

Advanced Workshop in Regulation and Competition
30th Annual Eastern Conference

Skytop Lodge, Skytop, Pennsylvania, May 18-20, 2011

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

- Policy and Regulatory Issues
- Postal and Telecommunications
- Market Structure & RTOs
- Performance & Reliability
- Demand Response

Who should attend:

- Industry Economists, Attorneys and Consultants
- Marketing and Regulatory Managers
- Regulatory Commission Staff

Dinner Speakers:

William Levis, President & Chief Operating Officer, PSEG Power
Dave Lobach, Chairman & Chief Executive Officer, Embassy Bank

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WEDNESDAY, MAY 18, 2011

- 3:00 - 4:00 Registration *Pine Room*
- 4:00 - 6:00 Welcome to Conference: Michael A. Crew *East Laurel Room*
Michael A. Crew & Paul R. Kleindorfer: The Contribution of the Journal of Regulatory Economics
James Cooper & William Kovacic: Behavioral Economics: Implications for Regulatory Agency Behavior
Jeffrey T. Macher & John W. Mayo: The World of Regulatory Influence
- 6:00 - 7:00 Cocktail Hour *Inn Lounge*
- 7:00 - 9:00 Dinner & Keynote Speech: **Dave Lobach, Chairman & CEO, Embassy Bank** *Lakeview Dining Room*

THURSDAY, MAY 19, 2011

- 8:00 - 9:40 **Concurrent Sessions**
- | | |
|---|---|
| MODERNIZING POSTAL SERVICE <i>West Laurel Room</i>
Chair: Robert Curry
Discussants: Antoinette Crowder & Robert N. Sidman
Emil J. Dzuray Jr., Han Dinh, J. Otis Smith & Jennifer Bradley: Evaluating Electric Vehicles for the U.S. Postal Service
Mohammad Adra & Renee Sheehy: A Framework for Optimizing and Modernizing the U.S. Postal Service Retail Network
William C. Miller: Linking Service Quality with Price Caps: the Postal Service Case | REGULATION <i>East Laurel Room</i>
Chair: William Deehan
Discussants: Alan E. Finder & Tom Frantz
Eric Ackerman: Alternative Regulation: What it is, and why it is Vital for Investor-Owned Electric Utilities and Their Customers
Collin Cain & Glenn George: Beyond Nuclear Loan Guarantees
Jeff D. Makhholm, Agustin J. Ros & Meredith A. Case: Total Factor Productivity & Performance-Based Ratemaking for Electricity & Gas Distribution |
|---|---|
- 9:40 - 10:00 Coffee Break
- 10:00 - 11:55 **Concurrent Sessions**
- | | |
|---|--|
| POSTAL REFORM <i>West Laurel Room</i>
Chair: John G. Callan
Discussants: Stephen DeMatteo, J.P. Klingenberg & Marc Smith
Claudio Lucarelli & Rick Geddes: The Effects of the Postal Accountability & Enhancement Act of 2006
Jessica Dauer Lowrance & Gregory Dawson: Rationalizing Postal Costing for the 21 st Century
Robert A. F. Reisner & Lawrence G. Buc: Anticipating the Reform Debate: How Will the Trajectory of Postal Reform II Be Guided by the Consequences of the First Round | ADMINISTERED MARKETS <i>East Laurel Room</i>
Chair: David Lamont
Discussants: Joseph Cavicchi & Mario DePillis
William Hogan: Transmission Benefits and Cost Allocation
Richard D. Tabors & Robert Stoddard: When Assumptions Turn Out to be Wrong: Peak Energy Rent Regulation in ISO NE
Jeffrey W. Mayes, Joseph Bowring & Howard Haas: Strengthening Market Monitoring & Market Power Mitigation in the Organized Wholesale Electric Markets |
|---|--|
- 11:55 - 1:00 Lunch *West Windsor*
- 1:00 - 2:30 **Concurrent Sessions**
- | | |
|---|---|
| NATIONAL CONNECTIVITY <i>West Laurel Room</i>
Chair: Peter Jacobson
Discussants: Gene Del Polito & Timothy J. Tardiff
David Asher, John Callan & Bruce Marsh: Bridging the Digital Divide: Expanding the Postal Platform
Victor Glass & Stela Stefanova: Economies of Scale for Broadband in Rural United States
Michael Ravnitzky & J.P. Klingenberg: Government Use of the Postal System: A Valuable USO Component | PRICING <i>East Laurel Room</i>
Chair: Dale G. Schoenberger
Discussants: Peter Cappers & Glenn Meyers
Richard E. Schuler, Jr.: Back to the Future, Time of Use Pricing Pilots in New York
Andrew Kleit, Alina Mackenthun & Anastasia Shcherbakova: Bidding for Electricity Contracts in Pennsylvania
Peter M. Schwarz, James Cochell & Thomas N. Taylor: The Effects of Industrial Real-Time Pricing on Electric Utility Emissions |
|---|---|

THURSDAY, MAY 19, 2011 (CONTINUED)

2:30 - 4:00 Concurrent Sessions

EFFICIENCY

West Laurel Room

Chair: Ann Daley

Discussants: A. Thomas Bozzo

Edward S. Pearsall: On Equilibrium in a Liberalized Market

Casie D'Souza, Paul Hamilton, William Miller & Margaret

Cigno: Measuring Cost Efficiency of Universal Service

Providers

Kevin M. Currier: Optimal Pricing of Postal Services under Endogenously Determined Entry

CHANGING SUPPLY

East Laurel Room

Chair: Howard Spinner

Discussants: Parviz Alivand & Menahem Spiegel

R.J. Briggs & Anastasia Shcherbakova: Linking Warnings, Monitoring, and Enforcement

Seth Blumsack, Alisah Fernandez & Patrick Reed:

Evaluating Wind-Following and Ecosystem Services for Hydroelectric Dams in PJM

Timothy D. Mount, Alberto J. Lamadrid & Woo-Young

Jeon: How Will Customers Pay for the Smart Grid?

4:00 Exercise Break

6:00 - 7:00 Cocktail Hour

South Porch

7:00 - 9:00 Dinner & Keynote Speech: **William Levis, President & Chief Operating Officer, PSEG Power** *West Windsor*

FRIDAY, MAY 20, 2011

8:45 - 10:30 Concurrent Sessions

ENERGY EFFICIENCY/DSM

East Laurel Room

Chair: Colin J. Loxley

Discussants: Beverly A. Brereton, Jim Cater & Richard Stevie

Sheldon Switzer & Mary M. Straub: Using Available Information for Efficient Evaluation of DSM Programs

Timothy J. Brennan: Energy Efficiency Policy: Surveying the Puzzles

Larry Blank & Doug Gegax: An Opportunity Cost Model for Electric Utility Efficiency Programs & the Development of Shared Savings Incentives

SUPPLY CAPACITY FUNDING

West Laurel Room

Chair: Robert Stoddard

Discussants: Pradip Chattopadhyay & Kurt Strunk

John Caldwell: Abundant Natural Gas Supply & the Future of Electricity Generation: Can There be Too Much of a Good Thing?

Richard Michelfelder, Panayiotis Theodossiou &

Pauline M. Ahern: Public Utility Beta Adjustment & the Cost of Capital

Richard E. Schuler: Pricing the Use of Capital-Intensive Infrastructure over Time & Efficient Capacity Expansion: Illustrations for Electric Transmission Investment

10:30 - 11:00 Coffee Break

11:00-12:45 Concurrent Sessions

TELECOMMUNICATIONS REGULATION

East Laurel Room

Chair: Saikat Sen

Discussants: Kiwan Lee & Michael Ravnitzky

Karl A. McDermott, Carl Peterson & Agustin Ros: A Tale of Two Policies: A Reexamination of State

Telecommunication Policy on the Protection of Universal Service & the Advancement of Competition in the Post-Divestiture Period

David E. M. Sappington & Dennis L. Weisman: The Uneasy Marriage of Regulation & Competition Revisited

David L. Waring: An Empirical Analysis of the Impact of Telecommunications Policies on Broadband Diffusion

EVOLVING MECHANISMS

West Laurel Room

Chair: Pauline Ahern

Discussants: Colin J. Loxley

Paul R. Kleindorfer & Lide Li: On Calendar Energy Options

Shmuel S. Oren, Tanachai Limpitton & Yihsu Chen: The Impact of Carbon Cap & Trade Regulation on Congested Electricity Market Equilibrium

Hung-po Chao: Linking Wholesale & Retail Electricity Markets via Consumer Subscription

12:45 - Lunch

West Windsor

SPEAKERS DISCUSSANTS & CHAIRS

- Eric Ackerman**, Director, Alternative Regulation, Edison Electric Institute
Mohammad Adra, Economist, United States Postal Service – Office of Inspector General
Pauline M. Ahern, Principal, AUS Consultants
Parviz Alivand, Senior Analyst, ISO-New England
David Asher, Economist, US Postal Service Office of Inspector General
Larry Blank, Associate Professor of Economics, New Mexico State University
Seth Blumsack, Assistant Professor, Pennsylvania State University
Joseph Bowring, President, Monitoring Analytics, LLC
A. Thomas Bozzo, Vice President, Christensen Associates
Timothy J. Brennan, Professor of Policy & Economics, University of Maryland Baltimore County & Senior Fellow, Resources for the Future
Beverly A. Brereton, Economist, ISO New England
R.J. Briggs, Assistant Professor, The Pennsylvania State University
Lawrence G. Buc, President, SLS Consulting
Collin Cain, Manager, Bates White, LLC
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James Cater, Director – Power Supply, Central Vermont Public Service
Joseph Cavicchi, Senior Vice President, Compass Lexecon
Hung-po Chao, Director, Market Strategy and Analysis, ISO New England, Inc.
Pradip Chattopadhyay, Regional Energy Analyst, New Hampshire Public Utilities Commission
James Cooper, Attorney Advisor to Commissioner William Kovacic, US Federal Trade Commission
Michael A. Crew, Director and CRRJ Professor of Regulatory Economics, Rutgers University
Antoinette Crowder, Principal, Eagle Analytics LLC
Kevin M. Currier, Department of Economics, Oklahoma State University
Robert Curry, Vice President USPS Business Development, USPS Global Account Manager, Siemens Industry - Mobility
Robert Czerwinski, Senior Management Consultant, NGI Solutions, LLC
Ann Daley, VP Pricing & Policy, Pitney Bowes, Inc.
Jessica Dauer Lowrance, Association for Postal Commerce, Executive Vice President
William Deehan, Vice President - Power Planning & Regulatory Affairs, Central Vermont Public Service Corporation
Stephen DeMatteo, Research Analyst, National Association of Letter Carriers
Gene Del Polito, President, Association for Postal Commerce
Mario DePillis, Supervisor, Market Assessment, ISO New England, Inc.
Casie D'Souza, US Postal Regulatory Commission
Emil J. Dzuray Jr., Manager of Sustainability Initiatives & Acting Chief Sustainability Officer
Alan E. Finder, Director, KPMG LLP
Tom Frantz, Director - Electric Division, New Hampshire Public Utilities Commission
Rick Geddes, Associate Professor, Cornell University, Department of Policy Analysis & Management
Glenn George, Partner, Bates & White
Victor Glass, Director of Demand Forecasting and Rate Development, National Exchange Carrier Association, Inc.
Shoshana Grove, U.S. Postal Regulatory Commission
Howard Haas, Chief Economist, Monitoring Analytics, LLC
William Hogan, Professor, Harvard Kennedy School
Lee Huffman, Hearing Examiner, New Mexico Public Regulation Commission
Peter Jacobson, CEO, NGI - Solutions
Kirk Kaneer, Office of Inspector General, US Postal Service
Paul R. Kleindorfer, Professor Emeritus, University of Pennsylvania and Distinguished Research Professor, INSEAD
Andrew Kleit, Professor of Energy & Environmental Economics, Pennsylvania State University
J.P. Klingenberg, Economist, U.S. Postal Regulatory Commission
Alberto J. Lamadrid, Graduate Student, Cornell University
David Lamont, Director of Planning and Energy Resources, Vermont Department of Public Service
Kiwan Lee, Manager, National Exchange Carrier Association, Inc.
Lide Li, Technical Fellow, Exelon Corporation
Colin Loxley, Director – Resource Planning, PSE&G
Bruce Marsh, Economist Manager, US Postal Service Office of Inspector General
Jeffrey W. Mayes, General Counsel, Monitoring Analytics, LLC
John W. Mayo, Professor of Economics, Business and Public Policy, Georgetown University
Karl A. McDermott, Ameren Professor of Government and Business, University of Illinois-Springfield & Special Consultant, NERA Economic Consulting
Richard A. Michelfelder, Clinical Associate Professor of Finance, Rutgers University, School of Business - Camden
William C. Miller, Senior Economist, U.S. Postal Regulatory Commission
Timothy D. Mount, Professor, Cornell University
Glenn Meyers, Managing Director, FTI
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30th ANNUAL EASTERN CONFERENCE

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Sufficient Rooms are reserved at the Skytop Lodge for all of the Conference participants. Participants should register for the conference by returning registration forms to Skytop Lodge must be received by April 4, 2011. Hotel reservation can be made through:

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Signature of Participant _____

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Abstract for the 2011 CRRI Western Conference

November 30, 2010

Paper : “Behavioral Economics: Implications for Regulatory Agency Behavior”

Authors

James Cooper, Attorney Advisor to Commissioner William Kovacic, US Federal Trade Commission

William Kovacic, Commissioner, US Federal Trade Commission

Abstract

An important focus of modern scholarship in law and economics is the extent to which the actual behavior of individuals confounds expectations of models that assume an important degree of rationality in decision making. One central theme of this literature is that individuals, owing to a variety of phenomena (e.g., emotion, psychological conditioning, incapacity to analyze large bodies of information) often fail to make choices that serve their best interests.

The modern behavioral economics literature has important implications for many forms of economic regulation. It suggests that the range of appropriate government intervention is considerably greater than the status quo. In particular, it calls into doubt the capacity of individual choice and market processes to provide consumers with an optimal range of goods and services. It suggests, instead, that regulatory bodies ought to play a more powerful role in determining what products ought to be available for consumers, in setting the terms on which these products are supplied, and in guiding the choices that consumers make among an array of product offerings.

Those who see the behavioral economics literature as justifying a more expansive form of regulatory state often make the explicit or implicit assumption that public regulatory bodies will make sensible choices among a range of policy options. This paper considers how the same forces that are said to shape the behavior of individual consumers might also affect the performance of public regulatory agencies. It examines how the apparent “irrationalities” observed in the conduct of individuals as consumers might also appear in the choices of individuals acting as regulators. In doing so, it raises cautions about accepting an assumption that public regulatory authorities are ordinarily likely to be proficient in setting default terms that better serve the interests of individual consumers.

Abstract: The Contribution of the *Journal of Regulatory Economics***Michael A. Crew and Paul R. Kleindorfer**

At the 20th Eastern Conference, we presented a commentary on developments in regulatory economics over the previous twenty years. One of these developments included the founding of JRE. In this paper we discuss the role of the JRE in regulatory economics over the last thirty years building on our previous paper. Regulatory economics was hardly a new topic in micro applied economic theory when it was first published in 1989. Its motivation was based on the growing literature in regulatory economics and the change in direction taken by the previous leading outlet in regulatory economics, the RAND Journal. The time seemed ripe for a journal devoted to solely to regulatory economics and subsequent events proved this to be the case. There was no shortage of interest in the JRE with many more submissions than published papers. 625 articles totaling 12,026 pages were published in the period 1989-2010.

This paper *inter alia* reviews the evolving nature and direction of regulatory economics through the lens of the JRE. The first Volume consisted of 25 articles; in 2009 it contained 31 articles. In 1995 the content was increased by 50 per cent by changing the frequency of each Issue from quarterly to bi-monthly. JRE was first published on line in addition to traditional hardcopy in 1998. Since its inception JRE has featured a number of survey articles and Special Issues, including January 2002, which contained selected papers from the 20th Annual Eastern Conference from leading scholars in regulatory economics, including the late Alfred Kahn, William Hogan, and the late Almarin Phillips. This paper builds on Crew and Kleindorfer (2002) in this same Special Issue, which examines advances in regulatory economics over the previous 20 years.¹ Its added contribution is its assessment of the impact of JRE on the literature of regulatory economics and its inter-relationships with policy and practice. Finally, some implications for the likely future direction of regulatory economics are developed.

References

- Darryl Biggar, "The Fifty Most Important Papers in the Economics of Regulation," unpublished, 29 January 2010
Crew, Michael A. and Paul R. Kleindorfer, "Regulatory Economics: Twenty Years of Progress?" *Journal of Regulatory Economics*, 21,1, January 1002, 5-22.

¹ Others have undertaken such exercises, of particular interest being Biggar (2010)

“The World of Regulatory Influence”

Jeffrey T. Macher and John W. Mayo
(Georgetown University)

Abstract

Beginning with the seminal work of Stigler (1971), economists have investigated both theoretically and empirically the influence that firms may have on the agencies that regulate them. In this paper, we take advantage of a unique and unprecedentedly large database (developed by the World Bank) of roughly 8000 firms and 60 countries to investigate the institutional-, industry- and firm-level determinants of influence that firms have on regulatory agencies. The volume and international scope of the data permit a broader and more detailed analysis of firms’ influence on regulatory agencies than has heretofore been possible. Preliminary empirical results are strongly encouraging, identifying several important determinants of influence on regulatory bodies, ranging from country-level differences in their judicial systems’ legal origin and political diversity, to industry-level differences in concentration, and firm-level differences in size and age. We also will seek, to the extent that data permit, to explore how specific regulatory governance mechanisms affect the extent of firms’ influence over regulators. The empirical results are also used to generate an index of regulatory influence for firms that operate in each of the sample countries in the dataset. The paper is expected to be of substantial interest to scholars who examine the economic theory of regulation, as well as those interested in the political economy of regulatory decision-making.

Abstract**“Evaluating Electric Vehicles for the U.S. Postal Service”**

Authors: Emil Dzuray, Manager of Sustainability Initiatives & Acting Chief Sustainability Officer; Han Dinh; J. Otis Smith; USPS; and Jennifer Bradley, Economist, USPS

This paper will discuss issues relevant to the United States Postal Service’s considerations in determining the most economically viable approach in making a large-scale investment to replace its aging fleet of delivery vehicles. More specifically, the paper will address issues relevant to electric vehicles, including work being done to assess their viability in a very large fleet operation. There has been a push for the Postal Service to be a leader in investing in the development of electric vehicles. The premise behind the arguments is that the Postal Service’s delivery routes are well-suited to the abilities of electric vehicles, including start and go driving, predictable routes, and adequate charging time. While the nature of the Postal Service’s delivery routes do make it an appropriate place to test the viability of electric vehicles - something the Postal Service has done for years – the economics do not appear to justify investing in a large fleet of electric vehicles at this time. The electric vehicle industry is still in its infancy; neither the infrastructure nor the ability to mass produce all of the technology required has been proven. Electric vehicles are extremely expensive, making any large-scale purchase a sizable investment, one that is not possible especially given the Postal Service’s current financial crisis. Even if the Postal Service were to receive funding for the purchase of vehicles, it may still be premature to make a large-scale investment. As with any emerging industry, the technology is rapidly changing, and will likely become more efficient and significantly less expensive over time, or possibly be surpassed by other technologies such as hydrogen fuel vehicles, two of which are currently being tested by the Postal Service. A large-scale investment now could leave the Postal Service with a fleet of sub-optimal vehicles, or even worse, vehicles with obsolete technology. For now, it makes more sense for the Postal Service to focus on extending the life of its current vehicles, continue evaluating vehicle technologies on a limited scale, and—as purchases are required—choose the best-value alternative to ensure that the Postal Service can provide the best possible service to customers at the lowest cost.

Abstract for the 19th Conference on Postal and Delivery Economics

“A Framework for Optimizing and Modernizing the U.S. Postal Service Retail Network”

Mohammad Adra and Renee Sheehy²

The U.S. Postal Service’s retail network is a legacy network that does not reflect current U.S. demographic patterns or serve modern lifestyles. This paper will propose a framework for transforming the retail network to make it more responsive to customer demand. It will also discuss the policy barriers to achieving such a transformation.

The first part of this framework is optimizing the distribution of postal retail facilities across the United States. We will present an econometric model developed by Dr. Anthony Yezer for the OIG based on the existing academic literature on the public facility location problem. The model makes it possible to predict postal retail demand using demographic and business information for a specific location and then to find the optimal size of and distance between facilities to maximize welfare for postal users. The next part of the framework is modernizing the network to reflect current retail practices. The current retail network is managed as part of the delivery network. This paper will analyze whether decoupling the retail and delivery networks would benefit the Postal Service by improving management of the Postal Service’s retail stores. The paper will also address the Postal Service’s current alternative access efforts in the face of declining volume. The paper may also describe successful and relevant international retail practices and discuss their suitability for the United States.

Finally, the paper will describe the legal and regulatory barriers in the United States that make it difficult for the Postal Service to change its retail network. Political concerns about fairness and service underlie these barriers; however, a thoughtful approach to optimization and modernization could ease these concerns. A framework for retail transformation could make it possible to lift these barriers by providing an objective approach to optimization and a modernization program to improve service.

References

U.S. Government Accountability Office, “U.S. Postal Service Facilities: Improvements in Data Would Strengthen Maintenance and Alignment of Access to Retail Services,” (Report No. GAO-08-41), December 2007.

² Mohammad Adra and Renee Sheehy work for the Risk Analysis Research Center (RARC) of the U.S. Postal Service Office of Inspector General (OIG). The views expressed in this paper are those of the author and do not necessarily reflect the views of the OIG or the U.S. Postal Service.

Abstract

Linking Service Quality with Price Caps: the Postal Service Case

William C. Miller

US Postal Regulatory Commission

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Although price cap regulation (PCR) has become an increasingly popular form of incentive regulation over the past 30 years, there is still considerable concern with respect to its effects on service quality. In particular, it is well known that operators under PCR have an incentive to reduce costs through service quality degradation. By contrast, rate of return or cost of service regulation (COS) appears to promote higher quality because of the price-cost linkage, even if added waste is encouraged as well. With fixed price systems (including PCR), however, there is an underprovision of service quality from a social standpoint, because operators cannot internalize increases to consumer surplus induced by added quality (Spence 1975). This shortfall under PCR typically leads regulators to mandate minimum service quality standards and penalize operators if these standards are not met (Sappington and Wiesman 2010).

Recent passage of the Postal Accountability and Enhancement Act (PAEA) underscores the continued importance of providing high quality postal services under the PCR authorized by the legislation. However beyond monitoring performance levels for set standards through various reporting mechanisms, the PRC has no authority under the PAEA to mandate and enforce performance standards. Therefore with the competitive threat removed by the private express statutes, it is unclear how the Postal Service is effectively motivated to reduce costs without reducing service quality. Indeed, if the Postal Service's recent five day delivery initiative were implemented, service quality would be clearly affected.

Accordingly, this paper examines how a price cap system might be modified directly to include the effects of changes to service quality. Under such a system, the Postal Service would be able to adjust the existing cap in the same direction as service quality changes. Effectively, with this type of cap, the Postal Service is compensated for the higher costs from higher standards through higher rates, as in previous COS systems, while keeping the central feature of current PCR systems - the incentive to reduce waste.

The welfare properties of such a system will also be explored. Mailers differ in their demands for quality and therefore not all are equally affected by quality induced changes in the cap. Under these circumstances, it is desirable to promote Pareto efficiency, but it may be unclear how this is possible when mailers value services differently.

These issues will be investigated in more depth within a single product-single quality standard framework applying to a heterogeneous set of mailers. A model will be developed demonstrating how mailers can be compensated efficiently for changes in number of delivery days through changes in the cap (rate). In the model, the Postal Service can "trade" a higher price for a lower number of average delivery days, or vice versa along the cap "frontier". It chooses the optimal single product rate-average delivery day combination, allowed by the new price cap, that maximizes profit and leaves all mailers at least as well off as before. The pre-existing price and number of delivery days is included as one of the combinations, so that any other choice indicates a Pareto superior result by design.

In particular, within the model framework, it will be shown that a profit maximizing Postal Service would increase price and lower the average number of delivery days from the pre-existing combination, if the current rate is lower than what an unregulated monopolist would charge. Infra-marginal mailers (high value mailers with a positive surplus at the existing rate and delivery day combination) gain as well, by the Postal Service's choice.³ Prior to model development, past research will be reviewed for relevance and inclusion into the present effort.

³ Surplus for all other mailers who value service at the pre-existing price is left the same at the new cap constrained offering.

It is expected that the present investigation can lead to further research on efficient price cap design for multiple products that differ principally along the service quality dimension. One can view such offerings as a way for the Postal Service to widen the scope of demand among mailers who value quality differently.⁴

The present research has particular relevance to the Postal Service's financial predicament. As the Postal Service's five day delivery proposal indicates, the Postal Service has an incentive to decrease costs, in part by increasing the average number of delivery days. This is consistent with previous literature explaining such incentives as part of high powered reward structures. Additionally, in FY 2009, the Postal Service submitted an exigent rate increase request which did not address service related issues directly. That request was rejected by the PRC. However the present model will show that there is a third way for the Postal Service to improve its financial situation while at the same time advancing the interests of mailers.⁵

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⁴ For example, the Postal Service views Express and Priority mail as different products. The difference in the service provided by each can be viewed along the service quality continuum, and different rates are charged accordingly. Mailers who place high value on service quality are willing to pay a premium for overnight delivery. Other mailers are willing to accept lower value at a lower rate and therefore choose priority mail. These two groups are divided by a marginal mailer who achieves the same surplus by choosing priority or express mail at the existing price-delivery day combinations. There is a second marginal mailer who is indifferent between using Priority mail and not mailing at all. It should be possible to design, an efficient price cap which allows the Postal Service to choose among the four different variables (the two rates and delivery day standards) such that profits are increased, all existing mailers are at least as well off as before, and new mailers are introduced into the system.

⁵ The model is normative in assuming that the Postal Service, as a public enterprise, acts as a profit maximizer. However even the Postal Service chooses a different, non-profit maximizing price-quality combination, the price cap retains its Pareto efficient features.

Alternative Regulation: What It Is, and Why It's Vital For Investor-Owned Electric Utilities and Their Customers

Eric Ackerman, EEI

One prominent EEI member executive observed recently that “While we were looking for new business models, they changed our core, traditional model in ways that make it unsustainable.” What he was referring to was the confluence of three factors, two unprecedented, and one traditional. The industry is facing capital needs that are unprecedented in scale - \$1.5 to \$2.0 trillion through 2030 – at the same time that it is experiencing a decline in energy use per customer that also is unprecedented. These two factors, taken together with the traditional phenomenon known as regulatory lag, are likely to put severe financial pressure on utilities in the years ahead. Considering that average credit ratings among electric IOUs have declined significantly from the last great construction cycle of the 1970s and 80s, the financial road ahead looks challenging indeed. Alternative regulatory policies will prove indispensable to negotiating this road. I propose to describe what is contained in the “altreg tool kit” (e.g., forward test year, construction cost trackers, CWIP, formula rate plans, decoupling, multi-year rate plans), and make the case for their use. I will explain how it is that utilities can't afford to build needed new infrastructure as they did in the past, and I will contrast the use of altreg tools with traditional cost of service procedures for making major plant additions and recovering costs in rates. I also will explain how performance-based features can be incorporated into some of these tools to rebalance risk in ways that are fair to consumers and shareholders alike. Finally, like an author who leaves room in the story for a sequel, I will elaborate the larger point that the range of new technologies which are reshaping electricity markets and the utility business (e.g., energy efficiency, distributed renewable energy, electric vehicles, the “smart grid”) imply the need for continuing innovation in regulation; in effect, alternatives to the altreg described here.

Collin Cain & Glen George

Abstract Proposal for CRRI Eastern Conference

Beyond Nuclear Loan Guarantees

Fostering U.S. Nuclear Investment in a Challenging Market

Nuclear investment in the U.S. faces a variety of “headwinds” that present increased challenges to the prospects for financing new nuclear construction. These include:

- **Low natural gas prices** – large increases in U.S. shale gas production and the tripling of acknowledged reserves are depressing current and projected natural gas prices;
- **Zero carbon price** – prospects for a national cap-and-trade or carbon tax regime are currently limited by political and economic considerations, and carbon prices are not expected to be significant for the foreseeable future;
- **Depressed demand** – electricity demand growth has been stalled by the recession and the slow recovery, and by an increased emphasis on energy efficiency in many states;
- **Increased renewables supply** – expanded generation from renewables is already putting pressure on baseload generation in parts of the U.S., and aggressive RPS standards in many states will continue to push supply increases.

The existing U.S. Department of Energy (DOE) loan guarantee program for new nuclear faces challenges and may not receive funding beyond that needed for four new plants. Assuming a policy interest in promoting new zero-GHG baseload nuclear generation, it is prudent to consider initiatives, policies, and programs beyond the loan guarantee program that might usefully foster new nuclear investment and development. The largest unmitigated risk for nuclear development is still that of construction cost overruns. Cost projections for proposed nuclear plants in the U.S. range from \$3,000/kW to \$5,000/kW, and past experience of cost overruns double and triple expectations will continue to dampen enthusiasm for financing new nuclear without fresh approaches—including both new public policies and initiatives from within the industry itself—to mitigate construction cost risk. We discuss the challenges of new nuclear development and potential approaches for promoting and facilitating financing.

Total Factor Productivity and performance-based ratemaking for electricity and gas distribution

Jeff D. Makholm, Agustin J. Ros and Meredith A. Case⁶

Abstract: Using publicly-available data from the U.S. Federal Energy Commission and other sources, we measure total factor productivity for 72 U.S. electricity and combination electricity and gas companies for the period 1972-2009. TFP is an important element in determining the X-factor in a performance-based ratemaking plan, an alternative to rate-of-return regulation. We derive the X-factor formula and use our TFP measure to provide the parameters of a PBR plan.

⁶ Authors are Senior Vice President, Vice President and Research Associate at NERA Economic Consulting.

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The Effects of the Postal Accountability and Enhancement Act Of 2006

After many years of deliberation, Congress enacted the Postal Accountability and Enhancement Act (PAEA) in 2006. The PAEA instituted the largest changes to US Postal Service regulation since its creation in 1970. The PAEA separated the Postal Service's products into market dominant and competitive products, strengthened its regulator, the renamed Postal Regulatory Commission, and instituted several other important changes. It has been four years since the passage of the PAEA, and its effects can now be assessed. Our goal is to compare the observed effects of the act with Congresses' stated objectives, and with theoretical predictions about how a state-owned enterprise is likely to behave when such changes are instituted. We utilize time-series data and semi-parametric techniques to analyze the effects of this important Act on a variety of key variables. Using univariate tests with several lags, we find that the Act significantly increased the price of both market dominant and competitive activities, but that the price of dominant products increased at a slower rate than competitive products. We also find that these effects of the Act became more pronounced over time. Ongoing work will add the Act's effects on postal profitability, productivity, and on cost efficiency to the analysis.

Authors: Jessica Dauer Lowrance, Association for Postal Commerce, Executive President & Gregory Dawson, USPS, Manager, Pricing Strategy

Abstract – Skytop 2011

Rationalizing Postal Costing for the 21st Century

Congress changed the law that underpins the U.S. Postal Service with the enactment of the Postal Accountability and Enhancement Act of 2006 (PAEA). This was the first fundamental change to the American postal system since the enactment of the Postal Reorganization Act of 1970 (PRA). Despite Congress' intent to change fundamentally the way in which postal services are organized and regulated, the views regarding postal costing and pricing that were entrenched by living more than three decades under the PRA have not changed much at all, much to the disadvantage of what was supposed to be a reinvigorated Postal Service.

While PAEA still uses terms such as "attributable costs" and "institutional costs" to describe the basic framework by which postal economics are discussed, a careful reading of the new law plainly indicates that the legacy language Congress brought forward to the 2006 act was not meant to straight-jacket the Postal Service with a way of operating and doing business that had grown increasingly anachronistic.

Today, postal economists still talk about attributable costs, institutional cost markups, postal discounts, worksharing pass-throughs as if Congress intended the postal system to be frozen in time rather than liberating it to better accommodate the nation's changing postal needs and the postal service that provides for them.

The views we intend to share in this paper lays out very clearly a belief that the dictates of PRA-era postal economic thinking were not intended by Congress to be immutable. In fact, the authors very much are of the mind that Congress provided the Postal Regulatory Commission (PRC) and the U.S. Postal Service (USPS) with more than sufficient instruction to allow both to re-engineer a way of postal thinking that better comports with a more business-like way of viewing and providing the nation's postal needs.

When PRA was enacted, the phenomenon called "worksharing" was at a very nascent stage. It matured and grew quite extensively over the 35 years that the 1970 law was in effect. The idea of providing postal "discounts" as a measure of compensation for the preparation and processing of mail before it was entered into the postal system was developed and took hold. Over time, however, we believe it distorted what should have been a more straight-forward method by which postal services could be organized and defined, precipitated a seemingly endless controversy over the values, costs, and rewards of worksharing, and created disincentives to restructuring mail products and services in the more rational way Congress could have envisioned through its enactment of PAEA.

The authors, in this paper, will set forward a more rational approach to the classification of mail products and services that retains the hallmarks of attributable and institutional costing calculations, but leads to a more appropriate and creative framework for determining the pricing of mail in today's more competitive market.

ANTICIPATING THE REFORM DEBATE:
HOW WILL THE TRAJECTORY OF POSTAL REFORM II BE GUIDED BY
THE CONSEQUENCES OF THE FIRST ROUND?

Robert A. F. Reisner and Lawrence G. Buc

In 2007 following the enactment of the Postal Accountability and Enhancement Act, a strategist and former postal executive, an economist and a lawyer who had been deeply involved in the decade-long debate over postal reform, collaborated to anticipate the next round in what then seemed the distant future. Reisner, Buc and Myers, following presentation at the International Conference on Postal and Delivery Services in Austria, published a paper with the innocuous sounding title of “The Postal Accountability and Enhancement Act, Some Consequences”. In the 2006 law, the Regulator is charged with reviewing how well the reforms had worked after “not more than five years.” In fact, after 4 years, the Postal Regulatory Commission has opened its first formal round of consideration leading to its report and recommendations to Congress. The Congress and the GAO have also begun work on a second round of postal reform.

The Reisner, Buc and Myers paper selected six issues that we thought were the foundations of the postal reform law. We asked how would each of these issues, the pillars of reform, best be evaluated or in other words, how might one know whether "reform" was working? We discussed:

- Long term financial stability
- Price Stability
- Efficiency (Productivity)
- Service Quality and Performance
- Fair Competition, and
- Preservation of Quality, Universal Service at Affordable Prices

This proposed 2011 paper will take up where that earlier discussion left off. The 2007 discussion is a good starting point for considering where the reform debate is today and for asking how the experience of these initial years under PAEA (2007-2010) will influence the future shape of reform that all agree is urgently needed in the face of severe financial difficulties challenging the viability of the Postal Service.

One natural starting point is to ask whether we would still select the same pillars and then whether measuring performance along each of these dimensions is in fact a reasonable basis for assessing the success or failure of postal PAEA. That is the starting point, a useful framework for looking at the larger questions that will define the future. The question for the future is whether the reforms that are being discussed today would in fact change the USPS business model in a manner sufficient to create a viable future for the USPS.

Many believe that the USPS may now be seeking to define its future in a marketplace that has changed substantially from the one that existed in 2006. If a fundamental “tipping point” has been reached with the digital economy, can the USPS be sustained on traditional services that have been fundamentally disrupted by new technologies? Whether the USPS should have anticipated the downturn and the consequences of financial crisis (as many customers have asserted) is relevant to whether PAEA “worked”. But the question today may be – given where the USPS is now, is something more than PAEA II (incremental change) required?

What is the role of the Postal Service in the 21st Century? Should Congress now facilitate the transition of the Postal Service to a new business model? Should the USPS be

privatized or moved to a new business model? Should it try to restore financial stability? How should Congress address the issues of retiree health benefits? Labor negotiations? Future rate increases? Universal Service? This paper will discuss where we are today, PAEA's role in getting us here and the path forward.

William Hogan, Professor, Harvard Kennedy School

Transmission Benefits and Cost Allocation

The Federal Energy Regulatory Commission proposed the principle that transmission investment cost allocation should be “roughly commensurate with estimated benefits.” Benefits include reliability, economic and public policy related impacts. Turning the principle into a workable policy is important as a support for restructured electricity markets. A challenge is to make the different measure of benefits commensurable, and to find “rough” approximations that honor the principle. A framework for such cost allocation uses examples from existing standards and investment studies to illustrate how the mandate could work within the limits of existing analytical capabilities.

When Assumptions turn out to be **WRONG**: Peak Energy Rent Regulation in ISO NE

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The concept of a Forward Capacity Market (FCM) within ISO NE was developed to be a long term solution for providing capacity adequacy that included short term incentives for generator behavior. A generator receiving capacity payments under the FCM is subject to a significant penalty if it is not available at the time of system scarcity, and penalties collected from those who are not available are allocated to those who are available, thus providing additional incentives to be available. The Peak Energy Rent (PER) is supposed to provide further incentives for generators to be available during periods of scarcity by reducing capacity payments to generators, including generators who are unavailable and who do not, therefore, receive energy payments, to reflect spot energy revenues in excess of a “strike price” set slightly higher than the marginal cost of the most expensive generator. As the name “Peak Energy Rent” suggests, the idea of setting the strike price at this level is to ensure that the revenues rebated to load-serving entities are rents earned by lower cost generators when energy prices are at that peak. The term “rents” as used in this context refers to revenues received for a product or process that are greater than that required for the product or the process to be produced or continued.

This paper reviews the multiple issues with both the structure and the implementation of the PER rules. At the time that the structure was proposed and accepted two assumptions were made concerning critical pricing relationships. The first of these was the assumption that the historic relationship between natural gas prices and oil prices would persist. In other words, it was assumed that natural gas prices would generally track light oil prices; generally lower by 15-30%. The second assumption was Day-Ahead (“DA”) and Real-Time (“RT”) energy prices would tend to converge and that on average, DA prices would generally be higher than RT prices.

Experience has shown that neither of these two assumptions has held. The paper will review the economic impacts of a regulatory structure based on assumptions that history has proven to have been incorrect.

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Strengthening Market Monitoring and Market Power Mitigation in the Organized Wholesale Electric Markets

The organized wholesale electric power markets in the United States are characterized by structural market power and will remain non competitive, absent administrative intervention. Market power mitigation is a fundamental and permanent part of the market design for the organized wholesale electricity markets. Market power mitigation is consistent with and essential to FERC's policy of relying on competition to regulate electric wholesale power prices, consistent with its mandate under the Federal Power Act. Significant controversy has arisen about how to ensure that the markets clear on the basis of competitive offers that have been determined to be free of market power. Specifically, the issue has been what institution and function is best situated to provide the initial critical determination about whether a participant's offer that will be applied in market power mitigation is competitive.

Despite a recent effort to strengthen the market monitoring function, current FERC policy on this issue remains unclear. The respective roles of market administrators and market monitors are not well defined, and are a potential source of confusion and counterproductive institutional conflict. The FERC should reform, refine and clarify its policy in this area by according exclusive responsibility to institutional independent market monitors to monitor participants' conduct and the potential for the exercise of market power through ex ante review of cost-based offers used in market power mitigation.

The involvement of a market administrator (the entity responsible to perform the market clearing function in accordance with FERC-approved rules) in the

development and evaluation of market based offers duplicates the efforts of and interferes with the ability of independent market monitors or “IMMs” to monitor the conduct of participants in the market administrators’ regional markets. The FERC requires every such market administrator to have an associated independent market monitor, and detecting and deterring the exercise of market power is among the most important objectives of this function. IMMs do not have enforcement authority or other regulatory authority. Such authority over wholesale electric markets is reserved to the FERC. A key purpose of an IMM is to monitor the markets for the exercise of market power, and this purpose is exactly consistent with providing ex ante determinations to market participants about whether the level of cost-based offers raises market power concerns. IMMs’ incentives are to provide objective analyses of cost-based offers proposed by participants. A clear ex ante indication of whether a sell offer constitutes an exercise of market power from a single credible source allows market participants to make a responsible and informed decision about market conduct, and an opportunity to obtain ex ante regulatory review, if desired.

This approach enables the FERC to have justified confidence that the market power mitigation program is sufficient to ensure just and reasonable results consistent with its regulatory mission. Although the Commission retains sole enforcement authority, the Commission cannot review every offer submitted in markets it regulates ex ante and it cannot effectively deter the exercise of market power with ex post investigations and enforcement actions. A major benefit afforded by the inclusion of the market monitoring function in the framework for regulation through competition is that IMMs can perform a screening function that ensures that the Commission’s resources are effectively applied to resolving market power issues where clear and supportable differences of view over the accuracy of an input to market power mitigation have crystallized.

Bridging the Digital Divide: Expanding the Postal Platform

David Asher*

John Callan+

Bruce Marsh*

Over the past decade, new technologies have transformed consumer and business behavior, bringing about a “digital revolution,” where communications and transactions moved increasingly from a physical to a digital world. This new digital revolution has disrupted the Postal Service's traditional hard copy-based business, forcing it to re-examine how it serves the general population. This paper stresses the urgency of moving into a new era and conducts a strategic analysis of how the Postal Service can successfully traverse this divide between its traditional hard copy business and the rapidly advancing digital universe.

The Postal Service provides a number of core assets that reside on its platform: a highly trusted and secure brand, an address management system, and far-reaching national retail and delivery networks. The paper explores the persistent dangers and gaps of today’s fast moving digital world, from the absence of industry-wide standards for electronic identity verification to personal data management to the lack of accessible financial tools for e-commerce, finance and government transactions. In all of these cases, the Postal Service is in a unique position, as a provider of last resort and with a long tradition of serving the American public, to help fill these gaps both through new services and collaborative arrangements with third parties.

A wide range of new services utilizing innovative technologies are rapidly developing in this marketplace such as official electronic identity issuance and management, electronic authentication of documents, e-Government services, hybrid mail, and seamless cross-border e-commerce transactions. Postal operators from around the world are implementing many of these technologies in various forms in an effort to diversify and offset the losses experienced in the rapidly declining letter mail market. The paper argues that these new technologies and services could transform the Postal Service from an analog materials handling entity to a digital entity and platform handling secure information flows, sometimes associated with physical products, in the online world.

The timing and process are critical as the window of opportunity for such a slate of electronic services is closing. The paper argues that the Postal Service must quickly develop an effective implementation process and work closely with legislative and regulatory entities for the needed flexibility to maximize its chances of success in these digital ventures.

Please note: the views in this paper do not necessarily reflect those of the US Postal Service Office of Inspector General or any other organization. It reflects the views of the authors only.

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Economies of Scale for Broadband in Rural United States

By Victor Glass and Stela Stefanova

Empirical cost models for wireline broadband circuits are used to test whether economies of scale exist in rural areas and whether new Ethernet technology lowers the unit cost of broadband transportation.

The data used for estimation were supplied by more than several hundred rural local exchange carriers. Although previous studies have shown limited or nonexistent economies of scale for wireless technology, this is not true for wireline networks. Results from earlier studies demonstrated voice-only wireline networks displayed economies of scale that diminished with network size and were fully exploited for large networks.

This paper finds economies of scale are substantial for small rural wireline networks, but such economies diminish as network size increases.

Market size limitations appear to prevent rural telephone companies from fully exploiting unit cost savings. The data shows increasing capacity over existing broadband connections is subject to substantial economies of scale and supports Ethernet technology reduces broadband transmission cost.

Government Use of the Postal System: A Valuable USO Component

By Michael Ravnitzky and J.P. Klingenberg, Postal Regulatory Commission

The world's earliest postal networks were established for the purpose of communications by the sovereign and the government. Today, postal networks provide essential communication functions for governments. This paper examines the current governmental usage of the mail, primarily by analyzing how a defined segment of the United States Government spent over US\$1 Billion on mailing and shipping services each year between 2007 and 2010.

This paper also provides an international comparison of typical government functions that produce or require mail. The functions that serve to demonstrate the importance of postal networks to government communications include employment and tax information, legal correspondence, regulatory compliance, immigration documents, product recalls, licensure, benefits administration and certification, voting materials, credentialing and aspects of law enforcement. Assessing the purposes of government mail demonstrates how it embodies a significant yet previously overlooked aspect of the Universal Service Obligation.

The authors utilize newly released federal government data reports that describe the revenue and volume of mailing and shipping services by federal executive branch agencies during the fiscal years 2007 through 2010. This quantitative data is supplemented and interpreted through discussions with mail managers at individual federal agencies.

We also compare the attributes of government mail with those of the overall mail stream. Analysis shows that government mailer behavior is more similar to that of single-piece mailers than to that of bulk mailers. Accordingly, the nature and fundamental importance of government mail

has interesting implications for liberalization and privatization. To date, electronic substitution for the mail has occurred less in government-related communications than it has in other sectors; agencies rely on the secure, reliable and ubiquitous communication services provided by postal networks. The long-term dependence of government on the mail will be quantified, discussed, and placed in the context of those postal networks.

ABSTRACT
Back to the Future, Time of Use Pricing Pilots in New York
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Rutgers Advanced Workshop in Regulation and Competition
30th Annual Eastern Conference
Skytop, PA
May 18-20, 2011

This paper will examine pricing pilots in New York from at two distinct points in time. From 1982 through 1985, Orange & Rockland Utilities engaged in a “Residential Peak Activated Rate Experiment”. More recently, over the 2003 to 2006 time period, NYSERDA ran its Westchester Smart Homes Pilot. What do these pricing pilots indicate regarding the change in the demand responsiveness of New York customers? What insights from these earlier pilots might be useful in guiding more recently planned pilots?¹

Changes in customer demand responsiveness over the last quarter century will be analyzed via customer usage information collected from the Orange & Rockland and Westchester pilots. Information on the percentage reduction in coincident peaks at various points in time will be used to estimate price elasticities for 1980’s era customers. This paper will also discuss the estimation of own and substitute price elasticity equations using early 2000’s participant data from NYSERDA’s Westchester Smart Homes Pilot.²

¹ For example, in October 2010, the NYPSC announced that 250 households will be selected to participate in a state wide initiative called Jumpstart NY.

² The data gleaned from the Westchester analysis over the 2003 to 2006 time period are, in many respects, similar to those from the California Statewide Pricing Pilot from which Charles River Associates estimated its often cited daily price elasticity and substitution equations. A substitute price elasticity equation for this Westchester analysis will be estimated using the peak and off peak prices that ECONenergy provided to each pilot participant on the previous day. Average daily prices for the own price elasticity equation will be calculated for each pilot participant using the hourly prices used to bill each Westchester pilot participant, and the hourly electricity usage for each Westchester pilot customer. These equations will also utilize hourly cooling degree hours obtained from the NOAA for the Westchester weather station. A number of alternatives will be explored to address the simultaneity issues that arise with the daily price variables.

Bidding for Electricity Contracts in Pennsylvania

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The nature of bidding for supply contracts in electricity markets is not well-understood. In particular, it is not clear what drives the number of bidders or the winning bid price. Here we analyze this question. Specifically, we examine what factors impact the number of bidders and the price of the winning bid. Though many jurisdictions worldwide have restructured their electricity markets, the only research on this topic is Hattori (*Energy Economics*, 2010), which only deals with the number of bidders for particular contracts in Japanese electricity markets.

The Penn State Facilities Engineering Institute (PSFEI), which acts as a broker for a large number of state agencies and private entities, has agreed to make their contract data available to us. This data contains information on: date of bid, winning bid price, type of bid (fixed or basis), number of bids per account, identity of bidders, identity of winning bidder, identity of customer, location of customer, start date of contract, and length of contract.

Pennsylvania's electricity market is among the most deregulated in the U.S., both at the wholesale and more recently retail levels. Because of this, we anticipate that PSFEI data will enable us to analyze the effect that both wholesale and retail competition had on the contract bidding process within the state, and whether each type of competition had a significant impact on the number and level of bids. Additionally, taking advantage of PSFEI's diverse client base, we will capture any public/private sector variations that may affect the two outcome variables, in addition to controls employed by Hattori on demand levels, contract length, and regional characteristics.

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James Cochell, Duke Energy Company

Thomas N. Taylor, Formerly Duke Energy Company

The Effects of Industrial Real-Time Pricing on Electric Utility Emissions

Economists have long advocated electricity prices based on marginal costs. In its current form, real-time prices (RTP) are hourly prices that correspond to the hourly cost of providing electricity. Recently, however, economists investigating the impact of actual and potential deregulation of electricity and the likely increase in the use of RTP in a deregulated environment have suggested the possibility that such rates could have negative effects on the environment. Most recently, Holland and Mansur (HM) (2008) provide evidence that time-varying effects can be positive or negative, depending upon the mix of base load and peaking generation. Effects are negative in areas such as the Southeast and Midwest that depend on coal for base load plants and hydro or natural gas for peaker units. Where effects are negative, real-time rates lead to a transfer in output from relatively clean peaker units, to relatively dirty base units. However, HM do not examine real-time rates per se, but rather simulate any pricing mechanism that reduces the demand variance of electric system load.

In contrast to HM, our starting point is to evaluate emissions for customers billed on an RTP tariff (Duke Energy Company's Schedule HP (hourly pricing)). System emissions for SO₂, NO_x, Hg, and CO₂ under real-time pricing are compared to an estimate of system emissions if these customers were billed under a hypothetical flat rate that does not vary by time of use. Since we do not have flat rate data for our customer sample, we estimate how these customers would respond to the flat rate using demand response built upon a model of price response developed by Taylor, Schwarz, and Cochell (2005). We also estimate emissions had these customers stayed on

Duke's peak-load rate, which contains a peak, off-peak differential based on historical, but not real-time conditions.

Title: On Equilibrium in a Liberalized Market

Author: Edward S. Pearsall

This paper describes how equilibrium occurs in a simple liberalized market with an incumbent and one potential entrant, both producing single imperfectly substitutable products. Entry and exit are assumed to be costless, collusion is prohibited, and the incumbent is prevented from engaging in price discrimination based on entry. Under these conditions the market is a non-zero-sum non-cooperative two-person game for which there exists a Nash equilibrium.

The equilibrium corresponds to one of three well-known market models. These are: 1) Monopoly – the potential entrant stays out of the market; 2) Stackelberg Duopoly – the incumbent is the price leader and the potential entrant always enters; and 3) Contestable Market – the equilibrium pair consists of a price for the incumbent that leaves the entrant with a zero profit whether he is in or out of the market; and a mixed strategy of entry and exit for the potential entrant parameterized by a state probability of entry. The equilibrium probability of entry leaves the incumbent with no incentive to change his price.

A Nash equilibrium does not appear to have been recognized as a possibility by the authors of contestable market theory⁷. Instead, the standard model of contestable markets employs a description of equilibrium that makes the unrealistic assumption that the incumbent can predict the potential entrant's exact choice of strategy. In this paper it is argued that the incumbent would actually confront a mixed strategy and would be dependent on judging the frequency of entry by observing his competitor's behavior in the liberalized market. This makes the Nash equilibrium the correct basic description of how a liberalized market works.

The Nash equilibrium opens a window on a garden of issues regarding liberalized markets. How does the simple model generalize to more realistic cases of multiple products and/or multiple participants? What is a regulator's proper role in preserving conditions that are, at best, only semi-competitive? How is equilibrium affected by predetermined conditions of demand and cost? And, ultimately, what is the social benefit (if any) from liberalizing markets?

⁷ I rely on the description of contestable markets found in Baumol, W. J., J. C. Panzar and R. D. Willig (1988), Contestable Markets and the Theory of Industry Structure, Revised Edition, Harcourt Brace Jovanovich.

Abstract
Measuring Cost Efficiency of Universal Service Providers
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The downward trend in letter volumes stemming from electronic substitution and the financial pressures of a mature postal market has renewed interest among Universal Service Providers (USP) to improve cost efficiencies through various benchmarking techniques. In the past, econometric studies have proven to be useful aids in establishing cost efficiency rankings among USP's, net of scale and scope effects. Rankings from these studies have informed decisions aimed at improving cost efficiency in the postal sector through various methods, including reorganization and alternate operational structures.

Our paper builds on past work by widening the scope of analysis. In particular, employing an econometric approach, we will identify the separate contributions to cost differences among a sample of countries forthcoming from scale economies, and differences in cost efficiencies, and density-related (environmental) impacts. Cost efficiency differences will be further disaggregated into differences caused by different degrees of market liberalization, and a residual, unexplained portion. We consider estimating the cost impact from privatization and market liberalization an important part of our analysis, given that USPs are now facing varying degrees of competition. Also, as part of our research, we will rank USPs according to different cost indices. These indices will be constructed using the estimated parameters from our econometric model.

Initially, our econometric model will be constructed to explain postal costs for 30 USPs, segmented into three groups according to revenue levels. To observe trends and impacts of competition and privatization on the postal industry, five years of data, fiscal year 2005-2009, for each USP will be collected. We expect to use a Cobb-Douglas type cost function (log-log) to explain postal costs according to five sets of independent variables: a) volumes, b) input (resource) prices, c) network-related (environmental) variables, d) variables quantifying the extent of liberalization achieved, and e) USP-specific dummy variables that identify any residual differences in cost efficiencies among providers. Data and estimated parameters from the Cobb-Douglas functional form can be readily transformed for construction of cost indices.

The availability of accurate and reliable data was a consideration in the selection of the sample of postal operators. For this purpose, non-accounting data, generally considered to be more reliable, will be collected. The data is currently available from the USP's annual reports and the website of the Universal Postal Union. To neutralize the

effect of currency fluctuations, the cost and input price data will be normalized to a single currency for comparative purposes, using average exchange rate values for each year.

The major contribution of this paper to the body of literature on this subject⁹ will be our findings on the importance of each explanatory variable's contribution to observed cost differences across USPs. Also, we expect that the empirical results of this paper could be used by postal management in assessing the cost efficiency of their respective entities. Finally, results should prove useful for policy makers to assess the impact of market liberalization on the industry's cost structure.

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Optimal Pricing of Postal Services under Endogenously Determined Entry

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In this paper, we consider a regulated USP providing single piece and bulk mail services, facing potential entry by a competitive fringe offering an imperfectly substitutable bulk mail service. For simplicity, we assume a single delivery zone, although our results generalize to the case of multiple delivery zones. We first provide a welfare analysis of the delivery method choice (access vs. bypass). Assuming constant marginal costs, we show that welfare under access is greater than welfare under bypass if the fringe's unit delivery cost d^E exceeds that of the USP. However, if the welfare maximizing access charge is greater than d^E , entrants will have an incentive to bypass although entry via access is socially desirable. Hence, assuming that the regulator cannot choose the entrant's delivery method, optimal pricing requires the regulator to incentivize socially desirable entry, in which case access charges must not exceed d^E . We demonstrate that constrained welfare maximizing (access) prices can be determined by embedding these access charge constraints in the lagged expenditure regulatory policy of Vogelsang and Finsinger (VF). Our adaptation of the VF procedure depends critically on the fact that the services of the USP and the entrants are substitutes.

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Linking Warnings, Monitoring, and Enforcement

Why should economically rational agents take costly compliance action when faced with a zero cost warning? Several prominent regulatory agencies in the US use non-penalty actions to warn violators and urge compliance. The US EPA, for example, takes non-penalty actions in the form of warning letters, Findings of Violation, Preliminary Determinations, or Administrative Orders the Clean Air Act. The Mining Safety and Health Administration similarly uses a “Pattern of Violation” system to enforce the Federal Mine Safety and Health Act.

Nyborg and Telle (2004) show that when regulators have limited budgets to pursue costly prosecution, warnings may help maintain compliance by lowering the probability of accidental violation triggering the penalty process; in turn, regulators then have a larger budget to provide a credible threat for prosecution of violators. This result relies on several frictions, including a principal agent problem within firms, adaptive expectations, and a hypothetical “verification cost” incurred as a result of warnings. Furthermore, because the model describes compliance as a binary decision and assumes perfect monitoring, the interesting links between the degree of violation, warnings, future monitoring, and the cost of prosecution present in current regulations and our legal system do not receive attention.

We analyze the impact of warnings in a continuous choice, dynamic regulatory game with monitoring and enforcement. To focus solely on the strategic value of warnings, we eschew the probability that firms accidentally violate in favor of a perfectly rational view of firms. We do not assume that the choice to comply after a warning implies verification cost. Our model extends the enforcement regime of Nyborg and Telle (2004) to allow for the possibility that warnings may affect monitoring rates, penalty rates for non-compliance, or the cost of prosecution in the future. This paper is currently in its preliminary stages.

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Evaluating Wind-Following and Ecosystem Services for Hydroelectric Dams in PJM

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Abstract: Hydropower can provide relatively inexpensive, flexible fill-in power to compensate for intermittent renewable generation, with minimal environmental effects compared to competing generation sources, such as natural gas and diesel. Water management policies for hydropower dams, however, maintain multiple services beyond electric generation such as flood control, recreation, ecosystem services, and municipal water supply. Managing these multiple services involves various, sometimes conflicting policy objectives, specifically with system stresses such as population growth, hydrological variability, electricity and water demand.

We perform a scenario analysis of a small-scale hydroelectric dam providing multiple social services representing multiple constituencies or interests. These services include flow management for downstream ecosystem maintenance; profit-maximization for the generation owner; and a “wind-following service” similar to the ancillary services currently provided in electricity markets. Our analysis focuses on the potential conflicts and trade-offs that arise from the formulation of energy policy differences separately from river-management policy decisions. Our specific case study uses the Kerr Dam, located on the Roanoke River in North Carolina. The scenario analysis models the profit-maximizing behavior of the dam’s owner, Dominion, participating in the PJM day-ahead and ancillary services markets under different river-flow

management regimes representing current operations and a policy aimed at increasing downstream ecosystem quality. Our analysis suggests that reserves market prices in PJM would need to increase to move Kerr Dam from the day-ahead market to the ancillary services market to offer wind-following services, unless monthly or seasonal “wind-following” contracts could be implemented in the months with the highest volatility in wind energy output. Moreover, dedicating a significant portion of Kerr Dam’s capacity to wind-following yields water release patterns that are inconsistent with the ecosystem-services goals of Kerr Dam’s operations, particularly in low-water years.

How Will Customers Pay For The Smart Grid?

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Abstract

The vision of a smart grid, with two-way data communication between different elements that allows agents to take actions on the up-to-date grid conditions, can potentially provide benefits in terms of curbing pollution, benefitting customers financially and improving the reliability of the supply system (Pratt, et al. 2010). In order to implement this vision, however, all stakeholders need to be involved, and this includes the customers who eventually will have to pay for the capital cost of the new infrastructure for communication and data processing needed to support a smart grid. Given the major expenditures involved in building a smart grid (FERC 2009), the initial negative reactions of customers to some rate increases attributed to Advanced Metering projects (Burr 2010), (Zeller 2010) are an ominous sign of problems ahead. The objective of this paper is to show that customers will not benefit fully from a smart grid until the demand-side of the market is an active participant by 1) relying more on non- time-sensitive load (e.g. replacing air-conditioners with thermal storage) to buy electricity when the price is low at night, and 2) selling ancillary services such as regulation and ramping capacity to mitigate the inherent variability of generation from renewable sources. These two factors coupled with the lower operating cost of generation from renewable sources of energy will eventually reduce the net cost to customers.

The paper compares different ways for customers to reap the benefits that a smart grid can offer. The range of ancillary services analyzed include regulation services, ramping services, load shifting from peak to non-peak hours, and temporary load curtailment in response to contingencies. These services can be provided by customers or their representatives if storage capabilities are available on distribution networks. Although utility-scale storage can also deliver these services, customers in the end will have to pay the full capital cost of this equipment. On the other hand, distributed storage, such as the batteries in electric vehicles and thermal storage, is likely to be cost effective because a large part of the capital cost is paid for by delivering the non-electric services of transportation and space conditioning. Previous research has shown that higher penetrations of renewables are associated with higher annual costs for conventional installed generating capacity (\$/MW/Year) due to increased missing money. Consequently, there are likely to be substantial economic benefits from reducing peak system demand and the associated amount of installed capacity needed to maintain System Adequacy.

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A new multi-period SuperOPF¹ is used in the study. The cases analyzed are applied to a reduction of the North Eastern Power Coordinating Council (NPCC) network(Allen, et al. 2008), with representative days defined to cover the annual pattern of load for the network. The main lesson that can be drawn is that Real Time Pricing (RTP) is not enough to pay for a smart grid. Customers will also need to earn revenue by selling ancillary services in the wholesale market by, for example, allowing aggregators to manage some of their appliances. However, this will not happen unless regulators restructure how customers pay for electricity and introduce new ways to compensate customers for supporting the reliability of the grid.

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¹A stochastic contingency-based security constrained AC OPF with endogenous reserves, co-optimizing dispatch with a set of credible contingencies. (Thomas, et al. 2008).

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Using Available Information for Efficient Evaluation of DSM Programs

Mary M. Straub and Sheldon Switzer

“Price is what you pay. Value is what you get.” – Warren Buffet

Demand-Side Management Programs are implemented by utilities (or by other entities) as a cost-effective alternative to generation capacity and energy production. Given the large financial investments in these demand-side initiatives, it is important to have reliable and verifiable estimates of energy and demand impacts. Effective evaluation is critical to determine if programs are meeting their objectives, to determine the costs and savings associated with the programs, and to suggest improvements in program design and delivery, especially as markets and technology change.

Impact Evaluation is crucial for the verification of changes in energy consumption and demand attributable to energy efficiency and demand response programs (including such factors as the assessment of free riders, spillover effects and measure persistence). Process Evaluation is conducted to assess where changes can be made in program implementation to improve the effectiveness of program operations, reduce costs and maintain customer satisfaction. Market Evaluation is an assessment of how well a specific market is functioning with respect to the acquisition of energy efficiency or demand response resources, including a baseline characterization of the market before program implementation and a determination of progress in transforming the market sufficiently so that program interventions can be modified or eliminated.

This paper will provide a brief overview of evaluation issues and will discuss how evaluation can be conducted efficiently by jointly funding research with other utilities, using available information from other areas and participating in regional initiatives. The paper will also, as a case study, present the econometric development of load profiles for central air conditioning, heat pumps and water heaters using existing load research data. The analytical results provide, for each technology, 8760 hourly loads for a given connected load and weather condition.

Energy Efficiency Policy: Surveying the Puzzles

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Abstract

Promoting energy efficiency (EE)—essentially, using less energy to achieve a given level of energy-supplied service such as lighting, heating, or cooling—has become a leading objective for regulators in recent years as concerns have developed regarding greenhouse gas emissions, energy independence, and avoiding the cost of new generators and transmission lines, especially for meeting peak demand. Electricity prices below marginal production costs, because of unpriced environmental externalities or failure to reflect real-time cost variations, could warrant EE policies if EE and energy are substitutes.

That EE and energy use need not be substitutes, and will not be substitutes if the energy price is sufficiently high, is the first of a number of puzzles surrounding EE regulation and policy. We survey half a dozen of these puzzles. A second is that much EE policy is predicated on the belief that consumers fail make privately beneficial investments in EE, where future savings in energy expenditure more than compensate for higher up-front costs. Rejecting “rationality” raises the question of how to do cost-benefit analysis when demand curves cannot be trusted to reveal willingness-to-pay. Third, proposed legislation would allow electricity suppliers to apply EE-related savings toward requirements to use electricity generated by renewable energy, leaving open a question of how to calculate the “no regulation” baseline against which energy savings would be measured.

Other policy puzzles involve the roles of regulated utilities and their regulators. Many want utilities to administer EE policies, despite utilities having a century of being in the business of producing and selling electricity rather than discouraging its use. More important, encouraging utilities to dominate a potentially highly competitive and entrepreneurial EE sector runs counter to decades of regulatory policies designed to separate competitive from monopoly sectors. On the other hand, decoupling policies, designed to make distribution companies indifferent to

output by guaranteeing a fixed level of profit regardless of energy delivered, stand in opposition to the central economic contribution to regulatory economics in the last thirty years, that incentive-based mechanisms outperform traditional cost-of-service regulation. In addition, regulators may implement EE policy to exercise buyer-side market power against generators, increasing consumer welfare but reducing overall economic performance.

The overall purpose of this survey is twofold: to inform the development of energy efficiency policy by revealing that propositions obvious to its policy constituencies may not hold, and to encourage regulation economists to investigate questions presented by the differences between what our research says and what these constituencies presume.

An Opportunity Cost Model for Electric Utility Efficiency Programs
And the Development of Shared Savings Incentives

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Abstract

Successful utility-sponsored energy efficiency programs should slow required capacity expansion and reduce future utility investment. Electric utilities have proposed incentive mechanisms such as shared savings programs supported by arguments that foregone investments are an opportunity cost and, therefore, a disincentive for successful energy efficiency objectives. While the opportunity cost justification may be accurate, we find that incentive proposals from utilities typically do not rigorously link the incentives to a formal measure of opportunity cost. Consumer advocates have opposed incentive proposals to complement energy efficiency program implementation suggesting that utility investors do not have an opportunity cost. The strongest theoretical opposition suggests that foregone investment can be re-directed to enhance shareholder equity position in the utility and/or shareholders can seek out non-utility investments as a substitute. We first counter the theoretical opposition from consumer advocates based on capital structure regulatory constraints and finance theory. Second, we will demonstrate that the consumer advocate opposition contradicts other long-standing consumer advocate theoretical concerns such as the Averch-Johnson Effect and gold plating. Third, we develop a financial model for estimating opportunity cost on foregone capacity investment that could serve as a regulatory benchmark to formally and more accurately develop incentive mechanisms such as shared savings levels for electric utilities.

Abundant Natural Gas Supply and the Future of Electricity Generation: Can There Be Too Much of a Good Thing?

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Over the past couple of years, estimates of available domestic natural gas reserves in the U.S. have risen dramatically, due to advances in technologies that have made it possible to extract gas from unconventional sources such as shale in a more economic manner. Many experts in the natural gas industry have gone so far as to declare that the era of volatile natural gas prices is over, and have significantly lowered price projections over the next couple of decades. The electricity industry, which had already been contending with increasing resistance by regulators and environmentalists to coal as a baseload generation fuel, along with the prospect of significantly rising costs of environmental regulations for both existing and new coal plants, has begun to reconsider the role of natural gas as a baseload generation fuel. Fears about the consequences of a “dash to gas” on the level and volatility of natural gas prices have largely subsided, and some electricity producers are considering a significant increase of natural gas in their generation mix. While other electricity sources, such as nuclear power and renewable energy, offer cleaner alternatives, these are often expensive to build and/or maintain and, in the case of wind and solar power, present new challenges to the system because of their intermittent availability. Conversely, natural gas promises to be an economical fuel source, and one that is much relatively cleaner compared to coal. But is there a danger in becoming overly reliant upon natural gas? This paper will use portfolio theory to examine this question, in which alternative generation mixes are evaluated in terms of their return (energy delivered per unit cost) and the aggregate variation in their costs (based upon estimated correlations in fuel and operating costs between the different technologies). The analysis will address the complications associated with the alleged changes in the cost characteristics of natural gas, including reductions in price volatility and a reduced correlation with other fossil fuels – particularly oil, and other complications arising from the uncertainty of future environmental regulations. It will offer guidelines on reasonable limits to the share of electricity production that natural gas provides by identifying clearly suboptimal changes in the generation portfolio, as well as other changes which will require a rational determination of the tradeoff between risk and return.

Public Utility Beta Adjustment and the Cost of Capital

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Public Utility Beta Adjustments and the Cost of Capital

Abstract

Public utility rate of return expert witnesses typically use Blume-adjusted capital asset pricing betas to estimate the cost of common equity capital for public utility rate cases. The sources of these widely disseminated adjusted betas are stock analysis services such as Value Line, and Bloomberg. The Blume adjustment is done to convert betas estimated with historical returns data into ex ante betas. We provide empirical support to show that the commonly-used Blume beta adjustments as applied to public utility betas may not be appropriate since public utility betas do not appear to be mean reverting to the market beta of 1.0. Short-term betas have followed a cyclical pattern, with structural breaks since the mid 1990's and long-term betas trending downward. The implications of our findings are that Blume-adjusted utility betas may not be accurately estimate the cost of common equity capital for public utilities. The Blume model appears to be a poor predictor of future public utility betas, may introduce a bias in the estimation of the cost of common equity capital, and may result in inefficient utility rates if the capital asset pricing model is relied upon exclusively in regulatory rate proceedings.

“Pricing the Use of Capital-Intensive Infrastructure over Time and Efficient Capacity
Expansion: Illustrations for Electric Transmission Investment”

By
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Classic economic theory provides a conundrum: very different short- and long-run pricing prescriptions for large capital-intensive infrastructure projects. Short run prices should cover only the operating costs of the facility (short-run marginal cost); otherwise, the project may be under-utilized. Only as the facility becomes congested are additional fees warranted to allocate its use efficiently. But capital costs should be included in the calculation of user-fees only when additional demand would force the construction of more capacity (long-run marginal cost). But after the new capacity is built, economists would have the price fall back to short-run marginal cost, resulting in schizophrenic behavior by customers and investors as prices swing widely over time. By integrating the assessment and assignment of congestion fees with other economic principles like “peak-load-pricing” and the “inverse-elasticity” rule for apportioning capital costs, a sequence of pricing rules is described that can lead to a smooth, efficient and fair evolution of prices over space and time. These pricing principles also result in compatible incentives for all parties, and they complement several existing electricity system planning processes. These principles that are based upon the proper assignment of congestion fees are also compatible with a “real-options” analysis of efficient capacity expansion.

Abstract: A Tale of Two Policies: A Reexamination of State Telecommunication Policy on the Protection of Universal Service and the Advancement of Competition in the Post-Divestiture Period

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The economic literature on telephone penetration rates and universal service has focused on the estimation of the price effects of local access, local usage and long distance service on penetration as competition was introduced and led to significant restructuring on the industry. While programs like lifeline and link up were expected to help with the transition to competitive markets the concern at the time of the divestiture of AT&T and the increasing competition in the sector was that price rebalancing would adversely affect customers and telephone penetration would diminish, reversing the general trend of higher penetration. At the time two policy options were considered by states in response to the transition to competition. The first was to embrace competition and let the economic chips fall where they may, while the second approach was viewed as resisting competition and finding other sources of subsidy to replace the flows formerly delivered through the long distance separations process. The purpose of this paper is to more closely scrutinize the policy responses of states in order to estimate whether or not state policy responses had a significant effect on re-pricing services and sustaining the goal of universal service. Did those that embraced competition fare worse in terms of penetration and universal service than those state that resisted competition? Is competition and universal service compatible? We seek to provide insights into these questions by developing a two stage model of telephone penetration, telephone rates and state policies on competition and pricing. Employing data from 1984-1990 we test to see if there were differences between states employing an "immunization" policy of restricting entry and raising common carrier line rates and those states that aggressively rebalanced rates and opened markets to competition.

The Uneasy Marriage of Regulation and Competition Revisited

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Abstract

The economics literature provides detailed guidance about the design of regulatory policy in settings where the incumbent supplier is a monopolist that faces no competition. And in the case of unfettered market competition, economic regulation is presumably unnecessary. The literature is less complete regarding the design of regulatory policy in the presence of developing competition. Yet competition continues to develop in many industries that historically have been characterized by monopoly supply, including telecommunications and energy. Thus, it is important to determine how the central tenets of monopoly regulation should be modified when regulation is employed in settings with developing competition.

In a widely cited article (“The Uneasy Marriage of Regulation and Competition”) published about the time of the first CRR conference, Professor Alfred Kahn notes that “[There is] no rational half-way house between thorough regulation and free competition,” and “Between regulated monopoly and unregulated competition, regulated competition represents the worst of both possible worlds.”

Professor Kahn’s observations, which pre-date the widespread use of incentive regulation, suggest that the joint presence of regulation and competition may create irreconcilable tensions. There is no doubt that mixing regulation and competition is a delicate exercise that continues to perplex policymakers. Yet we remain optimistic that suitably designed regulation can complement developing competition. This research analyzes the manner in which regulation should change as the market transitions from regulated monopoly to effective competition. We view the design of regulation in a setting with developing competition to be more about the rules governing the “handoff” from regulation to competition than as an irreconcilable conflict between the two types of industry discipline.

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AN EMPIRICAL ANALYSIS OF THE IMPACT OF TELECOMMUNICATIONS POLICIES ON BROADBAND DIFFUSION

DAVE WARING

Broadband is becoming important to both the economic and social progress of a nation. Commerce and community interaction is increasingly conducted “on line.” The economic importance of broadband has been theoretically framed in terms of the “network effect.” Additionally, broadband may produce significant positive externalities in areas such as education, healthcare, and the environment. For these reasons, policymakers have been closely monitoring the progress of broadband diffusion. Although the US ranks second in total broadband lines, it currently ranks only 15th among OECD countries in terms of subscribers per 100 inhabitants.

A decade of hard data on the rollout of first generation broadband is examined in the context of broadband policies employed by different administrations. In this study the primary interest is the use of “loop unbundling” and industrial policy. Indicators are collated for 30 OECD countries reflecting years when unbundling was imposed and when industrial policy was in effect. These indicators are gathered for the time period 2003 through 2008, a timeframe for which good broadband deployment data is available. As in previous studies, the dependent variable modeled is broadband subscribers per 100 inhabitants.

The use of an unbundling policy is statistically significant when lagged by one or two years, and it is always positive. The impact of industrial policy is consistently a statistically significant predictor of broadband density, with a stable value and positive sign over all regressions. These are new findings in the empirical literature, and predict that both policies will increase the availability of broadband to citizens. These findings can inform policy intended to promote broadband availability, particularly relative to the next generation of broadband which will provide higher speeds and will require substantial investment in new fiber infrastructure.

On Calendar Energy Options

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Abstract submitted to the 30th Annual Rutgers Eastern Conference (May, 2011)

In today's power market, the participants, including power generation companies, marketers, banks and speculators, use financial and physical trading instruments for a variety of purposes. For example, power suppliers need to hedge their positions, and marketers use trading information to estimate the volatilities of monthly or annual prices. Increasingly, financial tools in the form of power options are used. The most common form of such options is "fixed volume" options, based on fixed volumes specified for delivery or sale as monthly, daily or annual options.¹ While they are the "simplest" in the power market, they are assuredly not usually "plain vanilla." Rather, while their terms can be set as purely financial or physical, they are often integrated with swaps, so that a typical monthly call option, for example, is an option (which gives its holder the right but the not the obligation) to engage in a swap, with fixed total volume or fixed daily volume, for the month in question. Surprisingly, notwithstanding the importance of these types of calendar options (or in their usual form "swaptions") for risk management in practice, little has been written about their integration with energy portfolio theory and their implications for associated risk management strategies. This paper attempts to remedy this by focusing on a few of the most commonly used "calendar options" in the energy markets and their potential uses in risk management. Besides presenting a review and synthesis of calendar options in general, we will demonstrate how to calculate the annual uncertainty base for monthly swaption prices and volatilities and how these can then be integrated in an annual portfolio management framework such as that proposed in Kleindorfer and Li (2005, 2009). Our focus will be on contracts from power markets. However, the principles can be applied to other energy markets as well, such as natural gas and oil markets.

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¹ See Eyedeland and Wolyniec (2003) and Kaminski (2004) for a description of various types of trading instruments in the energy sector.

The Impact of Carbon Cap and Trade Regulation on Congested Electricity Market Equilibrium

Tanachai Limpaitoon, Yihsu Chen, and Shmuel S. Oren

Regulations aimed at limiting Green House Gas (GHG) emissions can be implemented through several market based alternatives. Examples include renewable portfolio standards (RPS), GHG emissions tax, and Cap and Trade (C&T) programs. One of the strength of these market-based instruments is their ability to couple with competitive electricity markets. However, the impact and the efficacy of a regulatory policy depends on interactions of demand elasticity, transmission network, market structure, and strategic behavior of generators. Such interactions will affect system operations and market outcomes and their ultimate impact on the operation of the electricity markets as well as their environmental consequences must be carefully analyzed to avoid unintended adverse consequences.

In a perfectly competitive market, for instance, a carbon tax levied upstream on power plants would shift production toward low-carbon technologies. Such intuition, however, may break down when the behavior of strategic firms (owners of power plants) and demand response are taken into consideration. Under an emissions tax, these firms will face higher energy generation costs, and they will therefore alter their production schedules accordingly while taking into account emissions costs. In a locational marginal price (LMP)-based electricity markets, changes in energy outputs from plants at different locations might alleviate or intensify transmission congestion, thereby altering congestion patterns that possibly lead to some unintended outcomes. For example, Downward (2010) illustrates through a stylized two-node system that carbon emission can increase after a carbon tax is imposed due to reduced congestion and increased competition. While this example represents a theoretical market anomaly, which may not be prevalent in practice, it highlights the need to consider the interactions and the potential unexpected consequences of environmental regulation in the electricity sector.

This paper develops an equilibrium model of an oligopolistic electricity market in conjunction with a C&T policy to study such interactions. Our model accounts for transmission constraints using a DC approximation of Kirchhoff's law and capture horizontal market power in terms of technology and spatial distribution of capacity owned by firms across the network. In our analysis we demonstrate the potential impacts of network congestion, ownership structure, and demand elasticity on market and environmental outcomes for a 24 bus test network and for a reduced 225 bus model of the Western Electricity Coordinating Council (WECC) system. The results show that market structure and congestion can have a significant impact on the market performance and the environmental

outcomes of the regulation while the interactions of such factors can lead to unexpected consequences.

Abstract

Linking Wholesale and Retail Electricity Markets via Consumer Subscription

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Smart pricing with price-responsive demand is essential for the electric industry to move to a smart grid future. However, the opportunity does not lie so much in whether smart pricing will yield sufficient social benefits but in whether consumers will be empowered in a risk management process to share the benefits. Consumer subscription is a simple, yet sophisticated, rate design concept that could foster consumer engagement in price-responsive demand by forging a much needed connection between the wholesale and retail markets. We study retail rate designs that allow a consumer to subscribe forward contracts with fixed levels of electricity consumption at fixed prices set in advance. Consumer subscription entails a two-settlement transaction system. The consumer subscription service is settled as a forward transaction, allowing consumers to manage risks with access to differentiated service options. It is supplemented with a pay-as-you-go default service, allowing consumers to adjust their procurement in real-time at the wholesale market price. We discuss both the theory and practice of consumer subscription and show how it could help remove a major obstacle to a smart pricing future.