

Advanced Workshop in Regulation and Competition 15th Annual Western Conference

Embassy Suites, in South Lake Tahoe, California, on June 19–21, 2002

The Conference features some of the latest developments in the telecommunications and energy sectors, including:

- %Future of Distribution
&Innovations in Pricing and Technology
- %Market Structure
&Strategies under Competition and Deregulation
- %Incentive Regulation

Who should attend:

- &Industry Economists
- %Marketing and Regulatory Managers
- &Regulatory Commission Staff

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The *Center for Research in Regulated Industries*, located at Rutgers University, aims to further study of regulation in economics, finance, and institutions. Its publications, seminars, workshops, and courses make available the latest advances to academics, managers, and regulatory commission staff. The Center has twenty-five years of experience providing research, instruction, conferences, courses, seminars, and workshops in economics of network industries. The Center's *Journal of Regulatory Economics* is an international scholarly bi-monthly publication intended to provide a forum for the highest quality research in regulatory economics. Other research from the Center's programs has been published in the book series *Topics in Regulatory Economics and Policy*.

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School of Management ˆ 180 University Avenue ˆ Newark, NJ 07102-1897
973-353-5761 ˆ 973-353-1348 (fax)

15th Annual Western Conference of the Advanced Workshop in Regulation and Competition

Wednesday, June 19, 2002

3:00 - 4:00 Registration
 4:00 - 4:30 Welcome to Conference
 Michael A. Crew
 4:30 - 6:00 **Cliff Rochlin:** Is Electricity a Right?
William Kovacic: Regulation and the Law: The Year in Review
 6:00 - 9:00 **Cocktail Hour, Dinner**
Keynote Speech:

11:45 - 1:00 Lunch Break
 1:00 - 2:30 **Concurrent Sessions**

MARKET POWER I

Chair:
 Discussants:
Robert Earle & Karl Schmedders: Conditions for Short-term Efficacy of Price Caps
Steve Ostrover & Mursaleena Islam: Measuring Market Power in Deregulated Electricity Markets - Theory and Application
Carl Pechman: The Economics of California Refunds

Thursday, June 20, 2002

8:00 - 9:45 **Concurrent Session**

PRICING & METERING I

Chair:
 Discussants:
Timothy Brennan: Assessing the Benefits of Real-Time Metering
Peter Schwarz, Thomas Taylor & James E. Cochell: Industrial Customer Hourly Response to Electricity Real-Time Pricing: Short-Run and Long-Run
Chris King: Early Results from California's Real-Time Metering Implementation

TELECO REGULATORY REFORM

Chair: David Pitcher
 Discussants: Brenda Kahn & Julie Kelly
Kent Currie: Natural or Unnatural Monopolies? Another Examination of Large ILEC
Carl Danner: The Next Stage of Local Telephone Regulatory Reform
Christian Dippon & G. Mitchell Wilk: Regulatory Failure of Market Success? The case of the struggling CLEC?

9:45 - 10:00 Coffee Break

10:00 - 11:45 **Concurrent Sessions**

PRICING & METERING II

Chair:
 Discussants:
Robert D. Levin: Toward a Broader Definition of Peak Load: Does California Avoided Cost Methodology Undervalue Energy Efficiency?
Kevin Coughlan: A 20/20 Ex Post Look at California's 20/20 Rebate Program
Mehdi Danesh and Steve Jack: Evaluation of SDG&E 20/20 Rebate Electric Conservation Program

DEREGULATION & EFFICIENCY

Chair:
 Discussants:
Michael A. Crew & Paul R. Kleindorfer: The Legacy of Deregulation: Where Do We Go from Here?
Stathis Kostopoulos, Shane Chapman & Brian Thomas: Efficient Rate Structures in Water Wholesale Markets
James Prieger: The Supply Side of the Digital Divide: Is There Redlining in the Broadband Internet Access Market?

2:30 - 4:00

Concurrent Sessions

MARKET POWER II

Chair:
 Discussants:
Robert Michaels: Measuring and Mitigating Market Power in Electricity: How Superior Is Supply Margin Analysis?
Anjali Sheffrin: Reserve Margin Requirements Necessary to Promote Workable Competition
Doug Hale: Some Costs of Reliability Limits on Electricity Trade

AUCTIONS

Chair:
 Discussants:
David Salant: Recent Developments in Simultaneous Auctions: Clocks Auctions
Gregory Duncan: Valuation of Previously Auctioned Properties: A Hedonic Approach to Valuing Radio Spectrum
 Exercise Break

4:00

14th Annual Western Conference of the Advanced Workshop in Regulation and Competition**Friday, June 21, 2002**8:45 - 10:40 *Concurrent Sessions***ROR vs. PBR**

Chair:

Discussants: Tom Frantz

Ron Knecht & Bill Stanley: Cost of Capital:

Next Steps to Getting It Right

Jim Reid: Is the CAPM a Biased Estimator of Market Risk?**Larry Blank:** A Yardstick Competition Model:

For Performance-Based Regulation Benchmarks

DEMAND

Chair:

Discussants:

Christopher Garbacz & Herbert Thompson:Demand for Local Telecommunications Network
Access: 1970-2000**Yasuji Otsuka:** A Recent Development in
Telecommunications Demand Estimation and
Forecasting**Wesley Wilson & Jeremy Zhou:** Costs,
Efficiency, and Heterogeneity in the Telephone
Industry

10:40 - 11:00 Coffee Break

11:00- 12:55 **PLANERY SESSION**

Chair:

Discussants:

David Gamson: A California Conundrum:
Tradeoffs Among Rates, Reliability and the
Environment During CA's 2000-2001 Energy
Crisis**James Bushnell Erin Mansur, & Celeste
Saravia:** A Cross-Market Analysis of the
Performance of U.S. Electricity Markets**Mark Reeder:** Merchant Transmission, Market
Failure, and the Uneasy Interplay Between
Regulated Providers of New Transmission and
Unregulated Providers of New Generation.

12:55 - 1:00 Closing Remarks—Michael A. Crew

SPEAKERS, DISCUSSANTS & CHAIRS (CONT)**Kent Currie**, Manager-Economic Analysis, SBC**Mehdi Danesh**, Senior Pricing Analyst, San Diego Gas and Electric**Carl R. Danner**, Consultant, Wilk & Associates, Inc.**Christian M. Dippon**, Senior Consultant, National Economic Research
Associates**Gregory M. Duncan**, Senior Vice President, National Economic Research
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Pacific Gas & Electric**Robert J. Michaels**, Professor of Economics, California State University at
Fullerton**Steve Ostrover**, Senior Consultant, Econ One Research, Inc.**Yasuji Otsuka**, Economist, Public Utilities Commission of Nevada**Carl Pechman**, President, Power Economics**David Pitcher**, Chief Economist, Verizon**James E. Prieger**, Assistant Professor, University of California at Davis**Mark Reeder**, Chief of Regulatory Economics, New York State Department of
Public Service**Jan Reid**, California Public Utilities Commission**Cliff B. Rochlin**, Market Consultant, Southern California Gas Company**David Salant**, Senior Vice President, National Economic Research Associates**Peter M. Schwarz**, Professor of Economics, Belk College of Business

Administration, University of North Carolina at Charlotte

Anjali Sheffrin, Manager, Financial Planning, California ISO**Thomas Taylor**, Senior Economist, Rate Department, Duke Power, A Division
of Duke Energy Corporation**Jeremy Zhou**, Associate Professor of Economics, Aomori Public College**Wesley W. Wilson**, Associate Professor of Economics, University of Oregon**SPEAKERS DISCUSSANTS & CHAIRS****Larry Blank**, President and Chief Consultant, TAHOEconomics, LLC**Jeremy A. Bloom**, Principal, Knowledge Development, Primen**Timothy J. Brennan**, Professor of Policy Sciences and Economics, University
of Maryland Baltimore County**James Bushnell**, Professor, UC Berkeley & California Energy Institute**Hung-Po Chao**, Area Manager-Policy and Risk Analysis, EPRI**Shane Chapman**, Program Manager, Metropolitan Water District**James E. Cochell**, Senior Economist, Rate Department, Duke Power, A
Division of Duke Energy Corporation**Kevin P. Coughlan**, Advisor to Commissioner Richard Bilas, California Public
Utilities Commission**Michael A. Crew**, Professor of Economics, Center for Research in Regulated
Industries, Rutgers University

15th Annual Western Conference of the Advanced Workshop in Regulation and Competition

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CONTACTING CRRI

Home Page: <http://crri.rutgers.edu>
 Address: Center for Research in Regulated Industries
 Rutgers University, School of Management,
 180 University Avenue
 Newark, NJ 07102-1897
 Phone: 973-353-5761
 Fax: 973-353-1348
 Email: mcrew@andromeda.rutgers.edu (Michael Crew)
schuh@andromeda.rutgers.edu (Joseph Schuh)
crri@andromeda.rutgers.edu (Jeremy Guenter)

HOTEL RESERVATIONS

Sufficient Rooms are reserved at the Embassy Suites for all of the Conference participants. Participants should register for the conference by returning registration forms to Embassy Suites. Reservations must be received by May 2002. Hotel reservation forms can be downloaded from the internet at:

<http://crri.rutgers.edu/ws/>

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CANCELLATION POLICY: Until May 8, 2002 cancellation is allowed without penalty and refunds will be allowed in full. After this date, the indicated fee is due in full whether or not the participant actually attends. Substitutions may be made at any time.

Signature of Participant: _____

Abstract
15th Annual Western Conference

Cliff Rochlin
November 29, 2001

Is Electricity a Right?

The California Energy Crisis has led to finger pointing, recriminations, judicial and legislative action, and the financial ruin of two major electric utility companies. Because the political and financial stakes were so high, decisions were made quickly. However, these quickly made decisions will cloud the California energy picture for many years to come.

The basis for these decisions is political, not economic. This view is consistent with former FERC Chairman James Hoecker's observation that the changes in the utility environment in California were "a political process, not a restructuring as others, such as an economist, would do it."¹ The state deliberately chose to avoid the immediate, painful economic response - higher retail electric rates. Instead, the threat of higher electricity rates elicited political responses. Clearly, politicians always have an incentive to avoid angering the electorate. However, in market economies, commodity prices are known to fluctuate, sometimes greatly. Why intervene in electric markets and not in other markets?

When prices rise by over an order of magnitude in both the peak and the non-peak seasons, there must be a problem.² One can ask was it poor market design or is there something unique about electricity? In fact, these are the two questions that continually surface and have been addressed in the media. However, the fundamental question of electric deregulation has not been asked, let alone answered. *Is electricity a right?* That is, are consumers entitled to all the electricity they want, whenever they want it, at "just and reasonable" rates? This is the way the regulatory paradigm has historically dealt with electricity.

Providing an answer to this question leads to two distinct directions to choose from, political (regulatory) or economic. The California experience demonstrates that one cannot go in both directions simultaneously. This paper explores each direction's impact on the level of reserve requirements, the most crucial issue influencing reliability and price volatility, and the ancillary issue of cost responsibility - who pays for the reserves?

¹ Larry Levy, "The Daily Oklahoman, Tribune Business News," November 17, 2001.

² Price rose from about \$30/MWh to over \$1,000/MWh.

2002 Western CRRRI Conference Abstract

Topic: *Regulation and the Law: The Year in Review*

Presenter:

William E. Kovacic, General Counsel, Federal Trade Commission, 600 Pennsylvania Avenue, N.W., Washington, D.C., 20580. Tel. 202 326 3661; Fax. 202 326 3198; E-mail: wkovacic@ftc.gov

Abstract

This presentation will analyze the central developments in the law concerning economic regulation from July 2001 to June 2002. The survey aims to give conference participants an overview of cases and other proceedings that are shaping the legal framework of economic regulation.

Topics

Major areas for treatment in this presentation will include:

- * The Supreme Court's pending case involving the setting of interconnection rates and access conditions under the 1996 Telecommunications Act.
- * The resolution of the *Microsoft* litigation, including a discussion of remedies adopted in the proceedings in the United States and the European Union (EU).
- * The EU's decision (made in March 2001 and issued in the late Summer of 2002) involving abuse of dominance by *Deutsche Post* in the postal services sector.
- * The tensions between U.S and EU merger policy concerning "portfolio" and conglomerate effects arising from General Electric's attempt to purchase Honeywell.
- * Legislative and judicial measures involving privacy and limits on the ability of companies to disseminate or use truthful information acquired from their customers.
- * The application of bankruptcy principles to the restructuring or rehabilitation of regulated enterprises.

Format

The format will follow the approach used in presenting this survey in recent years at the CRRRI Western program. The presentation will address selected developments by describing the background of each matter and analyzing its significance. The presentation will be accompanied by source materials involving each major case discussed.

Assessing the Benefits of Real-Time

Abstract for 15th Annual Western Conference

Timothy J. Brennan
Professor, Policy Sciences and Economics
University of Maryland, Baltimore County

Commentators on restructuring have identified peak-period pricing as crucial. Without it, electricity on-peak will be unduly cheap, creating more demand for power just when the sector is least able to provide it.

Peak demand periods for electricity are not known in advance. They depend on stochastic factors, most notably weather, unexpected outages of generators, or failures in the delivery system. The stochastic nature matters because hitting capacity constraints can depend on shifts in just a few percentage points in demand. In addition, because peak periods can be just a tiny fraction of hours in the year, peaking plants have to recover their capital costs in just a short amount of time.

Because peaks are stochastic, getting users to see the right prices requires that energy rates depend on when peaks actually occur. This requires devices to measure electricity use when it is used, i.e., real-time meters.

Desirability of real-time metering, to enable peak-period pricing, need not warrant policy intervention. Meters have costs that need to be weighed against the benefits of installation. More fundamentally, one needs to identify a positive externality. How does my installation of a real-time meter benefit other users?

We examine these questions in three contexts:

1. Electricity retailers must meet peak demand by purchasing wholesale power from a competitive wholesale power industry, even if they operate at a loss.
2. Electricity retailers can ration energy (e.g., impose blackouts) when peak demand exceeds supply.
3. Wholesale power markets are subject to the exercise of market power during peak periods, but not off-peak.

Preliminary analysis shows that rationing matters, i.e., no positive externality warrants policy to subsidize real-time meters as long as electricity retailers are obliged to meet demand. Claims that real-time metering achieves benefits by increasing peak demand elasticity remain to be studied.

Industrial Customer Hourly Response to Electricity Real-Time

Abstract for 15th Annual Western Conference

Peter M. Schwarz
Professor
Belk College of Business Administration
University of North Carolina at Charlotte

and
Thomas N. Taylor
Senior Economist, Rate Department
Duke Power, A Division of Duke Energy Corporation

James E. Cochell
Senior Economist, Rate Department
Duke Power, A Division of Duke Energy Corporation

As electricity deregulation continues, there is an ever increasing need to estimate retail customer response to real-time rates that reflect volatile wholesale prices. In a forthcoming paper at Economic Inquiry, presented at the 2000 Advanced Regulatory Workshop Eastern meeting, Schwarz, Taylor, Birmingham, and Conklin, presented hourly and daily elasticities for industrial customers served by Duke Power, a Division of Duke Energy Company. The most notable part of that paper is the estimation of both short- and long-run response. Earlier papers did not differentiate, but utilities need to know how customers will respond to rates both short-run and long-run. The short-run response allows utilities to decide which plants to use today, and the long-run response indicates when it is worthwhile to add additional capacity.

The current paper disaggregates industrial elasticity response to determine elasticities within and across hours, based on a methodology presented by Patrick and Wolak in a 1997 EPRI report, and again in Pricing in Competitive Electricity Markets, 2000, in Michael Crew's Topics in Regulatory Economics and Policy series. By disaggregating response over hours, it is possible to investigate the potential for peak shifting. Another issue is whether customers respond to prices in individual hours or to the average of prices over an extended period such as a work shift. Patrick and Wolak, as well as a 1998 doctoral dissertation by Kim, use data from Midlands Electric Company of Great Britain. Our study, as well as the Economic Inquiry paper, use a new data set of Duke Power customers. But more important is that the Duke data set will contain up to eight years of data for some industrial customers, allowing separate estimation of short-run and long-run response.

Early Results from California's Real-Time Metering Implementation

Abstract for 15th Annual Western Conference

Chris King
Executive Director
American Energy Institute

In spring 2001, the California Legislature approved the spending of \$35 million to provide real-time meters to large electricity customers (above 200 kW) throughout the state. The goal was to provide these customers with the financial incentives -- via real-time pricing -- and information -- via real-time meter usage data available on the Internet -- to reduce loads during critical peak hours. This paper summarizes the status of the project, including meters installed, information provided to customers, response by customers to the meters and to the information, and related material. It covers all five major utilities (PG&E, SDG&E, SCE, LADWP, and SMUD). It sets the stage for the role of these customers and this program for the summer of 2002 in California, when available capacity has been forecast in a range from excessive (due to long-term contracts) to inadequate (due to renegotiation of those contracts and a reduction of construction activity).

**Natural or Unnatural Monopolies?
Another Examination of Large Incumbent Local Exchange
Companies**

Kent A. Currie
SBC Communications Inc.

Abstract

An important economic presumption underlying the current introduction of competition into local telephone markets is that such markets are not now, if ever, natural monopolies. Recently, Wilson and Zhou (2001) reexamined the natural monopoly issue within the context of a cost function that controls for firm heterogeneity among large incumbent local exchange companies. Their analysis suggested that, when controls for unobserved firm heterogeneity are made, local telephone markets are natural monopolies. This paper examines the robustness of their conclusions by extending their analysis in several directions. First, their data set is extended from 1988-1995 to 1988-1999. Second, various infirmities of their data set are remedied. Third, the output set used by Wilson and Zhou is expanded to include nonrecurring as well as recurring activities. Finally, because of the importance of unobserved firm heterogeneity to their results, additional firm-specific characteristics are explored, such as regulatory treatment and ownership relationships, in order to minimize the importance of the unobserved.

Wesley W. Wilson and Yimin Zhou. "Telecommunications deregulation and subadditive costs: Are local telephone monopolies unnatural?" *International Journal of Industrial Organization*. 19 (2001). Pp. 909-930.

The Next Stage of Local Telephone Regulatory Reform

Abstract: November 30, 2001

Carl R. Danner and G. Mitchell Wilk ¹

We stand at something of a crossroads regarding the local telephone market and its regulation. Five years ago the nation codified a fundamentally new direction for the industry, towards competition and away from the prior franchise monopoly. Accordingly, regulators were instructed to embrace certain transitional forms of regulation to stimulate local competition, while also phasing out regulatory legacies that would stand in the way of the new competitive world.

Since then, the report card for regulation has been decidedly mixed. Regulators have embraced transitional regulation to promote competition, but in ways that will tend only to make that regulation permanent. Few steps have been taken (particularly by states) towards phasing out regulatory legacies, including those that hobble competition. It would appear that many state officials regard ongoing political control of local telephone markets as the imperative, and view competition-promoting measures as a means to preserve their position in the center of that process. Yet, the premise and promise of local competition is precisely the opposite – that market interactions will replace political control as the basis on which the industry is organized, and responds to customer demands. The critical question for the next five years will be which of these opposing forces will prevail.

To address these concerns, this paper considers the impact of holdover regulatory requirements from the days of the monopoly, how success in promoting competition can appropriately be measured, and whether there is an end game to regulation – including proposing specific steps by which deregulation might be achieved consistent with the circumstances of today's local telephone markets.

¹ Wilk & Associates/LECG, 100 Bush Street, Suite 1650, San Francisco, CA 94104;
cdanner@lecg.com; mwilk@lecg.com.

Regulatory Failure of Market Success?

The case of the struggling Competitive Local Exchange Carrier

CHRISTIAN M. DIPPON
Senior Consultant

National Economic Research Associates, Inc. (NERA)
One Front Street, Suite 2600, San Francisco, CA 94111
E-mail: christian.dippon@nera.com

Abstract

In recent months, many Competitive Local Exchange Carriers (CLECs) have declared bankruptcy. Does the failure of these companies indicate that regulators have failed in opening the last mile to competition or are we experiencing an economic shakeout of less efficient competitors? This question has drawn heated debate in both the industry and on the political platform. Numerous failed CLEC operations blame their demise on insufficient regulation and subsequent price and non-price discrimination by the former monopolists – the Incumbent Local Exchange carriers (ILECs).

In order to establish an accurate assessment, one has to question why so many CLECs failed. Was it strictly an inability to compete with the Incumbent Local Exchange Carriers or did something else cause these failures? Equally important is the question of the economic impact these failures have on the opening of the local market. Has the market experienced a decline in competition because of these failures? This paper attempts to answer these and similar questions using microeconomic theory and basic econometrics.

The preliminary analysis indicates that although a number of CLECs went bankrupt, this appears to be primarily due to the economic slowdown and consequently lack of sufficient funding and overly optimistic and simplistic business models. This “telecom shake-out” is not an indication that local competition is flagging. Certainly, there is no indication that ILECs stand in the way of full competition. Rather, it is part of the normal working of a market, and thus market success, and a sign of the changing economic environment.

Firms entered the market with the passage of the Telecommunications Act of 1996 and instantly began acquiring subscribers and earning revenues. As more CLECs entered the market and began vying for a piece of the same telecom pie, cost reductions became necessary. However, building and maintaining a telecommunications network is costly, and many firms were unable to reduce their costs or to pass prices on to consumers. Thus, it became necessary to rely on outside funding—funding they were unable to secure. Without the capital to fuel operations and with costs rising faster than revenues, additional CLECs are likely to report difficulties or even announce bankruptcy. However, this is not an indicator of the overall health of the CLEC market, but an indication of changed market conditions. Further, even if some individual CLECs exit the local market, the remaining CLECs likely will purchase their assets and/or take over the customer base. This will strengthen the purchaser’s network and product mix; and strengthen competition. Although many CLECs have failed and others will continue to go out of business, there is no chance that competition will become ineffective or is anything less than permanent. The current shakeout, consolidations, and acquisitions should result in a CLEC industry that will be more robust and viable in the long term. In fact, competition is thriving—CLEC market share grew 93 percent over the one-year period of January to December 2000. We expect that the next generation of CLECs will be larger in terms of revenue, geographic reach, and service lines, better capitalized, able to take advantage of economies of scale and scope, and very credible with customers (such that they will enjoy a lower churn rate).

Toward A Broader Definition Of Electric Peak Load: Does California Avoided Cost Methodology Undervalue Energy Efficiency?

Robert D. Levin
Pacific Gas & Electric

Abstract

This paper examines California utility and ISO hourly electric load data, ISO reliability alert data, and market clearing price (MCP) data during the summer seasons of 1998 through 2000, as well as the California PUC's and ISO's definitions of peak load conditions. Based on these data, we conclude that the CPUC's current noon-6:00 P.M. summer peak period fails to adequately encompass those hours for which system reliability is at risk.

Further, the avoided costs of electric generation adopted by the CPUC as a primary determinant of the economic benefits of conservation and energy efficiency programs undervalue evening-hour energy savings. The current large disparity in the avoided costs between late afternoon and early evening hours is caused by the application of a multiplier to the noon-6:00 P.M. hourly MCPs, which is not applied in the remaining hours. This disparity does not have a sound basis in physical or economic reality. Summer weekday evening hours (and, to a lesser extent, late morning hours) are much more similar to the afternoon hours than they are to the late night and early morning off-peak hours, and should be treated similarly to the afternoon peak hours in the development of avoided costs.

Additionally, there is reason to believe that long-run forecasts of electric generation avoided costs are biased low because the model most often used in California to forecast MCP does not fully capture the effects of supply and demand uncertainties. Since the effects on MCP of deviations from mean supply/demand conditions are strongly asymmetric, failure to capture uncertainty in key supply/demand inputs may lead to an overly complacent forecast of MCPs. This may provide additional support for the use of MCP multipliers—further research is needed.

A 20/20 *Ex Post* Look at California's 20/20 Rebate Program

by

Kevin P. Coughlan
Advisor to Commissioner Richard Bilas
California Public Utilities Commission

In March and April of 2001, Governor Gray Davis issued Executive Orders to implement a limited-term rate reward program. The purpose of the program was to promote conservation by providing customers with a 20% discount off their electric bill for each month during the summer they reduced their consumption by 20%. The program was applicable to the high energy usage months of June, July, August, and September. Consequently, the California Public Utilities Commission in May 2001 ordered Pacific Gas and Electric Company, Southern California Edison Company, and San Diego Gas & Electric Company to commence their programs.

The California Department of Water Resources funded the 20/20 Program. By the summer of 2001, DWR was purchasing all non-utility generation for PG&E, SCE, and SDG&E. Approximately 30% of the utilities' customers benefited from the program and received rebates. Total rebates were approximately \$1/4 billion.

The purpose of this paper is to analyze the cost-effectiveness of this program on an *ex post* basis. Preliminary estimates said that the purchased price of energy would have to exceed \$0.011/kwhr in order for the 20/20 Program to be cost-effective. Wholesale energy prices during the summer were approximately ½ the break-even price.

Evaluation of SDG&E 20/20 Rebate Electric Conservation Program

Mehdi Danesh and Steve Jack
San Diego Gas and Electric

Background: California 20/20 Rebate program was implemented by Department of Water Resources for the customers of electric utilities in California to mitigate the effect of emergency energy shortage in the state of California. Under this program the customers would receive a credit up to 20% of their electric bill when the reduction in their consumption for each billing month during June through September 2001 with respect to the same month last year is at least 20%.

Abstract: This paper summarizes the results of a study conducted by SDG&E in order to get a better understanding of the impact of the 20/20 Rebate Program and the electric savings that occurred during the summer 2001. SDG&E evaluated the performance of the program under different influential factors such as weather, price variability, seasonal, economy conditions, and other customer-related programs that could create incentives for changes in consumption.

More specifically, the effect of the program on different groups of rate categories in residential, commercial, industrial, and agricultural classes were evaluated and compared. In order to quantify the impact, a frequency distribution approach on the percentage of consumption reduction in different classes of rate categories based on different service area sub-regions (such as zip codes, service city codes, and etc.) was applied. The results indicated that factors such as weather and geographical locations have significant impact on the rebate program.

The Legacy of Deregulation: where do we go from here?

Michael A. Crew and Paul R. Kleindorfer

In Crew and Kleindorfer (2001, 2002) we argued that “deregulation” was flawed because although it released the forces of competitive entry, *inter alia*, it did not remove the incumbent’s obligation to serve. The obligation remained but the ability to fund it was diminished and, in the case of electricity in California, severely compromised. In California the problems created by the deregulation were of much greater magnitude than the stranded cost problems the deregulation aimed to address. The significant problems resulting from deregulation remain and will not just go away. Nor can the processes set in motion easily be reversed. In this paper we examine some of the major problems in industries undergoing deregulation, the legacy of deregulation, and discuss ways of proceeding. The major problems include:

The obligation to serve

Probably the greatest problem facing traditionally regulated monopolies under deregulation is that, while they face competitive entry, they still have an obligation to serve. This obligation to serve is viewed in different ways in different industries and we examine it primarily for electricity, postal service, and telecommunications, but also briefly for gas and water. In the case of electricity the obligation is particularly severe for a distribution company, i.e. a company with minimal generating assets, as the risk exposure is considerable and currently very difficult to hedge. We discuss means of addressing the problem. The conclusion, that the obligation to serve has become much more expensive under deregulation, and will not become significantly cheaper, seems hard to avoid.

Stranded costs

The problem of stranded costs was a major motivating factor in the electricity deregulation in California. The problem has not gone away, and it is not restricted to electricity. USPS faces major stranded costs in the form of over \$30 billion of pension obligations.

The legacy on deregulation on entrants

Entrants will not just disappear. They have certain property rights and even entitlements that exist because of deregulation. The terms under which entrants access the incumbent’s network are still contentious. Issues of access pricing and possible further industry restructuring will be examined.

The paper will examine all of the network industries mentioned and, wherever possible, derive general principles. However, there are limits to this part of the exercise. One size definitely does not fit all.

References

Crew, Michael A. and Paul R. Kleindorfer, "Regulatory Economics: Twenty Years of Progress?" *Journal of Regulatory Economics*, 21,1, (forthcoming January 2002).

Crew, Michael A. and Paul R. Kleindorfer, "Putty-Putty, Putty-Clay or Humpty Dumpty: The Universal Service Obligation under Entry," in Crew, Michael A. and Paul R. Kleindorfer (eds), *Postal and Delivery Services: Pricing, Productivity, Regulation and Strategy*, Kluwer, 2002.

Efficient Rate Structures in Water Wholesale Markets

By Shane Chapman and Stathis Kostopoulos
Metropolitan Water District of Southern California

To be presented at the Annual Western Conference, June 19-21, 2002

Abstract

Typically, rate design at most water utilities uses bundled volumetric charges, which are based on total embedded cost of service. Such a rate structure provides a poor linkage between costs and prices, because the bundled rate makes the cost of each service invisible to water users. As a result, price signals to water users are blurred. In addition, cross subsidies abound in such a rate design because differences in customers' usage characteristics are not adequately incorporated in the bundled rate.

In light of increasing competitive trends in the water markets, MWD has developed a new rate structure that improves the incentives, equity, and competitiveness of its pricing. The new rates are based on a cost of service study that breaks down total cost into the different services provided, like source of supply, conveyance, storage, distribution, treatment, etc. The cost study identifies cost drivers, and determines what portion of each service's cost is demand-related or commodity-related. Demand and commodity charges are then designed to send the proper incentives to customers. For example, source of supply pricing includes a two-tiered structure that sends the right price signals for conservation, and growth, while it improves financial commitment to the utility by increasing fixed revenues. By unbundling rates, customer equity is greatly improved, and choice is made possible. This facilitates wheeling and the formation of a water market.

This new pricing mechanism leads towards an efficient allocation, and achieves the following objectives: Maintains the wholesaler as the regional provider of imported water. Supports cost-effective local resources development. Accommodates a water market.

The Supply Side of the Digital Divide:
Is There Redlining in the Broadband Internet Access Market?

Abstract for 15th Annual Western Conference

James Prieger
Assistant Professor
University of California, Davis

The so-called “Digital Divide” has received much attention in the past few years, both in policy circles and the popular press. The public-policy focus on the Digital Divide is shifting toward broadband Internet access. An unanswered question is whether groups lacking broadband access are deprived because broadband services are not available where they live. Some observers have charged broadband carriers with redlining, the practice of avoiding areas with high concentrations of poor and minority households.

This study explores whether redlining is present in the current diffusion of broadband. A new, nearly comprehensive broadband survey by the FCC enables study of the supply of broadband for the first time using data from the entire United States. In particular, after controlling for varying cost conditions, demand factors, and competition in local telephony, does the racial composition and income of an area affect whether broadband is available? The results contain some surprises. Income and poverty levels in an area are not statistically significant predictors of broadband availability. Among racial composition factors, only those for Native Americans and Asians have significant negative effects on broadband availability. Those for blacks, ethnic Hispanics, and other non-white races have no significant impact. More important determinants of broadband availability are demand characteristics such as age, education, commuting time to work, sex, and size of businesses in the area.

Regulatory factors are also expected to influence a firm’s decision to offer broadband access. State policies to encourage broadband deployment, resale and unbundling requirements, and other regulations all affect the expected profitability of deployment. By the time of the conference, I hope to have explored the consequences of these regulatory variables as well on broadband deployment.

Conditions for Short-term Efficacy of Price Caps

Abstract for 15th Annual Western Conference

Robert L. Earle
Principal
Charles River Associates

and

Karl Schmedders
Kellogg Graduate School of Management, Northwestern University

Price caps are sometimes used as a form of price control in order to protect consumers against putatively inequitable prices. While price caps are often considered to have deleterious consequences in the long-term by discouraging new supply, they are sometimes thought to provide relief in the short-term by limiting welfare transfers from consumers to producers. Indeed, standard oligopoly theory suggests that price caps will tend to constrain the price of a good over the short-term and increase production. Firms become price-takers when the amount produced is less than where the price cap intersects the demand function. This paper examines the theoretical conditions under which the short-term efficacy of price caps work, displays some under which they do not, and discusses their role in the wholesale electricity markets.

Regulation and Competition in Network Industries
15th Annual Western Conference

Measuring Market Power in Deregulated Electricity Markets – Theory and Application
(Abstract)

by Mursaleena Islam and Steven Ostrover (Econ One Research, Inc.)

Horizontal market power has been, and will continue to be, a critical concern for states (and countries) proceeding with deregulation of wholesale and retail electricity markets. Because of some of the distinct structural characteristics of the electricity industry (e.g., lack of storage and long lead times for new supply) as well as some of the fundamental dynamics of day-to-day operations (e.g. transmission constraints and the existence of significant daily and seasonal peaks), measuring and controlling market power within electricity markets is particularly important and challenging.

Economists have several different ways of measuring market power. They can be broadly organized within two categories – structural measures (focusing on market shares and market concentrations) and performance measures (focusing in particular on the Lerner Index, a simple and direct measure of the extent to which market prices exceed system marginal cost). As a conceptual proposition, the Lerner Index is superior to structural measures. While the latter indicates the strength of a company's position vis-à-vis its (potential) attempts to move the market (price), the latter explicitly accounts for the vulnerability of a market's static equilibrium to these types of attempts. More specifically, consideration of demand and supply elasticities (i.e., the parameters defining the sensitivity of a market's equilibrium to movements in a supply – or demand – curve) is formally incorporated within the Lerner Index. It is very often the case that these elasticities are – more than market shares and concentration – the key driver of market power within electricity markets.

This paper will explain – both conceptually and through a presentation of data from California markets – the inadequacy of structural measures for evaluating market power in the electricity industry. It will also review the history of FERC's particularly poor attempts to rely on structural measures (and will describe and comment upon FERC's recent attempts to improve its analysis in this area). The paper will also highlight the foundational difficulty in applying Department of Justice (DOJ) Antitrust Guidelines (which have been adopted by FERC) to analyze market power in the electricity industry. While DOJ guidelines focus on the notion of a sustained and non-transitory price increase (i.e. what would be expected to result from a market power rooted in a dominant structural position), market power in the electricity industry is very often opportunistic (i.e. exercisable when overall market conditions are "right") rather than persistent. The implication is that much of the existing antitrust machinery is not aligned to effectively address the particular types of market power common in electricity markets.

Finally, the paper will focus on implementation issues by discussing the difficulties in relying on performance-based rather than structural measures. While the former are conceptually superior, the empirical challenges are correspondingly greater. Although some of the general empirical difficulties may be mitigated by the unusually large amount of data available in electricity markets coordinated at least partially through power pools and transmission system operators, significant implementation challenges remain.

The Economics of California Refunds

Abstract for 15th Annual Western Conference

Carl Pechman, Power Economics, Inc.

Having found that electric rates in California were unjust and unreasonable, the Federal Energy Regulatory Commission has instituted two proceedings to determine the extent of refunds. There are a number of fundamental economic issues in these proceedings including: what is a competitive market, what is the appropriate time horizon of a spot market, what are the appropriate basis for determining a competitive market price, how should the FERC determine the scope of intent of refunds.

This paper will describe the rationale for refunds, the FERC's limitation of issues for consideration in the refund proceedings, the economic arguments that have been made in the refund cases and to the extent available a discussion of the final resolution of the level and distribution of the refunds.

Abstract for 15th Western Conference

Risk Management in Electricity Market Design

Hung-po Chao
EPRI and Stanford University
November 29, 2001

In power market design, a distinction needs to be made between public and private risks. While efficient allocation of private risks can be achieved through trading of risk management contracts (e.g. options and futures) and derivatives, the management of public risks, such as system reliability and market power, is a matter of policy decision in market design. In electricity restructuring, an efficient risk management strategy is essential to attract private capital for investment, support efficient spot markets, and manage supply shortages under extreme conditions. However, the design of an effective risk management strategy is complicated by three factors: 1) long investment leadtime, 2) non-storability of electricity, and 3) an asymmetric information structure. Further, the separation between public and private risks is difficult statistically because they both contribute to the price volatility that is commonly observed. Following a close examination of risk management issues, we conclude that a broadly consistent, albeit imperfect, strategy for public risk management is essential to ensure adequate investment and a workable spot market. The California energy crisis in 2000 can be interpreted as a consequence of lacking a consistent, comprehensive risk management strategy in market design.

Challenges in Designing Default Retail Electric Service

John L. Jurewitz
Manager, Regulatory Policy
Southern California Edison Company

A key question in any state's electricity restructuring plan is whether some form of retail power service should continue to be offered on a regulated basis under certain conditions to at least some customers. This question is both a short-term (i.e., transitional) as well as a long-term question (i.e., post-transitional). So far, in every state adopting retail electricity competition, utility distribution companies have been required to offer retail services of some sort on a continuing regulated basis at least during a transition period.

The terms of continuing default service in the electric power industry is especially problematic because it can stifle the development of retail competition. The usual political motivation for requiring some continuing form of default service is to protect consumers. However, if this service is too protective, it can inhibit the development of retail competition. This dynamic can easily become a self-justifying circle. Specifically, the default service obligation cannot be removed until there is development of ample competitive retail alternatives, but these competitive alternatives will never develop as long as default service is too attractive.

Furthermore, default service responsibilities can present the utility with substantial uncompensated risks involving inconsistencies between the terms of power procurement contracts and the obligations (or lack thereof) of customers to purchase power from the utility for comparable lengths of time. In short, there needs to be some reasonable consistency between the obligations placed on utilities to procure power for their default-service customers and the corresponding commitments of customers to purchase power from the utility. Sometimes these rules are referred to as customer switching rules.

This paper will explore these issues, attempt to delineate some alternative frameworks, and make some public policy recommendations.

Issues in Risk Management for Distribution Companies

Jeremy Bloom
Primen
3412 Hillview Avenue
Palo Alto, CA 94304
650-855-2796
jbloom@primen.com

In the regulated electricity industry of the past, vertically integrated companies generally handled three major functions – generating power, coordinating generator dispatch and bulk power transmission to load centers, and distributing power to end-use customers. However, as the industry restructures, these functions are increasingly performed by separate corporate entities, and new entities are making their appearance – power marketers and brokers, power exchanges, and retail energy services providers. Some of these functions are now governed more by competitive markets than by regulation, particularly power generation and power marketing. These changes have created significantly different patterns of risks and rewards for the participants in the industry. In particular, regulated distribution companies face many risks that differ significantly from those encountered prior to restructuring.

This paper describes an analytical framework for managing the risks faced by distribution companies in their role as energy providers and demonstrates the use of tools that address these novel sources of risks.

The paper briefly discusses the types of risks that distribution companies face. It then discusses the types of contracts that are being put in place between retail energy providers and their customers. The paper presents illustrative examples, using EPRI's Product Mix model, demonstrating the kinds of risks these contracts place on the parties. Finally, it discusses the role of risk management tools on the customer side, interruptible rates, load management, and on-site generation.

The examples illustrate the differences in risks among traditional flip-the-switch service, forward contracts, and real-time pricing. In summary, contracts tend to allocate risk in asymmetric fashion. Those with low risk for the supplier tend to have high risk for the customer and vice versa. Thus, flip-the-switch and forward contracts for a large portion of the demand tend to have the lowest risk for customers and the highest for the supplier. Real-time pricing and forward contracts for a small portion of the demand tend to have the highest risk for customers and the lowest risk for the supplier. Customers with more volatile demand tend to incur higher risk and to impose higher risk on the supplier.

The paper closes with a discussion of needs for further research on these risk issues. In particular, describes the tools needed in order to analyze the risk management opportunities afforded by load management and related, customer-side options.

ABSTRACT

Measuring and Mitigating Market Power in Electricity:
How Superior Is Supply Margin Analysis?

Robert J. Michaels
California State University, Fullerton

Over the past year, the Federal Energy Regulatory Commission (FERC) has formulated (and is in the process of implementing) important changes in its methods for measuring market power that will apply to new applications for market-based wholesale electric rates, and in all likelihood also to mergers. Subject to motions for rehearing and the outcome of a generic rulemaking, FERC intends to abandon its Hub-and-spoke analysis of short-term energy supply and generation capacity that relies heavily on measures of supplier concentration such as the Herfindahl-Hirschman Index (HHI) and the existence of certain barriers to entry. In its place the Commission will use a Supply Margin Assessment (SMA) to determine whether an applicant is pivotal. After calculating the difference between available capacity (net of other commitments) and peak demand in the relevant market (the supply margin), the Commission will deem an applicant for market-based pricing as pivotal if its holdings of capacity exceeds the market's supply margin.

The Commission has thus far produced no rationale for the switch in methods other than an assertion that changes in the vertical structures and horizontal scopes of wholesale markets have rendered its old standard obsolete. According to FERC, its old methods worked reasonably well (Docket Nos. ER96-2495-015, et al, Nov. 20, 2001) but will do so no longer. The old HHI screen has some theoretical linkage (and possibly some empirical support) with the likelihood of collusion and the potential size of deadweight loss in more concentrated markets. The SMA, as best can be determined from preliminary modeling, has no qualitative association with the likelihood of harm to competition. The neglect of competitor reactions and the typical applicant's ability to shift between short-term and long-term transactions allows the construction of plausible cases in which an applicant whose capacity is below the market's supply margin may have greater ability to influence price than one whose capacity exceeds it.

FERC has thus far been reluctant to move in the direction of detailed consideration of the competitive effects of long-term contracts and the revision of their terms ex post. The Commission's new policy, if implemented as planned, will probably necessitate expansion of the scope of its market power mitigation policies beyond short-term energy into markets it has hitherto viewed with benign neglect. In the process, the adoption of an SMA policy may adversely affect other important restructuring initiatives. Most important of these is the Commission's push for a small number of regional transmission operators that cover the country and the concomitant pressure for uniformity of short-term market institutions in order to eliminate the seams between these areas. In this more integrated world, an SMA-based standard for market power will not be obviously superior to an HHI-based standard, and may further impede existing FERC policies to encourage the movement of transactions out of short-term markets.

Reserve Margin Requirements Necessary to Promote Workable Competition

Anjali Sheffrin, Ph.D.
Market Analysis, CAISO
Revised, December 1, 2001

Abstract

Experience in the deregulated energy market in general, and California's specific experience since the summer of 2000, indicates that a sufficient level of capacity reserve is a critical factor in reducing the possibility and extent to which electricity generators can exercise market power. The purpose of this study is to address the following question: What is a sufficient level of reserve margin in California to ensure a *workably competitive market*, i.e., to ensure that the average price of energy is reasonably close to the average price that would result in a *competitive market*?

To analyze the impact on prices from the exercise of market power and to project future impacts on market prices, the DMA developed a key indicator of market power based on the structural characteristics of the wholesale power market. This indicator, the "Residual Supply Index" (RSI), is a measure that indicates whether the largest seller in a particular market is pivotal in the sense that total market demand could not be met absent that seller's supply:

$$RSI = (Total\ Supply - Largest\ Seller's\ Supply) / (Total\ Demand)$$

An RSI value less than 100 % would indicate that the largest supply is pivotal and thus would have the ability to set the market clearing price. When RSI is marginally higher than 100%, the largest supplier, or a few of the large suppliers jointly, still have significant market power. Our study indicates that only when RSI is significantly above 100% (usually at 120% or more) will market outcomes be fairly competitive.

To translate the findings on RSI into reserve margins, we undertook several simulations. We used actual data from the California energy market between November 1999 to October 2000 to perform a regression analysis involving System Load, RSI, and price-cost markup¹. We then determined how much additional competitive generation must be added to the market to ensure a price-cost mark-up below 10%. To account for seasonal and time of day variations, the data was separated into four categories, namely, May to October (Peak & Off-Peak Hours) and November to April (Peak & Off-Peak Hours) and separate regressions were done for each period. Once this relationship was estimated based on historical base year data, we simulated the effects of new capacity on prices in the market. As explained above, any new capacity from **competitive** suppliers will increase the RSI and lower price-cost mark-up, thus producing lower prices in the marketplace.

¹ In our regression analysis we used the Lerner Index that is defined as $(market\ price - competitive\ marginal\ cost) / market\ price$. This simple transformation of the price-cost mark-up into the Lerner Index allows us to estimate a linear relationship between the Lerner Index and the RSI, whereas the original relationship between RSI and price-cost mark-up is highly nonlinear. The transformation is simple since the price-cost mark-up is defined as $(market\ price - competitive\ marginal\ cost) / competitive\ marginal\ cost$, so we can use $price-cost\ mark-up = Lerner\ index / (1 - Lerner\ Index)$.

We found that for the period November 1999 to October 2000, the average annual price-cost mark-up was 58.6%, and the reserve margin at the peak hour (hour 16 of August 1, 2000) was 2%.

In order to limit the average annual price-cost mark-up to 10% in the future, we must add new competitive generation capacity (not owned by the existing generation owners). With the historical load and generation patterns observed during the study period, an additional amount in the range of 5,050 MW to 7,500 MW of new competitive dependable supply must enter into the market to ensure a competitive market outcome. With the added capacity, the reserve margin would be in the range of 14% to 19% for the peak load hour. We note this supply of reserves can come from a variety of sources including price-responsive demand under real-time meters, interruptible and curtailable loads, or new generation with the necessary transmission upgrades necessary to make them available to the larger market. Our findings were borne out with the California market experience of Summer 2001, where dire predictions of shortages did not occur. Due to the aggressive conservation efforts by California consumers of 3,000 – 5,000MW, large amounts of existing generation under an obligation to supply under long-term contracts and new generation additions of 2000 MW, spot market outcomes were considered fairly competitive in the summer of 2001.

Some Costs of Reliability Limits on Electricity Trade

Abstract for 15th Annual Western Conference

Doug Hale
Energy Information Administration
Department of Energy

To ensure that the electrical grid will continue to operate even when generators and lines fail, electricity system managers restrict power flows between areas to levels below the physical capability of the lines. Electricity traders have complained that these safety margins, which are formalized in area interchange limits, can preclude profitable trades. Line limits can also protect local markets from outside competition. This paper quantifies some of the costs of area interchange limits constraining power flows between areas in the Eastern Interconnect in the summer of 2000. Recognizing the hidden costs and competitive effects of line limits is a prerequisite to achieving reliability goals at least cost.

Recent Developments in Simultaneous Auctions: Clocks Auctions

David Salant
NERA

Over the past half dozen years, simultaneous ascending or simultaneous multiple round (SAA or SMR) auctions have been used for allocating spectrum rights, and more recently assigning electricity contracts, such as Power Purchase Arrangements (PPAs) in Alberta, energy entitlements in Texas, PPVs in France and most recently Basic Generation Service contracts in New Jersey. There have been many modifications to the SMR auction format since it was first developed by Preston McAfee, Paul Milgrom, and Bob Wilson and first adopted by the FCC in 1994. Perhaps one of the more significant changes in the SMR design has been the Clock Auction. This was used in New Jersey for the procuring BGS contracts, in France, and elsewhere. The clock auction is much simpler to run than the original SMR format and has some added benefits. However, it does have limitations. Here I discuss these benefits and limitations.

Valuation of Previously Auctioned Properties: A Hedonic Approach to Valuing Radio Spectrum

Abstract for 15th Annual Western Conference

Gregory M. Duncan
National Economic Research Associates

The purpose of this paper is estimation the likely price a block of spectrum in a geographic area would likely bring in were it auctioned, or reauctoned in the event of a default. Using data from previous auctions I am able to estimate the valuations of the winning and sometimes the highest losing bidders for each license in the auction. Using an assumption that the bid will be no higher than the value to the bidder I am able to construct a probability model for the value for the license as a function of the characteristics of the license, the characteristics of the bidder, the characteristics of the market and characteristics of other bidders. The model allows maximum-likelihood analysis and also allows me to test certain independence and affiliation assumptions made in the literature.

Cost of Capital: Next Steps to Getting It Right

*By Ron Knecht, MS, JD & PE
Howard Hirsch, MA
Bill Stanley, PhD & JD
Nevada PUC*

DRAFT Abstract: Cost-of-service rate regulation has been displaced to some extent by other regulatory paradigms, but it will continue to be a staple of utility regulation. Hence, it's time to get it right. With many regulators relying at least in part on CAPM and other risk-premium models, as well as on the still-dominant DCF approach, we address the basic major issues in return-on-equity modeling and cost-of-capital determination:

1. The DCF model is overwhelmingly driven by the “g” variable, or growth rate. Regulatory proceedings are replete with a priori and ad hoc advocacy for various sources and methods for estimating it – but almost no reference to the track records of the various sources and methods, a consideration that should carry great weight in choosing among them. We investigate the track records and find that projected earnings growth rates have by far the poorest record and that there is clear reason to suspect systematic bias in them that explains their poor track record. Retention-ratio (sustainable-growth), time-trend and direct dividend growth rate estimates have much better track records, as well as sound logic.
2. DCF g values are developed typically for a period of five years, a period that often reflects intermediate-term disequilibria instead of the long-term steady-state value required by the simplistic single-stage models so widely used. Multi-stage models (typically three-staged) are quite practical and can be used to test and replace as necessary single-stage models. We test them, and show that single-stage models are no longer reasonable, and that the alleged problems or shortcomings of multi-stage models are quite trivial in comparison.
3. Determining market risk premia for CAPM models and other specific risk premia for other RP methods from historical data in the manner normally done gives false values – not due to any flaw or problem in the CAPM and other RP methods, but strictly due to the data manipulations to estimate these parameters. That is, if one knew that perceptions of risk were decreasing (increasing), then one would expect associated stock prices to increase (decrease) – but when increases (decreases) in stock prices are observed, estimated risk premia based on them are taken to reflect increases (decreases) in risks! We explain and illustrate this problem, and are forced to conclude that these modeling approaches, elegant and often compelling in theory, are not at this time tenable in regulatory practice because the basic input variables cannot be reliably quantified.
4. [We have recently begun to isolate other technical – statistical – problems with RP estimates, with various facets. We have not settled yet on a characterization of these problems or conclusions concerning them, but we expect to do so before this abstract must be finalized – and thus we tentatively reserve this point.]

5. Some literature has suggested that, considering a stock market as a whole, there is regression to the mean value of 1.0 for CAPM betas over time, leading some practitioners to adjust raw betas in anticipation of such a trend appearing in the future for regulated firms. Nothing in theory supports or opposes this practice and there is some controversy concerning the alleged market-wide trend anyway. Moreover, even if the regression-to-the-mean trend does in fact characterize the stock market as a whole on a continuing basis, nothing in logic or mathematics requires it to apply to any particular firm or industry – and there well may be reasons it will not characterize some of them. Because they originate in empirical analyses of the stock market as a whole, this claim and practice should be investigated empirically for the industries and firms to which one proposes to apply it. We do so and find not only no basis for it, but instead a trend away from the mean, as well as strong affirmative reason to believe there will be no regression to the mean for franchised regulated firms.
6. Traditionally, a major part of the gaming of return-on-equity regulation has been the use of screening variables to determine sets of allegedly comparable firms. We show that this practice is unnecessary and unsound in various ways; in our view it survives merely due to its gaming value and it should be eschewed specifically for that reason.
7. With divestiture and vertical dis-integration of regulated industries, much speculation and many claims have been advanced concerning the relative risk levels of various sectors of previously integrated regulated industries – e.g., generation versus transmission versus distribution of electricity. We address this issue both empirically, finding little basis for such claims. Moreover, there is substantial analytic basis to believe there is little if any risk differential and that regulatory regime, not the industry involved, determines the cost of common equity.
8. Finally, traditional regulation has estimated the required return on equity in a vacuum and then used this estimated value to determine the weighted average cost of capital, without sufficient attention to the relationship between the allowed return on equity and the capital structure. The Modigliani-Miller theorem has been shown to apply to cost-of-service-regulated firms, as well as to others, and it holds that the WACC is the constant value, with the cost rates for debt and equity varying as functions of the capital structure – so traditional regulatory treatment needs to be modified to reflect these facts. Moreover, we show that the M-M constancy of the WACC also implies the constancy of the rate of return on rate base, and this fact yields a straightforward method for comparing and reconciling varying ROEs associated with different capital structures.

Is the CAPM a Biased Estimator of Market Risk?

By L. Jan Reid

California Public Utilities Commission

ABSTRACT

The Capital Asset Pricing Model (CAPM) is often used to determine an appropriate return on equity for regulated utilities. However, the CAPM will sometimes produce unrealistically high or low results during times of excess market volatility. I hypothesize that these unrealistic results do not indicate a failure in the model itself. Instead, they are caused by the traditional implementation of the CAPM and the underlying definition of risk used by many financial theorists.

My paper uses 1993-1997 data to provide an empirical comparison of betas generated in a manner consistent with the capital asset pricing model (CAPM betas) to betas generated using a method based on market losses (“Alternative Betas”). I use psychological literature and a mathematical example to show that when a loss-based notion of risk is used, only those observations in which the market declines constitute market risk; and that the CAPM is a systematically biased estimator of market risk because variability of gains receive the same weight as variability of losses.

Harry Markowitz (1952) established the principles of diversification and risk reduction that form the basis of the Capital Asset Pricing Model (CAPM). The model itself was developed in a series of separate articles by Sharpe (1964), Lintner (1965a), and Mossin (1965). The CAPM beta estimates the effect of a change in the market on the value of an asset or group of assets. Beta is typically calculated (Damodaran 1997, p. 129) by using ordinary least squares (OLS) and regressing stock returns (R_j) against market returns (R_m). The CAPM regression equation is $R_{jt} = \alpha + \beta R_{Mt}$, where α is the constant term, R_{jt} is the single-period return of portfolio j in period t , R_{Mt} is the single-period return of the market in period t , and β is the coefficient of market returns.

In the CAPM world, there are only two types of risk: market risk (measured by beta), and firm-specific risk; with the assumption that only market risk will be rewarded since firm-specific risk can be diversified away. The CAPM assumes that the market is mean-variance efficient; predicts that the constant term will be 0; and predicts that a security's risk premium is proportional to both beta and the risk premium of the market portfolio (Bodie, 1996). Mathematically, the risk premium is equal to $\beta[E(r_M) - r_f]$, where r_M is the market return and r_f is the risk-free rate.

The major defense of mean-variance analysis (on which the CAPM is based) has been provided by Paul Samuelson (1970) in his “Fundamental Approximation Theorem.” Samuelson argued that “mean and variance are equally important, and we can overlook all other moments without harm”

(Bodie *et al.* 1996, p. 161). In other words, higher moments (such as skew and kurtosis) have no effect on an investor's portfolio choice.

In the 30 years since the initial publication of the CAPM, there have been numerous criticisms of the model in the financial literature. Studies have suggested that the CAPM is not testable because the composition of the true market portfolio is unknown (Roll, 1977); the constant term is positive and significant (Miller and Scholes, 1972); the estimated risk premium is significantly lower than the actual risk premium (Black, Jensen, and Scholes, 1972); non-systematic risk has a significant effect on excess returns (Lintner, 1965b); and the expected return-beta relationship is not fully consistent with empirical observations (Fama and MacBeth, 1973).

My paper pursues another criticism of the CAPM: the CAPM is a systematically biased estimator of market risk, because the calculated betas do not properly account for the actions of risk-averse investors. I redefine “risk” based on the results of behavioral studies; show the approximate amount of bias in the estimation of standard CAPM betas; and use a loss-based definition of risk to develop an “Alternative Beta.” I then use an EGARCH (1,1) model to empirically estimate the effects of both the CAPM beta and the “Alternative Beta” on portfolio returns.

I collected a sample composed of weekly data on 2,000 stocks (and the S&P500 index), calculated CAPM betas from a previous period, and grouped the stocks into 100 portfolios based on the calculated betas. The first portfolio contains stocks with the lowest betas, and the 100th portfolio contains stocks with the highest betas. Next, four sets of Alternative Betas were calculated using different definitions of loss.¹

Finally, a cross-sectional regression was run (for each of the four definitions of loss) to attempt to determine if the Alternative Beta was a better predictor of the average return of a portfolio than the CAPM beta. The results of my study indicate that the “Alternative Beta”, calculated using a loss-based definition of risk, is a better estimator of market risk than the CAPM beta, which is calculated using a definition of risk based on the variability of returns. The EGARCH(1,1) estimates indicate that when both betas are included in a single equation, the Alternative Beta has a significant² effect on portfolio returns, and the CAPM beta has an insignificant effect.

My study suggests that portfolio returns (and therefore the appropriate return on equity) can be best determined by the “Alternative Beta”; and by higher moments such as skew and kurtosis.

¹ The four different definitions of loss used in this study are: negative deviations from 0, negative deviations from the U.S. treasury bill rate, negative deviations from the U.S. inflation rate, and negative deviations from the expected return of the market $[E(r_M)]$. Expected return is defined as the weekly average of the 12-month returns of the S&P 500 index.

² A coefficient is assumed to be significant if it has a significance level of 0.05 or less.

A Yardstick Competition Model For Performance-Based Regulation Benchmarks

Abstract Submission to
Center for Research in Regulated Industries
Rutgers University
For
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*Larry Blank, Principal
TAHOEconomics, LLC
LBlankT1@aol.com*

Abstract

The research begins with the development of a regression model for utility expense categories. Parameter estimates are derived from cross-sectional data taken from different electric distribution utilities. Explanatory variables in the model are chosen to control for variation in utility characteristics that affect costs (e.g., number of customers, energy consumption, peak system demand, circuit kilometers, plant in service, etc.). The estimated econometric model then provides predicted values for expense categories that may be used for two practical purposes. First, in the true sense of yardstick competition, the model's predicted values for expenses may serve in the regulator's evaluation of expenses for individual utilities to identify abnormally high levels that require additional investigation and possibly in the determination of reasonable costs. Second, the model's predicted values for expenses may serve as benchmarks for performance-based regulation. In addition to its practical purposes, the model also allows for a new academic evaluation of the nature of a distribution utility cost function.

With 141 electric distribution utilities, the Republic of the Philippines offers a unique opportunity to fully develop an econometric model for evaluation of utility expenses and to establish benchmarks for performance-based regulation. Furthermore, the Electric Power Industry Reforms Act of 2001 requires the filing of rate applications by all distribution utilities in an unbundled form by December 26, 2001. These simultaneous filings, using a common 2000 test year, provide a consistent source of detailed cross-sectional expense data used for the dependent variable(s) in the econometric model as well as current utility characteristics used as explanatory variables. Given the presence of both privately owned electric utilities and electric cooperatives in the data pool, the model also allows for an assessment of cost expectations under these two alternative organizational forms and past differences in the regulatory treatment of each type.

Demand for Local Telecommunications Network Access: 1970-2000

Christopher Garbacz
Mississippi Public Utilities Staff
P. O. Box 1174
Jackson, MS 39215-1174
E-Mail: Chris.Garbacz@psc.state.ms.us

Herbert G. Thompson, Jr.
Public Utilities Commission of Nevada
1150 E. William Street
Carson City, NV 89701
E-Mail: HThompson@puc.state.nv.us

Abstract

Our most recent telephone demand study (Garbacz and Thompson, May, 2002 – forthcoming) used state decennial census data across time that allowed the inclusion of long distance price and increases the variation in the standard variables (Studies using pooled FCC penetration data are suspect due to large standard errors in the sample.) Time-effect dummy variables controlled for unobserved shifts in the data. Given that these dummy variables pick up some of the effect of the long distance price, as well as other unobserved effects, their estimated impact was relatively small. Robust model results lead to the conclusion that price and income elasticities decline through time. Furthermore, we found that while subsidized penetration is more effective for targeted than untargeted programs, the cost per year of adding a household to the network is very high in either case (for 1990 about \$5368 for untargeted; and for targeted \$191 in 1990 and \$1581 in 1998).

In this study, we extend our model with additional Census data for the year 2000, and assess the impact of variables representing new technologies that may directly impact the demand for network access, such as wireless telephone, Internet and cable TV. These technologies represent important new competitive and complementary relationships with the existing telecommunications network. Furthermore, the recent major expansion in Lifeline and Link-up Programs can be assessed. Universal service issues and other public policy issues can be addressed with this new, expanded model.

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A Recent Development in Telecommunications Demand Estimation and Forecasting

ABSTRACT

Yasuji Otsuka,
(PUC of Nevada)

While economists are typically reluctant to use a demand study for forecasting purposes, it has been used often under certain conditions: the market is relatively stable; and the forecasting is limited within a reasonable time frame. However, such conditions are increasingly unattainable in a dynamic industry such as the telecommunications industry. When a researcher embarks on a demand estimation study for an existing (or group of) telecommunications service(s), she must rely upon available data, based on the industry structure in which the investigated service is available. However, it is becoming rare that the market she studies remains the same even for one year. More likely, the market will have new applications and/or services, which have not been considered in her study, but may be replacing or complementing (the group of) services she has studied.

There has been another line of study, which focuses more on broadband demand. For instance, a recent paper by Lanning, O'Donnel, and Neuman proposes an alternative approach to the study of telecommunications demand and forecasting. Instead of estimating the demand for existing or foreseeable individual services, they propose to estimate aggregate demand elasticity.¹ They argue that "the positive feedback loop of technology-driven price decreases and high-elasticity demand will quickly make it possible to base forecasts on bandwidth elasticity alone." Though their paper is at the stage of formalizing models, but it appears promising.

In this paper, I survey the existent traditional telecommunications demand studies, in particular attention being on the dichotomy of demand estimation and demand forecasting. I also survey the new approaches, represented by the above study, that appear to emphasize the forecasting side of telecommunications demand estimation. The paper should shed some light on a more productive demand studies in the telecommunications study.

¹ The paper, "A Taxonomy of Communications Demand," was presented at the 1999 Telecommunications Policy Research Conference, Alexandria, VA, Sept. 27th, 1999.

Costs, Efficiency, and Heterogeneity in the Telephone Industry:

Stochastic Cost Frontiers of Local Exchange Carriers

By

Jeremy Zhou

Department of Management and Economics

Aomori Public College

Aomori City, Aomori 030-01

JAPAN

And

Wesley W. Wilson

Department of Economics

University of Oregon

Eugene, Oregon 97405

Recent research has suggested that there are significant and unobserved across firms in producing telephone services. This research estimates cost functions, using traditional specifications, but incorporating controls for differences across firms that are not observed by the econometrician. Introduction of these controls has a tremendous effect on measures of scale and subadditivity of costs. Such controls, however, can be accounted for theoretically by differences in the technology used by firms or by differences in relative efficiency. In this research, we employ a model of cost consistent with unobserved heterogeneity and use an approach that allows differences in relative efficiency. Specifically, we estimate a translog cost function with controls for unobserved heterogeneity *using a stochastic frontier approach*. This approach allows a direct test of whether firms' technologies are different and also allows direct estimation of relative efficiency at the firm level.

A California Conundrum: Tradeoffs Among Rates, Reliability and the Environment
During California's 2000-2001 Energy Crisis

David Gamson, California Public Utilities Commission¹

Abstract for Western Conference
Center for Research in Regulated Industries
June, 2002

The 2000-2001 California energy crisis was a public policy problem of huge complexity and scope. Once considered a national and international electric restructuring model, the California system veered far off course in 2000 and 2001 as demand increases, supply shortages, a poorly designed market and abuses of market power led to exorbitant wholesale electricity prices and ongoing threats of blackouts. The purpose of the paper is to consider actions of policy makers that were undertaken in 2000 and early 2001 to address policy objectives of rates, reliability and the environment within the context of the unfolding energy crisis. The paper develops a theory of how tradeoffs between these three objectives can be addressed in a crisis. Next the paper examines the actual behavior of policy makers as they developed and implemented various programs to fix or limit the consequences of the electricity crisis.

The paper concludes that, while policy makers attempted to attain improvements in each of the areas of reliability, rates and the environment back toward pre-crisis levels, their actions prioritized improved reliability over low rates and environmental improvement, and prioritized the low rates over environmental improvement. Based on information and predictions available at the time, policy makers' choices reflected the expected level of degradation of each objective: policy makers believed reliability would suffer more than rates might increase and more than the environment would degrade.

¹ The opinions expressed herein are solely those of the author, and do not necessarily represent the views of the California Public Utilities Commission, the State of California or anyone else. I am solely responsible for all errors and omissions.

A Cross-Market Analysis of the Performance of U.S. Electricity Markets.

Abstract for 15th Annual Western Conference

James Bushnell, Erin Mansur, and Celeste Saravia
University of California Energy Institute

Underlying the current debates over the appropriate organization of the electricity industry and its wholesale markets is a need for metrics that allow for comparisons of the markets that are already operating. One such metric is provided by competitive benchmark analysis. The basic idea behind a competitive benchmark is to estimate the price that would result if no firm attempted to exercise market power and compare it to observed market prices. In this paper we examine benchmark estimates from the PJM, New England, and California electricity markets. We test for indications of the extent to which various underlying structural and regulatory factors are contributing to the differences in market performance.

Abstract for Rutgers Western Conference to be held June, 2002

Merchant Transmission, Market Failure, and the Uneasy Interplay Between Regulated Providers of New Transmission and Unregulated Providers of New Generation

By Mark Reeder
New York Public Service Commission
November 30, 2001

- I. Generation and transmission are substitutes
- II. The Economics of Market-Based Provision of new transmission
 - a) Value lies in the price differential between the low cost and high cost markets connected by the new transmission. Market based transmission's revenue stream is derived from these geographic price differentials, via Transmission Congestion Contracts (TCCs) or Firm Transmission Rights (FTRs)
 - b) Revenue stream driven by the marginal value of the last MW of transmission added.
 - c) Future stream of revenues is very risky since price differentials can be very unstable (new generation additions on the high cost side of the constraint, other transmission additions, changes in fuel prices).
- III. Market Failure – Theory and Practice
 - a) In theory, market failure of transmission provision can be easily shown to be a problem.
 - i. Lumpiness (scale economies) can cause the marginal value of transmission to lie well below its average value, depressing revenue stream.

- ii. All parties on high cost side of constraint benefit from new transmission, even those that did not build the new line (public good aspect).
 - iii. Market failure problem not solved by coalitions that build a line.
 - b) Identifying market failure in practice is very difficult due to the large role played by risk assessment.
 - i. If a transmission project that appears to be economic to society on an expected value basis goes unbuilt, is it market failure, or proper risk aversion?
- IV. The Dangers Associated with a Mixing of Market-Based Provision of New Generation with Government-Induced Provision of New Transmission.
- a) Biggest risk to a builder of new generation in a high cost market is the addition of new transmission that increases the links to lower cost markets.
 - b) Potential for government – induced transmission that is not based on proper economics/risk analysis can be a large threat to a new generation provider.
 - c) Optimal location decisions of new generation entrants is one of the key benefits of deregulation, but it could be compromised by fear of poor transmission addition decisions.
 - d) On the other hand, the very real possibility of under-building of transmission due to market failure can be highly sub-optimal as well.
- V. Guidelines for a decision by Government (the Regulated T & D Company), to solve market failure in transmission by building a new line on a cost of service basis.

- i. Show that line is economic from societal perspective, given risk.
- ii. Show that incentives facing market based providers are distorted in a way that causes a bias against building the line, e.g., lumpiness of line which depresses its marginal value.
- iii. Conclude that market has been given sufficient time to act, before initiating a cost-based initiative to build the line.

VI. Policy Options

- a) “Just say no” to cost-of-service based provision of transmission.
- b) Cautious reliance on cost-of-service provision of transmission where market failure is convincingly shown to have occurred. I conclude that this is better than “just say no” approach.