

Regulating Competition in Wholesale Electricity Supply

by

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Introduction

The technology of electricity production, transmission and distribution and the traditional approach pricing electricity to final consumers make designing a wholesale electricity market the benefits consumers extremely difficult. There have been a number of much-publicized disasters—the California electricity crisis during the period June 2000 to June 2001 and the New Zealand market meltdowns during June to September of 2001 and 2003. Even the markets that are generally acknowledged to have benefitted consumers experienced significant problems during the initial stages of development.

The general conclusion from the past ten years is that although there are opportunities for benefits to consumers from electricity industry re-structuring, these benefits are small relative to the benefits achieved from the introducing competition into other network industries such as telecommunications and airlines. In addition, the probability of a costly market failure appears to be higher than in these industries. This conclusion motivates four major questions to be addressed in this chapter. First, why has the experience with electricity structuring been so disappointing, particularly in the United States? What factors have led to success and limited the probability of costly market failures in other parts of the world? How can these lessons be applied to the re-structuring process in the United States and other industrialized countries? How should these lessons be modified to apply to the reform process in developing countries?

Rough Outline of Paper

Introduction to Industry under Former and Current Regime

1. Review of technology of electricity industry—generation, transmission, distribution and retailing. Range of generation technologies and how these can be used to meet a given daily load shape. The basics of power flow—Kirchoff's laws, transmission congestion and the purely financial nature of electricity “deliveries.” Basics of system operation—automatic generation control and reserve requirements and use.
2. How things worked in former regime and how they were assumed to work in wholesale market regime. Short-run and long-run cost-benefit tradeoffs between vertically integrated and competitive regime and state-owned and privately-owned firms.
3. Imperfect competition versus imperfect regulation choice at each stage of the production process. Unilateral market power versus private information problem in regulating retail prices. How the need to balance supply and demand at every instant in time throughout the entire transmission

network and fact that how one market participant operates its generation units or withdraws energy from the network can significantly impact the overall reliability of the transmission network impacts these choices. The impact of the long lead time necessary to site and build new generation facilities and significant start-up costs for most sizable generation facilities market on this choice.

4. Standard re-structured market structure as the solution to these tradeoffs between imperfect competition and imperfect regulation. Operating efficiencies and long-term investment incentives. Lost economies to scope between generation and transmission. Local market power problems. Problems with lack of demand response in wholesale market regime versus former monopoly regime. Vertically integrated supplier as provider of insurance against high cost electricity production during certain periods of the day, month or year.

5. The problem of initial conditions. Very difficult political task to break-up large incumbents. Successes and failures in dealing with this issue. Very difficult to privatize certain government-owned assets. Problems with government-owned entities in wholesale market environment. Contractual enforcement problems. Reduced cost of government intervention in market with large government-owned entity..

Sources of Costly Market Failures

1. Excessive focus on design of spot market. Substantial market power problem with of pivotal suppliers in bid-based spot market without significant forward contracts and limited demand response. Benefits of forward contracting to commit suppliers to be more aggressive competitors. Why suppliers may or may not sign forward contracts. Why retailers may or may not sign forward contracts.

2. The costs and benefits of divestiture. Divestiture to create more electricity suppliers. Divestiture to creates more merchant generation capacity with no native load obligations. The costs and benefits of vertical integration between generation and retailing.

3. Lack of effective local market power mitigation mechanism. Local scarcity versus local market power. The costs and benefits of location marginal pricing versus an effective local market power mitigation mechanisms. The New Zealand market meltdowns. Market structure, adequate hedging, and adequate transmission capacity, not spot market design.

4. The role of capacity payments and capacity markets. Paying for capacity has a cost, does it have a benefit? Is there are reliability externality? If so, are capacity payments the best way to internalize this externality.

5. The impact of bid caps and price caps on wholesale market performance. What is a credible price cap and how to insure it is credible.

6. Lack of coordination between federal and state regulatory processes. Federal government regulates wholesale markets and state governments regulate retail markets. Successful market

design requires coordinating in these two regulatory processes. This has proved virtually impossible to do in the United States. Why has this occurred and how might this interaction be improved.

7. Enforcing the Federal Power Act in the United States. What just and reasonable prices for consumers and producers are. Definition of market-based rate authority and what suppliers must do to obtain it. Logical inconsistency of market-based rate process. Moral hazard problem facing Federal Energy Regulatory Commission (FERC) with respect to meeting just and reasonable price standard. How FERC is currently dealing with this problem.

8. Lack of price-responsive final demand and impact on wholesale market outcomes.

9. Lack of transmission expansion policy that recognizes wholesale market competitive benefits of transmission upgrades.

10. Methods for measuring market performance and unilateral market power possesses by a suppliers in a bid-based wholesale market.

Factors that Led of Success in Industrialized Countries

1. Focus of development of active forward market for energy.

2. The benefits of vertical separation of generation, transmission, distribution and supply. The initial UK experience and Australia experience.

3. The role of bid caps and bid mitigation. The UK, Australian and Nordic country experience versus California experience.

4. The ISO as a market participant, with a financial stake in the market (National Grid Company in the United Kingdom) versus the United States model of the ISO as a black box with no financial stake in market outcomes.

5. The role of market monitoring and regulatory intervention in detecting and correcting market design flaws.

Factors that Led to Success in Developed Countries

1. Credibility of regulatory process. Setting market rules that can be enforced.

2. Ensuring independence of regulatory process from government interference.

3. Cost-based versus bid-based spot market—costs versus benefits of each.

3. Special challenges of hydro dominated systems. The problem of gambling on the weather and under-pricing of retail electricity. Energy versus capacity shortfalls and how to guard against these. Implementing real-time pricing in hydro-based systems does not require interval meters.
4. Encouraging active forward markets in countries with significant regulatory and political risk.
5. The role of retail competition. Greater diversity in willingness to pay for electricity, but is infrastructure necessary for retail competition worth the cost?