *pricing* and *information for renegotiation*, two critically relevant issues at the moment. Section 6 concludes identifying the main weaknesses and strengths of the current practices and provides some practical recommendations for its improvement.

2. REGULATION AND INFORMATION IN ARGENTINA

Since 1990 Argentina has experienced an unprecedented process of transfer of services and publicly-owned firms to the private sector, both by selling assets and by concession contracts. The national railroad (*Ferrocarriles Argentinos*, FA) was privatized during the 1989-1995 period, after years of mismanagement, deteriorating services and huge increases in operating losses. The privatization was carried out by dividing FA into three business units: freight, commuter and intercity passenger services. Freight services were awarded in six concessions to private operators. FA's urban commuter railroad services, centered around the Buenos Aires Metropolitan Area, were divided into separate lines and offered in seven concessions (one of which also included the municipally-owned subway system). All intercity passenger services were offered to the provinces, but most of them were ultimately abandoned.[2] The main changes in the industry and the current situation are summarized in Table 2.1.

From the point of view of regulation (and, in particular, with reference to its implications for regulatory accounting), the reform of Argentina's railways has had different consequences for the operation of each of the former FA business units. In the case of intercity passenger services, all the management responsibility was transferred to the provinces. Freight railways continued to be vertically integrated and the concessionaires become responsible for delivering services and maintaining infrastructures. In the commuter services, the Federal Government kept the main responsibility for infrastructure improvements, whereas in the case of the Buenos Aires subway that duty corresponded to the municipality.

[2] A recent summary and detailed description and analysis of the changes in the Argentine rail sector can be found in Thompson (2000) and Campos and Estache (2001).

Table 2.1. Argentina's railways privatization and current situation

	Type of process	Current operators*	Current situation
Freight Railways	10-year concession contract of rolling stock, infrastructure and services in exchange for a canon payment to the Government. Concessionaires committed a volume of investment in their winning bids.	- Ferroexpreso Pampeano (FEPSA) - Nuevo Central Argentino (NCA) - Ferrosur Roca (FSR) - Buenos Aires al Pacífico (BAP) - Mesopotámico Gral. Urquiza (MGU)	Investment commitments have not been fulfilled. Output increased below expectations. Starting renegotiation process.
Commuter Services	10-year management contract for passenger services (including subways). (20 years for Metrovías). Government pays an operating subsidy or receives a canon and finances infrastructure investments.	- Trenes de Bs. Aires (TBA) (2 lines) - Metrovías (1 line + Subway) - Ferrovías (1 line) - Metropolitano (3 lines)	Demand exceeded predictions. More investment was needed. Renegotiation just concluded with some concessionaires.
Intercity Passenger	Transfer of rolling stock, tracks and services to provinces. Services not transferred or non-accepted by the provinces were discontinued.	Several companies owned by Provincial Governments. The most important one is in the Buenos Aires Province (Ferrobaires)[3]	Direct operation with subsidies. Concession project for Ferrobaires, not yet defined.

* A sixth freight concession corresponding to *Ferrocarril Belgrano* is currently being operated by the unions, with Government support.

Since the conclusion of the rail restructuring process, the Argentine government has been facing three main challenges:

- the need of outlining a new **institutional structure** for the sector since the reform;
- the redefinition of the **regulatory objectives** in the context of private participation, and
- the definition of adequate **operating procedures** to reach these objectives efficiently.

These three elements are crucial for the understanding of the main issues related to regulatory accounting and we review them in turn.

2.1. The new institutional structure for regulation: who should do it?

The federal structure of the country and the large asymmetry between the provinces and the Buenos Aires Metropolitan Area in terms of population and economic activity results a differentiated regulatory responsibility. In the provinces rail regulation is still in the hands of dedicated units within their respective provincial transport secretariats These units have exclusive jurisdiction over the intercity passenger railroads that were transferred to them. Freight rail concessions are entirely under the jurisdiction of the Federal Government, although they have to grant access to passenger services by contract.

[3] Apart from Buenos Aires, other provinces that have dedicated rail units for intercity passenger services are Río Negro, Chubut, Chaco, Córdoba, Tucumán and Salta.

On the other hand, transportation in the Metropolitan Area of Buenos Aires is subject to the regulatory and fiscal policies of the federal, provincial and municipal Governments. The Federal Government is responsible for construction and maintenance of national highways, for financing investments and operating subsidies for the suburban railways and the subway, for regulating the commuter bus lines that connect the city with its suburban districts and for regulating the buses operating entirely within the city of Buenos Aires. Furthermore, the Federal Government's traffic police division is responsible for traffic control and enforcement. The Provincial Government of Buenos Aires is responsible for the construction and maintenance of provincial roads, the rail passenger services between Buenos Aires and Mar del Plata and also controls inter-municipal bus lines. Finally, the Municipality of the City of Buenos Aires is the owner of the subway infrastructure and rolling stock and is in charge of road and traffic management within the boundaries of the city.

In 1996 National Decree 1143 established the framework for the privatization of the Buenos Aires subway and the concessioning of the commuter rail services. This Decree also approved the agreement between the Ministry of Economy, Public Works and Services and the Municipality of the City of Buenos Aires for the creation of a Metropolitan Area Transport Authority (ATAM), that would have been a cooperative entity among the federal, provincial and municipal governments, with authority for planning, managing and regulating transportation in the Greater Buenos Aires.

With specific reference to passenger rail transport, initial plans envisioned the ATAM with power to monitor and control the concession agreements, except for safety issues which were to be regulated by National Commission for Rail Transport (CNTF). Dispute resolution between concessionaires and the government were to be handled by the National Commission for Rail Regulation (CNRF). Both the CNRF and the CNTF were also to deal with inter-city passenger and freight railways. A 1993 decree established the CNTF, but two attempts in 1992 and 1994 to create an arbitration body (i.e., CNRF) failed. Although a preliminary institution (the so-called pre-ATAM) was created to define and develop the ATAM, the Congress could not pass the bill legalizing the ATAM, due to political and institutional conflict.

The initial regulatory entity for the metropolitan railway concessions was the Railway Restructuring Program Coordination Unit (UCPRF, within the Ministry of Economy, Public Works and Services), which had designed and overseen the entire concessioning process. In this sense, no real regulatory framework was defined before the concessions took place. In 1996, the UCPRF was merged with the regulatory body for bus transport and the CNTF to form the **National Commission for Transport Regulation** (CNRT), created by Decree 660/96, within the context of a wider public administration's reorganization and restructuring process.

CNRT was born as a decentralized agency inside the environment of the Secretary of Works and Public Services of the Ministry of Economy and Public Works and Services but was later integrated in the Secretary of Transport, under direct control of the Ministry of Economy. CNRT's main functions included the enforcement of laws and norms, information collection for system evaluation, verification of contract fulfillment, and

sanction application. The CNRT cannot dictate regulations and the Ministry effectively retains all responsibilities for changes in the concession contracts and for fare setting (including fare changes envisaged in the concession contracts). The CNRT ends up looking like a three-legged workhorse – significant resources but no regulatory power – and with limited vision – to the extent that since there is no real transport strategy, it is not to clear as to where it is heading as a partner in the implementation of transport policy.

2.2 The objectives of regulation: what should CNRT do?

The Argentine case illustrates the difficult institutional transition that often accompanies the reform of any traditionally state-controlled sector. Once private participation has been introduced in the rail sector The objectives of regulation should have been explicitly redefined to reflect the fact that they are supposed to reconcile the interests of the private operators with those of consumers and users in general. [4]

This redefinition of objectives was difficult because the creation of CNRT was carried out amid a difficult political context that conditioned its future development, its functions and objectives. Although formally, CNRT is the main *regulatory* body in rail transport at the moment, a review of its main mandates and competencies show that it has no real regulatory functions. According to Decree 660/96, CNRT oversees and controls the performance of freight and passengers transportation, by road and railway under national jurisdiction. More specifically, these functions can be summarized as follows:

- to enforce laws and decrees regarding road and railway transport,
- to oversee road and railway transport companies' performance,
- to request the information and the necessary documentation to transport companies to verify and evaluate the system performance, with the appropriate confidentiality of the used information,
- to control that the fares settled in the concession contracts are complied with and apply the sanctions foreseen in the legal framework in case of non-fulfillment of the established conditions,
- to take the necessary steps in order to respond to passengers and user's complaints about the services, and;
- to promote civil or penal actions in order to ensure the execution of its functions.

In particular, Decree 660/96, explicitly points out that CNRT has *inspection* and *control* activities, but it does not assign explicitly regulatory responsibilities which in most cases with boil down to the right to resolve conflicts between players with respect to pricing or contract compliance .De facto, the Transport Secretariat takes on that role.

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[4] In this context, Burns and Estache (1998) suggest that the regulation of newly privatized infrastructure firms as specified in the mandate of regulatory agencies ends to have very similar objectives around the world. They tend to identify up to five main **regulatory objectives**: protect customers' interests regarding prices and quality of service, ensure that the business, operating efficiently, can finance its activities, promote efficiency, fulfill obligations as decided initially by policymakers, and ensure that the regime is sustainable and robust.

CNRT's actions focus customer and community rights protection, competition promotion in the sector under national jurisdiction, and the achievement of higher safety standards, better operation, reliance, equity and widespread use of the road and railway transport system.

Thus, when compared to the more general regulatory objectives usually expected from a regulator, it is clear that CNRT's mission is short of what would be expected from a regulator. Its objectives are mainly addressed to the protection of the consumer (in terms of prices and quality) and of the system as a whole (technical standards, safety, etc.). The viewpoint of the operator emerges only in as much as its interests are consistent with those of the consumers and the sector. Moreover, the need of **making regulation** in a **consistent** way with the **financial and economic viability** commitments made through the contract to each operator has been left out of the CNRT's functions and is managed by the Transport Secretariat. As discussed below, this is the key issue in the current regulatory debate and an element to think about in any future reform of the system. Assuming that the government decided to actually empower the regulator with a full-fledged regulatory responsibility – including the mandate to make fairer assessment of the viability of the operators – the need to define relevant operational procedures is the next challenge CNRT will have to face.

2.3. The operational procedures and the processes: how should CNRT act?

In general terms, Argentina's rail concession contracts are not very different from those found in other parts of the world in the sector. They cover prices, investment decisions, service standards, technical quality and environmental quality. As suggested by Alexander *et al.* (1999), to be able to monitor compliance in these functions, any regulator will have to focus on some of the key aspects of the business covered by the contract with the private company. In general, the main elements of each industry to be monitored can be classified as **operations**, **finance**, **transactions** and **services**. Table 2.2 shows that for most of the key functions of a regulator, information is a necessary condition of their effectiveness in regulating.

Table 2.2. Information requirements by regulatory functions

Function	Operational	Financial	Transaction	Service
Price control	►	►	►	
Investment decisions	►	►	►	
Service standards				►
Technical quality	►			►
Environmental quality	►			
Financial viability	►	►		
Non-discrimination in price setting			►	
Promotion of competition		►	►	

In the case of Argentina, according to Decree 660/96, CNRT faces four primary targets when collecting information from the rail sector. The information must be useful for:

- the instrumentation of the necessary mechanisms to guarantee the effective exercise of its attributions regarding the operation of the road and railway transport system under national jurisdiction,
- the execution of the police power for activities under its competence in the transport system, enforcing the laws, decrees and other regulations, as well as the enforcement of concession contracts of the rail and subway services,
- the control of the operating performance of rail concessionaires, and
- the control, regarding railway security, of the execution of the existing norms referred to tracks and fixed facilities, rolling stock and other materials and spares, as well as of the works and provisions integrating the investments plans of the concessionaire.

In order to evaluate the suitability of these objectives, any consideration of the range of information collected to meet these targets has to take into account the existing and future regulatory functions. Furthermore, there is a trade-off between having information regularly reported, with potentially high monitoring and compliance costs, and having agreed formats and definitions for information that can be requested when the need arises. The assessment should establish whether the minimum amount of information necessary for the day-to-day operation of the regulator is provided.

In terms of the four categories of information to be monitored, CNRT's experience in information collection can be summarized as follows:

- **Operational information**. It is provided on a monthly basis through direct contact with the concessionaires. For the commuter services, for each month and each of the concessioned lines, CNRT monitors output data in terms of total passengers, total number of trains and car-kilometers. For each of the freight operators, the operational information available each month to CNRT is the total output (in terms of total tons and total tons-kms). For the intercity passenger services operated by the provinces, CNRT obtains information on the total number of passengers. In general, the coverage of all this operational data is adequate for the purposes of CNRT.

- **Financial and investment information**. In the case of commuter services, where prices are set by contract and revised by the Secretary of Transport, financial information is related to operating information. CNRT requests annual audited balance sheets and other accounting information from the concessionaires, but does not impose specific accounting procedures nor demands a full detail of cost assignment. The revision of investments commitments is carried out on a monthly, project by project basis, but unrelated to the overall financial and economic situation of the firm. With respect to freight concessionaires, apart from the same accounting information as above, CNRT obtains revenue data on a monthly basis, which allows it to calculate average tariffs. Investments are also reviewed project by project, in reference to the commitments made in the concession contracts. None of the concessionaires is in the

Stock Exchange, although their cost and financial information is audited every year. In the case of intercity passenger services, CNRT has only general information provided by the corresponding dedicated units in the provinces.

- **Transaction information** includes the details of any contracts with customers, suppliers or employees, as well as special agreements with respect to certain facilities (for example, port terminals or exclusive provision of services for mines). CNRT has a limited access to this information which, so far has been seen as of little relevance, but could be important in the future from the point of view of intermodal competition.

- **Service information.** CNRT has monthly accounts of the incidences (in terms of punctuality and regularity) of commuter and subway trains. It also elaborates periodical customer satisfaction surveys. Since, according to the contracts, quality of service is linked to price reviews in the case of commuter services, CNRT has been quite effective in this. In the case of freight railways, detailed information regarding their services is much less available to CNRT.

Following the eight functions described in Table 2.2. Table 2.3 provides a summarized assessment of the relevance of the information collected by CNRT for most standard regulatory needs. The quick assessment evaluates the procedures in data collection and provides a quick diagnosis of some elements that should be considered in greater detail.

Table 2.3. Information collected by CNRT: an assessment

Function	Evaluation of procedures
Price control	Set by contracts. CNRT lacks economic mechanisms for price reviews or access prices setting
Investment decisions	Adequate operational information, but poor cost assignment control. No efficiency measurement
Service standards	Extensive quality in commuter services but poor enforceability of penalties
Technical quality	Standards set in contracts. Adequate supervision but lack of efficiency measurement
Environmental quality	
Financial viability	CNRT lacks a financial model that link price, quality and investment requirements with financial viability
Non-discrimination in price setting	Prices set in contracts, but insufficient coverage of transaction information
Promotion of competition	Irrelevant for now from CNRT's viewpoint. No major cases of captive shippers nor anti-competitive practices.[5]

[5] This is quite important where there are risks of cartelization which is quite important when few players are involved, as is often the case in developing countries infrastructure sectors. In Argentina, as shown by Table 2.1, only four consortia operate the seven commuter lines in Buenos Aires, whereas two of the private freight concessionaires (BAP and MGU) are owned by the same company. Although, lack-of-competition risks are not high at the moment, further concentration should not be discarded in the future, since the provisions for the acquisition of cross-participations among the concessionaires are not very restrictive.

Summarizing this analysis, there are broadly two applications for the information collected by the regulatory agency: *(i)* as a means of **monitoring the performance** of the company as spelled out in the contracts and *(ii)* to support occasional or **periodic reviews** of specific activities or issues. CNRT can perfectly deliver on the first but it is not ready to carry` out the second one. Having information is only one part of the overall regulatory information story. The key aspect is the ability to manipulate and use the information, and reconcile the objectives of the regulatory agency with its function and structure. That overall internal consistency of the system is the most important and difficult piece of the mechanism. The punch line is that CNRT's mandate and procedures are not as clear as in other countries with respect to the financial viability In addition, non-discrimination pricing rules and the commitment to competition are not included in the obligations imposed on the private companies under contract with the government but are likely to be a concern of the competition agency, if not of CNRT

2.4. Identifying the pending issues

The current structure of rail regulation in Argentina needs a fine tuning that clarify its functions and correct some existing problems. Part of this need for additional regulatory capacity is arising from the fact that most concession contracts proved to be incomplete in terms of the information requirements needed to anticipate investment problems. The two specific major areas where development and new work is more necessary include **objectives** and **procedures/processes**.

- With respect to **objectives**, it should be clear by now that regulation is something more than simple operational and financial control. In contradiction with its name, the National Commission for Transport Regulation, is and purely controlling agency with a passive view of regulation. Information flows from the private operators to CNRT; then, dates are scrutinized with respect to the contracts obligations and, in case of non-fulfillment, penalties and sanctions are enacted. CNRT lacks the mechanisms to make an active regulation, more **consistent** with the **financial and economic viability** of the operators. CNRT, for example, makes no detailed analysis of the productivity of the concessionaires, which could be crucial to conform their performance with the current economic conditions under which they operate. CNRT also lacks instruments to revise prices (for example, access prices) set in the contracts, since its monitoring of the operators costs is inadequate.

- From the point of view of **procedures**, CNRT has access to a large volume of information, but hardly exploits it in a comparative way. As some other sectors/ countries have shown (for example, water or electricity) yardstick competition could provide a powerful instrument to make comparisons among concessionaires, thus improving the information mechanisms available to the regulator. However, a major, out of CNRT control, obstacle lies here. Accounting information among the firms is not homogeneous in terms of accounting or fiscal year. Moreover, accounting criteria are relatively permissive and comparisons across private concessionaries are not automatic. If a complete regulatory accounting is to be set up, this should be one of the issues to be addressed.

The remaining parts of this document try to emphasize this diagnostic by providing three different specific examples where regulatory accounting mechanisms could be improved. The first one (Section 3) is a discussion of the methodology and the importance of **efficiency measurement**. This is a currently underdeveloped area in CNRT's monitoring of concession contracts. The second example, in Section 4, is a detailed study of the **access prices** issue in the Argentine rail system, including a proposal to collect information needed to address this issue. Section 5 is devoted to the need of a **financial model** for price regulation and price revision, something that currently is out of the scope of CNRT, but that could very important for future renegotiations.

3. INFORMATION FOR EFFICIENCY MEASUREMENT

Among the specific responsibilities that are indeed covered by the decree that creates CNRT, several of them suggest quite clearly – although only implicitly – that the promotion of efficiency in various forms is one of its main obligations.[6] This includes the responsibility to ensure that:

- the interest of the current users are taken into account in the operator's "production" decisions; in practice, this means that the regulator should check that the operators minimize the cost of delivering their services while meeting all their contractual obligations; in more technical terms, it means that the regulators must monitor the operator's **cost efficiency** which combines **allocative** and **technical efficiency** that is that inputs are used in their least cost-combination and that inputs are combined to get the highest possible output;
- the sector grows appropriately, that is that the right investment, technology and management choices are made to ensure that the future demand is met in a smooth way and that service rationing does occur, also known as **dynamic efficiency**.

Implicitly, the decree says that for any period of observation, CNRT's performance assessments must offer a balanced view of the various sources of efficiency which is a reasonable request on any regulatory agency. In Argentina, the need to control progress in the performance of railways operators is particularly important as improvements are an expected outcome of a switch from public operators which had grown to be known for their poor productivity and user orientation. The control of performance improvements achieved through the reforms must, at least to some extent, be quantitative if gains are to be shared with users or losses with taxpayers in a fair and transparent way. The balanced view of performance needed by the regulators can be approximated by a synthetic indicator of efficiency changes over the specific period of observation which demands an adequate

[6] See Section 2 above. Decree No. 1996/660, of June 24, in particular Annex 1 where its responsibilities are defined as protecting the rights of users, promoting competition in the markets for transport services and ensure better safety, better operation, reliability, equity and generalized use of the motor and rail transport systems for passengers and freight, as well as ensuring appropriate progress in all modes.

regulatory data base. CNRT has not yet worked on such an indicator. The rest of this section suggests an action plan to adopt one.

3.1. Picking a synthetic concept of efficiency to increase regulatory accountability

The computation of a number of basic physical and financial indicators and their comparison with some best practice benchmark or with some average of all comparators – typically the unit cost of an output measure such as the cost per ton-kilometer supplied, or the ratio of passenger-kilometers to employees – has so far been the main approach followed by CNRT. It is indeed the approach favored by many traditional regulators because these partial indicators hey are simple to calculate, easy-to-understand; and generally widely accepted. However, they also have two significant disadvantages: they can ignore the facts that rail operators tend to have multiple outputs and they wrongly assume homogeneity between operators (rail operators are typically heterogeneous, i.e. differing input and output mixes, customer size, type and densities, topography etc.).

The problem of heterogeneity can be dealt with at a simplistic level by grouping comparable companies into broad categories (e.g., passengers and freights). However, such an approach requires a large number of comparators, and the division into groups will inevitably involve a large degree of arbitrariness. More sophisticated means of dealing jointly with the problem of heterogeneity and multi-production involve the application of statistical techniques to measure the total factor productivity of each operator.

The most common indicator used among the most effective regulators is the average level of **total factor productivity** (TFP).[7] TFP is essentially the ratio of total output over total inputs. The TFP of two firms facing the same operating environment (at one point in time) can differ because of technical, allocative, dynamic or scale efficiency differences. Since TFP can vary over time due to changes in these efficiencies, to technological or any policy change that influences the operators' and user's incentives, it has enough flexibility to be relevant to regulators in fluctuating economic environments as is the case for CNRT.[8]

Information on TFP changes provides enough information on the total ***scope*** for performance improvements to ease CNRT's job in setting or resetting tariffs, subsidy levels and service obligations accordingly in a transparent way. But this does not mean that they can ignore the sources of TFP changes. It will often be crucial to be able to assess each source of inefficiency separately. This is because the degree to which an operator has control over the various sources of inefficiency influences its performance and this may

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[7] In the UK, US and Australia, which are viewed by many as defining best practice in the field in particular in the energy and telecom sectors, efficiency measurements are built into the regulatory regime as part of the price-cap design. It is also the case in the energy sector in Argentina.

[8] There is an extensive literature on the topic which suggests that the scope for efficiency improvements after reform continues to be quite significant around the world; see for instance, Oum, Waters and Yu (1999), for an overview of methodologies and results, NERA (2000), focusing on the efficiency of the provision of infrastructure services and Estache *et al*. (2000) for an overview of econometric issues and results on efficiency measurements through stochastic frontiers.

require regulatory actions. For instance, strategic uses by an operator of this ability to control sources of inefficiency may result in anti-competitive behavior. On the other hand, not all sources of potential efficient gains can be controlled by the operators. Scale and environment are often not controllable, and in some cases, allocative inefficiency may exist for historical reason – e.g. long term employment or borrowing contracts – and can be slow to adjust. The upshot is that knowing what is going on at a fairly detailed level is the normal business of the regulators and coming up with the information needed to make a rigorous fair assessment is what is going on should be an immediate concern for CNRT.

In Argentina's railways sector, conflicts and trade-offs between the various regulatory options have often been fueled by the fact that the regulators are less well informed than the operators about the costs and benefits of these options in terms of the various efficiency goals. The conflicts are further fueled by the lack of rigor of the "watchdogs" – and most obviously the media who, lacking the benefit of rigorous neutral regulatory information, often tend to report criticisms from interest groups without adequate analysis of their underlying hidden agenda and incentives. The lack of adequate information is one of the reasons why regulation seems to end up striking an uncertain and unstable balance between goals which never seem to satisfy anyone. Users think they pay too much, operators argue they are paid too little and Governments feel that the residual bill they often end up picking up is much too high – at least as high as the political cost of not pleasing anyone.

3.2. Measuring total factor productivity

Ultimately, if a regulator cannot raise the level of the discussion due to lack of transparent analytical support to its decision, it can only blame itself. This is why regulators across sectors and countries are increasingly relying on indicators such as TFP. This is not to say that TFP is perfect. All the techniques available tend to make assumption which are not necessarily ideal for a country like Argentina. For instance, they often tend to assume that firms operate in competitive output and input markets. The competition from the truckers on the output market would seem to suggest that the output market is reasonably competitive but it only applies to some of the profit centers for the operators. Similarly, the credit rationing and the lack of a long term capital market suggest that competitive conditions are not that great on the input side. Ignoring for the time-being these considerations and their consequences – because they can partially be addressed in the way the inputs are measured as discussed later –, the next challenge is to pick a specific measure to assess TFP. In deciding how to measure the TFP performance of its operators, CNRT could pick between three broad types of analytically rigorous instruments – price-based index numbers, non-parametric methods and parametric methods – whose advantages and drawbacks are summarized in Table 3.1.

Table 3.1. A comparison of the main approaches to efficiency and productivity measurement

	Data Envelopment Analysis (DEA)	***Stochastic Frontier Analysis (SFA)****	***Price-based Index Numbers (PIN)***
Description	A linear programming method which constructs a non-parametric cost or production frontier by fitting a piece-wise linear surface over the data points available from each operator for each period.	An econometric method which estimates a production or cost frontier of the form: $y=f(x)+v-u$, where v is a symmetric error term used to capture noise and u is a one-sided error term used to capture technical inefficiency. A cost frontier (short run or long run) or distance function can alternatively be used.	Traditional index numbers approach to TFP measurement. Prices are used as the weights. Tornqvist or Fisher formulae usually employed.
Data needs	Quantity data on inputs and outputs for a sample of firms – ideally over a number of years.	For a production frontier or distance function: quantity data on inputs and outputs for a sample of firms – ideally over a number of years. For a long run cost frontier: total costs, input prices and output quantities. For a short run cost frontier: variable costs, variable input prices, fixed input quantities and output quantities.	Quantity and price data on inputs and outputs for two or more firms or time-periods.
Advantages	Identifies a set of peer firms (efficient firms with similar input and output mixes) for each inefficient firm. Can easily handle multiple outputs. Does not assume a functional form for the frontier or a distributional form for the inefficiency error term.	Attempts to account for noise. Environmental variables easier to deal with. Allows for the conduction of traditional statistical tests of hypotheses. Easier to identify outliers, but cost frontier and distance function can deal with multiple outputs.	Can do a study with only two observations. Reproducible and transparent. Captures allocative efficiency.
Drawbacks	Strongly influenced by the degree of imperfection of the information used Very sensitive to choice of best practice standard Traditional hypothesis tests are not possible. Requires large sample size for robust estimates – which may not be available early on in the life of a regulator.	The decomposition of the error term into noise and efficiency components may be affected by the particular distributional forms specified, and by the related assumption that error skewness is an indication of inefficiency. Requires large sample size for robust estimates - which may not be available early on in the life of a regulator.	Need price information. Cannot decompose TFP measure into components.

* Ordinary least squares (OLS) estimation of a frontier can be viewed as a special case of SFA, where one assumes that there is no inefficiency. Corrected OLS (COLS) estimation, where the OLS intercept is shifted so that the frontier envelopes all data points, is also a special case of SFA, where one assumes that there is no noise.

Source: Coelli, Estache, Perelman and Trujillo (2001)

The index number approach is the simplest and less demanding in terms of data and this is why it is often popular among "new" regulators with modest data bases. Its main drawback is that is its can only help in assessing the evolution of TFP. It cannot be used to identify the sources of TFP changes. For most cases, it does however provide a useful order of magnitude of what needs to be assessed. With *M* outputs (to build in the fact that the operators may have multiple profit centers), with *K* inputs and with appropriate weights attached to each output and input – most generally their prices – the TFP change from period 0 to period 1 is defined as:

$$TFP_1 / TFP_0 = \left[\sum_{m=1}^{M} a_m Y_{m1} \Big/ \sum_{k=1}^{K} b_k X_{k1} \right] \Big/ \left[\sum_{m=1}^{M} a_m Y_{m0} \Big/ \sum_{k=1}^{K} b_k X_{k0} \right].$$

If prices are used as weight, which is the most common, the main question is to decide whether to use the base of the end period prices.[9] The non-parametric approach relies on mathematical programming techniques which doe not require a specification of the functional form of the best possible output outcome that can result from the combination of input, also known as the *production or cost frontier*. The standard non-parametric approach is *Data Envelopment Analysis or* DEA. It is a deterministic approach useful in assessing multiple output/multiple inputs activities and allows a disaggregation of the sources of changes in TFP. The efficient firms are those for which there is no other firm or linear combination of firms which can produce more of each good/service with the given set of inputs. Alternatively, there is no other firm or linear combination of firms which uses fewer inputs for a given level of output. The main advantage of this approach is that it does not require any a-priori assumption on the functional form and that it generates useful information with a relatively modest set of data. Its main disadvantage is that it requires arbitrary decisions by the regulator on the sample size and the best practice benchmark. Arbitrary decisions may reflect misunderstandings of the regulatory needs, of the sector…or of the technical challenges stemming from the methodological choice. In addition, since there is no assumed functional form, a large set of standard statistical tests cannot be performed.

The parametric approach relies on econometric estimates of the determinants of the frontier and of the sources of changes in TFP. There are three parametric approaches: the **stochastic parametric frontier** (SPF), and the **deterministic parametric frontier** (DPF) and the **frontier obtained without assumptions with respect to inefficiency** (FWA). In all these approaches, efficiency is generally derived from an analysis of the wedge between observed costs or outputs and those calculated from the econometric model. In other words, they are implicitly or explicitly derived from a measure of the distance between the observed firm and the closest firm on the frontier. With a DPF, all the firms are assumed to

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[9] Using the base period prices yields a TFP index which is the ratio of a *Laspeyres* output quantity index to a Laspeyres input quantity index. Using period 1 prices yields *Paasche* indices. Both imply than inputs combine into outputs in a linear production technology. A *Fisher* index is the geometric mean of these two indices and implies an underlying quadratic production technology, which is much more sensible (i.e. more flexible), from an economic viewpoint. A popular alternative is the *Tornqvist* index, which implies an underlying translog technology. The Fisher and Tornqvist indices often give identical results.

share the same costs and production frontiers. The differences in the behavior of individual firms and the frontier are attributed completely to inefficiency. It ignores the relevance of any other factor not under the control of the firm (e.g. weather). This assumption may be quite reasonable in the short run when all firms have been subject to an equivalent restructuring. But it many cases, it is not reasonable and the SPF and FWA are then the preferred options.[10]

In addition to having to pick a method, the regulator must also decide whether to focus on production or on costs – i.e., on physical or financial concepts. Whether the frontier is estimated for cost or production depends upon the type of sources of inefficiency that needs to be assessed. If allocative or cost efficiency are of concern and the information on prices is important, a cost frontier should be the main focus since it gives the total cost of production as a function of total quantity of output and of the factor prices. Production frontiers are, however, often preferred as they require less data on inputs and outputs which are easier to obtain than the information needed for cost frontiers. Their main drawback is that they only generate information on technical efficiency. Their main advantage is that they do not require information on input prices.

3.3. How the data availability drives the choice of methodology

While an element of arbitrariness remains under all these techniques, ultimately, the choice between the various approaches is driven by the assumptions the regulators can live with and the quality and volume of data available. So far CNRT has issued few guidelines to generate the information it needs to comply strictly with its obligations as a regulator. In particular, it does not have a good ability to control the commitments made by the operators in terms of technical, allocative and dynamic efficiency through parametric methods because its does not have enough comparable data yet to generate fully reliable information on each operator. The data bases available are incomplete – even considering that for many of the data series available monthly data is available and could generate of volume of information large enough to measure some of the efficiency concepts. It could rely on non-parametric methods, but here also, the data base available is incomplete. Moreover there is no comparable data on what could be viewed as a good benchmark to which the Argentinean operators could be compared. The best bet would be to look at what happened in Australia and Japan where the rail market structure may be closest to the one observed in Argentina and where some reasonably comparable information is available. For now the most realistic approach to assess TFP changes for each operator is to follow the simplest of these more rigorous approaches and to apply standard index number analysis to efficiency measurements.

For the near future, it makes sense for CNRT to follow the lead of ENRE or ENARGAS and to start getting organized to generate the information it will need in most

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[10] More recently, researchers have started to rely as well on distance function to assess the physical performance of an operator because they do not require an assessment of efficiency under optimizing conditions which may be quite useful when assessing the short run performance of a rail operator where quasi fix inputs raise many issues of optimal capacity. See Coelli and Perelman (2000), for one of the first applications.

interactions with the operators from tariff resetting to renegotiations. A production function requires data measured in physical or monetary terms on production, employment, capital and intermediate inputs. A cost function requires data on total or average production costs (including the opportunity cost of capital), on the production level and on labor, capital and intermediate inputs prices. In practice, this can be quite demanding. Most regulators would assume they have the necessary information and so did CNRT until very recently. The reality is somewhat more subtle but cannot be fully assessed with a detailed diagnosis of the situation which would assess the type of data available and its quality against some best practice benchmark. Table 3.2 summarizes the kind of information a rail regulator would need to measure TFP changes and its sources as rigorously as possible.[11]

Table 3.2: Minimum Ideal Data Requirements for each operator

	Year 1	Intermediate years (as many as possible)	Latest possible year
Non-financial data			
Total Length of line (in km)	–	–	–
Length of electrified line (in km)	–	–	–
Tons of Freight transported	–	–	–
Thousands of passengers	–	–	–
Trains-kilometer	–	–	–
Number of administrative workers	–	–	–
Number of operational workers	–	–	–
Number of locomotives	–	–	–
Number of wagons	–	–	–
Number of coaches	–	–	–
Energy consumption	–	–	–
Financial data for each cost center for each operator			
Fixed Assets Valuation	–	–	–
Past accumulated amortization or remaining life	–	–	–
Annual Amortization	–	–	–
Economic Depreciation	–	–	–
Wage costs per category of workers	–	–	–
Social Security costs	–	–	–
Other Workers compensations	–	–	–
Energy costs	–	–	–
Total taxes	–	–	–
Administrative costs	–	–	–
Other costs	–	–	–
Subcontracting costs	–	–	–
Infrastructure levies	–	–	–
Financial costs	–	–	–
Dividends	–	–	–
Debt/equity ratio and debt/equity levels	–	–	–
Total costs	–	–	–

[11] For a longer discussion of measurement problems in the context of a regulated industry, see Coelli, Estache, Perelman and Trujillo (2001).

The first part of Table 3.2 focuses on the physical data needed to assess the a production function if this is what CNRT wishes to do. It has a strong overlap with the partial performance indicators commonly used in engineering publication and is more readily available than the data needed to assess a cost efficiency. For most of its operators, CNRT knows about the infrastructure, rolling stocks and traffic volumes. However, it has only partial information on employment levels – it sometimes knows the total levels but not the composition per skill types and it does generally not know about temporary workers and the labor inputs of subcontracted activities. It has very little information on intermediate inputs, most importantly .energy consumption. The upshot is that the simplest of the frontiers is already likely to be a challenge and require some heroic assumptions under the current state of information.

The second part of Table 3.2 is more directly relevant to the estimation of a cost frontier –which would be needed to assess the relevance of allocative efficiency. It demands detailed data on the various costs related to capital, labor and other unrelated costs. It seems to have a strong overlap with financial accounting data but this can be misleading. In practice, because financial accounts seldom meet the norms needed by a regulator. Standard cost accounting, for instance, may not have the degree of disaggregation a regulator needs to be able to allocate every type of costs across profit centers strictly enough to make a fair assessment of production or cost efficiency. This is why CNRT's ability to comply with its terms of references as a regulator as described in its statutes will depend on its commitment and ability to generate regulatory accounts and to impose cost allocation rules sufficient fair and conceptually reasonable to calculate TFP and its main components.

3.4. From financial to regulatory accounting and other information needs

As CNRT takes own its need to develop a regulatory accounting system to address routine needs and comply with its statutes, it needs to organize its task around a set of principles against which its options can be assessed. In general – but in particular when it comes to assessing TFP – the information its regulatory accounts will generate needs to be:

- ***Reliable:*** it is essential for information to be as reliable as possible to ensure that all meaningful applications of any efficiency measurement techniques; this requires clear definition for each indicator and the ability to apply standard audit tests to any set of data for any regulatory purpose; for instance, the definition of salary costs must clearly spell out all the taxes and other social obligations paid by employers and employee; similarly, the definition of asset life, of amortization rules or of the terms of asset valuation must be clearly explained if the contribution of capital to production is to be assessed in any reasonable way

- ***Comprehensive:*** it is just as important for the regulators to understand the business of the operators and to obtain accounts that are detailed enough to the separation of the cost structure into the various components of the business – the separation between regulated and unregulated activities is the most crucial but the ability to check on reallocation possibilities between operational and capital expenditures is also important –; each activity is a cost center and insufficient details or unclear

allocation rules on what accrues to each center can lead to significant distortions in the measurement of efficiency;

- ***Consistent over time*:** the ability to monitor the absolute evolution of the operator costs and income sources over time is essential to the ability to generate any type of measure of efficiency gains; while two points in time are sufficient, the longer the series of years available, the longer the menu of technical options available; consistency over time requires a guarantee that whatever definition is chosen at the beginning of the reform process, it is only changed exceptionally;

- ***Consistent across operators:*** since in most cases, the historical information will be limited to a few years only, many regulators will be interested in the possibility of comparing the relative performance across operators; this can only be done if all operators follow the same guidelines for reliability and comprehensiveness and that the indicators selected are all measured at the same point in time across operators.

These objectives can be achieved by CNRT through the imposition of standardized regulatory accounts which specify cost disaggregation levels, measurement rules and definition rules for each regulated account and calculation and allocation rules when subjective interpretations are possible to the detriment of certain users. The natural place to start to generate this set of regulatory accounts sufficiently detailed to allow the measurement of the efficiency performance is to check the quality of the accounting data available.

In most countries, railways operators, as with any other firm, are required to produce annual balances which are expected to generate a common set and standardized set of data to assess the absolute (over time) and relative (across operators) performance of the concessionaires. This is not strictly possible in Argentina. The accounting year varies across firm and the accounting data generated for fiscal purposes is confidential. This means that until CNRT has been able to impose a common timing for regulatory accounts inter-operator comparison will be limited to the comparison allowed by data available on a monthly basis which can then be annualized. Only a modest subset of the raw data is available on a monthly basis and hence access to relevant comparisons will be limited. CNRT should however be able to at least track down the evolution of the performance of each operator individually if the accounting information is reliable, comprehensive enough and consistent over time.

The transformation of existing financial data into regulatory data will demand adjustments even for inter-temporal comparisons of specific operators. This should not cause significant trouble and could be negotiated with the operators if clear and consistent rules are defined and imposed across the board. The specific information needs may be best discussed for each one of the key variables – outputs and inputs – independently. This data, as summarized in Table 3.2, is of course only useful if the underlying technical elements and the constraints they impose are well assimilated in the analysis.

Physical production is seldom available from accounting data. But since it is not uncommon for operators to have multiple outputs, it is important for regulatory accounts to

recognize this explicitly and ensure that the various business units are separated in the regulatory accounts as separate profit and costs centers. In rail, the most common business lines separation are passengers vs. freight but an important potential business can be the provision of infrastructure services to other carriers. This separation is quite handy when the regulator needs to assess cost efficiency. It is also important for cases in which no physical units are available. The provision of infrastructure services or any other type of services cannot always be expressed in physical terms and hence revenue expressed in constant terms is a good approximation. If the accounts are separated, the main challenge left is to find a reasonable deflator–which can be a major headache when consistency across operators is needed and service mix vary significantly across operators. In practice, most analysts focus on physical measures of the core business (such as tons or passengers-km), ignoring non-core businesses, and hence overestimating costs and input requirements.

The information on *inputs* needed to measure TFP is generally also only partially satisfied by the accounting system. Most analytical instruments require separate information on labor, capital – which can be separated between fixed, i.e. km of lines and variable or quasi fixed, i.e. rolling stocks and locomotives – and "other inputs". *"Other inputs"* is a catch-all category and is often defined in some constant price value. Its composition must however be well understood by the analysts and hence a request for accounting details may be a good idea when it represents over 10-15% of the total cost. For instance, when subcontracting of some contractual obligations is important, it is likely to be an important component of this catch-all category and it may be misleading to ignore it.

Indeed, its is important for the regulator to understand the coverage of the subcontracting and its allocation across cost centers. Unfortunately, unless the regulator requests the information for each business unit, the operators are unlikely to provide. Many analysts prefer to focus on only the main intermediate input, i.e. energy consumption, to simplify matters. Others take this category to be a residual category which reflects whatever is not labor or capital input. But here also it may be important to understand every category to avoid double counting. A common mistake is to include financial expenditures in intermediate inputs when they are already reflected in the economically correct definition of the cost of capital discussed below.

The *labor input* is typically the easiest to derive from standard information. While operators are sometimes reluctant to release too specific information on the number of workers allocated to each cost center because they see it as commercial information, they are often willing to provide an aggregate figure which, in expressed in constant prices, are useful approximations of labor inputs. Moreover, this information can also be used to compute average wages paid by each operators which may be needed for some of the approaches to TFP measure. In addition, it is sometimes possible to obtain salary scales from the operators, separating at least between blue and while collars. The degree of homogeneity of the labor force and of the payments mode (low employment, many temporary and large overtime vs. high employment, low temporary and low overtime) is

likely to be important in assessing the relative contribution of the labor factor and its average costs. However, rough approximations are often sufficient.[12]

The *capital input* is the most challenging one. Its treatment is still arbitrary and subject to many debates. Part of the debate reflects a confusion on the multiple concepts. The "capital" production factor is the quantity of capital needed to produce a specific service level. The capital cost or expenditure is what the operator spends of the "capital factor". The cost of capital is the price of a unit of capital. All three concepts can come in handy to measure efficiency. The first one is hard to obtain as capital is not a homogeneous factor. The physical units of the first part of Table 3.2 can be useful in this respect but may not be comprehensive enough. The most common comprehensive approximation comes from asset valuation which should have been assessed during the preparation of the concessions and which can be complemented with investment flows. It provides the basis for most regulatory decisions and in particular for the design of tariffs as well as for the calculation of capital costs and of the cost of capital. It is also at the core of the business value of any of the concessions and should hence have been reflected in the business plans. It can also help significantly in the construction of the capital flow variable needed for most TFP measures. If asset value has not been done at all or properly at the beginning of the process, using undepreciated replacement values as a proxy for capital quantity may be the easiest – yet not easy – solution.

The next challenge is to come up with an economically sensible rule to assign the share of the asset value that corresponds to the annual service flow. Many analysts assume a linear depreciation rule over the economic lifetime time of the asset which is not necessarily what the accounting depreciation rules reflect. The backup used by many analysts is to simply use the accounting depreciation data as is, trying to relate as much as possible to each cost center. The main problem with this approach is that it ignores the opportunity cost of capital. Calculated as the annual revenue from a placement of the assets in US bonds, the opportunity cost of capital can be added to the annual accounting depreciation to obtain an approximation of the an economic capital cost. The price of capital is ideally based on the weighted average financing cost of capital (*WACC*) (see Section 5 below) of which financial costs and dividends are often the main components,. but can also be approximated by the ratio of the economic capital cost to the asset value.

3.5. Measuring efficiency as a sign of good and fair governance

A good reason to try to assess the TFP performance of the operators is to increase the fairness of the regulatory process. Efficiency performance can be assessed in various ways as discussed above and these methods are clearly to some extent arbitrary as each one embodies different sets of assumptions and restrictions. But by getting all players to agree on a specific method, in an open discussion of the choice, the regulators create clear and

[12] Average wages obtained by dividing the wage bill by the number of workers can be misleading when the composition of activities varies across operators. For an operator subcontracting most low skilled jobs, the average wage calculated from standard accounting information will be higher than for operators with many low skilled workers on the payroll.

transparent rules of decisions. Estimating a relatively simple synthetic benchmark indicator of potential efficiency achievements against which the compliance of each operator can be checked provides a logic to regulatory assessments. In addition, the data requirements imposed by these methods can also be used to generate new regulatory tools such as yardstick competition which allows the comparison of the performance of an operator with that of all others. But this, of course, requires reliable, comprehensive and consistent data, which may be the most pressing challenge CNRT is facing.

4. INFORMATION FOR ACCESS PRICES

The second regulatory issues for which information and accounting rules are essential is the pricing of the access to share facilities. It is one of the most contentious regulatory issues. The problem is particularly relevant in industries where the network owner remains vertically integrated with the service provider, as in Argentina railways because it may imply competition effects as well as efficiency issues. Given that regulators have wider objectives when setting access prices and have different levels of information, the approaches used by different countries vary markedly.

In Argentina, many parties – including the CNRT and most operators – do not consider access a first-order problem in the rail industry for now. This is spite of the fact that under the terms of the concession agreements, freight concessionaires were required to allow passenger trains to operate over their tracks in return for a toll or *peaje.* In particular, the level of the *peaje* was an explicit element in the bid evaluation and revenues from track access fees built-in the concessionaires' business plans. It is also surprising because access tolls have remained unpaid since 1996 by intercity train operators on the basis of insufficient investment improvements. Some concessionaires, such as *Ferroexpreso Pampeano* (FEPSA), with a relatively weak financial position and a large number of intercity passenger services running on its tracks, could greatly benefit from an agreement. Therefore, the questions addressed in this section are: is CNRT ready to intervene in this dispute? Could it set revised access prices that take into account actual levels of investment? In addition, access issues in the commuter lines in Buenos Aires could become worse in the future. If clear rules for accessing to the ports are not clearly developed, the intermodal distribution of traffic achieved could end up being less than optimal results, only because the lack of prevision from the regulatory point of view. Although the remaining of this section is mainly devoted to access prices in the freight concessionaires' lines, it may be worth pointing out that a similar problem might arise in the ports.

4.1. Access prices in Argentina's railways

After the disintegration of *Ferrocarriles Argentinos* into three business units and the concessioning to private operators of freight services, the initial passenger track access rules were agreed upon between the concessionaires and the federal operator of passenger services (FEMESA). When intercity services were transferred to the provincial Governments, the contracted access fees were negotiated downwards, but provincial Governments have generally refused to make their payments, even while continuing to

operate trains and in fact, some provincial rail units appear to be planning even more passenger services, presumably while continuing non-payment of their access fees.

Table 4.1. Access prices by type of owner and user (US$ per train-km)

Track owner* / Track user	Freight operator	Commuter operator
Intercity operator	$2.50	$1.20 (only in the Buenos Aires area)
Freight operator	Trackage and access rights bilaterally negotiated (example, $4.00 in rural lines and $6.00 in urban lines)	$4.50 (4:00 am-10:00 pm) $1.10 (10:01 pm-3:59 am)

* Ownership refers to exploitation, since legal ownership remains in the hands of the state not the concessionaires'.

Table 4.1 summarizes the situation of access prices in Argentina today according to the concession agreements. Since the commuter operators always run trains on their own tracks they have not been included in the rows. The intercity passenger operators are not included in the columns because their infrastructure is not used by any other operator. As it can be seen, the official toll set for intercity passenger services running on freight concessionaires' tracks was $2.50 per train-kilometer, irrespective of other details (such as type of line or traffic). *Ferrobaires*, the intercity passenger operator in the province of Buenos Aires has also an access fee of $1.20 per train-kilometer to the commuter operators' track. With respect to the freight operators, their access to other freight operators' tracks is bilaterally negotiated, as well as trackage rights. This negotiation depends on the type of line used and, as an example provided by a concessionaire, they could be around $4.00-$6.00 for rural and urban lines respectively. Access to commuter tracks is set in the concession contracts at $4.50 per train-kilometer during peak hours and $1.10 during the night. Access slots are managed by commuter concessionaires.

In general, the access tolls paid by freight concessionaires among themselves and those paid to commuter trains operators are working in an adequate way. The real problem lies in the access prices set to intercity passenger services for accessing to freight operator's tracks. The provincial Governments with dedicated rail units claim that the tolls are unrepresentative of the service provided. If concessionaires do not carry out their investment commitments, passenger services will be limited (in terms of speed, for example). This makes it difficult for them to attract more passengers and therefore to increase their revenues and improve their weak financial position. On the other hand, the amount due to the freight operators from the passenger train operators with respect to past access is estimated at about $40 million including interests. If a renegotiation of the concession agreements will result in a resolution of the mutual claims between the rail concessionaires and the Federal Government, then serious consideration should be given to resolving the claims of the freight operators against the provincial Government at the same time.

4.2. The economics of access charges: a quick reminder

The basic economic principles for the efficient use of rail infrastructure is that, in the absence of capacity constraints, operators willing to pay the extra costs they impose by their use of the infrastructure should be allowed to use it. In the presence of capacity constraints the capacity should go to the operator and type of traffic for which it has the highest value. This approach to pricing has essentially been labeled by economists as short-run marginal cost pricing; in other words charging the incremental cost of use of the existing infrastructure by the train concerned.[13] This ***simple incremental cost pricing*** rule takes into account both the competition effect (in the downstream market) and would cover the wear and tear cost, plus any costs imposed on other services in terms of delays or retiming to accommodate the train concerned. In the presence of a capacity constraint, this cost would have added to it the value of any train which could not be run as a result of lack of capacity.[14]

However, this approach often neglects the other side of access prices: cost coverage. The most relevant economic characteristic of railways is that a large proportion of the total cost of providing rail infrastructure is fixed, in the sense that additional traffic imposes relatively low additional costs to the system as a whole, in the absence of congestion or disruption to existing traffic. In practice, these cost characteristics mean that average costs decline as traffic levels increase, since fixed costs can be spread over a greater volume of traffic. Accordingly, pricing on the basis of incremental costs may result in traffic that cannot cover its average costs, being priced off the network: setting access charges on an incremental cost basis would result in the infrastructure provider failing to get enough revenues. Consequently, access charges cannot be determined on the basis of incremental costs alone. Box 1 summarizes the two most prominent theoretical frameworks to addressing this access pricing problem in vertically integrated markets. These are the Ramsey pricing approach and the efficient component pricing rule (ECPR).

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[13] The term *incremental cost* of a service (for example, the use of infrastructure, in the case of access) is used to refer to the cost per unit of service necessary to provide the entire service, or the cost avoided by not providing the service, given all the other services supplied. In this second sense it is also referred to as "avoidable cost".

[14] This concept is often contrasted with that of long run marginal cost, which represents the additional cost of an extra train when the infrastructure is optimally adapted to the demand in question. It is well known that if the infrastructure were optimally configured, the two concepts would give the same resulting value, since the infrastructure would be improved to the point at which the cost of the extra capacity exactly matched its value in terms of relieving congestion and permitting additional trains to run. The general perception that short run marginal cost is below long run is only true in the presence of excess capacity; the reverse is true when capacity is scarce. Since no major infrastructure improvements are being considered in Argentina at the moment, we will not proceed further in this line of analysis.

BOX 1: Ramsey pricing vs. ECPR

A first general approach to efficient access pricing under a break-even constraint for the infrastructure provider is Ramsey pricing. Consider the usual example of a vertically integrated rail company that offers services connecting towns *A* and *B* as well as *B* and *C*. *AB* is the bottleneck, over which the incumbent *M* has a monopoly. However, *BC* is a competitive route in which *M* and a rival firm *R* can compete. The question then arises as to how *M* should set an access charge *a* to enable *R* to offer a service along the route *AB*. In terms of the Argentine case, this could be also interpreted as *B* being the Buenos Aires port, for example, and the contentious route *AB* is one of the commuter passenger lines. Alternatively, and very broadly interpreted, *AB* could be a congested segment in any of the freight concessionaires' routes affected by intercity passenger trains.

In any of these cases, if *M*'s final retail price for the entire service *ABC* is *p*, the firm's marginal cost of granting access to *AB* is *c and* its marginal cost of the downstream activity is *d, M*'s total marginal cost of providing the service *ABC* is *c+d*. Assume also that *M* incurs a fixed cost *F* that is joint to both *AB* and *BC*. Because there are joint costs, the marginal costs *c* and *d* are incremental as well as marginal. If rival downstream suppliers are assumed to have constant returns to scale, and produce a final product that is in some way differentiated from that offered by the incumbent *M*, then the optimal access price will be of the form: ***a* = c + Ramsey term,*** where the Ramsey term takes account of both own-price and cross-price elasticities of demand. The approach is related to sensitivities in demand more than it is to costs. As such, it does not guarantee least-cost production. The approach also requires extensive demand information on the part of the regulator for the purpose of setting prices. However, if the network provider were allowed some discretion to set its own prices within some overall basket, then this may help to alleviate both of these problems. The standard Ramsey term would justify raising price above marginal cost in inverse proportion to the elasticity of demand for the service in question. However, it would be difficult to do this in a fixed tariff for more than a limited number of categories of train. Much finer differentiation would be possible if individual negotiations between infrastructure provider and train operator were permitted

Given the practical issues that arise from the Ramsey mechanism, a popular alternative to the problem of setting access prices with a focus on competition *and* cost coverage is the efficient component pricing rule. The entrant who comes in on a small scale should be charged marginal social cost plus whatever contribution to the fixed charge the existing operator loses as a result of the new entry. Under the ECPR, the infrastructure owner is permitted to charge an access price equal to the direct incremental cost of supplying the additional unit, plus the incremental opportunity cost of providing that access. This opportunity cost component is the profit forgone by the network owner from not selling the entire product downstream itself. To illustrate this principle, assume that the indirect opportunity cost of *M* granting *R* access to the route *AB* is the price mark-up that *M* could have made over its total incremental costs *c+d*. Hence, since the direct incremental cost of providing access is *c*, the ECPR states that the optimal access charge *a** should be of the form: ***a* = c + [p – (c + d)].*** This equation may be simplified to give the 'margin rule', such that the difference between *M*'s retail and access prices is equal to the incremental cost of the downstream activity, that is, ***p – a* = d.*** The advantage of using the ECPR is that, since it is cost based, it does not require detailed information on demand. It also ensures minimum cost production, since a higher access charge would deter more efficient rivals, whereas a lower access charge would invite excessive entry. However, the ECPR has been criticized by a number of authors, on the grounds that it may be overly protective of incumbents, thus preserving monopoly rents.

4.3. Regulatory accounting procedures for setting access prices

When, as in Argentina, downstream competition is not a major issue, setting access prices is relatively easier although the economic principles outlined above still apply. The rule that arises from the Ramsey mechanism or the ECPR mechanism is simply to set the access charge equal to the incremental costs associated to passenger trains plus an adequate proportion of indirect and general costs. Yet, although the recipe is easy in words, it is not in practice, since it requires a tremendous work of cost identification (direct costs) and cost allocation (indirect costs).

4.3.1. Identifying the relevant direct costs

The operation of passenger trains over the lines of the freight concessionaires usually imposes several direct costs. These costs are relatively easy to identify and be grouped into three main categories:

- ***Incremental costs of new track***. Passenger trains require higher quality standards in the tracks than freight trains. For technical and safety reasons, any new track that would

be used for passenger services should include these enhancements and would therefore be more costly for the provider. In addition, running passenger trains could also affect the number of crossing protections that must be built and maintained in densely populated areas. The same is true for switches, fueling stations, and all other fixed plant investment. In the case of Argentina, since no major new track constructions have been planned, this cost should be interpreted in terms of rehabilitation.

- ***Incremental operating costs***. Freight trains operating costs may increase as a result of passenger services if there are capacity constraints. For example, a full siding is necessary if one freight train meets one passenger train coming in the opposite direction. These costs are relatively less important in the Argentine case, since few tracks are used at full capacity. However, if any passenger train has an accident that creates a bottleneck, any benefit associated to cargo trains no longer running on time should be imputed to the passenger traffic.

- ***Incremental costs of maintenance***. Deterioration increases when freight and passenger trains run on the same lines. At the moment, only incremental costs of maintenance seem relatively important in Argentina, although they are related to the level of quality of that maintenance. If the freight concessionaire is not obligated to maintain its lines at a higher level than it needs for its freight operation and if the freight concessionaire had adequate track capacity available, the operation of a limited number of passenger trains would only impose a modest incremental cost.

All the direct costs associated to the operation of passenger trains over the freight concessionaires' tracks should be identified and included within one of the former categories. This requires must have an adequate **costing mechanism** that should be embedded in the overall procedures of the **regulatory accounting**.

4.3.2. Allocating fixed and common costs

In addition to costs that are directly attributable, a passenger service may also be assigned a reasonable portion of those costs of the freight operator which cannot be clearly associated with any one service. The presence of substantial economies of scale and scope in the railroad industry creates a number of problems for this allocation and, in fact, it should be reckoned that it is impossible to allocate, in any non-arbitrary way, a share of fixed and common costs to any particular railroad activity.[15] There is simply no way to subdivide

[15] A fixed cost is one that is necessary to provide a service or group of services, but whose magnitude does not vary with changes in the quantity of a service that is planned to be or that is in fact provided. For example, if a railroad is to run between A and B, there is a minimum outlay on track and roadbed that must be incurred, even if the trains run virtually empty. The service can be discontinued altogether; but even in the longest of long runs, its roadbed cost cannot be reduced to a negligible level if the amount of the service is to be positive. Also, a loading facility may be necessary to transport coal efficiently between points A and B, but its cost may be unchanged if the amount of coal transported is doubled or halved. Common costs are often fixed (e.g., the basic portion of the outlays on track and way and structures between A and B may be both fixed and common costs).

those costs in a mechanical fashion that is unique and has any foundation in economic logic.

In practice, regulatory authorities historically have determined tariffs (including access fees) based on the so-called fully distributed (or allocated) costs mechanism, or FDC. Under this method regulators do (somehow) allocate shared production costs to individual services. Each service is then required to generate revenues which will cover all the costs associated with that service. Although it is often argued that there is no sound economic rationale for fully distributed cost pricing, this practice obviously does have economic consequences.

Traditionally, regulatory proceedings have focused on three types of FDC rules. The first is the distribution of shared costs on the basis of a common measure of utilization, such as gross ton-miles. Under this FDC approach, which is termed the relative output method, shared costs are allocated in proportion to the number of units of output of each service. A second approach sometimes used is the allocation of shared costs in proportion to the costs that can be directly attributed to the various services. This attributable cost method has also been traditionally used by many unregulated firms in their allocation of overhead costs. A third scheme requires allocation of shared costs in proportion to the gross revenues generated by each service. This gross revenue approach, has been frequently used to allocate overhead costs between freight and passenger services.

Any of these three methods or any of their many variations could be equally acceptable for allocating a substantial part of the indirect costs. The real issue however, from the point of view of the regulatory authority is to outline a clear and non-discriminatory mechanism open to the concessionaires and track users. To do this, as in the case of direct costs, some procedures should be established in the **regulatory accounting**.

4.3.3. Access prices from a regulatory perspective

According to the analysis carried out so far – and consistently with the results of Section 2 – it seems obvious that CNRT is not prepared at the moment to identify the direct costs imposed by passenger services to freight concessions. In addition, it does not have clear criteria to allocate common costs to different types of traffic. Therefore establishing a process to address in detail the access pricing question would impose a high cost on both the regulator and the companies and several information needs the freight concessionaires may not be in position to face. These information improvements should be needed on the following areas from the freight concessionaires: operational information on a line-by-line basis (particularly on those lines shared with passenger trains); detailed asset inventories and valuation information; and information on the use of shared assets.

Table 4.2 outlines the general methodology for establishing access tariffs along the theoretical and practical lines described above. The next section illustrates how this works out in practice. However, an outstanding issue is that there is no unique solution, rather there is a range of values for the tariff, depending on the definition of some of the cost items and the approach adopted for cost allocation. A decision needs to be taken as to whether the regulator will determine the appropriate price or set the boundaries that then

allow negotiations between the provincial governments and the freight operator. If the latter approach is adopted, there is a need to have a final appeal to CNRT if the two sides still cannot determine an appropriate price within the boundaries that have been set.

Table 4.2. Methodology for establishing access prices for passenger trains

Action	Comment
Step 1. Identification of **costs directly attributable** to the passenger trains; and other costs incurred in the system.	This is the basic operating information necessary to establish the tariff range.
Step 2. Determination of the **cost accounting system** to be used.	Could be a very important aspect in terms of homogeneity of information across different concessionaires.
Step 3. **Allocation of indirect costs** . It should be a standard procedure and methodology that took into account the financial and economic equilibrium of the concessionaire and the nature of the passenger service (for example, frequency).	How indirect costs are allocated depends on a range of factors. These can include the importance of the passenger services to the freight operator.
Step 3. **Comparative analysis** of the tariff, against similar users in the same market; other users in other markets within Argentina; and other users in other countries.	This is a reasonability check on the figures established through the calculation.

4.3.4 An example: the Ferroexpreso Pampeano case[16]

The methodology can be illustrated with the information currently available to CNRT in the case of the *Ferroexpreso Pampeano* concessionaire. This seems a suitable example not only because of the data availability, but also because – as mentioned above – this is possibly a concessionaire that would greatly benefit from a new agreement on access prices. *Ferroexpreso Pampeano's* (FEPSA) network comprises about 5,000 kms that run southwest Buenos Aires and connects this city with the important Bahía Blanca area. FEPSA is one of the freight concessionaires more crudely affected by the lack of payments of access fees by the provincial Governments. In 1991 the access prices were set for *Ferrocarriles Argentinos* through a *Convenio* or agreement with the Governments. After the privatization process started, in 1993 the agreement was between the *Unidad Ejecutora Provincial* (UEPFP), the entity that exploited the intercity passenger railroads, and FEPSA, and its terms were honored until 1995. From 1995 to 2000, the UEPFP has refused to pay – on accounts of lack of investments – and FEPSA estimates an accumulated debt of $40 million. FEPSA's operating characteristics in years 1997-1998 are summarized in Table 4.3. Since 1992 the company has experienced a steady growth in traffic volume from 1.9 million of tons to about 2.4 million in 1999. However this figures are well below capacity, since the average load factor during this period has been around 50%. In accumulated terms demand in 1999 was a 40% below supply.

[16] FEPSA has already conducted its own study on access prices (see FEPSA, 2000), but no major initiatives had been taken until December 2000. It is quite likely that the revision of access charges will be one of the key issues in the next renegotiations between freight concessionaires and the Government. Information for this section comes from this study and Polo (2000).

Table 4.3. Basic operating information of FEPSA

	1998	1997
Locomotives-kilometers	1,955,853	1,924,399
Locomotives-hours	129,381	126,224
freight trains	100,397	98,780
non-operating trains	28,984	27,444
Ton-kilometers (gross)	2,710,640,183	2,964,630,767
Train-kilometers	1,890,853	2,101,766
freight	1,573,053	1,804,181
passenger	317,800	297,585
Trains	5,559	5,681
freight	4,315	4,514
passenger	1,244	5,681

Source: Polo (2000)

In absolute terms, passenger traffic represented in 1998 a 16% of the train-kilometers or 22% of total trains running on the network. However, their relative importance in total tonnage varies across routes and lines, and depends on the frequency and the number of passengers involved. Although the weighted average for the entire network has been estimated in 13.7% (FEPSA, 2000), a figure larger than in previous years due to the relative stability of freight figures, FEPSA distinguishes among three types of lines:

- *few passenger services*: those where passenger services represent a minimum part of the total tonnage in the corresponding sector (less than 5% of the total).
- *minor passenger services*: those lines with a significant portion of passenger services, but still in minority compared to freight tonnage (between 10-18% of total).
- *major passenger services:* those where passenger traffic is predominant (with a share of between 43 and 86%).

Using the methodology proposed in Table 4.2 above, the first step to compute the adequate access prices would consist of the identification of the direct costs attributable to these passenger trains. Since no major new track investments have been carried out for the specific purpose of improving the quality of the track needed for passenger services, FEPSA can be assumed to face no incremental cost of a new track. With respect to incremental operating cost, as discussed above, they are incurred when capacity is close to full utilization and (obligatory) passenger trains delay or impede freight trains to run. This is not the case of FEPSA either because the frequencies of the passenger trains (3 or 4 trains per week in densest routes) are relatively low at the moment.

Table 4.4. FEPSA's maintenance costs attributable to passenger trains

Passenger Sectors	Length (kms)	Maintenance costs ($/km)	Gross ton-kms ('000)		Cost per gross ton-km	Cost attributable to passenger trains ($/ton-km)	Annual passenger services (trains)	Cost attributable to passenger ($/train km)
			Freight	Passenger				
FEW PASSENGER SERVICES								
from Bragado **to** Pehuajó	154	2,180	1,204	156	0.00160	250	312	0.80
from Pehuajó **to** Catriló	160	1,394	1,170	156	0.00105	164	312	0.53
from Catriló **to** Toay	92	750	44.6	109.2	0.00487	532	312	1.71
from Toay **to** General Pico	91	1,166	1,374.8	78	0.00080	63	312	0.20
							Average	0.77
MINOR PASSENGER SERVICES								
from Olavaria **to** Lamadrid	93	750	1,115	228.8	0.00220	504	416	1.21
from Lamadrid **to** Coronel Suárez	64	1,020	1,080.9	228.8	0.00078	178	416	0.43
from Coronel Suárez **to** Pigüé	48	7,906	1,518.9	228.8	0.00452	1,035	416	2.49
from Pigüé **to** Saavedra	20	1,867	1,717.5	228.8	0.00096	219	416	0.53
from Saavedra **to** Napostá	84	1,333	1,970.3	228.8	0.00061	139	416	0.33
from Napostá **to** Bahía Blanca	40	11,198	1,970.3	228.8	0.00542	1,240	416	2.98
							Average	1.20
MAJOR PASSENGER SERVICES								
from Lincoln **to** Roberts	44	750	26.8	20.8	0.01574	327	104	3.15
from Roberts **to** Cuenca	60	750	3.3	20.8	0.03101	645	104	6.20
							Average	4.91

Source: FEPSA (2000)

The concessionaire has often claimed that when passenger trains have accidents, the subsequent bottleneck and the towing and clearing expenses are paid by FEPSA itself. If available data on the average number of such incidents per year (and the associated costs) were available, they should be included in the calculation. The major item to be included in the direct incremental costs is the incremental maintenance costs.

According to FEPSA (2000) the average maintenance cost for the entire network can be estimated in **1.11$/ train-km**, although this figure widely varies across the three types of passenger lines identified above. For the *few passenger services* routes, the attributable cost can be very low (for example 0.20$ per train/km), but the average is 0.77$. For the *minor passenger services* lines, the cost range is between 0.43 and 2.98$ per train-km (with a mean value of 1.20). Finally, in the case of major passenger services routes, this cost can be as high as 6.2$ per train-km, with an average of 4.91$.

As presented in Table 4.4, the calculation of these figures from the point of view of the regulatory agency only requires a detailed disaggregation of maintenance costs and operating data by those routes affected by passenger traffic. This procedure is currently available to CNRT, which would only require more disaggregated data from the concessionaires. It is very important to choose an adequate weighting criteria to balance the impact of the different types of lines.

This definition of the informational requirements would constitute **step 2**, as mentioned in Table 4.2 above. As it has been suggested in other sections, in order to estimate an adequate access price it is very important to define a homogeneous set of rules that guarantee a minimum level of homogeneity of information across different concessionaires. Technically speaking, setting a single access price for the entire network requires that the information used in the different computations (for example, what each concessionaire considers a "maintenance cost" match exactly across concessionaires. It is obviously possible to set different access prices for different parts of the network, but this solution has been scarcely favored in most countries due to the legal and political complications that might arise.

Table 4.5. Cost structure of a typical freight train in Argentina

Direct costs	$/Ton-km	%	Indirect costs	$/Ton-km	%
Train crew	0.0025	7.4	Infrastructure	0.0019	5.6
Fuel and energy	0.0025	7.4	Maintenance of infrastr.	0.0005	1.5
Maintenance	0.0043	12.7	Stations	0.0041	12.1
Amortization	0.0021	6.2	Administration	0.0034	10.1
Other direct costs	0.0021	6.2	Other indirect costs	0.0104	30.8
Total direct costs	0.0135	39.9	Total indirect costs	0.0203	60.1

Source: Polo (2000).

Once the direct costs associated with passenger trains have been estimated, the next step towards computing the adequate access price consists in the allocation of indirect costs. As discussed above, there are many approaches. Polo (2000) presents in Table 4.5, a typical cost structure of a representative Argentine freight railroad in $/ton-m and percentages. The calculations have been carried out considering a 1,500-tons train, loaded with grain, and for an average haul of 220 kms and they show that indirect costs may represent about 60% of total costs. This would be a reasonable starting point for any discussion.

Step 3 requires the allocation of indirect costs. The allocation of fixed and common costs, as described in Section 4.3.2, would require the choice of one of the specific methods available. CNRT has access to general accounting and financial information from each concessionaire and most of should be sufficient to apply any of the methods. A final figure for the indirect cost attributable to each passenger train could be obtained. Surprisingly, FEPSA's own study does not include any reference to these indirect costs in their estimation of the adequate access fee. In FEPSA (2000) it is simply considered that the direct maintenance cost of **1.11$** per train-km is sufficient to cover the major incremental cost incurred by the freight operator as a consequence of intercity passenger trains. It is then implicitly assumed that the difference between this value and the actual price of **2.50$** per train-km is enough for the indirect costs. When compared to international standards (taking into account differences for traffic density and different maintenance and labor costs) these figures seem reasonable (see for example, Campos and Cantos, 2000).

4.3.5 Where do we go from here?

In sum, CNRT is not too far off from being able to take an analytically sound position regarding access prices. It may have to start with an inventory of the routes significantly affected by access issues both in the case of freight and commuter concessionaires. Second, it may have to request the operators to disaggregate the information they send to CNRT the level of these routes, at least with respect to operating information and most relevant direct costs. Third, CNRT should pick a reasonable procedure for allocating indirect costs should be chosen. The resulting access prices should be balanced to take into account future investments in tracks to make sure that future needs are not omitted.

5. OTHER USES OF REGULATORY ACCOUNTING

After reviewing in regulatory demands of efficiency measurement procedures and access pricing techniques, this final section provides a general discussion of other possible uses of regulatory accounting. In particular, we focus on the need for model of the firm's financial behavior. The need of the model arises not only from the obvious need of informing price-setting decisions, but also for the subtler purpose of defining the size of the cake to share between the different parties in any contract renegotiation.

5.1. Collecting financial information for price-setting and price-revision

The mechanisms needed to set and revise a price-controls in any concession is quite well established. They involved a series of data requirements most regulators would consider reasonable.[17] This section discusses these data requirements and makes an assessment as to how CRNT fares in this respect for its railways responsibilities. Most regulators start by asking the company for information on its present and projected operating costs, its assets, its investment plans, and its demand forecasts. In Argentina, CNRT currently collects most of this information. The problems is that, as mentioned earlier, the application of some light consistency tests to the data collected and published raises some doubts on its quality. Routine tests include checks that the operators are not predicting excessive operating costs or investments systematically or controls for some patterns in the errors which have tended to be quite common among the operators. This has probably never been a major problem for CNRT because the data has generally been used in a passive way by the regulators. Yet the forecast offered by the operators have been so frequently off that it seems reasonable to wonder why the regulator has not yet decided to sharpen its regulatory in this respect. These forecasts are coming up in any tariff revision and should hence be assessed independently by the regulator.

The regulator also needs a realistic valuation of the firm's assets as well as their depreciation rate. This has always proved an extremely controversial area and yet regulatory asset valuation is at the core of any regulatory system. The valuation of Argentina's asset from the viewpoint of the regulators is not sufficiently linked to its regulatory needs. In principle the regulator should have a clear idea as to whether the current cost value of the assets, or another value reflects the price at which the assets have been concessioned. They seem to be using current costs values. Yet, where possible, the international experience suggests that regulators should steer away from using current cost values as a basis for regulation and instead derive a regulatory value, based upon the traded value of the assets rolled forward by net investment. For the concessions that have changed hand since the beginning of the reform, the existing assets valuations should be reassessed. This is all the more important since the depreciation profile reflects this choice of asset valuation. It should be assessed on the regulatory, rather than current cost value. For the business which have lost value (mostly freight), the depreciation schedule is likely to be much too generous, providing an implicit subsidy to the operators and vice versa for the businesses which have gained value (mostly suburban passenger). This avoids giving investors a return on assets valued at a higher price by the regulator than was actually paid by investors (see Burns and Estache, 1998).

Once the costs have been forecasted and the assets valuated, the following step is to project the company's revenue requirement. This is not done on a regular basis by CNRT, rather it comes up as part of renegotiation and even in those cases, it tends to be based on a

[17] Green and Rodríguez-Pardina (1999) provide a detailed account.

standard traditional accounting approach.[18] This is fine when the accounting system is reliable and comparable across companies and when there is no cash constraint for the operators. This is not the case in Argentina and until the accounting system is beefed up, it may be a reasonable approach to forecast revenue based on the cash flow approach. In the more traditional accounting based method, over the price control period, revenues should be expected to cover: operating costs; plus depreciation; plus a return on capital. The cash-flow approach sets regulated revenues over a price control period equal to: the present value of operating and capital expenditures forecasted for the period; plus the present value of the expected change in the asset value over the period.

Under either method, apart from operating costs, investments, asset values, and depreciation rates, the regulatory agency also need a cost of capital as a critical input to proceed with the calculation of the allowable revenue. The cost of capital is always a contentious issue in regulation. It is necessary to compute the weighted average cost of total capital (*WACC*) – including debt plus equity – to provide a return to investors and sustain the asset base, but few regulatory agency do it in a consistent way.[19] Formally,

$$WACC = g \cdot r_d + (1-g) \cdot r_e$$

where g is the level of gearing in a company, i.e. the proportion of debt in the total capital structure; r_d is the cost of debt finance. This is simply measured as risk free rate, r_f plus a debt premium over this rate. The premium is either measured directly from the yield of a company's bond or through comparator information and r_e is the cost of equity finance; its estimation raises bigger problems and yet for privatized infrastructure monopolies, it is quite important since access to debt finance can be quite restricted for many developing countries privatization projects. One of the common approaches adopted to measuring the cost of equity is the **Capital Asset Pricing Model** (CAPM). This estimates the cost of equity as*:*

$$r_e = r_f + \beta_e \left(r_m - r_f \right),$$

where: r_e is the cost of equity finance; r_f is the risk-free return; β_e is the equity beta which measures the relative riskiness of the company's equity (and sometimes the sector's riskiness) compared to the market as a whole; its value depends on the type of regulation used; r_m is the level of market return; and $r_m - r_f$ is the market risk premium. Establishing

[18] There are two equivalent methods to calculate allowable revenue: the *cash flow* approach and the *traditional accounting* based method. The first of these components ensures that the business can conduct its on-going activities; the second maintains the value of existing assets so that any expropriation of asset value is made transparent.

[19] For a quick review of how to estimate this cost of capital, see Alexander and Estache (1997); for a more detailed analysis, see Alexander *et al*. (1996).

the values for each of these items is relatively straightforward when developed capital markets exist and companies are quoted on a stock exchange.[20]

Finally, it makes a lot of sense for the regulator to have some demand forecasts to check the consistency with the required revenue and to ensure that price elasticities and tariff levels are combined in a way that allows the allowable revenue to be met within reasonable margins. Once more, CNRT has little formal information on demand for the system and for each operator. The Secretariat has taken the lead on tariff setting which continues to be a major political issue. A better demand study combining ability and willingness to pay would probably yield combinations of traffic levels and revenue simulations that would reveal more explicitly the economic consequences of the political constraints on any tariff revision.

The overall consistency of the variables discussed here should be checked within a regulatory financial model that must translate estimated allowable revenues into prices for each service or product. A lot of the relevant information should have been generated as part of the reform process itself and would have been revised many time since. Unfortunately, most of the information available needs to be updated and improved. CNRT is a young agency established well after the concession contracts were in place and had therefore to accept a situation that was imposed by other circumstances. Developing this financial model for each one of the concessions it is monitoring should be at the top of its agenda and would generate a lot of the data it needs to measure efficiency and access prices.

5.2. A financial model for contract renegotiation

Regulatory accounting can also help in contract renegotiations. After more than six years of private operation, at the beginning of 2001 the Argentine rail concessionaires are immersed in a renegotiation process with the Government. As any other renegotiation, this will imply a redefinition of the size and type of the "cake" to be shared between the Government (national and provincial), the users and the operators. While the role played by CNRT in this process is minimum, it could design the financial models it needs to build to help the Secretariat in its renegotiation. A well designed mode will allow a check of the internal consistency of all the contractual obligations and rights of each operator.

As mentioned in Section 2, the five existing freight concessions were designed for a 30-year duration with an optional 10-year extension, and the commuter railways were concessioned for a 10 year period. However, by Presidential Decree 605/97, the Executive ordered the Secretary of Transportation and Public Works to modify the concession contracts, following the authorization to do so by the *Comisión Bicameral de Reforma del*

[20] A companion paper by Estache and Strong (2001) provides back of the envelope estimates of this cost of capital for various sectors in Argentina.

Estado in April 1996.[21] The reasons for renegotiation alluded to in the decree include "unforeseen changes in conditions, which made contract plans incompatible with the level and composition of the demand," in part due to a "shortfall in actual demand relative to expected demand."

5.2.1. A financial model of the renegotiation process

Renegotiation requirements in the decree included four important constraints. First, it cannot affect the "economic and financial equation" of the concessions (i.e., leaving profits constant in net present value terms which is essentially a profit cap). Second, it preserves the degree of entrepreneurial risk assumed at the time of competition for the market. Third, it introduces flexibility to formal (or input) requirements but respecting substantial (or output) results. Lastly, the agreements are subject to both internal and external scrutiny by auditors and the Bicameral Reform Commission.

The first requirement is probably the most difficult to meet, since renegotiations are carried out in a context of asymmetric information penalizing CNRT. Having an explicit financial model for each concession could not only make a significant difference in the Government's strategy, but also become necessary to define its bargaining margins. As in the case of price-setting, this somewhat more complex model should be constructed around the financial position of the concessionaire and define the implications or consequences of the renegotiation.

The concept of cost of capital and its interrelationship with the rate of return of each concessionaire is at the heart of this financial model. Very broadly, the discounted rate of return (*RoR*) that investors in the company expect to receive, measured as the difference between revenues (R_t) and costs (C_t) over a T-period project should be at least equal to the cost of capital (WACC),

$$[RoR]\times[capital]=\sum_{t=0}^{T}\frac{R_t-C_t}{(1+d)^t}\equiv WACC\times[capital],$$

where d reflects the appropriate discount rate and *capital* is debt (D) plus equity (E). In its attempt to guarantee at least competitive returns in the long run, it is common for regulatory policy to employ a cost of capital as one of the major determinants of either the rate of return or the price cap in regulated industries.

In a conventional non-regulated business, the cost of capital is typically used as an opportunity cost of funds and it is often the rate at which future profits are discounted into the present. If this discounted value is positive, the business is worth the investment. Otherwise, the investors would get a larger return elsewhere. In the arena of regulated business – such as the railways in Argentina – the role of the cost of capital is different.

[21] During 1995 the Government was trying to renegotiate the contracts without going through Congress. The Commission opposed these attempts arguing that the discussion disregarded important issues such as the dispute over access charges involving the provincial operator (UEPFP) in Buenos Aires.

Prices are regulated to limit market power and mimic, if possible, a price structure that is closer to what would occur if the companies faced competitive forces. In these cases the viability of an industry is basically taken as given and the cost of capital just measures the return the regulator allows the private firm to obtain.

5.2.2. An example: the commuter services renegotiation

It is possible to provide an **illustrative** example of the previous reasoning in the case of Argentina' commuter services based on the information available publicly. This is by no means a rigorous assessement of a specific renegotiation. The main purpose is to show how, with some simple simulations, a regulator can make a better assessment of trade-offs in renegotiations options.

Consider *Ferrovias*, the concessionaire of the *Belgrano Norte* Line in Buenos Aires. The concession started in April 1, 1994. It basically included a 10-year "rehabilitate, operate and transfer" (ROT) concession (that could be further extended for consecutive 10-year terms upon Government's approval). The network comprised a 54 km diesel suburban railway connecting the Retiro terminal area with five suburban municipalities northwest of Buenos Aires (22 stations).

The concessionaire committed to operate the system, execute an investment program, and maintain the existing track and rolling stock. The owner of the track, stations and rolling stock would remain the National Government. The basic investment program was financed by the National Government and carried out by the concessionaire; it included the acquisition of new rolling stock and incorporation of renovated rolling stock, partial track renewal, installation of automatic signaling system, installation of gates at grade crossings, construction of underpasses, new terminal and transfer center. Any change to the timing or size of these obligations clearly implies a change in the value of the business of the operator. In addition, the Government sets maximum fares and subsidizes the operations. Prices are subject to automatic increases according to the service quality achieved, and increases in the US CPI. Non-achievement of quality levels results in financial penalties. Other penalties are levied in case of non-compliance with regulatory requirements and other punishable actions (safety, maintenance, etc). Table 5.1 summarizes these values. Once more any changes to these pricing and revenue driving variables changes the value of the business as well.

Table 5.1. Investment program and penalties

$ thousands	Basic Investment Program		Penalties (*)	
Period	Contract	Actual	Levied	Paid
1994-1999	47,890	42,140	50.9	44.9

Source: CNRT (2000). (*) No disaggregated annual figures were available.

Table 5.2 summarizes the financial position of *Ferrovias* in the 1994-1999 period. Note that the initial year (1994) only includes seven months and that accounting year goes from June to June. The concessionaire' capital structure is mainly equity (70%) and short-term debt with suppliers of rolling stock and maintenance services. Although the

Government finances investment on infrastructure, in most cases the companies have to supply money in advance. They discount commercial paper against the Government promises of payment at rates of 17-25% depending on specific projects and the economic environment. None of the concessionaires has raised long-term debt in large amounts since ticket sales. With subsidies and discounted paper, this is enough to cover most expenses.

Table 5.2. Ferrovias financial data (1994-1999)

(in $ thousands)	1994	1995	1996	1997	1998	1999
Subsidies	5261.7	24539.9	23441.5	24128.0	24236.2	23559.0
Passenger revenues	1443.4	8494.6	11210.4	11943.4	17613.2	19047.4
Investment transfers	–	78.9	12678.3	17348.6	4208.1	14619.1
Access revenues	6.3	85.4	31.4	–	–	–
Other revenues	112.9	877.2	1196.0	1361.6	1249.3	293.3
Total revenues (R)	6824.4	34076.2	48557.8	54781.8	47307.0	57518.9
Operating costs	5655.6	28399.5	40331.9	45514.7	37586.0	44328.6
Other costs	1002.4	5223.2	7706.4	6828.7	6981.6	11364.3
Canon payments	–	–	–	–	–	–
Penalties (*)	7.5	7.5	7.5	7.5	7.5	7.5
Total costs (C)	6658.0	33622.7	48038.3	52343.4	44567.6	55692.9
Debt	5655.4	6181.5	10959.0	13675.7	15089.8	20351.9
Equity	3314.7	3723.9	4061.1	6041.0	5823.8	5666.9

Source: CNRT (2000). (*) Paid penalties have been equally distributed among the six year period.

The cost of equity is more difficult to approximate. Alexander *et al.* (1996) estimated betas between 0.74 and 0.86 for electricity and telecom companies in Argentina between 1992-95. Green and Rodríguez-Pardina (1999) estimated that the cost of equity varied between 16.04-17.75% in the Argentine gas industry in 1996. A figure of 18% could be appropriated for this example, although it is well above the corresponding value for the Brazilian rail industry (see Alexander *et al.*, 1999).

These figures let us estimate a rough initial value of the concessionaire's IRR from the point of view of the regulatory agency. However, since only 6 of the initial 10-year period (1994-2004) is currently available, it is first necessary to extrapolate the 1994-1999 values into the remaining four years. As in the case of efficiency measurement, there are many alternatives procedures available, but none of them is completely free of criticisms.[22] Since we only intend to illustrate the arguments described above, we have chosen to calculate the average of the total revenues, R (41,511 $ thousands) and total costs, C

[22] Single and multiple variable regressions taking into account microeconomic and macroeconomic conditions could possible be one of the most complete methods, but we lack enough information. For this example, other, simpler mechanisms are preferable.

($40,161), and the same method for debt, D, and equity, E, (resulting in $11,900 and $4,700 thousands, respectively). Thus, using the expression

$$RoR = \sum_{t=1}^{T} \frac{R_t - C_t}{(1+d)^t} \Big/ (D+E),$$

under different discount rates (d=0.15, 0.20 and 0.25), the corresponding *RoR* for *Ferrovias* for its initial concession term (T=10) with the capital structure evaluated in year 2000 would be:[23] Note that as mentioned earlier, any change in the contract will change R and C and this should in principle be simulated in detail by the regulator before plugging in the final data in the final equation.

Table 5.3. Simulated rate of return for Ferrovias (1994-2004)

D	0.15	0.20	0.25
$\sum (R_t - C_t)/(1+d)^t$	6272,4	4948,7	3979,2
D+E (average)	16757,5	16757,5	16757,5
RoR	37.4%	29.5%	23.7%

whereas the calculated *WACC* for year 2000 would be, with g=71.5%, r_e=18% and r_d=17-25%, between 17.2 and 23%. In spite of the evident limitations of the calculations provided by this example, the difference with the estimated *RoR* and *WACC* for Ferrovias shows that the business looks better the more patient the investors are since the highest discount rates get them very close to the break even point. If these results are representative, the concerns that the operators are expressing currently with the business suggest that they have discount rate which are even higher than 25% since most claim to be losing money. Any renegotiation than gets the operators to be more patient—i.e. decrease the rate of time preference—will help in keeping them on board.

In June 1997 Decree No. 543 was enacted, authorizing the Transport Secretariat to re-negotiate the concession agreements. The terms of the new contract were agreed on with the Transport Secretariat at the end of 1999 and they included changes in the duration of the concession, a new investment plan and selective price increases. These changes, published in a document called "Addenda 1999", were contested by the new administration that came to power in 2000. The new Government negotiated again with *Ferrovias* some adjustments to the changes and a new document, "Revision 2000" was published. As summarized in Table 5.4, the main differences between the outcomes of the two renegotiations were related to the extension of the concession, the tariff increase and the new investment plan. In both cases, new valuations of assets were in place as well as revisions of the penalty system.

[23] If we had taken year 1999 capital structure of $26,018 thousands, the corresponding RoR would have been 24%, 19% and 15%, respectively.

Table 5.4. Renegotiations of Ferrovias concession: 1999 and 2000

	Addenda 1999	Revision 2000
Extension of concession	30 years	24 years
Tariff increase	100% in 6 years	84.8% in 6 years
Tariff increase for long journeys	80-90%	28-38%
New investment program	Electrification of track between Retiro and Villa Rosa, refurbishing of all 22 stations, including bus/rail interchanges, acquisition of new rolling stock, and construction of new road-rail crosses	+16 km electrified + 3 new junctions. Total program $338.7 million
New valuation of rolling stock	Electric cars: $2 million by car	Electric cars: $1.5 million by car
New valuation of interest payments	$79 million	$8.8 million
Demand projection	+52% in concession period	+35% in concession period
Other issues	Improvement of the penalty system Control of the funds generated by tariff increase	

Source: www.mecon.gov.ar

Any of these changes has implications for the calculations made above. For example, a greater extension of the concession modifies the value of T; tariffs increases or changes in the demand projection affect the value of the revenues (R), whereas the valuation of the assets of the changes in the penalty system would change the costs (C). Using the information from Table 5.4, CNRT should be able to provide a general framework on the consequences of the renegotiation for each of the concessionaires in terms of their expected *RoR*. For example, Table 5.5 roughly re-calculates the *RoRs* in Table 5.3 according to the outcomes of the "Revision 2000" document.[24] The results, show as that for the three discount factors of d=0.15,0.20 and 0.25—which approximate the rate of time preference of the operator--, the concessionaires' position is not changing dramatically. It improves somewhat if the operator is not in a hurry and is patient enough to get the benefits of its investment. For operator more in a hurry, the renegotiation leaves them a little worse off but not significantly. There is no doubt that any private concessionaire uses its own financial model in the renegotiation process. So should the regulator, and these estimated values –calculated with more sophisticated techniques – could be used as a guide for the renegotiation.

[24] It is considered that subsidies will be reduced (on average) by a 30% and passenger revenues increased by a 30% from 2000 with respect to 1999 values; investment transfers of $338 million are evenly distributed among the 17 years, whereas access and other revenues remain unchanged with respect to Table 5.3. Operating costs are increased by a 20% on average since 2000 with respect to 1999 values, whereas other costs are unchanged.

Table 5.4. Simulated rate of return for Ferrovias (Revision 2000)

d	0.15	0.20	0.25
$\sum (R_t - C_t)/(1+d)^t$	10126,4	7133,7	5288,8
D+E (1999)	26018,8	26018,8	26018,8
RoR	38.9%	27.4%	20.3%

In conclusion, this section has shown using a relatively new approach that the uses of regulatory accounting go further than a simple collection of information with control purposes. Balance sheets and financial statements can be used by the regulator to simulate the financial models of the firms. This is "as if" the regulatory agency adopted the firm's point of view, which undoubtedly could lessen the asymmetric information problem. In the case of Argentina, we have provided several examples on the way these financial models could be used in the context of the privatized rail industry. [25]

6. CONCLUSIONS

This paper has attempted to address a very simple question: how to regulate a sector which is no longer under direct control of the Government, after a concessioning process carried out under diverse circumstances, and where available information is now mainly provided by private operators. Unfortunately, the answer is not equally simple. In most developing countries, one of the effects of the lack of experience in setting up concession agreements has often been that the resulting agreements did not clearly define all of the information needed to carry out the oversight role and the regulatory role.

In Argentina, according to the reputation and institutional background of public policy accumulated until the 1990s, rail concession contracts intended to be very specific about the way in which tariffs, quality, investment, exclusivity, etc., would have to evolve over time. Yet, some discretion was left to the newly created regulatory bodies to adjust those contracts according to unforeseen developments. Nevertheless, the economic context in which the initial privatizations were carried out did not allow the time to refine terms and many loopholes remained. Naturally, those unforeseen events have come to pass, and the regulatory agency – the CNRT – has had to adapt its procedures and decisions to the available information. In some cases, the alleged modifications in the environment have given place to renegotiations.

[25] Green and Rodriguez-Pardina (1999) provide a model for the revision of prices in privatized utilities. However, they do not take explicitly into account the impact of renegotiation in the same way we do.

The Argentine experience since setting up the concessions at the beginning of the 1990s has proven very helpful in highlighting the information not available that is currently needed. Therefore, the changes to be introduced in the approach to information furnished to the Government for purposes of oversight and regulation are now defined in a much more clear way than six years ago. These changes encompass a number of dimensions of what it widely known as regulatory accounting, but they could be summarized into four major issues:

- **Harmonization and comparison of accounting data**. Taking into account its limited resources, CNRT is currently doing a very important job in collecting and controlling the information provided by rail concessionaires. However, its function is mostly passive, and a more proactive use of its capabilities is missed. The causes of this are not only attributable to CNRT's deficiencies, since – for example – a lack of comparability among balance sheet data limits the ability of the regulator to compare the relative performance of the companies or to employ techniques of yardstick competition.

- **Efficiency measurement**. The comparison of performances could be also completed with an adequate measurement of efficiency, whose advantages have been described in Section 3. Increasing the fairness of the regulatory process is for example a good reason to proceed with this, and the regulator can create more transparent rules of decisions. Estimating a relatively simple synthetic benchmark indicator of potential efficiency achievements against which the compliance of each operator can be checked provides a logic to regulatory assessments. In addition, the data requirements imposed by these methods can also be used to generate new regulatory tools (such as yardstick competition) which allows the comparison of the performance of an operator with that of all others. But this, of course, requires reliable, comprehensive and consistent data, which may be again the most pressing challenge CNRT is facing.

- **Access prices**. With respect to this issue CNRT could play a more active role in the disputes between the freight concessionaires and the provincial Governments on access fees if the suitable mechanisms for calculating access prices were in place, as described in Section 4. What it is needed is to identify the routes affected by access issues and disaggregate at that level the information collected from the concessionaires.

- **Financial model**. Finally, the use of a financial model in regulation has been shown in Section 5 to be a key element in regulation, not only from the point of view of price revision but also as a supplementary tool in the renegotiation process. Regulatory accounting goes further than a simple collection of information with control purposes. Balance sheets and financial statements can be used by the regulator to simulate the financial models of the firms. This is "as if" the regulatory agency adopted the firm's point of view, which undoubtedly could lessen the asymmetric information problem. In the case of Argentina, we have provided several examples on the way these financial models could be used in the context of the privatized rail industry.

It should be reckoned that at the beginning of year 2001 the circumstances in the Argentina rail industry are not favorable for dramatic changes, but – as suggested in other parts of this document – the current renegotiation process could be used to adjust the regulatory agency to the needs that have been revealed after six years of experience. If

changes are not considered, Argentina could lose the advantages and experiences gained since the 1990s.

7. REFERENCES

Alexander, I. and A. Estache (1997), "A back-of- the- envelope approach to assess the cost of capital for network regulators", mimeo, The World Bank.

Alexander, I., C. Mayer and H. Weeds (1996), "Regulatory Structure and Risk in Infrastructure Firms: An International Comparison", Policy Research Working Paper 1698, World Bank

Alexander, I., J. Campos and A. Estache (1999), "Information Capability, Systems and Requirements in the Brazilian Privatized Transport Sector", *mimeo*., The World Bank Institute, Washington, DC.

Baumol, W. and Sidak, J. (1994), *Toward Competition in Local Telephony*, Cambridge, MA, MIT Press.

Burns, P. and A. Estache (1998), "Information, Accounting and the Regulation of Concessioned Infrastructure Monopolies", *Policy Research Working Paper* No. 2034, The World Bank, Washington, D.C.

Campos, J. and P. Cantos (2000), "Rail Transport Regulation", en Estache, A. y De Rus, G. (eds.), *Privatization and Regulation of Transport Infrastructures*, The World Bank Institute.

Campos, J. and A. Estache (2001), "Argentina's Rail Concessioning Experience after Ten Years", *mimeo.,* The World Bank Institute, Washington, DC.

Carey, A.; M. Cave; R. Duncan; G. Houston and K. Langford (1994), *Accounting for Regulation in UK Utilities*, Institute of Chartered Accountants of England and Wales, London.

Cave, M. and R. Mills (1992), *Cost Allocation in Regulated Industries*, Institute of Chartered Accountants of England and Wales, London.

CNRT (2000), *Información estadística*, *mimeo*., Buenos Aires.

Coelli, T.J. and S. Perelman (2000), "Technical Efficiency of European Railways: A Distance Function Approach", *Applied Economics*

Coelli, T., A. Estache, S. Perelman and L. Trujillo (2001), "A primer on efficiency measurement for utilities and transport regulators", *mimeo,* The World Bank Institute

Estache, A., M. González and L. Trujillo (2000), "Un resumen de las medidas de eficiencia con fronteras estocásticas en ferrocarriles", *mimeo.,* The World Bank Institute and Universidad de Las Palmas de Gran Canaria.

Estache, A. and J. Strong (2001), "The cost of capital in Argentina's transport sector in 2001", The World Bank Institute and Universidad de Las Palmas de Gran Canaria.

FEPSA (2000), *Peaje Ferroviario sobre la red de Ferroexpreso Pampeano*, Buenos Aires.

Green, R. and M. Rodríguez Pardina (1999), *Resetting Price Controls for Privatized Utilities. A Manual for Regulators.* EDI Development Studies. The World Bank.

Laffont, J. and Tirole, J. (1994), "Access Pricing and Competition", *European Economic Review*, **38**, pp. 1673-1710.

NERA (2000), *Railway Efficiency-A Draft Final report for the Office of the Rail Regulator*, London. Online accessible at www.orr.gov.ok.

Oum, T.H., W.G. Waters and C. Yu (1999), " A study of productivity and efficiency measurement in rail transport", *Journal of Transport economics and Policy*, 33, 9-42.

Polo, C. (1999), Los Costos de Transporte y la Competitividad, Secretaría de Transporte, Buenos Aires.

Thompson, L. (2000), "Argentine Rail Freight Concessioning: Achievements and Challenges" *mimeo.*, The World Bank.