• Power Sector Reform in Latin America:
• Accomplishments, Failures and Challenges

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Power sector reforms have been widespread in Latin America and the Caribbean. While there have been significant accomplishments, several challenges remain. The paper looks at four issues: (1) difficulties in separating the various roles of the state and of providing effective regulation; (2) constraints in following the correct sequence of reforms and its consequences; (3) difficulties in achieving competition in markets; and (4) regulation of the non competitive segments of the sector and addressing the needs of the poor. The author concludes with several lessons and recommends that local needs and capabilities should be taken into account in developing a reform model.

Power sector reform has been widespread throughout Latin America and the Caribbean (LAC), since Chile's pioneering efforts in the 1980s to introduce comprehensive reforms aimed at opening the sector to private participation and competition.

Reform efforts must be viewed against the background of the failures of the old regime. Lack of incentives for efficiency and tariff levels that did not reflect actual costs led to poor performance, with a few exceptions, of state-owned enterprises (SOE) that accumulated huge financial deficits. Inadequate incentives were related to a lack of role separation in government that facilitated the political abuse of utilities. Rent-seeking groups were allowed to capture the sector and pervert objectives. The consequences included generalized and poorly targeted subsidies, inefficient and insufficient expansion of distribution, and a sector acting as an employment agency vulnerable to corruption.

Similar reform introduced in OECD countries has attempted to deregulate or restructure the electricity industry in order to facilitate competition, as a means towards greater efficiency. While efficiency was also a major issue in LAC, reforms have been motivated to relieve the government of the burden imposed by SOE and to avoid deterioration of services.

According to the reform, attracting private sector investors would reduce the financial burden on the State; enlisting market forces to attain efficiency in the competitive segments of the market would minimize the regulatory burden. A new

incentive framework and new regulatory institutions would be established to foster competition, attain efficiency in monopoly segments and protect the consumer. Social considerations would be addressed by using distortion-free, well-targeted instruments.

While reform has had major achievements and the new regime is an improvement in practice, it has proven difficult to put such reforms into effect. Important issues threaten its direction and sustainability. While most stakeholders are surprised by difficulties in implementation, the success of reform cannot be judged by the expectations of the reformers.

After a summary of some accomplishments and challenges of reform, this paper looks at four issues that affected reform performance and the status of current efforts to address them. First, difficulties in achieving a separation of roles of the State in an environment where it plays the role of entrepreneur and difficulties of providing adequate regulation in an institutional and resource-constrained environment. Second, the difficulties in following the correct sequence of reforms and the resulting additional costs to such. Third, difficulties of achieving competition while assuring long-term resource adequacy. And fourth, the regulation of non-competitive segments and the elusive goal of achieving cost recovery, while addressing the needs of the poor.

Accomplishments and Challenges

The reform process has occurred in waves and has not reached all countries in the LAC region. The example of Chile was followed by Argentina in the early 1990s and later by Bolivia and Peru. By the mid-1990s it had spread to Brazil and Colombia, and then to several Central American countries – a trend that may lead to the physical and regulatory integration of their electricity sectors. While enthusiasm for reform and private participation has weakened during the last five years, the only major players missing from this process have been Mexico and Venezuela, where transfers of electricity assets to the private sector have been small and reforms are scanty.

Box 1 summarizes the major reform features of a selected sample of countries and facilitates understanding of the following paragraphs that summarize accomplishments and challenges for the LAC region.

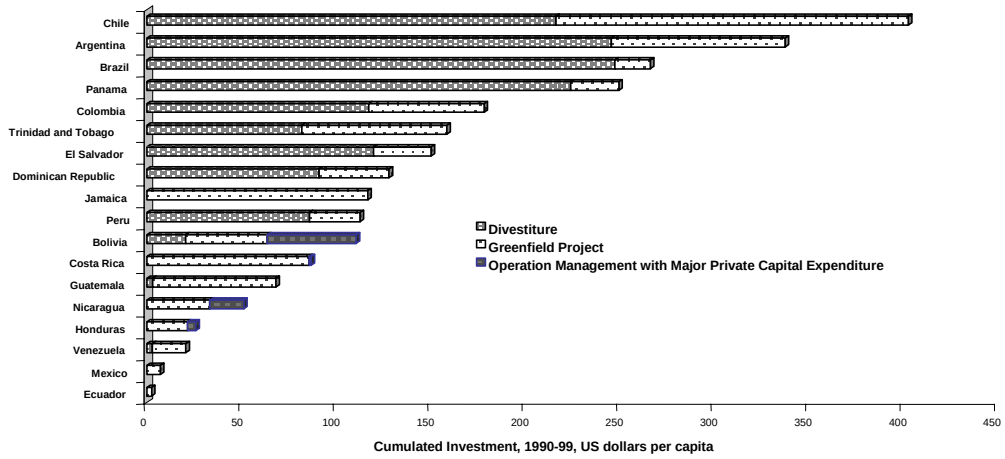
LAC Power Sector Reform in a Nutshell

Chile (The Pioneer): Chile has a 44 TWh electricity market with a large mining sector demand. Chile was the first country in the world to reform its power sector. It followed the textbook approach based on the following steps: (1) Set up a regulatory framework, (2) Corporatized existing SOE, (3) Set up a cost-based market, and (4) Unbundled transmission, distribution and generation. Only then did it privatize. Electricity is supplied by generators to large consumers including distribution companies based on contracts. A marginal cost based spot price is used by generators to trade between themselves to fulfill contracts. Distribution company tariffs are based on the costs of a model company. Chile has been successful in attracting private capital in the sector. Wholesale electricity prices have dropped significantly since the introduction of reforms, but retail prices have not declined as rapidly in spite of significant efficiency gains in distribution. The sector has performed well except for power outages due to drought during 1998-99. More recently, Argentina reduced gas supplies to Chile in March 2004 and this has led to an increase in generation costs for the gas-fired generators in Chile. There are some additional potential problems in the Chilean power sector. Competition in the generation market is limited because of a high degree of concentration. The Chilean system has managed to deliver reliable service and increased coverage at low cost without putting undue burden on state finances.
Argentina: Argentina has a 85 TWh electricity market that was restructured starting in 1992. It followed the Chilean model in that it uses a cost based electricity market. However, it ensured a more competitive wholesale market than Chile through both vertical and horizontal unbundling. This led to substantial wholesale price reductions. There have also been significant efficiency gains through improvements in plant availability, labor productivity, and reductions in losses. The benefits of electricity reforms are in jeopardy due to a macroeconomic crisis that triggered a drop in the value of the peso. Electricity tariffs have been frozen in peso terms, resulting in large financial losses for companies that have debt in dollars. Since the beginning of 2004, the economy has been recovering resulting in an increase in demand for electricity and this in turn, has caused supply shortages.
Colombia: With annual electricity sales of 45 TWh, the Colombian market is roughly the same size as Chile. It is a predominantly hydroelectric system (70%). Colombia decided to break even further from the Chilean model by establishing a bid based wholesale market similar to the one in England and Wales. However, privatization was only partially done. There have been also been problems with the capacity charge scheme which was introduced to assure resource adequacy. While there have been significant reductions in distribution losses in some areas, the results have been uneven. There are separated bodies for regulation and its oversight. Regulator's performance has been controversial in handling market power and distribution tariffs reviews. Critics complain that low salaries and lack of transparency in the selection process prevent hiring the best-qualified candidates for the job.
Brazil: Brazil is the largest electricity market in the region with annual sales of 360 TWh. A latecomer to reforms, it struggled to adopt a market suitable to a predominantly hydro system. It privatized distribution without having the regulatory framework and market fully in place. Then delays in putting the market in place allowed SOE and local interests to effectively block privatization of generation. These flaws in the transition process led to a power shortage in 2001 that while well managed cost the government coalition the next election. The new government pragmatically ignored its populist electoral promises and is in the process of implementing a new model, which allows private sector participation in new generation and a free environment for large customers.
El Salvador: 4 TWh market. Most liberal design in the region, (Nordpool style wholesale market, full retail competition, transmission is not a monopoly) seems unfit for such a small and concentrated market. Distribution was privatized but hydro and geothermal as well as existing transmission was kept in government hands. Market power and volatility in the spot market have led to the introduction of modifications, still under discussion, but stranded cost may be difficult to compensate. Distribution has experienced efficiency gains and coverage has improved. Problems notwithstanding, on balance reforms cannot be deemed a failure.
Mexico: 197 Twh. Constitutional requirements have prevented a full reform but opposition controlled Congress has prevented even milder adjustments. SOE inefficiency, particularly the utility serving Mexico City, requires heavy government transfers. In the past the government has managed to attract private sector investment in generation through PPA procured by CFE, the other SOE, but some investors are weary of increasing their positions unless finances are improved.

Private sector investment: Generation capacity has expanded vigorously in the reformed sectors with the major exception of Brazil, where until now greenfield activity has been slow. Altogether, LAC developed the largest share of private

electricity projects in developing countries: out of a total investment of $193 billion in the developing world, over $77 billion took place in LAC [World Bank 2005] (see Figure 1). But new investors have been few, particularly after demand stagnated because of meager growth during the 2000-05 and the IPP blues following Enron and California. SOEs are also major players, carrying the burden of social programs and priorities and serving as vehicles for transferring rents to interest groups. Some SOEs, rather than being scaled down, have extended their participation and the separation of roles of the State has been difficult to achieve.

Figure 1
Private Investment in Electricity, 1990-99
(US dollars per capita)



Source: PPI Project Database, World Bank

<u>Efficiency gains</u>: Most privatized distribution companies increased their efficiency by cutting losses and reducing staff while providing better quality of service. The Chileans were pioneers in improving the efficiency of their privatized companies and profited from their experience as they participated in the privatization of distribution companies in Argentina, Brazil, Peru and Colombia. An example may be found in CODENSA, the privatized Bogotá distribution company, that halved losses from 24 percent to 12.5 percent, increased customers per employee from 800 to 1,900, and reduced the frequency of service interruptions and mean interruption time by more than 30 percent in two and a half years [Ayala and Millán 2003]. Losses in Argentinean and Chilean utilities are between five and ten percent [Pollitt 2004a;

2004b]. However, there are countries and regions, in deprived areas and urban slums, where private investors are struggling to control losses and collect payments.

Reduction in Wholesale Prices: Wholesale prices have also been reduced in countries where competition has been introduced, up to 30% in Argentina [Pollitt 2004a] and 20% in Colombia [Ayala and Millan 2003[2]]. But competition is not always vibrant, and is hampered by concentration. Despite some successes, wholesale markets have failed to offer required price signals to attract new investment. Security of supply seems to have improved as a result of reforms but the blackouts in Chile in 1998-99, and in Brazil in 2001 have raised concerns about the adequacy of incentives.

Uneven Distribution of Gains: While gains are real, their distribution is contested. Governments have in general benefited from privatisation and fiscal burden relief. Society may also have benefited from the release of public funds. But the main beneficiaries of lower prices have been large customers. But prices are still high. Cross subsidies from non-residential to residential customers have been partially or totally dismantled. Distribution price review has been demanding. In a few countries service coverage has increased but an important share of the population still lacks access.

Widespread Regulation: But the regulatory system has not always evolved towards improved transparency, simplicity or certainty. Regulators, governments and legislators frequently clash over the jurisdiction, interpretation and implementation of reforms.

Despite some good outcomes, public frustration with the economic crisis of the last six years with unfavorable developments in the sector, both at home and abroad, have taken a toll. There are signs of reform fatigue. While many problems plagued the performance of the reformed electricity markets during the initial years[3], they were dwarfed by recent developments in Argentina, Brazil and the Dominican Republic. While the Brazilian crisis led to a model change, it was not a backlash on reform. Privatization of existing generation has been stopped, property rights of existing investors have been respected and private investors are encouraged to participate in new generation and transmission projects [Lock 2005] procured in competitive ways. For Argentina, the handling of the macro-economic crisis of 2001 seriously jeopardized sector reform [Haselip 2005]. In the Dominican Republic, a combination of external and internal factors led to the exit of the main private distributor[4]. Other

small countries in Central America struggle to adjust an initial reform that was maybe too optimistic. Latecomers like Ecuador remain puzzled.

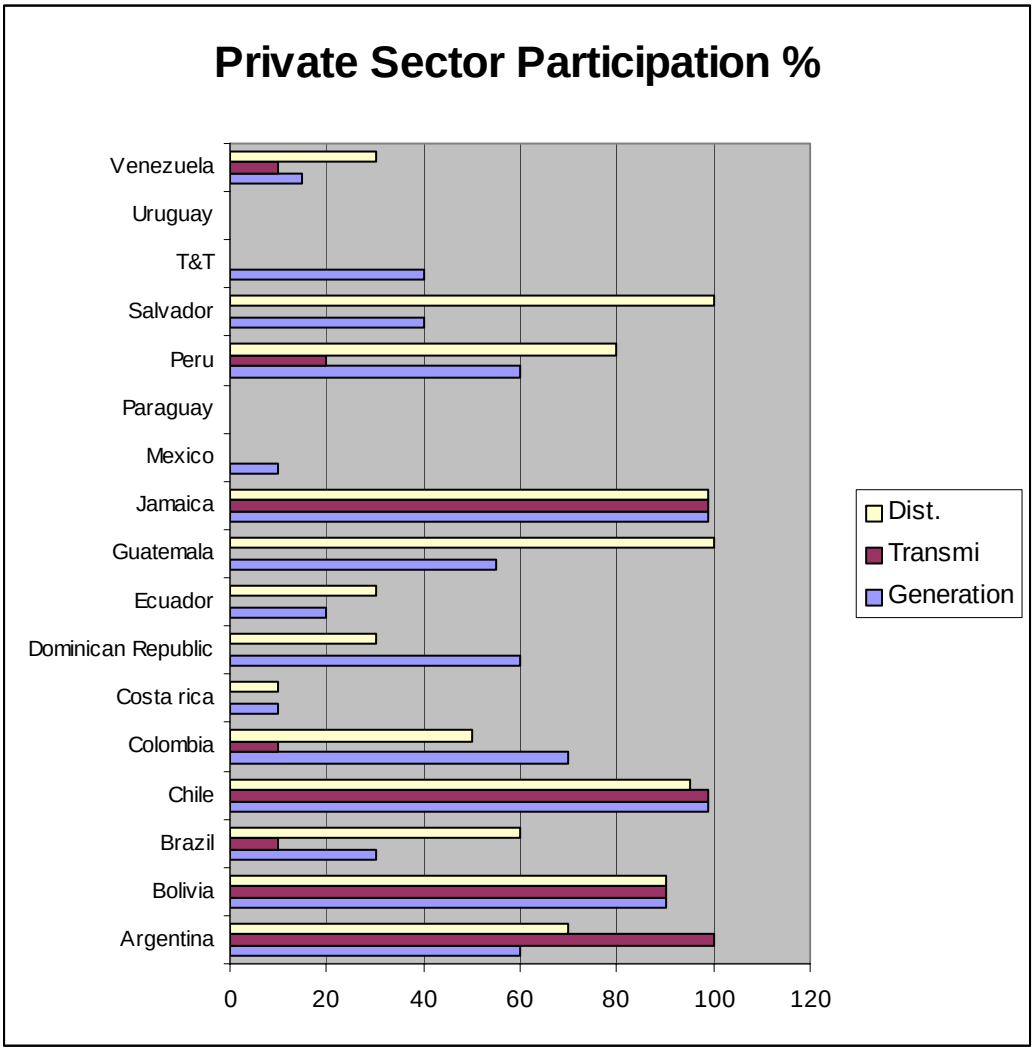
While such problems may look overwhelming, countries in the LAC region are showing innovation in coping with them. But progress in reform depends on how well we understand the nature of institutional and technical constraints that conspire against the transfer to the electricity sector of models, developed in other environments.

The Role of the State

The inadequate separation of the multiplicity of roles played by the government in the electricity sector – as policymaker, regulator, entrepreneur and client – was a major flaw of the old regime. Multiple roles give rise to conflicts of interest and to the erosion of regulatory power. Efficient governance requires that various roles be separated and that the rights and responsibilities of individual agencies be defined, for handling conflicts between different interests of the government; and between such interests and private citizens or organizations. Reformers addressed these problems by limiting the direct role of government to policy-making, leaving regulation to independent bodies and entrepreneurship to the private sector. But evidence suggests that, in LAC, fuzzy borders remain between policy-making and regulation. For example, in Colombia, take the struggle between the regulator and the government ministry about the liberalization of the natural gas market [Ayala and Millan 2003].

There have also been conflicts of interest, where the State remains an entrepreneur, in competition with the private sector, for example (1) by discriminating in favor of SOE, as in Colombia and Brazil, or (2) by demanding that generation companies meet social obligations not related to its main purpose, such as in El Salvador, Guatemala [Fundación and Rufin 2003] and Dominican Republic [Rufin 2004], or (3) by forcing private investors to participate in joint ventures with the State as is currently demanded in Argentina. In spite of impressive investment figures (see Figure 2), privatization of the electricity sector in LAC has been more limited than commonly suspected. The State still controls sizeable amounts of the generation, transmission and distribution segments. Hence, the cohabitation of both regimes leads to inevitable conflicts of interest.

Figure 2



Source: *Author's update of Espinasa (2001).*

At present most countries in LAC have established formal regulatory organizations. Only Guyana has opted for a system of regulation by contract. Jamaica, Costa Rica, Panamá, and Bolivia have multi-sectoral institutions. In Colombia and México the same office attends to electricity and natural gas. Most countries, with the exception of Colombia and Chile, keep the surveillance and control functions together in the same agency with the regulator. Recall that Chile's regulator has also been assigned a policy role.

The performance, integrity, independence and credibility of regulatory institutions have been below expectations in most cases. The tasks of the regulator are difficult, but they are compounded at the initial stages when it must simultaneously

start the office, design the market and regulations and test them in an environment loaded with special interests and apprehensions. It also takes a while to build a regulatory culture in countries with legal systems following the French tradition, weak or lacking in complementary institutions and with scarce human resources.

Autonomy, technical integrity and capture: In budget matters, even the countries that finance regulators through special user's contributions subject the appropriations to quotas established by the ministries in times of fiscal constraints. Granting a competitive remuneration to regulators has been a recurrent problem due to jealousies from bureaucrats receiving a low salary. This reluctance to pay market salaries to regulators together with a strict system of restrictions, intended to avoid conflict of interest, reduces the already limited pool of suitable candidates. Such measures avoid the capture of the regulator by the regulated by limiting the opportunities for the revolving door, but they result in less suitable candidates, thus facilitating technical capture.

Lack of credible commitment: The initial assumption that governments would show a credible commitment not to use their power opportunistically to favor their own companies or to expropriate investors, by delegating regulatory matters to independent bodies, was too naive. In most conflicts between governments and regulators, the former have intervened – overriding the regulators and sometimes firing them. Very few people doubt that the real power to fix tariffs still remains with the government, despite the original intentions of the legislator. Several causes lie behind such behavior: the legal tradition, a turbulent transition period that includes a learning process, the long time taken for regulators to consolidate prestige, and the tremendous importance of tariffs in the political realm along with the perception of the public, which will always hold the government accountable for disruptions in supply.

The need for flexibility: Since regulation is an incomplete contract between the regulators and the electricity firms, there is a trade-off between the credibility of the regulatory commitments and the flexibility required to accommodate unforeseen circumstances and changes of interests among the various actors. For instance, when credibility is low due to the weak rule of law or poorly protected property rights, the

advantages of flexible regulation must be traded in favor of rigid rules. This explains the extreme rigidity of some regulatory systems that followed the Chilean example.

Chile exemplifies the trade-off: the rigidity of its regulatory system was the key in assuring potential investors that the regulator would not expropriate their investment. But it had the undesirable effect of making the regulatory framework unresponsive to changes in the environment, as shown during the 1998-99 drought.

Transparency and accountability of the regulatory process: This is another axiom of academic regulation that has been difficult. While some countries have improved their consultation of regulation with the stakeholders and the public, the concept of a transparent process has been foreign to the culture of the LAC region. In many cases the regulatory style is very heavy (dominated by complex technical procedures), where it is easy to manipulate parameters, making it difficult to monitor regulatory performance. The appeal process is not efficient, leading to lawsuits. Due to pending litigation, regulators are reluctant to revise inadequate regulations.

Lack of complementary institutions: The chosen regulatory model is demanding in terms of complementary institutions, such as a suitable judicial system, competition authorities, suitable policy bodies, and the rule of law. The lack of strong and complementary institutions undermines the performance of the reformed industry and may slow the pace of reform. In LAC countries institutions taken for granted in other countries – like the rule of law, clear and accepted property rights, an independent and competent judiciary, mechanisms for peaceful dispute-resolution, contract enforceability, quality of public bureaucracies and competition agencies – are either missing or incipient.

At best, the absence of a relevant competition policy and of competent anti-trust bodies forces the regulator to oversee competition. At worst, this task is left to unqualified bodies, vulnerable to capture. So workable market architecture options are limited. Institutional constraints lead to legal uncertainty, which may not only discourage investors, but provide them with wrong incentives. So investors may seek comfort in the capture of judiciary and regulatory institutions.

The Sequence of Reform

The sequence of reform has been critical in the performance of the post-reform sector in LAC. The sequence advised in textbooks would start with the establishment

of a sound regulatory framework; continue to restructure government assets and organize the markets; after which it would privatize, starting with the distribution segment. This sequence has advantages: allowing the sector to develop the desired structure; facilitating privatization by giving clear signals to investors; assuring the existence of financially sound buyers in the wholesale markets; and avoiding the presence of SOE in competition with private companies.

But the window of opportunity for reform is short, forcing governments to depart from this textbook sequence. With the exception of Chile that followed the prescription, most reforms have been the result of negotiations among stakeholders that required compensations and compromises[5].

The Textbook Sequence to Reform: Attracting private investors in a market-driven sector was a major concern of Chile's reform. This was not an easy task, given that this model was untested in developed economies endowed with market institutions and a legal tradition. Chilean reformers understood that accomplishing this task would demand tremendous effort and patience. Fortunately for reform, although costly in other terms, the autocratic nature of the Chilean government afforded them the means and time to develop their plan in stages. They began, even before they talked openly about privatization, with a well-structured process of corporatization of SOEs accompanied by the adoption of a tariff policy based on marginal cost. These elements were incorporated in 1982 in a detailed law that left little discretion to the regulator. Given the Chilean political regime, this law became difficult to change[6]. Once corporatization was completed and before restructuring took place, the government assured the provision of electricity during the transition by contracting with multilateral banks, mostly the IADB for loans to finance several important hydroelectric developments. Only then was distribution unbundled and privatization started. [7]

Catching windows of opportunity may require cutting corners: Chile's success in privatizing its electric system without jeopardizing the continuity of service led other LAC countries to follow its footsteps. But time was not on their side and they were forced to depart from the textbook sequence. In Argentina, SEGBA, the vertically integrated company serving the Great Buenos Aires, was privatized before the regulatory framework and the wholesale market were fully in place. To attract

investors, eight-year initial contracts were given for SEGBA's power generation and for generous distribution tariffs, valid for ten years. In spite of this departure, episodic government interventions and design flaws in transmission, reform was successful [8] until events unleashed by the 2002 economic crisis resulted in its practical irrelevance.

But, doing this may lead to high costs: In Brazil, the reform process started with the privatization of distribution companies. But it took extremely long to complete the regulatory framework and put in place the wholesale energy market. This delay, combined with the stalled privatization of generation, led by opposition from the SOE bureaucracies in alliance with local politicians, has been one of the main causes of the lack of appetite for greenfield investment in generation that was partially responsible for shortages, leading to the model being dismissed.

Compromises come at a price: In Colombia most distribution companies were not privatized and remained subject to the incentives and political patronage of the old regime. So these companies continued to show high inefficiencies, such as billing only 70% because of physical losses, theft, lack of measurement and poor billing [Ayala and Millán 2003]. Many companies served low income and rural markets with limited payment capacity and high distribution costs that made them dependent on unreliable subsidies from the central government. Private capital was brought to Colombia's largest utility EEEB, serving Bogotá, after the company was nearly bankrupt. EEEB was unbundled and a controlling share was offered to private investors willing to provide fresh cash to pay debts and finance expansion [Bakovic and Millan 1998][9]. This success has not been replicated in the Caribbean Coast where private investors struggle with a difficult market [Manzetti and Rufin 2005].

Emergency solutions are costly, but sometimes are the only game in town: Lack of resources for investment in generation forced most Central American and Caribbean countries to engage in costly build-operate-and-transfer (BOT) operations, before reform. This has left the burden of the power purchase agreements (PPA), to financially weak SOEs. The lack of a clear regulatory framework and the urgency of these operations allowed Independent Power Producers (IPP) to exact high rents and to impose inflexible conditions like "Take or Pay" contracts, exacerbating the financial problems of the SOE. Many PPAs contracted prior to reform have been

accused of corruption. In Guatemala, the high cost of the PPA signed prior to reform has become a tremendous financial burden, forcing the government to use its remaining assets to buffer the impact on tariffs. Constitutional and political constraints to reform in Mexico have led the PPA option as the only available way of involving the private sector.

Achieving Competition while Keeping the Lights On

Competition was sold as a key element of the power sector reform package in LAC, necessary to assure economic efficiency while keeping a light regulatory burden. But, establishing competitive markets for electricity has become more difficult than anticipated. LAC ffaced difficulties of its own: small size, country risk and the strategic behavior of big investors conspired against the minimum number of players needed for competition. In several countries, a growing demand and energy-constrained system result in periodically tight markets, exacerbating price volatility and market power. Market failures, particularly lack of local capital markets, exacerbated resource adequacy problems. Lack of human resources, weakness or lack of regulatory institutions and an ambiguous judiciary make it difficult to oversee competition and enforce regulatory measures. In an excellent paper commissioned by IADB, Frank Wolak summarized the problems facing wholesale electricity markets in the LAC region and proposed some solutions [Wolak 2004a].

In spite of these difficulties, and those common to all electricity markets in the world [Wolak 2004a], LAC countries have responded with a variety of designs, which seek to reap the benefits of competition while avoiding associated problems. Wholesale electricity markets are fully operational today in Panama, Guatemala, Peru, Bolivia Chile, and Colombia, while Brazil and El Salvador are going through an adjustment process.

Volatility associated with competition is a nuisance. Early reformers in LAC addressed such problems in their market designs and adjusted them when experience revealed flaws. (See Box 2 for a tour of selected markets). First, in most markets – with the exception of Colombia, which has an England & Wales (pre-reform) type of pool, and El Salvador, whose pool resembles the Nordic model – generators were not allowed to make bids. Prices were determined by a mathematical model with parameters provided by the generator – including conversion factors and fuel prices

when relevant – and other parameters like the cost of rationing, determined by the regulator. Because the lower step of the rationing price constituted a cap on the spot market price, diminishing incentives for new investment, the Chilean and Argentinean models adopted a *capacity charge* to be collected from the load and received by generators that got dispatched. Variations of this capacity charge were later adopted in Colombia and the Dominican Republic.

In contrast, Guatemala and Panamá adopted variations of the capacity markets used in the Eastern USA. To complement the spot markets, generators and the load were allowed to engage in forward contracts of a financial type, physical in the case of El Salvador. However, while some countries required contracting a certain amount of demand in forward contracts of specific duration, Guatemala and Panamá [CEPAL 2002] made it mandatory to hold 100% of the next year capacity contracted, and Brazil 85% of the energy; others led these decisions to the discretion of LSE.

BOX 2
A Guided Tour to Some Electricity Markets in LAC

Chile: The pioneer and its followers: The Chilean wholesale market consists of regulated contracts between generators and distributors, priced by a simulation of the future operation, and free contracts with large customers (larger than 2Mw). A centralized dispatch model is used to price exchanges among generators, which are the only participants in the spot market. There is no market-clearing price that results from the interaction of supply and demand, but rather prices are set by an administrative system. By its own design, the Chilean system is not aimed at increasing competition, but at promoting private investment in generation and distribution. Chile's success in privatizing its electric system without jeopardizing the continuity of service led Peru, Bolivia and other countries in the nineties to follow its example.

Argentina: Improving the model: Learning from Chile, in the early nineties Argentina improved the scope for competition by unbundling the sector's structure both vertically and horizontally and establishing limits to cross-ownership. The availability of natural gas and new gas-turbine technologies permitted to increase the potential number of participants. The wholesale electricity market model in Argentina differs somewhat from the Chilean model in makeup and details. Dispatching continues to be based on costs, but the basis is the generators' semiannual statements of costs, including hydraulic power. Spot prices are used for trade between generators but also distributors (at a stabilized price) and large users can buy on the wholesale market. CAMMESA, the System Operator, is not a club restricted exclusively to generators, but includes all market agents and the government, making it less vulnerable to capture. Other innovations include the introduction of payments for ancillary services and procedures to deal with congestion. However, not all the changes are improvements, capacity charges have given the wrong signals.

Colombia: A second generation of power pools: Colombia, which also has a predominantly hydraulic system, decided to break even further with the Chilean model and adopted in the mid nineties a system of centralized auctions similar to the England and Wales pool. Although bilateral contracts are permitted, they are financial in nature, similar to contracts for differences, and use the pool price for settlement. The price formation process is similar to that of England and Wales, with identical bid patterns for hydraulic and thermal generators. The model didn't include zonal pricing or LMCP, when constraints were binding cost were allocated among producers and consumers. The Colombian model was novel for the region and was the first market to include traders as participants. Like the Chilean and Argentinean models before, it complemented its energy only market with a highly controversial capacity charge designed to reward generators that could be dispatched during critical hydrological conditions during occurrences of El Niño event.

El Salvador: Too much of a good thing: In 1997 El Salvador, driven by ideological consideration, approved the world's most market friendly electricity market. Retail competition was allowed to everybody immediately. While the existing grid was kept in government's hands distribution and transmission were not recognized as a monopoly activity, there were not limits to ownership horizontally or vertically. A bid-based spot market, similar to the Nordic model allowing bilateral (physical) contracts indexed to the sport market. Spot market prices are pass-through by distributors to retail

consumers.

Brazil: A stillborn market: The Brazilian power system is over 95% hydraulic; it has a large storage capacity and is made up of groups of physically interdependent reservoirs and plants located in the same river basin. Coordinated operation of the system is a must to obtain synergy gains. Because of these features Brazilians departed from the bid model adopted by Colombia and initially adopted a mandatory forward market to cover most of the load and a spot market for the balances with prices obtained by the system operator with the help of a complex mathematical model. Every hydro plant was assigned a fixed amount of *assured energy* that it could sell to distributors or large loads, the owner's only obligation was to keep the plant running. In addition to the SO a Market Operator, MAE, was in charge of settlements. MAE governance was controlled by stakeholders, which together with SOE behavior, paralyzed decisions and failed to settle any transaction years after initiated. While many factors lay under the supply crisis of 2001, and the model was not fully operational at the time, it was clear that its flaws compromised security of supply [von der Fehr and Wolak 2003]. Seeking to attract new investment while keeping the prices low, the new Lula government decided to keep two separated environments, a free environment for large loads, which could freely negotiate contracts and buy in the spot market, and a regulated environment in which distributors procure energy through auctions of forward contracts for both existing and new energy. Existing energy is procured in yearly auctions with distributors signing individual contracts with existing generators. New Energy will be centrally procured for delivery 3 and 5 years ahead in yearly auctions for 30 years PPA of *assured energy*, intended to remove all commercial risk to investors, and allocated among the load according to their demand projections. Several mechanisms permitted distributors to adjust positions [Lock 2005].

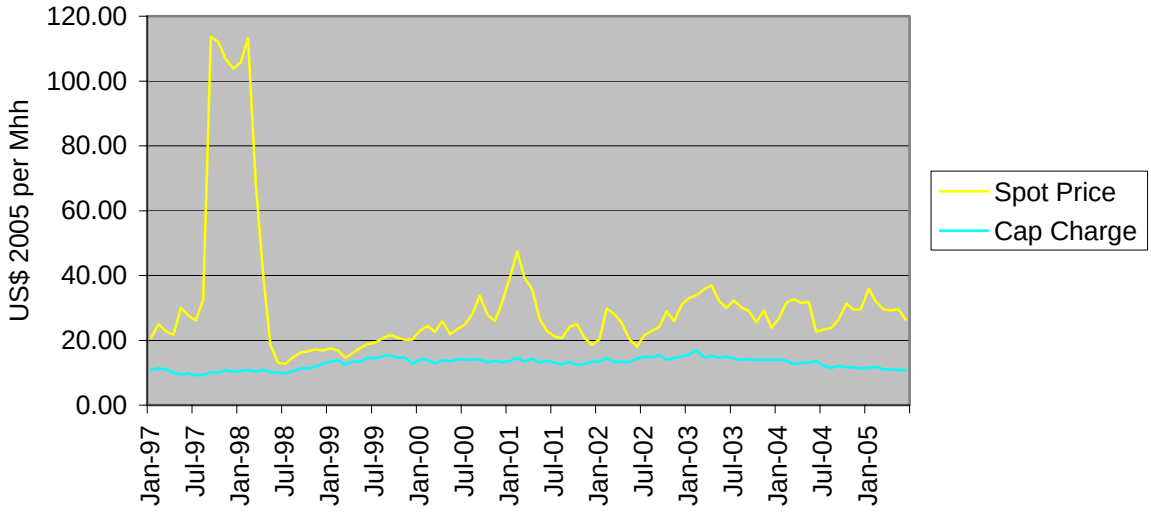
The following sections look in detail at the performance of these markets and at problems in their functioning.

Market performance

Market performance can be measured by the extent to which it allows for vibrant competition, while providing the required signals for new investment to keep the lights on. Competition in the spot market can keep prices down and benefits consumers. But too low prices are a poor incentive for new investors. In Argentina, a competitive generation market driven by abundant natural gas, macro-economic stability due to the convertibility program of 1991 and a sound investment climate attracted investors. Its flawed capacity charge may have led to too much investment [Estache and Pardinas 1998]. So Argentina managed to halve prices from US$50 per MWh in 1992 to US$25 per MWh in the late nineties. In El Salvador, the exercise of market power by generators, with an ill-conceived procedure for passing wholesale prices on to consumers with a lag of at least four months, led to high consumer prices and forced the government to hastily intervene. Regulatory interventions establishing a de facto cap on energy prices did not provide enough incentives for new investment, requiring government action to organize a mandatory long-term forward market. Price comparisons with the pre-reform situation may be misleading because they were kept low for political reasons.

In Colombia, recurrent droughts led to a pattern of prices (see Figure 3), indicating concentrated spikes, when the market is stressed during droughts, and long periods of low prices when conditions are more favorable to the satisfaction of consumers and great concern for investors. Overall, real time prices have increased as would have been the case in a vertically integrated monopoly entitled to recover generation investments approved in an expansion plan. Notice that those prices include a capacity charge that has been the cause of controversy in Colombia, [Ayala and Millan 2003], it fails to meet the basic objectives, a long-term signal for investment, it doesn't remunerate the energy delivered and involves income transfers among generators that continuously argue about it. Currently, the regulator discusses a new design after several failures to find a replacement. Market power opportunities grow in the Colombian system whenever the market is stressed, which may also occur when transmission constraints led to local market power[10].

Figure3
Spot Prices and Capacity Charge in The Colombian Power Pool



Source: *ISA 2005.*

Chile also experienced a large price decline – prices during 1997-2003 are about half the prices in the late eighties – but the drop became significant after the mid-nineties, when competition was more effective due to natural gas, imported from Argentina. The scope for competition in the Chilean pool is small and its main function is to price exchanges among generators. Experience shows that even this

limited spot market can be captured if it is concentrated and its governance is not transparent. Blackouts during late 1998 and early 1999 – traced by analysts to incompatible incentives, with the failure to transfer efficiency gains to consumers – ignited a political crisis that led to the first major overhaul in 18 years of electricity legislation in Chile. Pollitt (2004b) notices that the convoluted procedure used to forecast node prices to define pass-through to regulated consumers has inhibited the development of long-term contract markets. The sole reliance on capacity charges has also prevented the development of ancillary services.

Although performance in Peru and Bolivia, where markets are clones of Chile, and in the Dominican Republic, has avoided major shocks, it is limited by the same constraints as in Chile. Panamá and Guatemala also have cost-based markets but, instead of capacity charges, they use obligations to contract capacity. It is too early to judge, if they can pass the investment test.

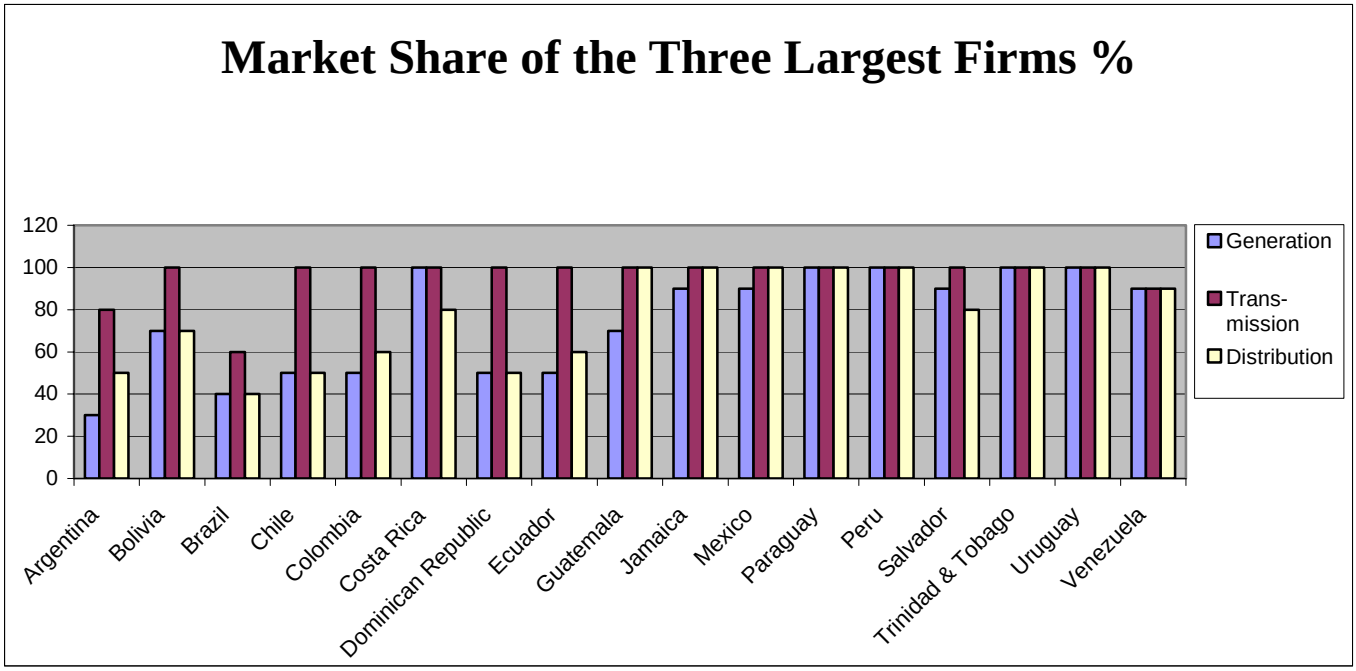
Flaws in structure and market design, and efforts to address them:

The cause for most difficulties is a market structure, which is incompatible with the desired competition and a reluctance to let consumers respond to prices. These failures are compounded by flaws in market design and by the inadequacy of institutions to operate and oversee the market.

According to the reform paradigm, enabling competition requires unbundling of the sector, both vertically (into competitive and natural monopoly segments) and horizontally to ensure enough participants. There is no prescribed market design, since no one can fully prevent market power. But the difficulty to cope with market power may be exacerbated by a poor market structure. A defective structure lies behind the failures of the El Salvador market (only two generators at the start of the market) and the limited competition of the Chilean market, because of few participants[11]. The most obvious examples are those where insufficient competitors have been established before market-based exchange is introduced.

Even by the standards of most markets, electricity generation is heavily concentrated in most LAC countries. The three largest producers in Argentina or Brazil control 30 percent and 40 percent of the *national* market. In any other countries, this measure of concentration stands at 50 percent or more (Figure 4).

Figure 4



Source: *Espinasa 2001.*

By early 2005, with the exception of Jamaica, Guyana and T&T, small countries opted to keep their markets vertically integrated with a good reason, while most other reformed countries have adopted some sort of unbundling. While Argentina set the right example by unbundling its sector and establishing strict rules that prevented cross-ownership, other countries have not been as successful in keeping an adequate separation. In addition to the flawed structure of the Chilean market, there are no limits to vertical and horizontal re-integration in Guatemala and El Salvador. AES, an investor controlling close to 80% of distribution in El Salvador, plans to build a new generation plant, as it did earlier in the Dominican Republic. In Colombia, where various models of integration of public and private ownership co-exist, utilities are only required to keep separate accounting, and limitations to concentration have been legally challenged. Fearful of not having enough new investment in generation to prevent the imminent crisis, Brazil relaxed the rules, allowing significant self-dealing. Re-integration makes it difficult to control anti-competitive behavior and imposes an additional challenge on regulators. [12]

Retail competition has been limited to very large loads and may be significant in some countries – 25% in Colombia, 20% in Guatemala, and 40% in Chile. However, the benefits of allowing retail competition for smaller loads are unclear. In

Colombia, it has often led to cream-skimming, because of the heterogeneity of consumers and the existing subsidy system to low-income population.

LAC has failed to use price as a tool to engage the demand-side. Analysts have been unanimous in blaming the lack of demand response as one of major reasons behind the collapse of California's electricity market in 2001 [Borenstein 2001]. Let us contrast the California experience with Brazil just a year later. There are many common features of both crises; politicians behave similarly north and south of the border. But the Brazilian government departed from California in a critical aspect: its willingness to use the market to allocate the shortage to avoid rolling black-outs. Brazil imposed a rationing quota and large users were free to trade their share or sell in the spot market. Large residential users are given a surcharge, but they get bonuses if they save more than their quota. Any consumer failing to meet the quota will be disconnected for a number of days[13]. But the new Brazilian electricity model failed to incorporate these useful lessons in its design.

This reluctance of the Brazilian government indicates a deeply-felt aversion by governments to let consumers face the true prices of electricity. In some LAC countries, governments have subsidized prices to avoid passing the volatility of oil prices on to consumers, and/or the stranded costs of the reform. [14] In most cases, even the muffled price signal sent by the markets failed to provide a good signal to consumers.[15]

Dampening of natural price movements may increase shortage problems that could be the main concern. For instance, the incentive to maintain reservoir levels high depends on the expectation of future prices and, if prices are capped, the incentive is correspondingly reduced[16]. Dampening seasonal price movements may send perverse signals to consumers as in the 1999 Chilean crisis, when consumer regulated prices and reservoir levels were simultaneously falling [Fischer and Galetovic 2000].

Crucial for the operation of the market is the existence of market institutions: properly designed, professionally staffed and governed to steer debate away from the particular interests of the stakeholders. Most markets are operated by a single institution, the SO, which performs the technical dispatch together with the commercial functions. Exceptions are Brazil, which has both a SO and a Market Operator, and Colombia, which is studying the separation of both functions. The experiences of Chile and Brazil shows that it is better to have independent

governance, giving proper role and voice to all stakeholders in operation committees. While financial and human resources have not been a constraint in large countries, small countries often lack the technical expertise.[17]

The market also lacked adequate institutions for surveillance of competition. Panama and some states in USA have set up market surveillance groups of independent experts to "institutionalize change"[Arizu et. al. 2001]. Their experience has two lessons: (1) experts must be perceived as independent and objective. ; and (2) the experts must have a broad mandate, and be able to recommend changes in structure as well as in rules. An excellent account of the issues involved in establishing such institutions is presented in a recent IDB publication [Wolak 2004b]. Cost-based markets are often considered less prone to the exercise of market power. However, the performance of the Chilean markets and other evidence, as reported by the Committee for the Oversight of Competition in Panama, are reminders that cost-based markets are not free from manipulation. While these may lead to high average prices, cost-based markets are less prone to extreme prices. The capacity charges used to complement the price signal to attract needed investment is a crude instrument that has been criticized. Several LAC countries are studying modifications to their market designs to provide better incentives to new investors while lowering volatility and incentives for exercising of market power. Long-term contracts can accomplish this, but the trouble is how to give incentives to the actors to contract. A solution initially suggested by von der Fehr and Wolak (2003) in their report to Brazil's government, is to establish mandatory auctions for covering an important share of the load with forward contracts and/or options. The decision to split the market between old and new energy, and to hold centralized procurement of PPA for the new energy, adopted by Lula's government, is an extreme modality that, while taking away commercial risk from new generators, introduces new sources of uncertainties, and translates to the consumer the costs of overcapacity required to increased resource adequacy.

The Regulation of Non-competitive Segments, Cost Recovery and the Needs of the Poor

Electricity transmission and local electricity distribution are usually considered natural monopolies that must be regulated. With the exception of some ancillary services, there is little scope for actual competition in the provision of electricity transportation services (though benchmarking may be possible).

Regulations must account for the incentives both for short-run operation of existing networks as well as incentives for extending the networks while meeting quality constraints.

Countries have adopted different price regulations in the three broad segments of the electricity industry from “rate of return cost of service” to “price cap” and the Efficiency Standard Scheme (See Table 1)[18]. This method implemented with the Chilean reforms for the distribution (wires) segment and adopted later by other LAC countries is based on the cost of a model distribution system. It is a combination of yardstick regulation, price caps and replacement cost accounting. Critics point to the enormous information burden that the method imposes on the regulator [Joskow 2000a]. The lack of success of the Chilean system, to transfer to final consumers the gains in efficiency obtained at the generation level, has prompted a review of the procedures to handle disputes about cost estimations. Colombia does not use the model distribution system, but allows to revalue assets with some ad-hoc criteria to control for efficiency in investment and operation cost. Because such regulation is new, with the exception of Chile, only a few distribution cost reviews have been conducted. These processes have been bitter in Colombia.

Reviews of distribution tariff have shown that initial expectations that the price-cap regulation would mitigate asymmetry against the regulator and reduce the regulatory burden compared to cost of service were too optimistic. On many occasions, investors complained about demanding quality standards, without properly acknowledging its cost in the tariff base.

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Table 1

Price Setting Mechanisms			
	Generation	**Transmission**	**Distribution**
Argentina	Market	Price Cap	Price Cap
Bolivia	Marginal Cost	Price Cap	Efficiency Standard
Brazil	Market	Cost of Service	Price Cap
Chile	Marginal Cost	Cost of Service	Efficiency Standard
Colombia	Market	Price Cap	Price Cap
Costa Rica	Cost of Service	Cost of Service	Cost of Service
Dominican Republic	Market	Cost of Service	Cost of Service
Ecuador	Market	Cost of Service	Efficiency Standard
Guatemala	Market	Cost of Service	Efficiency Standard
Jamaica	Cost of Service	Cost of Service	Cost of Service
Mexico	Cost of Service	Cost of Service	Cost of Service
Paraguay	Cost of Service	Cost of Service	Cost of Service
Peru	Marginal Cost	Efficiency Standard	Efficiency Standard
Salvador	Market	Price Cap	Efficiency Standard
Trinidad & Tobago	Cost of Service	Cost of Service	Cost of Service
Uruguay	Cost of Service	Cost of Service	Cost of Service
Venezuela	Cost of Service	Cost of Service	Cost of Service

Source: *Espinasa 2001.*

Transmission was poorly regulated in Argentina [Pollitt 2004a] with no incentives for construction of new lines. In most other countries, expansion is centrally planned and the cost is allocated to consumers, following different cost of service varieties. While there may be some issue-related incentives for location of generation plants, the objective of the tariff system should be to contribute to finance the expansion of the transmission grid. Because transmission costs are usually a small fraction of the customer price, a great effort of the regulatory agency to "fine tune" the allowed rate of return on transmission is unlikely to significantly reduce the customer's price.

Regulators face challenges where public and private ownership co-exist in distribution, since companies respond to a different set of incentives. At present none of the countries with sectors dominated by SOE had tariffs allowing full cost recovery. This has been also the case for some private companies in countries where governments have used their power to keep tariffs low for political reasons.

Private participation has resulted in significant improvement in efficiency signaled by a quick reduction in losses and increased collections. But in some countries, like the Dominican Republic, Nicaragua and the North Coast of Colombia,

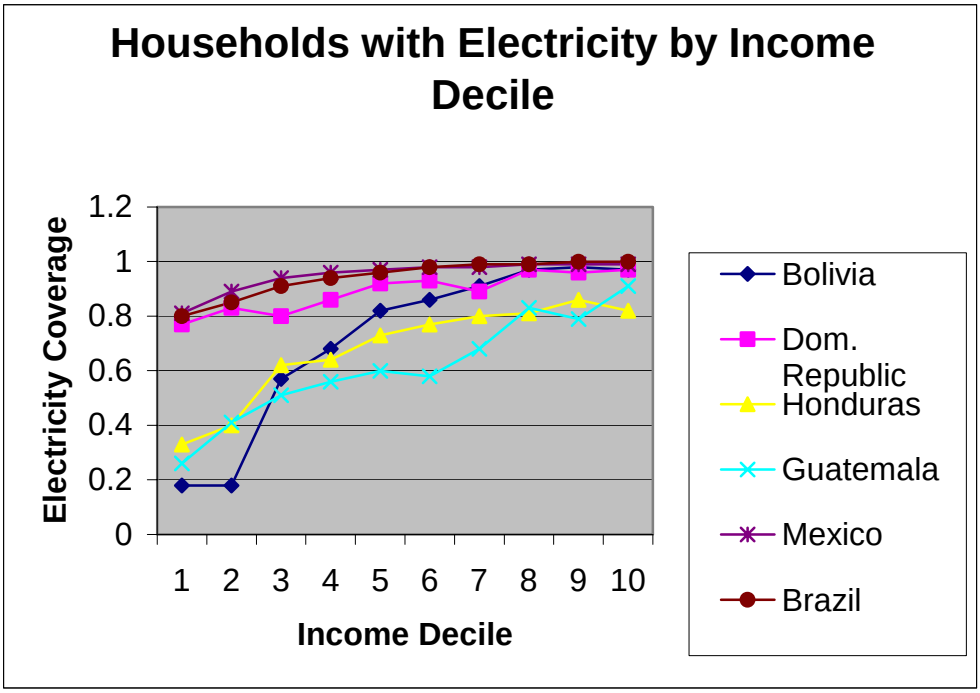
private entrepreneurs have had little success. There are several reasons behind this performance that range from strategic behavior of investors expecting to influence the price review to difficult local conditions including extreme poverty, a culture of nonpayment, weak law enforcement. Some foreign investors in distribution have been slow to realize that slum dwellers behave, and face financial constraints, different from their customers in OECD countries.

An interesting illustration of the difficulties involved, as well as some solutions was presented in a series of workshops held at IADB headquarters during 2004 [Manzetti and Rufin 2005]. The main lesson learned was that solutions required the building of a culture of payment slowly by making payments easier and more affordable and demonstrating care for customers. This necessarily requires the provision of focalized subsidies to the poorest. With few exceptions, countries have not been successful in designing well-targeted subsidies for the poor. Instruments for doing so must minimize the exclusion error, leaving the poor behind, and the inclusion error, providing subsidies to those that do not need them.

The most common subsidy in the region is to provide reduced tariffs for those users with consumption below a lifeline arbitrarily adopted and financed by the rest of consumers that are given an overcharge, and/or the government through the SOE. This lifeline has been set very high, 300 kwh month in Guatemala and Honduras, seeking to appease urban middle class voters, who are politically influential and has led to significant inclusion errors with most subsidy going to the non-poor [Foster 2001]. Colombia and Brazil use additional criteria to focus subsidies, like stratification based on dwelling characteristics or affiliation to other government support services. Coelba, a private distributor serving the state of Bahia in Brazil has obtained remarkable increases in collections after it concentrated its mandatory investments in energy efficiency in providing free energy efficiency appliances to the poorest [Pinhel 2005].

A more critical issue is that of expanding the service to those segments of the population that still lack access to electricity. As indicated in Figure 5, access is heavily skewed against the poor. Any subsidy avoiding this segment of the population incurs high exclusion errors.

Figure 5



Source: *IADB 2001*

Conclusions

The main proposition of this paper is that power sector reform has made significant progress to overcome problems that plagued the pre-reform sector in LAC. But it still faces significant challenges, some of which arise because of the technological features of electricity markets, while others arise because many LAC countries lack the institutional development and the human resources implicit in the adopted models. Gains from the reform have varied. Success of the reform should be measured with a pragmatic yardstick, weighing the desirable against the feasible.

As countries have privatized and attracted private investment, substantial improvements in productive efficiency have been achieved and a process of institutional learning has been put in place. But the consumer has not always benefited. While wholesale markets have maintained reasonable prices while keeping the lights on, vibrant competition remains elusive in many countries. Investors are reluctant to commit their capital to greenfield developments without considerable guarantees and are demanding high prices. Despite significant progress in most countries, the service coverage lags in some countries. With a few exceptions,

subsidies have not been used wisely to address the needs of the poor. Countries are struggling to implement price-cap regulation of the distribution segment and price reviews have been difficult. Government still has a significant presence as entrepreneur in many countries and the separation of roles has been hard to accept.

A comparison with the vertically integrated monopoly is difficult to make, because of the need of counter-factuals and the specificity of each case. It may be reassuring that countries which have chosen this alternative like Mexico and Venezuela have not obtained better results. Compared with the flaws of the old regime, lack of incentives for efficiency and its vulnerability to political manipulation, the challenges facing reform seem to be minor. Reformers should be aware that the reasons behind the failure of the ancient regime, naïve assessment of the incentives that motivate behavior, failure to understand constraints and the capacity of governments to keep on track, may come to haunt them. How each country copes depends on pragmatic assessments of constraints and ability to identify and resolve trade-offs, including competition, without compromising the goal of attracting investments that can keep the lights on.

Although the starting points and objectives were different, reforms in LAC followed the pioneering OECD countries. The possibility that OECD experience was dependent on context seems to have been given scant attention. Reform appears to have been based on ideology, which assumed that the market could be trusted to solve the problem. While some basic elements are essential, a cautious approach might have been to say that no universal model exists, and that success of sector reform depends upon the institutional setting and the timing of reform. Unless those tacit elements, crucial to success in the original, are replicated or replaced with local versions, and unless reforms are coherent across the economy, transferring a model out of context is a gamble. While blueprints, best practices, international codes and standards and harmonization may prove useful for some narrow technical issues, large-scale institutional development requires a process to discover local needs and capabilities.

The Lessons of Experience:

- Many LAC countries lack some of the political and regulatory institutional conditions for supporting the sort of reforms implemented. Reforms and institutional conditions should conform.. The main consideration when

designing or evaluating a regulatory framework should be a crude assessment of the people and organizations that will be in charge of implementing and enforcing it. Because institutions take time to develop, an evolutionary approach to reform may be preferable to a big bang approach.

- While following a sequence to reform that first lays down a well designed regulatory framework, set up and test a market design, unbundled and finally privatize may be the ideal, with the exception of Chile, this has not been possible for a variety of reasons. Departures from this sequence results in additional costs and in vested interests that may affect performance. Countries must weigh carefully the implications for future development imposed by forced departures from the textbook sequence.
- It is critical to keep the wires business – transmission and distribution – independent from supply, generation and commercialization. The existence of a constraint-free transmission system is of vital importance for the market and its expansion should not be limited by narrow efficiency considerations. The public sector is still called to play an active role in the expansion of transmission grids in most countries. Crucial for the operation of the market is the existence of market institutions properly designed, professionally staffed and with governance that can steer debate away from the particular interest of the stakeholders.
- While few countries, if any, have succeeded in involving the demand-side in the market, progress toward this goal should be a priority for every country that wants to fully grasp the benefits of a market system. With existing technology, the cost of extending retail competition beyond the large industrial and commercial clients seems to exceed its benefits.
- IThere is some consensus about the advantages of market arrangements that require a significant share of the load to be contracted through long-term forward contracts or options as a way to minimize the exercise of market power and to lower price volatility, while providing incentives for timely investment to meet demand.
- Regulation of monopoly segments remains difficult. Hopes that price-cap regulation would reduce the regulatory burden have proven to be naïve.

Regulators cannot escape the task of collecting and analyzing tons of data, but they should avoid the dangers of heavy-handed regulation of every detail.

- Serious research remains to be done. The best advice is to be pragmatic; beware of institutional weaknesses; beware of turn-key solutions (but be abreast of international developments), and be humble. Remember: not enough is known.

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[2] While it may be argued that the recession driven drop in demand may have depressed prices in Colombia this was possible because of the existence of competition. Similarly, Natural gas wouldn't have come into stream in Argentina in the ancient regime that favored large hydroelectric investments.

[3] Thus, in El Salvador, the exercise of market power by generators, together with an ill-conceived procedure for passing wholesale prices on to consumers with a lag of at least four months, led to high consumer prices and forced the government to hastily intervene in the recently created electricity market. The pioneering Chilean electricity market experienced blackouts during late 1998 and early 1999 that many analysts traced to incompatible incentives experienced by market participants. This episode, together with the failure to transfer efficiency gains to consumers, ignited a political crisis that led to the first major overhaul of Chilean electricity legislation in 18 years. Competition in the Peruvian and Bolivian markets, almost perfect clones of the Chilean model, has not fared any better. The Colombian Pool, which mimics the England & Wales (original) Pool, has also experienced numerous difficulties originating in the failure to control market power and in transplanting system design, developed for a purely thermal system, to a system dominated by hydropower. There is widespread concern that Pool prices will not provide the long-term signals required by investors to maintain security of supply. In Guatemala, the high cost of PPAs signed prior to reform have become a tremendous financial burden on the sector forcing the government to use their remaining assets to buffer the impact on tariffs. The 2001 drought in Brazil brought to light the weakness of its Wholesale Market model and the particular dangers posed by the transition.

[4] Weak regulatory institutions, strategic behavior of investors, governmsent opportunisms, high fuel prices and the existence of a culture of nonpayment and lack of trust in government institutions.

[5] This many times led to prolonged periods of coexistence between the new and ancient paradigms that provided opportunities for special interest to position them. Reformers were right in assuming that losers would oppose reforms—not only because they were losers but because compensations would make them winners. The problem is that the privileges, subsidies and all sort of rent-seeking activities provided by compensations may have created an interest in a stalled reform, preventing the extension of the benefits from reform to critical groups. Since compensations and compromises are unavoidable actual reform will usually depart from the reformer's dreams.

[6] An important feature of the Chilean model that often escapes pundits is that there is not a truly independent regulator since these functions are held by Comisión Nacional de Energía, integrated by cabinet level members and simultaneously exercising the roles of regulator and policymaker. Once again, given the particular Chilean conditions this feature doesn't seem to have affected its performance.

[7] For this, the government provided generous incentives to local financial groups and SOE employees that later would take control of the whole sector from retirement funds, initially the major investors. Generation followed suit later. Notice the absence of foreign investors from this plan.

[8] A significant share of generation, nuclear facilities and the bi-national projects of Salto Grande and Yaciretá remained in the hands of the federal government as independent companies and several provinces continued to own and provide electricity services. While there were not instances of conflict of interest originating in the government role as entrepreneur performance of SOE was tampered by governance problems remaining from the ancient regime.

[9] It took a tremendous amount of political courage and financial and legal skills to complete the process successfully. Today, in spite of the economic downturn experienced in Colombia the companies are relatively in good financial conditions and municipal government revenues from its share have contributed to make Bogotá a success story of urban rehabilitation.

[10] During 2000 and 2001 the repeated terrorist attacks to the Colombian transmission grid led to a de facto fragmentation of the market and provided strong incentives to generators to exercise market power. Thus, spot market prices during the first quarter of 2001 showed unusual spikes until the regulator intervened the market. However, this intervention was not very successful [Ayala and Millan 2003], and contributed to alienate market agents and to increase confusion

[11] While the government insisted that hydro developments in Chile were not subject to economies of scale, therefore making feasible competition in the market, it failed to adopt a proper structure for the sector. Seeking private companies strong enough to undertake large hydro developments the government kept most of the generation and transmission assets and most of the water rights in the

hands of one group, ENDESA. Financial maneuvers later led to the control by one group of more than 70% of the generation, 60% of the distribution and the whole transmission of the central interconnected system. Real competition was not present in Chile until the building of the first natural gas pipelines from Argentina. Foreign investors came to Chile years later, bought at high prices the existing assets, and invested in a few Greenfield projects but their appetite for investment has since decreased.

[12] Before concluding that concentration is inevitable those measures that do exist for improving competitive conditions should of course be given due consideration. Some of these constraints may be removed or lessened through time and effort, thus making feasible the type of workable competition that reformers originally had in mind. For instance, integrating individual markets, as intended in Central America, could form a larger market. Such an institution would not be easy to create and will take some time to develop as the experiences from the much more integrated economies of the European Union have shown. Additionally**,** there is still need to carefully craft the transition periods to avoid having the interests created during the interim period prevent the attainment of the ultimate goal.

[13] Interestedly, the Argentinean government adopted a similar procedures in 2004 and 2005 when faced with imminent shortage caused by the lack of investments. Consumers with more than 600kwh bimonthly should save 5% of their load or face increases in price ranging from 25% to 60%.

[14] Some countries have granted special conditions to investors, tax holidays, higher prices for local renewable energy and others, whose cost will ultimately end with the consumer or the taxpayer. While some of these measures may be justified on individual grounds, they may create problems of their own. Given that the financial burden of the electricity sector has been a major problem for most governments, it is not realistic, nor perhaps advisable, that investment in the electricity industry be made dependant upon public money.

[15] The initial intentions of the El Salvador to use the spot market price to set the pass-through to regulated consumers soon faded under the strong public reactions to volatility. To smooth volatility the regulator initially used estimations of the average future prices for a period of three months, which later changed to the averages observed during the past quarter, and subsequently last semester. This type of smoothing was common in most other countries that allowed to use, partially, the spot market as a reference, and the lag implicit in it led to important distortions, consumers were passed the high dry season prices later in the wet season when hydro energy was abundant and cost of production lower.
[16] Hedging instruments are ordinarily used to avoid volatility. However, by impeding price movements the incentive to develop hedging instruments is correspondingly reduced. It is only when the development of such instruments is unlikely, due, for instance, to weak financial markets, that price regulation can be advocated as a means of protecting market participants against the costs of price volatility.
[17] Dominican Republic solved this problem by hiring foreign consultants
[18] The generation segment refers to the cost of generation that is passed to the regulated final consumer, and the transmission and distribution components refer to the wire portion of such services. The generation component is referred to as “market” when the prices at which the retailer buys energy in the wholesale market are passed on to the consumer adjusted by losses with some sort of smoothing. “Cost of service” refers to the traditional way used by utilities in the past, and “efficiency standard” refers to the Chilean method for the wires segment.