

Comments on Brazilian Power Sector Reform

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Outline of Talk

- Restructuring in Hydroelectric Dominated Electricity Supply Industries
 - Gambling with Weather Problem
 - Encouraging Fuel Diversity
 - Attracting New Investment in Market Dominated By Large State-Owned Firm
 - Involving Final Demand
- Establishing Credible Regulatory Process
- For more detail on these points see “Report on Brazilian Power Sector Reform,” by Nils Henrik von der Fehr and Frank A. Wolak, on web-site

Gambling with Weather

- Hydroelectric capacity has close to zero incurred marginal cost of production
 - Very tempting for government to use this fact to keep price of wholesale electricity low
- How is this accomplished in Brazil other LACs
 - National System Operator (ONS) dispatches generation units using stochastic discrete dynamic programming (SDDP) model using operating cost of fossil-fuel units and cost of deficit
 - Current spot price reflects opportunity cost of operating fossil fuel units and cost of deficit
- Current cost of deficit is 350 \$R/MWh, which is approximately \$100/MWh at current exchange rates
- Problems with low cost of deficit parameter
 - Sets very low average spot price—approximately \$22/MWh at current exchange rates
 - Encourages over-consumption of electricity—average retail rate \$55/MWh at current exchange rates

Gambling with Weather

- Problems with low cost of deficit parameter
 - Fossil fuel units may not be used until water levels get too low—Rationing period of 2001-2002
 - Lower cost of deficit implies deficits will occur with higher probability
- As long as rain comes this strategy can be a very effective way to keep wholesale electricity prices low
- Discourages fossil fuel entry
 - Extremely volatile revenue stream for fossil-fuel units

Incentives for Fuel Diversity

- Brazilian Energy Reallocation Mechanism (MRE) pays hydroelectric suppliers according to their assured energy certificates (CEA), not their actual hourly production
- Each hour total amount of hydroelectric energy produced in Brazil is measured and this production is allocated to each hydroelectric supplier according to quantity-weight share of CEAs they own
 - Firm is paid market price times its share of total hydroelectric output
 - Payment to firm is does not depend on whether or not firm supplied any energy during hour or was available to operate in that hour
- Fossil-fuel units paid hourly price based on actual production
- New hydroelectric entrant makes profit on how many CEAs they are able to obtain, not based on hourly operating characteristics of unit
- MRE provides little incentive to build new capacity or choose fuel mix that provides maximum benefits to system reliability

State-Owned Hydroelectric Supplier

- New entrants recognize that large government-owned hydroelectric supplier may want to keep wholesale prices low for political reasons
- This is most likely to occur during periods when private supplier could recover much of its investment costs
- Norway experience is instructive
 - In fall of 1992, Statkraft—state-owned money hydroelectric owned announced policy to maintain prices above 100 NOK/MWh
 - Although plan was initially successful, prices have subsequently fallen below this level
- Norway has not had any new investment in generation capacity since restructuring took place in early 1990s

Involving Final Demand

- Final demand can be involved wholesale market without sophisticated metering in hydroelectric dominated system
 - Very little price volatility within day relative to fossil-fuel based system
 - Price volatility is primarily across seasons of the year
 - Wolak (1999) “Market Design and the Behavior of Prices in Restructured Electricity Markets: An International Comparison” provide evidence for this in Nordpool and New Zealand markets
- No need for hourly meters to involve final demand
 - Real-time pricing of electricity on monthly basis
 - High cost of water implies high price of electricity
 - ONS can set significantly higher cost of deficit because consumer can decide not to consume given wholesale price

Regulatory Oversight

- Countries with former government-owned monopolies face two transition problems
 - Establishing and enforcing market rules
 - Setting prices for monopoly services
- Regulatory process for setting prices for monopoly services
 - US has had almost 100 years of experience and they still have not gotten it right
 - Process must account for continual improvement
- Simple rules that are easy to enforce (that may not get things exactly right) may be preferable

Regulatory Oversight

- Regulation in market regime very different from regulation in monopoly regime
 - Monopoly regime—Regulator as lawyer and accountant
 - Market regime—Regulator as market designer
- Monopoly regime—set prices that allow firms opportunity to recover costs
- Market regime—set rules that allow firms opportunity to recover costs through market prices
- Despite 100 years of trying, US regulatory process is still a work in progress---FERC's performance during California crisis

Regulatory Credibility

- Advisory Committee approach to regulatory credibility
 - Establish committee of international experts to provide advise regulatory body
 - Committee has no power to issue order or impose penalties on market participants
 - Provide advice on best regulatory practices
 - Can issue public opinions on periodic basis
 - Provide cover for regulator
 - Prevent opportunistic behavior by government