Best Practices in Access Policies: Telecommunications, Energy and Railways

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ABSTRACT

This paper analyzes the access policies implemented in regulated network industries comparing the experiences in the UK, US and Australia. The main conclusions are: (i) access policies regulate mainly four elements: vertical structure, pricing, terms and conditions, and the mechanism to expand the network; (ii) negotiation is widely used as an alternative to regulation, with the exception of the electric supply industry; (iii) the combination of market incentives and minimal coverage requirements seems to be the preferred policy to incentive network development; and (iv), it might be very difficult for regulators to mandate vertical separation once incumbents are privately-operated.

1. INTRODUCTION

Network industries such as telecommunications, electricity supply, natural gas and railways have in common that the production of a unit of a final good requires inputs that are simultaneously produced in both, monopolistic and competitive markets. This situation produces an asymmetric relationship between the company that produces inputs in monopolistic markets and its competitors in related ones, which require access to input produced by the monopolist. This situation is known as the access problem.

The access problem has been dealt with in different ways. Some regimes rely on negotiation and market incentives to establish access prices and conditions, while others are based on a more strict regulation.

Experiences in implementing access regimes in network industries can be useful for regulators facing similar problems, even in sectors where natural monopolies are not the rule. For example, although ports in Europe, North America and some Asian countries compete fiercely for the same cargo, others located in Africa, Latin America and other developing countries constitute natural monopolies[1]. The same situation applies to many airports facing low levels of demand. In a context of increasing private provision of public services, efforts to concession their operations to the private sector need to be complemented with an access regime.

[1] See Tamayo, Paredes and Flor (1999) for Peru; Kent and Hochstein (1998) for Colombia, Costa Rica and Nicaragua; Van Niekerk (2005) for South Africa; and Harding and Hoffman (2002) for the Caribbean. Naturally monopolistic ports can also be found in southern Australia (SAIIR, 2002)

The purpose of this paper is to analyze the access policies implemented in regulated network industries and to extract useful lessons for regulators in these and other industries. The analysis has been performed using the particular experiences of the UK, US and Australian network industries. These countries where chosen because they have approached the access problem from three different perspectives. The UK was the first developed country in implementing a comprehensive privatization program, which underlined the need for addressing the access problem. The US has a long tradition of encouraging competition and allowing the private supply of public services, for which the reform of its network industries focused more in restructuring them than in changing the nature of their ownership. Lastly, the Australian strategy consisted on implementing a National Access Regime whose provisions cover all relevant infrastructures, regardless of the nature of their ownership and the industry they belong.

The paper is structured as follows. The following section presents the main policy options to regulate access, while section 3 discusses the potential for competition in network industries. Section 4 analyzes the access regimes implemented in the four analyzed industries and section 5 presents the conclusions of the research.

2. ACCESS POLICIES

When regulated monopolists are also allowed to participate in related competitive markets, they have incentives to deny competitors access to the inputs produced in monopolistic markets. This behavior would foreclose competition and thus allow the monopolist to recover profits foregone by regulation. To prevent such behavior to occur, access policies are implemented. Ideally, an access regime should allow competitors in related markets to access inputs produced in monopolistic markets while maintaining the incumbent's incentives to invest and expand the network (Flor and Defilippi, 2003).

Access regimes have been implemented in the regulated network industries of many countries. Although their characteristics differ from industry-to-industry and country-to-country, four are the elements commonly regulated:

a. Vertical structure;
b. Pricing;

c. Terms and conditions; and,

d. The mechanism to expand the network.

Vertical structure refers to the provisions regulating the supply of two or more complementary inputs. Under vertical integration, a single firm is allowed to supply several inputs. Under vertical separation, firms producing inputs in monopolistic markets have limitations to participate in related ones. Vertical separation can be legal or operational. Legal separation implies that activities are performed by different firms; while operational separation only requires activities to be performed by different business units within the same company. To enforce operational separation, accounting separation and ring-fencing arrangements are commonly implemented.

Although vertical separation may eliminate incumbent's incentive to foreclose competition in related markets, this is not necessarily the best policy. In presence of economies of scope (a feature common to many network industries), this limitation may lead to cost increases (Paredes, 1997).

There are two main policy options to determine access prices. These can be set by the regulator or negotiated by the parties. In such cases, negotiation procedures are typically regulated, and the regulator acts as arbitrator in case of dispute. An alternative arrangement is for regulators to set the methodology to calculate access prices instead of the prices themselves. A further option is to mandate the publication of reference tariffs calculated using regulated guidelines, which can be further negotiated.

The theoretical support for negotiation is the "Coase Theorem" (Coase, 1960). This theorem indicates that if property rights are well defined and there are no transaction costs (or these are extremely low), negotiation will lead to a better resource allocation than regulation. In this context, government intervention is only justifiable if regulation costs are lower than the transaction costs of a negotiated agreement.

The third regulated element is the terms and conditions upon which access is provided. As for access prices, alternative policies to determine terms and conditions are negotiation, regulation or intermediate approaches, such as the publication of standard reference terms that can be subject to further negotiation by the parties.

The fourth regulated element is the mechanism used to expand the network. One option is to leave the decision to the incumbent, who would decide to invest according to the incentives provided by the market. The other main option is to regulate this

decision via targeted outcomes. An intermediate approach is the one used in the Australian electricity industry, where assets secure a return only if they pass a "regulatory test", aimed at assuring that the investments reduce service costs.

3. COMPETITIVE AND MONOPOLISTIC ACTIVITIES

Each analyzed industry has distinguishable characteristics that affect the potential for competition within them; and thus, the need for pro-competitive regulation.

In the telecommunications industry, there are four distinguishable markets: local telephony, long-distance, mobile and internet provision. In the energy industries, each activity represents a potential market: production, transmission, distribution, etc. In the rail industry, the provision of infrastructure constitutes a single market, but in train services there are as many sub-markets as combinations of city pairs, commodities, schedules and service qualities. The potential for competition in each market depends on the combination of economies of scale, scope or density that make cheaper for a good to be provided by a single firm (Baumol, Panzar and Willig, 1982).

Table 1 presents the services provided in each industry and their potential for competition.

Table 1:
Potential for competition in each industry

Potential	Telecommunications	Electricity Supply	Natural Gas	Railways
High	Long Distance Mobile Internet provision	Generation Retailing	Production Retailing Storage	Train Services
Low	Local Telephony	Transmission System Operation Distribution	Transmission Distribution	Infrastructure

In telecommunications, the potential for competition is high in long-distance, mobile and internet provision markets. In fact, these services are competitively provided in most countries. Likewise, electricity generation, gas production and retailing are supplied by competing firms in most countries where competition is allowed. Gas

storage is also a potentially competitive market. Train services typically face not only intra-rail but inter-modal competition as well.

On the other hand, the potential for competition is low in local telephony, transmission and distribution services in energy industries, and in the provision of rail infrastructure. In the majority of cases, these are cost-sub-additive activities in which the construction of alternative facilities would lead to a waste of resources. Although competition in gas transmission can occur under certain circumstances, management of electricity systems requires centralized coordination. In these circumstances, competition is undesirable. Access policies are implemented to assure that companies providing these services do not extend their market power into markets with high competition potential.

4. ACCESS REGIMES BY INDUSTRY

4.1 Telecommunications

After being a heavily regulate industry during most of its existence, the telecommunications industry experienced a radical transformation since the 1980s. In many countries incumbents have been transformed, and state-owned monopolies are now operated by multinational private companies. The path toward the liberalization of the industry, however, has not implied the complete withdrawal of the government. Externalities, naturally monopolistic segments and situations inherited from state-ownership, provide incumbents with advantages that would impede competition unless some economic variables are regulated.

Table 2 presents the characteristics of the access regimes implemented in the UK, US and Australian telecommunications industries.

It can be noticed that vertical integration is a common practice for domestic and international long-distance services. Even in the US, where AT&T was once required to separate its activities to prevent anti-competitive behavior, local operators are allowed to provide long distance services. In this case, however, integration is conditioned to the opening of captive markets to competition. Vertical integration is also allowed in the provision of internet services; although all of the analyzed countries have

implemented local loop unbundling[2] (LLU) with the aim of reducing incumbents' market power (Umino, 2003).

Table 2:
Access regimes in the telecommunications industry

	UK	US[3]	Australia
Vertical Structure	Integration for long-distance; separation for mobile; LLU for internet services	Integration for long-distance; separation for mobile; LLU for internet services	Integration; LLU for internet services
Access Pricing	Regulated (after initial negotiation)	Negotiable reference tariffs	Negotiated, set through an undertaking or arbitrated
Terms and Conditions	Regulated via standard interconnect agreement	Negotiated	Regulated via standard access obligations
Network Expansion	Universal service obligations	Universal service obligations	Universal service obligations

Separation is mandated for mobile services in the UK and the US. In Australia, structural separation is not mandated, although certain operational separation rules, such as accounting separation, are implemented.

Negotiation seems to play an important role in the determination of access prices in telecommunications. In the UK, for example, charges were developed through negotiations between the incumbent and the regulator, in consultation with operators and consumers (OECD, 2002). In the US, access prices are set at state level by the Public Utility Commissions (PUC), although parties are free to negotiate other rates.

In Australia, the determination of access prices is subject to a negotiation-arbitration framework consistent with the National Access Regime. This framework, however, does not apply to the determination of non-price terms and conditions for access. Indeed, these have been previously determined and established as "standard access obligations" to be met by all providers of declared services. A similar mechanism is

[2] The "local loop" is the link between the incumbent's switch and the user's premises. Under local loop unbundling, incumbents must lease the loop and related facilities to competing operators.

[3] In the US some services are regulated at state-level, for which particular policies may vary from state-to state.

used in the UK, where firms cannot negotiate terms and conditions different to those established in the "standard interconnect agreement" published by the incumbent. On the other hand, incumbents and access seekers in the US are free to negotiate the terms and conditions initially set by PUCs.

As for the mechanism used to expand the network, all three countries impose universal service obligations upon their incumbents to assure that services are provided to all users, including population segments with special needs and those located in high-cost areas. In the UK, the cost is solely borne by the incumbent; while in the US and Australia, these are apportioned by all carriers.

4.2 Electricity

Due to the presence of natural monopolies and complementarities between generation and transmission, electricity was traditionally supplied by integrated companies. Since the early 1990s, however, competition in the industry has been introduced by unbundling activities and allowing the interaction of generators, suppliers and end-users. But for electricity to be delivered, traders require to make use of transmission and distribution networks under a schedule coordinated by the system operator. The access problem in the electricity supply industry (ESI), therefore, lies in the transmission/distribution network.

Countries such as Argentina, Chile, Brazil, Australia and some US states, have further unbundled their ESIs, separating the functions of system operator and transmission owner. The main argument behind this policy is that companies that provide both services may not favor the efficiency of the system, since they are keen to favor their own commercial interests. In the case of congestion, for example, they are likely to favor implementing solutions based on transmission even if least costly alternatives exist, such as building generation in another location. Critics of this policy claim that it is inherently inefficient, since independent system operators are non-profit organizations with complex governance structures which do not bear the costs of their decisions (Arizu, Dunn and Tenenbaum, 2001).

The approaches taken to introduce competition in electricity markets have similar elements but vary from country to country. The UK was the first developed country to restructure its ESI, and as such, was also the first to suffer the consequences of a flawed regulatory design. As corroborated later, the privatization of the generation plant failed to create sufficient rivalry among producers, and errors in the design of the pool allowed generators to obtain economic rents by exercising their market power.

These flaws led to the substitution of the Electricity Pool by the NETA (New Electricity Trading Arrangements) in 2001 (Parker, 2002).

In the US, the fact that many regulators lack of regulatory powers to mandate the unbundling of activities made reforms difficult to carry on. Moreover, while transmission assets are mostly privately-owned, generation, distribution and retailing present a mix of private and public ownership at federal, state and municipal levels. In many cases, the activities of these public-owned facilities are not even regulated by the PUCs.

Australia, on the other hand, reformed its ESI after the US and the UK and was able to reap from these experiences. The design of its electricity market, for example, is similar to that of the England and Wales pool, but avoids gaming from users by calculating spot prices ex post, establishing firm bids, and not considering capacity payments. As in the US, the Australian ESI is regulated at federal and state levels, but since states agreed to hand over some of their regulatory powers to independent agencies, the regulatory framework is simpler.

Table 3 presents the characteristics of the access regimes implemented in the ESI in the UK, US and Australia.

Table 3:
Access regimes in the electricity supply industry

	UK	US	Australia
Vertical Structure	Separation between transmission and other activities	Integration is commonly allowed; incentives for separation	Separation; integration subsists among public-owned utilities
Access Pricing	Regulated	Regulated	Regulated
Terms and Conditions	Regulated	Regulated	Regulated
Network Expansion	Regulated	Market incentives in "organized markets[4]"	Market incentives plus "Regulatory Test"

[4] These are Independent System Operators (ISOs) and Regional Transmission Organizations (RTOs), arrangements where the functions of transmission owner and system operator are separated.

It can be seen that there is a clear tendency toward the regulation of terms and conditions to access the non-competitive segments of the ESI. This is also the modality adopted by a large number of European Union members, to the extent that the alternative options contemplated in the first electricity directive (1996/92/EC) were eliminated in the second directive (2003/54/EC). Even in Australia, where the national access policies clearly favor negotiation over regulation, access to electricity transmission and distribution networks is tightly regulated.

The unique characteristics of the industry might explain this preference for regulation. On the one hand, the management of an electricity system requires centralized coordination, for which standardization is a valuable feature. Therefore, the scope for tailor-made agreements is thus limited. On the other hand, since system unbalances are costly for society, the functioning of a liberalized industry requires close supervision. In this context, negotiated agreements specifying diverse terms might difficult monitoring.

Vertical separation has been the policy used to reduce incentives to discriminate from transmission owners. In the UK, the transmission owner (NGC) is not allowed to participate in the remaining activities. In the US, the limited powers that regulators have to mandate divestiture have even prompted several states, such as California and Arizona, to provide financial incentives for integrated utilities to divest their transmission and generation assets. In Australia, where integration still subsists among public-owned utilities, unbundling has been complemented with ring-fencing arrangements.

In the analyzed countries, transmission is priced following approaches that are basically similar, but different in details. In all of them, for example, transmission charges are paid in two-part tariffs, under locational (zonal or nodal) pricing. But in the US and Australia, charges already incorporate congestion; while in the UK the costs of dealing with this problem are paid through additional balance charges. In the other hand, in the US and the UK, transmission costs are borne by all users; but in Australia, charges are paid entirely by final users. In the latter, nonetheless, the revenue surplus generated by congestion is used in part to reduce transmission rates paid by final users.

The issue of network expansion seems to be related to congestion management. In the UK, transmission and distribution operators must argue their expansion plans before the regulator at the beginning of each price review. NGC has to bear system balance costs above the target set by the regulator, for which it has incentives to invest in

congestion-relieving assets. In the US, the approach varies according to the state. In organized markets, the main approach has been to use tradable rights to signal for congestion and to empower organized markets with the role of network planner. In Australia, where the operation of the system has been separated from the ownership of transmission assets, the owners are in charge of planning and undertaking the expansion of the network, although a regulatory test has been devised to provide a uniform criterion.

4.3 Natural Gas

Two important factors influence competition in the natural gas industry. The first one is location. Indeed, competition can arise if producers are physically located in opposite directions from consumers. For example, the Sydney market in Australia is served from two different gas basins located northwest and south from the city. The second factor is the price of substitute sources of energy that interact to determine the long run market price of gas.

In the UK, the privatization of British Gas in 1986 was followed by a series of legal procedures aimed at limiting the company's anti-competitive behavior. This behavior was possible because the integrated structure under which the company was privatized reinforced the information asymmetry between regulator and regulated firm, allowing the company to discriminate among users and deter competition. Legal separation between transmission and other activities was finally mandated by the Gas Act of 1995.

In the US, the adoption of an open access regime was the indirect consequence of a series of flawed regulatory decisions and the existence of stranded take-or-pay contracts (NERA, 2002). Indeed, the Natural Gas Policy Act of 1978 raised the price of gas for industrial users and prohibited its use for electricity generation, among many other industrial uses. Both factors dramatically reduced demand and left pipelines with idle capacity and expensive take-or-pay contracts. Under the conditions imposed by the regulator, the provision of transmission-only services was the only way pipelines could generate enough revenues to pay for their stranded contracts.

As a late comer, Australia seems to have taken advantage of the lessons drawn from restructuring experiences in the US and the UK. Open access policies were complemented with unbundling and ring-fencing arrangements from the beginning of the reform process.

It is worth noting the differences in the structures and size of the UK, US and Australian natural gas markets. In the former two countries, market integration has been achieved. In the UK, it was achieved under a private-owned monopoly; while in the US, it was accomplished through a web of interconnected pipelines with different levels of market power. In Australia, however, the vastness of the territory and the relative small size of the population make integration difficult. As a consequence, relatively little competition exists among the transmission networks.

It is also important to note that the three analyzed cases have in common to be largely supplied by domestic production. Unbundling reduces the negotiation power of pipelines, distributors and gas purchasers and could be more difficult to implement in countries that depend on imported sources of gas.

Table 4 presents the characteristics of the access regimes implemented in the natural gas industries of the UK, US and Australia.

Table 4:
Access regimes in the natural gas industry

	UK	US	Australia
Vertical Structure	Separation between transmission and other activities	Integration with operational separation	Separation between infrastructure services and other activities
Access Pricing	Regulated	Negotiable reference tariffs estimated using a regulated methodology	Negotiable reference tariffs estimated using a regulated methodology
Terms and Conditions	Regulated	Negotiable reference terms established using regulated guidelines	Negotiable reference terms established using regulated guidelines
Network Expansion	Regulated	Market incentives	Market incentives

In all three analyzed countries, transmission services must be provided separately from other activities. In the US, separation needs only to be operational. In the UK and Australia, infrastructure providers have to be legally separated from related companies trading gas, but there are no limits in joint ownership. Ring-fencing arrangements have been implemented in the US and Australia to enforce separation.

In the UK and the rest of the European Union, regulation of access terms and charges is the preferred approach. In the US and Australia, negotiated access is mostly used, although some exceptions apply. However, the review of the Gas Access Regime in Australia revealed problems with the way negotiated access have been implemented. The fact that reference tariffs prevail in case of a dispute seems to have discouraged negotiation, leading to a de facto cost-based regulation (Productivity Commission, 2003).

In the US, the existence of a developed secondary market for transmission rights grants further flexibility to gas shippers, who can respond to demand increases by buying existing but unused transmission capacity. The secondary market allows capacity holders to recover at least some of the investment made in capacity contracts, thus reducing the cost of reserving capacity that they may not use. It also allows shippers who prefer not to commit in long term obligations to obtain capacity, sometimes at a discount.

The three countries use a different approach to deal with capacity expansions. In the UK, the regulator uses a mix of administrative-set targets and economic incentives (the transmission operator is exposed to buy-back costs). In the US, pipelines are required to hold open seasons to assess the demand for new capacity. Authorizations are granted when there is sufficient interest from shippers. In Australia, it is presumed that demand would encourage incumbents to expand capacity, but regulators may order the expansion of a pipeline if it is justified by the requirements of a prospective user.

In the UK, capacity restrictions are dealt by auctioning capacity rights. In the US, the high degree of network integration allows the use of a secondary market to trade capacity rights. In Australia, capacity trading is allowed, but the relative immaturity of its markets limits the use of this option.

4.4 Railways

Due to its natural monopoly characteristics and the strategic importance that railways play in the development of the economy, the rail industry has been heavily regulated in most parts of the world. However, public dissatisfaction with traditional forms of regulation led to the restructuring of the industry in countries such as Japan, Sweden the US during the 1970s and 1980s. Since then, many other countries have followed through.

In the UK, the network is mostly used for passenger traffic, which makes it operationally different from those in US and Australia. The approach was to privatize the infrastructure separated from the provision of services and to grant Railtrack (now Network Rail) a monopoly to provide infrastructure. The provision of passenger services is franchised through auctions to non-related train operators which receive subsidies from the Strategic Rail Authority. Freight services are supplied in competition with other transport modes.

In the US, the long distances involved concede rail freight advantages in the transport of commodities. The approach was to deregulate the industry to facilitate competition with other transport modes. Passenger services were taken over by a public corporation (Amtrak), which receives a large annual subsidy from the federal government.

In Australia, the problem of lack of integration was dealt by the commonwealth and state governments by harmonizing regulatory frameworks at state level and creating a public corporation to operate the interstate infrastructure. Within state jurisdictions, some governments vertically separated the provision of infrastructure and train services, while others privatized it.

Table 5 presents the characteristics of the rail access regimes implemented in the UK, US and Australia.

Table 5:
Access regimes in the railways industry

	UK	US	Australia
Vertical Structure	Separation	Integration	Separation for interstate; mixed for intrastate networks
Access Pricing	Regulated, with some scope for negotiation for freight	Negotiated	Negotiable reference tariffs
Terms and Conditions	Regulated	Negotiated	Negotiable reference terms
Network Expansion	Mixed	Market incentives	Mixed

It can be noticed that there is not a common approach toward the regulation of vertical structure in the rail industry. The approach taken in the UK was to separate the

provision of infrastructure from the supply of train services. In Australia, the interstate network is operated under vertical separation, while intrastate railways follow a mixed approach. In the US, integration is allowed.

Access prices in the UK are regulated on a cost basis, although there is scope for negotiation in freight services. In Australia, published reference tariffs can be further negotiated, consistently with the National Access Regime. Access charges are structured as a two-part tariff with floor-ceiling revenue limits, and adjusted annually using the RPI-X methodology (ACCC, 2002).

In the UK, the methodology used by the regulator is different for passenger and freight services. Access prices for passenger services in the UK are set by the Rail Regulator in the form of price-caps, using the RPI-X methodology, for five-year periods. Initially, access charges were calculated to cover all of Railtrack's costs and investments. But during the second review period the Strategic Rail Authority committed to finance one third of Network Rail's investment plans. Until the end of the first review period, access charges for freight services followed a negotiation-arbitration framework similar to the Australian regime. But for the second review period, the Rail Regulator set more deterministic criteria, therefore reducing the scope for negotiations.

In the US, where the industry is dominated by operators who also control sizeable parts of track, access prices, terms and conditions are based on voluntarily negotiated agreements. If conditions are perceived to be discriminatory, the arrangements can be appealed to the regulator. The voluntary nature of these access arrangements, however, implies that competition is not introduced in all segments of the market. In some circumstances, for example, although there are many competing railways, there is only one track to the final destination. Jahanshahi (1998) reports that there have been a number of disputes between energy companies and railways transporting coal regarding access charges for the use of these essential facilities.

Regarding network expansion, in the UK and Australia, the mechanism used is mixed. Regulators estimate access charges including only investments that are considered prudent. However, it is important to take into account that the interstate network operator in Australia is a state-owned company whose main aim is to consolidate and expand the rail system. Therefore, its incentives might be different if it was a private company. On the other hand, the rail network in the UK is a relatively mature one, for which its expansion is not a primary requirement. In the US, the decision whether to expand the network is left to the incumbents, which invest according to the incentives provided by the market.

4.5 Other issues

After twenty years of restructuring reforms, a common institutional framework has emerged to regulate network industries. Most countries have created regulatory agencies or have conferred power to the corresponding ministry to act as such. Their responsibilities are mainly concerned with (i) dispute resolution; (ii) pricing and quality of final services; and (iii), pricing and conditions for access (Boylaud and Nicoletti, 2001).

Regulator's jurisdictions follow the country's governmental organization. In federal countries, as the US and Australia, responsibilities are shared with state regulators and even local ones, depending on the industry. In the UK, the activities of the sectorial regulators (Ofcom, Ofgem and the Rail Regulator) are complemented with those of national-wide inter-industry agencies (the Office of Fair Trading and the Competition Commission).

A further aspect to highlight is the role of the essential facilities doctrine (EFD) in deciding which infrastructures incumbents should be mandated to share, especially in the telecommunications industry and the Australian National Access Regime. The problem of essential facilities can be seen as a conflict between the incumbent's property rights and the ultimate goal of public policies, ie, increasing society's welfare by promoting competition. Using the EFD as criterion, regulators maximize the likelihood of competition while interfering as least as possible with the incumbent's property rights.

Another aspect to underline is the use of auctions to allocate scarce capacity. Although it can be a useful mechanism in the short term, its use can create a conflict with long term goals, as occurred in the UK's natural gas industry. On the one hand, auctions allocate scarce resources to those who value them more and would use them more efficiently. On the other hand, its use creates extra revenues for infrastructure owners, thus making more profitable not to expand the infrastructure. Furthermore, if owners cannot keep excess revenues, they would not be either encouraged to expand the infrastructure unless they are exposed to (at least some of) the congestion costs. Overcoming this problem requires meticulous regulation that increases the probability of regulatory failures. The system devised by the gas regulator in the UK was to implement long term capacity auctions and to expose the owner of the transmission system to buy back costs.

5. CONCLUSIONS

a. Access regimes consist mainly on the regulation of four core elements: vertical structure, access pricing, access terms and conditions, and the mechanism to expand the network.

b. Although vertical separation may eliminate the incumbent's incentive to foreclose competition in related markets, this limitation may also increase production costs in presence of economies of scope. A careful analysis should precede its implementation.

c. Negotiation is the main alternative to regulation in determining access prices, terms and conditions. This option, however, has limits. Access arrangements include a large number of issues that need to be determined, and this complexity may induce incumbents to delay their completion. For this reason, negotiation is frequently complemented with arbitration. However, pre-announcing the outcome of arbitration (for example, by stating that previously established conditions would prevail in case of a dispute) may have the effect of leading to a de facto regulation.

d. The physical characteristics of electricity might explain this preference for tight regulation in the ESI. Indeed, since system unbalances are costly for society and standardization is valuable, the scope for tailor-made agreements is limited and might difficult supervision.

e. The issue of network development seems to be related to congestion management. The combination of market incentives and minimal coverage requirements seems to be the preferred policy.

f. The history of the UK's natural gas industry reform highlights the costs, in terms of time and regulatory efforts, of amending errors made during privatization. At the same time, it emphasizes the importance of restructuring the industry before its privatization.

g. The difficulties faced by US regulators to reform their ESI underline the need for creating effective mechanisms to implement vertical separation when needed.

h. The National Access Regime implemented in Australia seems to be flexible enough to allow policies to adapt to particular industry circumstances.

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