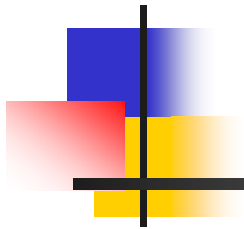


Risk Management in Liberalized Electricity Markets



Karl Borch Lecture

NHH, 29 October 2004

* * *

Robert Wilson

Stanford Business School

(and honorary Doctor of Economics, NHH, 1986)



Allocation of Risk

Regulated Investor-Owned Utilities

- Motives – historically
 - Minimize cost of capital
 - Smooth retail rates
- Both result from “Regulatory Compact”
Local franchise + regulated rates + cost recovery
 - Amortized costs are fully recovered over time
- Customers eventually bear all risks
 - Relies ultimately on state’s credit & credibility



Allocation of Risk

Liberalized Electricity Markets

- Suppliers bear investment risks
Customers bear retail price risks
Bilateral contracts hedge risks for both
 - Mutual interests in reducing price volatility
 - Strengthens incentives – evidence is clear
 - Works well for large industrial customers and independent power producers [IPPs]
- But...not for small customers [commercial/residential]
 - “Core” customers cannot easily bear risks and cannot obtain low-cost financial hedges
 - Core customers have few options and incentives to alter usage – service options not well developed



Basic Problems of Liberalized Markets

- Imperfect markets
 - Public goods, externalities, coordination
 - Solved by Transmission Operator [TO]
 - Example: provision of reserves
 - Capital intensity & scale
 - Market power of dominant suppliers
 - Incomplete contracts and markets
 - Retail demand does not respond to spot prices



Basic Problems: Role of Price Volatility

- Wholesale
 - Short-term: highly volatile spot prices
 - Long-term: fuel prices, droughts, technical change, business cycles (e.g., California crisis)
- Retail
 - Core customers depend on leveled rates
 - Regulatory imperative = universal service
 - Financial hedges depend ultimately on physical hedges (e.g. collapse of trading operations)
 - U.S.: Enron, Dynergy, Mirant, Reliant, Williams, Duke, ...



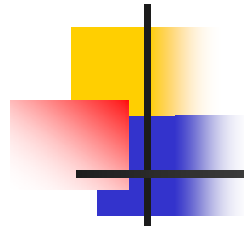
Goals of Liberalization

1. More efficient investments & operations

- System operations: TOs now working well
- Generator operations: improved efficiency
- Regional markets are robust and more efficient

But ...

- Integrated resource planning is jeopardized
- Resource requirements are imposed
- Cost of capital is higher, projects are delayed, some IPPs are financially distressed, bankrupt



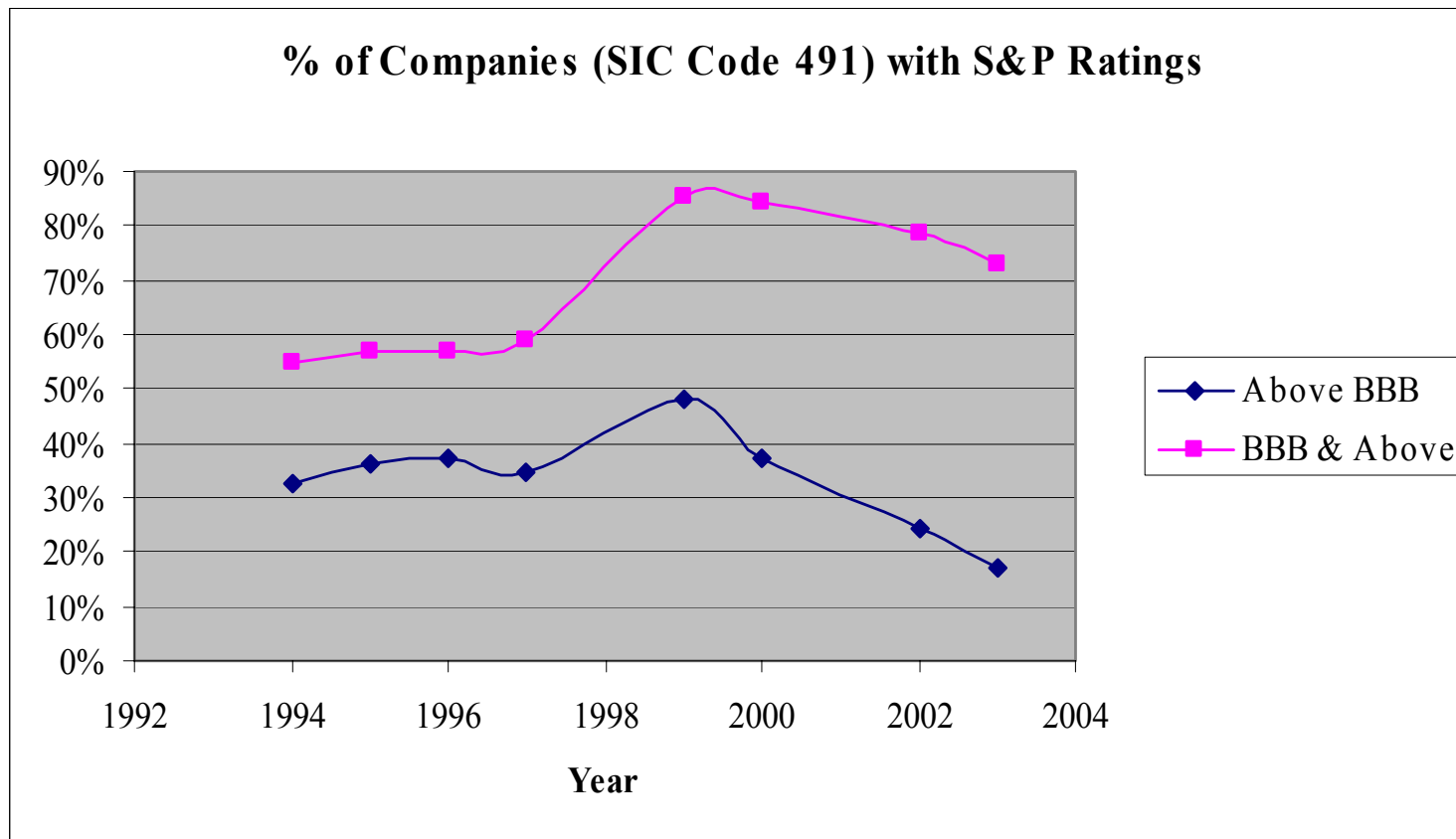
Financial Distress of Utilities in U.S.

Energy market events of the past three years heightened awareness and the attention of regulatory authorities and public policy setters, creating **concerns about credit quality** and reliable energy supply. The current utility credit environment is plagued by:

- § A **liquidity squeeze**
- § Banks and **creditors who are more risk averse**
- § **Counter-party credit exposure** to weak peers
- § Litigation
- § Accounting and disclosure issues undermining investor confidence; and
- § A **cyclical impact** with a current oversupply of generation in most regions.

(Quoted from **EEI 2002 FINANCIAL REVIEW**, Edison Electric Institute, 2003)

Declining Ratings of Utility Bonds in U.S.





Bond Ratings of Investor-Owned Utilities in U.S.

Bond Ratings—Moody's/S&P

SHAREHOLDER-OWNED ELECTRIC UTILITIES

	Aa1/AA+ to A3/A-	Baa1/BBB+ to Baa3/BBB-	Below Baa3/BBB-	Average
December 1999	72.9%	22.9%	4.2%	A2/A
December 2002	42.4%	43.6%	14.0%	Baa1/BBB+

Source: JP Morgan and Deutsche Bank

Cumulative 2002 Activity:	Upgrades	Downgrades
Fitch	12	81
Moody's	4	89
Standard & Poor's	10	120



Goals of Liberalization

- 2. Differentiation of retail services
 - Works well for large customers & IPPs
 - Contracts allow: options, tolling, load-profiling. Direct access to spot prices.

But ... slight progress for core customers

- Cost recovery limits utility's incentives
- Core is affected by adverse selection
 - In crisis, customers were abandoned and sent back to utilities with service obligations



A Middle Way for Utilities

Utility remains default service provider within modified regulatory compact.

As before liberalization, utility:

- Retains obligation to offer basic service
 - Assures universal service
- Levels retail rates to recover costs
 - Costs amortized at cost-of-capital



New Feature

Performance-Based Regulation

- Regulation is based on performance
 - Analog of PBR for TO (e.g., NGC in U.K.)
 - Standard of comparison = spot prices
 - Spot markets now provide objective measure
- Utility profits from share of cost savings from
 - Make-or-buy decisions, contracting
 - Differentiation of basic services for core customers
- Key aspect is stronger incentives from PBR and retail competition, but retains (a) lower cost-of-capital + (b) leveled rates



Implementation of PBR

1. Financial Aspects

- Core Exit & Entry fees required
 - Buy-out & buy-in embedded cost of contracts
 - Necessary to control adverse selection
- Cost-of-capital must recognize that utility requires more equity capital
 - Utility now bears shares of risks
 - stronger incentives require risk bearing
- A menu of PBR schemes is better theoretically
 - Utility chooses its preferred scheme based on its better information (e.g., NGC in U.K.)



Implementation of PBR

2. Supply Aspects

- Utility has resource-adequacy obligation
Contracts and capacity must cover peak loads
 - Standard schemes : ICAP obligations & markets
 - Innovative schemes: Option contracts at spectrum of strike prices
- Utility participates in reserve markets
Differentiation of basic service enables:
 - Price-responsive retail demands
 - Net gains for customers



Implementation of PBR

3. Service Differentiation

- Customers are heterogeneous
 - Differ in risk aversion, costs of altering usage
- Differentiation offers service menu; e.g.
 - Peak/offpeak prices
 - Cycling of appliances; e.g., air conditioners
 - Prices based on load-duration profile
 - Two-part tariffs: demand charge based on peak
 - Wright tariff (used in France)
 - Fuse level, above which price is higher
- Base retail prices on wholesale prices and contracts – for energy and reserves



Implementation of PBR

4. Further Aspects (partial list)

- Auxiliary obligations
 - Renewables not comparable to spot prices
- Strength of incentives – share of risks
 - Asymmetric rewards and penalties
 - Risk share affects equity capital required
- Comparative evaluation
- Renegotiation – periodic revision of PBR



Conclusion

- Liberalization's successes:
 - Regional operations & markets run by TOs
 - Bilateral contracting: large customers & IPPs
- Liberalization's deficiencies:
 - Risk is allocated inefficiently & capital costs are high
 - Need intertemporal smoothing of retail rates for cost recovery
 - Differentiation of retail services is insufficient
- PBR enables continued role for utilities
 - Spot prices can be basis for rewards and penalties
 - Provides incentives for utility, and for customers
- Regains advantages of guaranteed cost recovery