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Performance-Based Ratemaking Educational Seminar

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Performance-Based Ratemaking Educational Seminar

I. Why PBR?

II. Issues in Indexing

III. Yardstick Competition

IV. Plan Features

V. Implementation Issues

Why PBR?

Traditional Utility Regulation

- Regulators protect the utility franchise and guarantee a fair rate-of-return in exchange for utility obligation to serve at reasonable cost
- Cost-of-Service regulation protects the reasonable investment of the utility, while maintaining reasonable pricing for customers

Changing Economics

- Rapid technological change and the introduction of competition has already changed the economics of previously rate-of-return regulated industrial sectors
  - Rail
  - Trucking
  - Airlines
  - Telecommunications
  - Natural gas

Changing Economics of Electricity Markets

- Wholesale generation competition is now a reality in some electricity markets
- In the United States, FERC Order 888
- Retail competition: Pilot programs in a number of states, including Pennsylvania, New Jersey, New York, and Illinois
- In California, Massachusetts, New Hampshire, and Rhode Island, retail competition is underway

Incentive Regulation Models

- Price caps
- Revenue caps
- Rate-of-return bandwidth
- Yardstick regulation
- Purchase power incentive mechanisms
- Wholesale options
- Blended models

Incentive Regulation Models

- Price caps
  - Establish ceilings under which the prices for individual baskets of services may fluctuate
  - Typically indexed to a measure of inflation for a fixed period of time
  - Adjusted by productivity changes and other external factors

Incentive Regulation Models

- Revenue caps
  - Allowed revenue per customer determined at some baseline level
  - Revenue cap adjusted by specified measure of inflation and customer growth
  - Provides broad incentives to cut costs
  - Premise that costs are not proportional to sales

Incentive Regulation Models

- Rate-of-return bandwidth
  - Rates set as under Cost-of-Service
  - A band of authorized return is established for specific period
  - The utility is allowed to keep or share in higher returns that fall within bandwidth
  - Review triggered if results fall outside bandwidth

Incentive Regulation Models

- Yardstick regulation
  - A utility's costs are monitored relative to a reference group of utilities
  - Incentive to become more efficient than peer group
  - Similar in concept to industry price index or sector productivity offsets in price cap formula
  - Often a regional or firm characteristic component

Incentive Regulation Models

- Blended models
  - Plans generally combine various models to achieve regulatory goals (e.g., price caps with rate-of-return bandwidths)
  - Protects both the utility and ratepayers from excessive risk

PBR Experience

- United Kingdom
  - British Telecom
  - British Gas
  - Regional electricity companies
- United States
  - Interstate Commerce Commission — rail deregulation
  - Federal Communications Commission — long distance and local phone service
  - Federal Energy Regulatory Commission — natural gas transmission
- Canada
  - Canada Radio-Television and Telecommunications Commission — telecommunications

Competition in Ontario

- *MacDonald Report* (June 1996) recommended "the establishment of wholesale competition, followed by the phased introduction of full retail competition, for the supply of Ontario's electricity."
- *Direction for Change* (11/6/97) proposed utility restructuring and retail competition
  - OEB mandate to examine PBR
- Bill 35 ("Energy Competition Act") introduced June 9, 1998

Cost-of-Service and the Introduction of Competition

- Provides disincentives for efficient adoption of new technologies
- Undermines the introduction of innovative services
- Inhibits the flexibility of the incumbent utility in responding to new entrants
- Encourages cost shifting from competitive to regulated markets

Incentive Regulation as an Alternative Regulatory Model

- Severs the direct tie between costs and prices as in Cost-of-Service regulation
- Encourages utilities to undertake socially beneficial behavior
- Most recently, provides utilities with mechanisms to respond to competition

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Issues in Indexing

Issues in Indexing

- Price cap formula
- Revenue cap formula
- Supporting calculations and information
  - Inflation measures
  - Productivity measures
  - Data
- Implementation (Oftel/FCC, CRTC, railroads, electric, gas, water)

Price Caps and Revenue Caps

- Price caps and revenue caps are established to provide the utility with incentives to control costs and produce efficiently
- Both regulatory models have similar information requirements
- Revenue caps provide an incentive to reduce sales, possibly through higher prices
- Price caps focus on pricing flexibility below a ceiling to allow the incumbent the ability to compete

The Price Cap Formula Overview

- Initial prices for a basket of services are established
- Prices are then adjusted automatically over a specified time interval by:
  - Measure of change in input costs
  - Productivity offset
  - Adjustment for unusual events

The Revenue Cap Formula Overview

- Initial revenue or revenue per customer established
- Revenues are then adjusted automatically over a specified time interval by:
  - Change in the number of customers
  - Allowed change in usage per customer
  - Measure of change in input costs
  - Productivity offset
  - Adjustment for unusual events

Revenue Cap Formula

Norwegian distribution PBR example:

Allowed Revenue = Previous Revenue × (W/2) × (1 - X)

Where:

W = one year rate of sales increase
X = productivity adjustment factor.

Note: Norwegian cap is a “hard” cap for each year; surplus or deficient revenues are trued up in subsequent years.

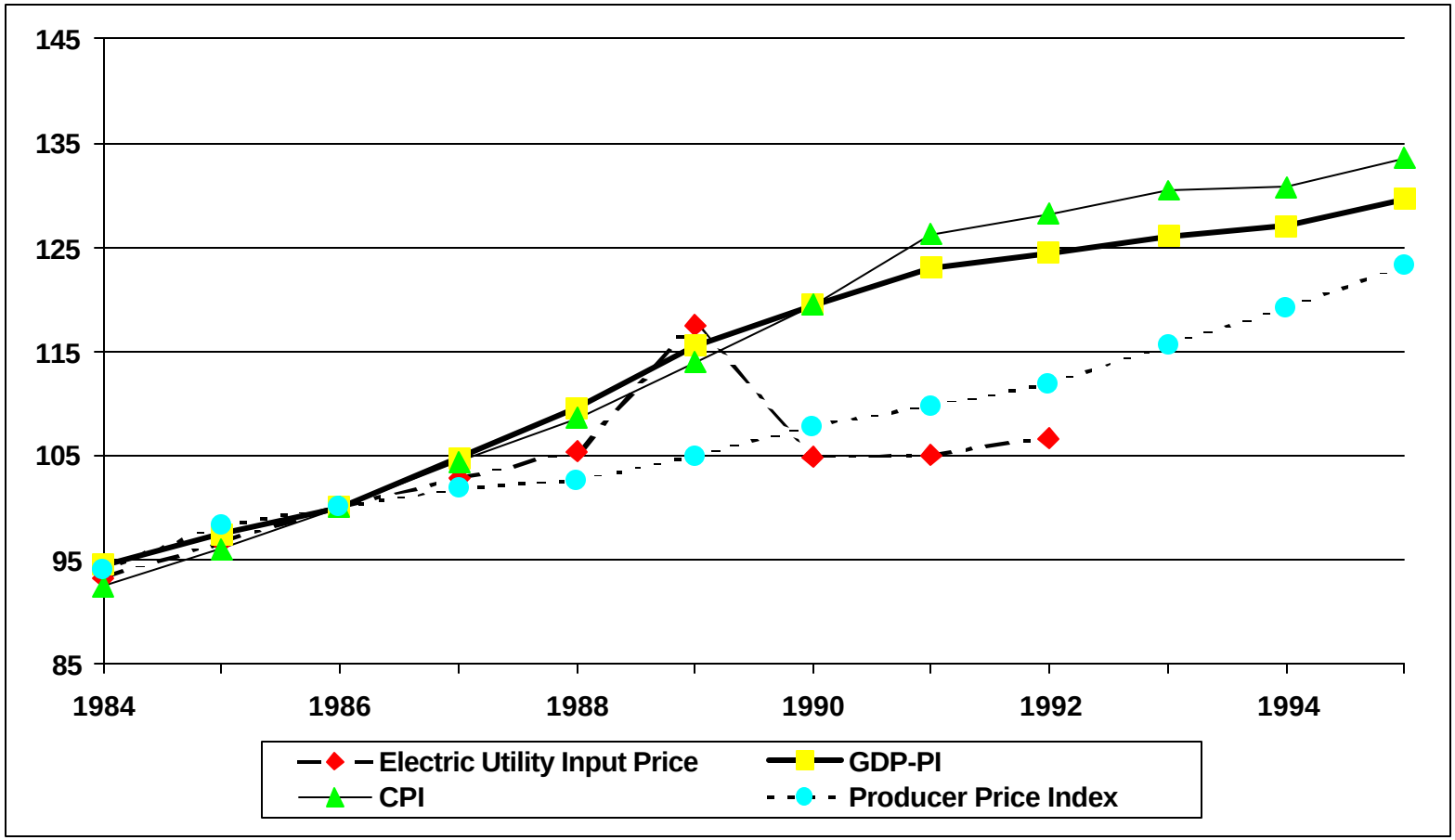
Supporting Calculations and Information

- Inflation measures
- Productivity measures
- Z-factors
- Data requirements

Inflation Measures

- Consumer price index
- Gross domestic product price deflator
- Producer price index
- Producer price index for electric power
- Input price index for electric power

Comparing the Electric Utility Input Price, the CPI, the GDP-PI, and the PPI in Canada (1986=100)



Source: Statistics Canada.

Industrial Composition of Telecommunications Sector Material Inputs and Economy-Wide Material Inputs in Canada

Telecommunications Top Supplying Industries	Percent of Total Telecommunications Industry Inputs	Percent of Total Economy-Wide Inputs
Printed Business Forms	20.2	1.0
Telephone & Related Equipment	8.2	0.1
Wire & Cable	6.7	0.3
Repair Construction	17.9	2.1
Telephone Carriers	5.8	1.7
Computer Services	5.2	1.0
Total	64.0	6.2

Source: Statistics Canada, Input/Output Division.

Productivity Measures

- The basis for the productivity offset
  - Utility or PUC TFP studies
  - Third-party “academic” TFP study
  - Negotiated based on expected technological advances
  - Politically derived “stretch factor”

Productivity Measures

- Selection of productivity measure depends on formula specification and inflation index selection
  - The ICC “Direct-Approach”
  - The FCC “Differential Approach”
  - U.S. LECs “Modified Differential Approach”
  - CRTC “Full Differential Approach”

Implementation

- ICC Direct Approach

$dp^R = dw^R - dTFP^R$

Where d() operator indicates annual percentage change, the superscript R denotes railroad industry. The relevant output price is indicated by p; w is the relevant input price, and TFP is the industry total factor productivity.

Implementation

- U.S. LECs Modified Differential Approach

$$dp^L = dw^L - (dTFP^L - dTFP^N)$$

The original price cap formula incorrectly adopted for the U.S. LECs modified the price cap formula in order to overcome the need to directly measure input prices for the telecommunications sector. Where d() operator indicates annual percentage change, the superscript L denotes LEC. The superscript N denotes the overall U.S. economy. The relevant output price is indicated by p; w is the relevant input price, and TFP is total factor productivity.

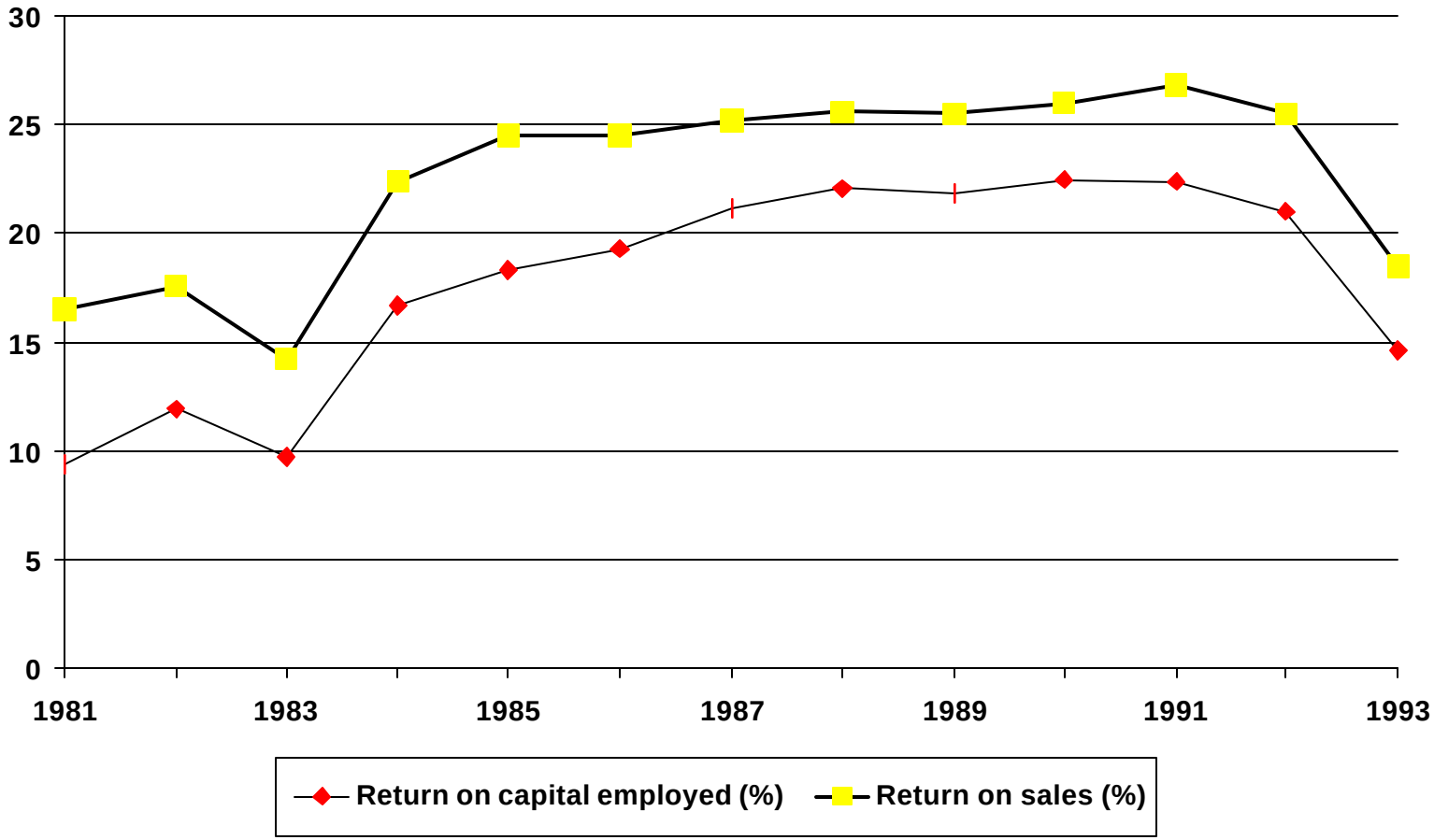
Implementation

- CRTC Full Differential Approach

$$dp^T = dGDPPI - (dTFP^T - dTFP^N) + (dw^T - dw^N)$$

The price cap formula adopted by CRTC correctly adjusts the price cap for input price differential between input prices for telecommunications (T) and the national economy (N).

Financial Performance of British Telecom



Source: "Regulatory Reform," *Economic Analysis and British Experience.* Armstrong, Cowan, and Vickers. 1994.

The Z-Factor

- Z-factors allow adjustment for unusual events beyond the control of the utility's management
  - Changes in regulation
  - Changes in accounting or tax rules
  - Natural disasters
  - Environmental issues

Data Requirements

- Data is needed for calculating:
  - Initial rate levels
  - Industry — specific input prices
    - Input shares and corresponding prices
  - Industry — specific productivity
    - Labor, capital, materials

Data Sources

- Company
  - Internal costs
- Industry surveys
  - Prices
  - Financial information
- Government
  - Input/output tables
  - Producer/consumer price indices
  - Investment/capital/depreciation
  - Employment/wages

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Yardstick Competition

Yardstick Competition

- Reduces the linkage between costs and rates
- Relies on objective industry standards for performance
- Simulates free market cost competition in a regulated environment

Implementing Yardstick Competition

- Selection of peer group
- Establishing benchmarks
- Linking incentives/penalties to benchmarks

Peer Group Development

- Companies with similar operating/cost profiles (FERC, 1993)
  - Meters per km^2
  - Consumption (kWh, joules) per customer
  - Consumption/sales by customer class
- In practice, standards are often set based on historical service levels ("peer group" of 1)
  - Eastern Utilities Associates (Massachusetts)
  - Niagara Mohawk
  - Portland General Electric

Benchmarking: Typical Indices

- System average interruption frequency index
  - Total customers interrupted/average customers served
- System average interruption duration index
  - (Customer outage hours) × 60 / average customers served
- Independent surveys of customer satisfaction
- Total customer complaints
- Call center response times
- Safety (e.g., lost-time accidents per 100 employees)

Linking Benchmarks to Rates

- Reduction/increase in allowed return on equity
  - Rhode Island: ±1% in each year tied to achieving benchmarks
  - National Fuel Gas (NY) ROE tied to benchmarks
- Direct monetary penalties/incentives
  - Portland General Electric: $1M per customer service index; $500k for safety
  - Niagara Mohawk: $20M at stake in achieving benchmarks

Yardstick Caveats

- Generally requires new data development
- Indices should measure factors company can control
  - National Fuel Gas: Customer complaints increased when spot market spiked in December 1996
- Benchmarks should allow for incentives as well as penalties

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Plan Features

Achieving Policy Objectives

- Regulators may fine-tune the incentive regulation framework through the determination of:
  - *Sharing:* Defining split of benefits between ratepayers and shareholders
  - *Standards:* Industry benchmarks for performance
  - *Service baskets:* Definition of which services are included under, for example, a price cap plan
  - *On ramps/off ramps:* Selection of service cost and revenue categories to be included
  - *Z-factors:* Identification of special circumstances
  - *Review periods:* Specification of length of time between regulatory review

Sharing Mechanisms

- Allocate risk and reward to shareholders and ratepayers
- Earnings that exceed specified threshold are shared by shareholders and ratepayers
- Sharing mechanisms aim to fine-tune regulation by providing an incentive for utilities to become more efficient, and to ensure that ratepayers share unexpected gains

Are Sharing Mechanisms Necessary?

- Evaluate implication of sharing mechanism for:
  - Rates
  - Service quality
  - Investor return
  - Economic development
  - Utility ability to compete in new environment

Competition and Sharing Mechanisms

- In the emerging competitive electricity market, a sharing mechanism may be appropriate during the transition from cost-of-service regulation to unregulated markets
- Ensures that benefits from incentive regulation will flow to ratepayers

Standards of Performance

- System average interruption frequency index
  - Total customers interrupted/average customers served
- System average interruption duration index
  - (Customer outage hours) × 60 / average customers served
- Independent surveys of customer satisfaction
- Total customer complaints
- Call center response times
- Safety (e.g., lost-time accidents per 100 employees)

Warning to Regulators

- As competitive forces build, regulators will have increasingly limited tools for achieving regulatory goals, as any form of nonmarket driven action may risk the financial health of the incumbent utility

Service Baskets

- Different cap levels may be applied to different service baskets to achieve policy goals and protect stakeholder groups
  - Urban/rural
  - Business/residential
  - Usage volume

Service Baskets

- In determining the composition of service baskets for incentive regulation in telecommunications, regulators have considered:
  - Number of and capacity of alternative suppliers
  - Market share estimates over time
  - Market share distribution among stakeholder groups
  - Ease of entry
  - The promise of economic benefits from competition

On Ramps/Off Ramps

- On ramps/off ramps allow regulators to:
  - Determine which ratepayer groups will benefit (or lose) from incentive regulation
  - Ensure against cross-subsidization of other services by retail services
  - Prevent other service losses from draining profitable service contributions to the sharing pool
- Mechanism allows regulators to explicitly deal with the treatment of costs associated with DSM, fuel and purchased power, and other cost items

Representative On Ramps

Company	Plan Type	On Ramp Scope
Central Main Power (CMP)	Price cap	All retail rates
NY State Electric & Gas	Price cap	Flow-through allowed for low-income DSM, and excess R&D expenses
Niagara Mohawk Power Co.	Price cap	All retail rates
PacifiCorp	Price cap	Calif. only; all prices with no pass-throughs
Tuscon Electric	Price cap (freeze)	All retail rates
PG&E	Base-rate revenue cap/price cap	Revenue cap on nonfuel expenses; price cap for large industrial customers

Source: Lawrence Berkeley National Laboratory, November 1995.

Representative On Ramps

Company	Plan Type	On Ramp Scope
ConEd	Revenue per customer cap	Pass-throughs for IPP capacity costs, pensions, DSM program costs, and renewables
SDG&E	Base-rate revenue cap	Certain nonfuel expenses
SDG&E	Modified price cap	Fuel and purchased power costs
SCE	T&D revenue cap	All nongeneration revenues
SCE	Modified price cap	All fossil generation revenue requirements
Alabama Power	Sliding scale	All retail rates
Mississippi Power	Sliding scale	All retail rates

Source: Lawrence Berkeley National Laboratory, November 1995.

Z-Factors

- One-time or unexpected circumstances and costs beyond management control can be captured as Z-factors
- Z-factors are often activated only when the extraordinary costs exceed a specified threshold
- Z-factor classifications vary greatly by jurisdiction

Z-Factors

- Z-factor classifications vary greatly by jurisdiction. Categories may include costs associated with:
  - Legislative, regulatory, and tax changes
  - Environmental costs
  - Accounting costs
  - Catastrophic events

Review Periods

- Incentive regulation requires periodic review
- A shorter review period greatly reduces the risks and potential rewards to the utility of incentive regulation
- A longer review period places much greater emphasis on the selection of the appropriate incentive regulatory plan and plan parameters

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Implementation Issues

Utility Example: CMPC

- Central Maine Power Company (CMPC)
  - General acknowledgment that cost-of-service regulation was problematic
  - Parties submitted stipulated alternate rate plan, October 1994
  - Maine Public Utilities Commission adopted the stipulated alternate rate plan, December 1994
- Lessons from price cap plans

Utility Example: CMPC

- Structure of the plan
  - Price cap
  - Profit sharing
  - Pricing flexibility

Utility Example: CMPC

- Initial results, January 1995 to September 1996
  - Modest increase in overall price (Commission allowed a 1.26 percent increase in the price ceiling for 1996)
  - Profit sharing has not been triggered
  - CMPC increased the number of discounted rates due to streamlined process

Implementation Issues

- Internal plan factors
  - Improper design (alignment of cost and revenue) has yielded over-earnings
  - Response has been to drive up the productivity offsets beyond level supported by data (fix the result, not the problem)
  - Lack of standards for quality, reliability, safety, and service
- Balance between term and oversight

Implementation Issues

- External/macroeconomic factors
  - An appropriate index may not be available
  - Economic cycles can mask productivity
- Plan flexibility
  - The new market will require greater flexibility than in the past (both service and price)
- Competitive effects