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Reshaping Power Markets—Lessons from Chile and Argentina

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The first experiment in transforming a government-owned and -operated power industry began in Chile in 1980. A 1982 law restructured the sector and defined basic regulations, and utilities were privatized between 1986 and 1989 after financial and corporate restructuring. The sector had been operating fairly well, but was reformed as part of a broader rationalization of the economy. In Argentina, by contrast, the market-based structure and privatization introduced in 1992 were intended to improve efficiency and reliability and to attract the substantial investment needed to upgrade the system.

The “Southern Cone” model underlying the systems in Chile and Argentina is now being applied elsewhere in Latin America, including Peru (starting in 1993), Bolivia (1995), and Colombia (1995). This model divides the industry into five functions—generation, dispatch, transmission, distribution “wires,” and distribution supply—and deregulates the utility systems at both the wholesale and the retail levels. The wholesale portion of the model, fully unregulated, relies on open competition in generation. The model’s retail portion ensures direct access to generators for medium-size and large users under freely negotiated contracts, and regulated prices for smaller consumers.¹

The reforms in Chile and Argentina, now roughly fourteen and four years old, show that large efficiencies can be realized through restructuring and deregulation. By any standard, both systems have improved. There has been active entry by new generators, the quality of supply has improved, and prices have fallen in constant terms. But experience shows that precautions must be taken to introduce and preserve competition.

Chile’s bold initiative

Chile instituted market mechanisms to encourage competition. First, it allowed large consumers to purchase from any generator or distribution company, giving suppliers an incentive to lower costs in order to capture more of this market. Second, it linked the regulated price to the market price, so that small consumers would share in the efficiencies resulting from competition. Third, it used the unregulated price as a signal for investment, so that expansion decisions would reflect market forces.

The reforms have demonstrated the effectiveness of having a central dispatch and clearing system dispatching privately owned generators and the practicality of the competitive market mechanics the system uses. The northern system, the SING² (dominated by large, sophisticated industrial purchasers), has developed fierce competition to supply consumers. The other system, the SIC, has also seen efficiency gains, price reductions, and high service quality.

As in England, however, there have been transitional problems in converting to a competitive market structure. A major concern is the predominance of one generator in the SIC. At the time of privatization, there were no restrictions on cross-ownership of assets in different segments; the bulk of the generating capacity and all of the transmission capacity serving the SIC were acquired by one private company. A controlling interest in this company was later purchased by an investment group that also had a controlling share in the largest distribution company. Thus, one investment group controls most of the system’s generating capacity, the largest distribution company, and the transmis-





sion assets. Cross-ownership and consequent conflicts of interest have hindered the development of a more competitive generation market.

Argentina: The next generation

Argentina, privatizing much of its power system more than ten years after Chile, benefited greatly from observing that country's successes and problems. It adopted the basic market mechanics that had worked in Chile: open access to the wholesale capacity and energy pool for generating facilities, and least-cost centralized dispatch. But it replaced or modified the less successful aspects—most important, adopting mandatory separation of dispatch and transmission from generation and distribution and establishing an independent dispatch agency. No generator is permitted to control more than 10 percent of the system's capacity, and restrictions on reintegration and cross-ownership are enforced. In the generation sector, of the thirty-three units with about 16 gigawatts (GW) of capacity, twenty-six units were sold to the private sector and seven remained under national or provincial ownership.³ The resulting diversity in ownership ensured a more competitive environment for generation than in Chile.

The Argentine privatization has been a clear success. Plant performance has noticeably improved, wholesale and retail prices have declined, and consumers have also benefited from reduced outages and increased reliability.

Deregulation

The following sections describe general features of the model for each of the five functions.

Generation

Effective competition requires that there be enough companies generating power to prevent dominance by one or a few, that capacity and energy payments at system marginal cost be available to new market entrants, that generators lack the ability to affect access to or pricing of transmission or dispatch services, and that the retail market be at least partially open (for example, for large users). The model therefore

allows free entry into the generating market. Current and prospective generators make their own judgments, and take their own risks, on demand growth, investment levels, fuel market trends, the evolution of production technologies, and so on—just as producers in other commodity markets do. New generators must construct any transmission facilities needed to deliver their output to the trunk system, and meet industry conventions for interconnection in accordance with a grid code.

Transactions between sellers and large customers are normally based on long-term contracts, and bulk power transactions between generators are normally made at spot prices. In fulfilling long-term contractual obligations, generators can use their own energy or purchase energy from other generators at freely negotiated prices, or from the pool at spot prices. Generators receive two types of payment from the pool: a payment for energy dispatched and a payment for capacity offered to the grid. They are paid only the market value of their output, not the actual cost of generation. In other words, full cost recovery is not guaranteed.

A generator is paid a price for energy, when dispatched, based on the system's short-term marginal cost of production (for example, the variable operating cost of the most expensive unit in operation). Plants are selected for dispatch by a dispatch center on the basis of their variable costs, as posted with the dispatch center. Because the price a plant receives is unrelated to its posted price, there is no advantage (assuming the market is truly competitive) to be gained from "bid strategies." Generators maximize their profits by keeping costs low and posting accurately.

Pooling and dispatch

Chile and Argentina have adopted somewhat different pooling arrangements. In Chile, each of the two principal integrated systems has a coordinating committee (Centro de Despacho Económico de Carga, or CDEC) responsible for system operation (ensuring security of supply and optimizing generation). The coordinating committee for the SIC is limited to representatives of the largest generators. And it turns out

that committee members have the ability—and perhaps the incentive—to “interpret” data and results in favor of the generation company shareholders. The asymmetry of information in Chile may have benefited the large generators, which are able to use their superior access to market information, and to the market itself, to the detriment of smaller competitors.

To avoid such conflicts of interest, Argentina set up an independent dispatch entity, *Compañía Administradora del Mercado Mayorista Eléctrico S.A. (CAMMESA)*, owned in equal parts by the generation, transmission, and distribution sectors, as well as by large consumers and the government. Because each generator has a relatively small share of total capacity, no one generator can “game” the system to its own advantage—a major strength of the Argentine reform.

Transmission

Privately owned, transmission companies must provide open access to all generators, but may not buy or sell energy for their own account. They deliver power from the generators to distribution companies, or directly to large customers.

With transmission considered a natural monopoly and therefore subject to government regulation, transmission companies are entitled to payments from generators adequate to cover the costs that would be incurred by an efficient transmission company of comparable size. In Chile, these costs are based on the replacement value of the assets plus the operating expenses of a “model” company. In Argentina, transmission charges are capped, and a transmission company that can exceed the benchmark performance can retain all the benefits for its stockholders.

In Chile, independent generators can sell energy to large consumers at negotiated prices and to distribution companies at regulated prices. The law establishes general guidelines for setting wheeling charges, but the method for calculating both the cost and the cost sharing formula for transmission assets has proved contentious. The calculation requires determining the “influence areas” for each generator, the allocation of the load served by it and other generators, and

the replacement values of transmission lines. Not surprisingly, there have been disagreements—as well as some cases of unsuccessful wheeling negotiations, attributed to an investor’s cross-ownership of generation and transmission companies. But some large consumers have successfully opted for independent supply.

Transmission companies in Argentina do not have an obligation to invest in new transmission capacity. Investment in transmission may be undertaken by existing companies or by new entrants, subject to an assessment of need by the regulatory authority.⁴ Concession agreements for transmission and distribution were granted under fifteen-year agreements with ten-year extension periods (except for provincial distribution companies, which were not privatized). There is international competitive bidding for the right to take over the asset at the time of each extension, with the winner paying the bid amount to the former concessionaire in the event of change. There are some concerns that the system lacks the right incentives to encourage optimal new investment in transmission. The recent decision by new entrants to install additional generation close to consumption centers while there is available capacity in the system suggests increasing transmission constraints that the current institutional arrangements are not properly addressing.

Distribution wires and supply

Distribution services are separated into wires and supply sectors. Like transmission facilities, they are considered a natural monopoly and are privately owned and regulated. Distribution companies operate under concession and have an obligation to serve. They can meet their power needs with long- or short-term contracts or spot market purchases. Under the principle of third-party access, supply is unregulated for consumers larger than a certain size,⁵ but the wires portion of the services is regulated. Both supply and wires charges are regulated for smaller consumers.

The main difference between the Southern Cone model of regulation for distribution companies and the conventional rate-of-return



model is that the first does not base estimates of cost of service on the distribution companies' assets. Instead, it uses as a benchmark the facilities that an efficient company would require to properly run the corresponding distribution services. In Chile, the benchmark is based on a hypothetical "model utility." Chile's distribution sector has become more efficient, it has made comfortable returns since the restructuring, and rates to end users have decreased (though there is a perception that more of the efficiency gains could have been passed on to consumers). But competition for retail customers has been slow to develop. Because the largest distribution company is also the largest wholesale consumer, its importance as a purchaser may have suppressed competition for customers in its market area.

Some problems have been reported in the procedures for regulating distribution rates in Chile. The regulated price to small consumers has two elements: the energy purchases passed through by the distributor, and a distribution value-added component. The value-added component is the problematic one. During its review every four years, the regulators and the utility each propose a tariff structure, based on the infrastructure necessary for a model utility to serve actual and projected loads in an optimum manner. But the criteria for determining the appropriate infrastructure are in dispute, and price setting has become complex and crisis-prone. The asymmetry of resources between the distributors and the regulators, and the stakes, emphasize the importance of continuing scrutiny of financial returns in "deregulated" systems.

Distribution tariffs in Argentina are regulated through a price cap mechanism and do not distinguish between wires and supply. Increases in electricity costs and transmission tariffs are reflected in periodic reviews, but cost reductions due to productivity increases are to be shared between the investor and the consumer. The distribution utilities have found it difficult to improve efficiency. Electricity theft has remained high, and it has proved difficult to collect overdue payments. Provincial distribution companies, which are still not privatized, also

must strike a difficult balance between increasing efficiency and maintaining employment.

Conclusion

The power sector reforms in Chile and Argentina have brought real benefits to consumers large and small, though public and political pressures may have supplemented market forces in ensuring that efficiency gains were shared with consumers. Still, the Southern Cone model shows that several conditions are important for creating competitive and efficient energy markets:

- Mandatory separation of functions, and clear delineation of the limits on cross-ownership and vertical integration.
- Limits on the size of generators to ensure competition.
- The unbundling of transmission charges and the provision of fair access to transmission.
- Clearly defined, published transmission prices reflecting incremental costs.
- Establishment of a centrally dispatched bulk supply market, with energy priced at the system's marginal cost, and a parallel bilateral market based on long-term contracts.
- Access by generators and marketers to at least part of the retail market.

This Note is an abbreviated version of an article that appeared in *Electricity Journal* 9 (2): 63–71, March 1996).

¹ In Chile, the cutoff for users considered medium-size and large is 2 megawatts (MW); in Argentina, it started at 1 MW and was reduced to 100 kilowatts (KW) in 1995.

² Because of its geographical characteristics, Chile has two power systems, the Sistema Interconectado del Norte Grande (SING) and the Sistema Interconectado Central (SIC). The SING, about 1.2 GW, is predominately thermal, with less than 2 percent hydro. The SIC, about 4 GW, includes about 75 percent hydro and 25 percent thermal.

³ Before privatization, the Argentine power sector consisted of four national utilities, one international hydro plant, nineteen provincial utilities, and several cooperatives. Three of the federally owned utilities were privatized. The fourth, the power generation branch of the CNEA, the national atomic energy agency, remains in state hands.

⁴ The licensing arrangement for new transmission requires potential beneficiaries to propose new lines. The need is then evaluated by the regulator, CAMMESA, and the high-voltage transmission company. If they agree that there is a need, the project is opened to competitive bidding.

⁵ See note 1.

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