Performance-based regulation

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What is PBR?

- Performance-based regulation (PBR) is a rate setting mechanism that, for a set period of time, breaks the direct link between the costs of a utility and the rates charged to customers.
- Also referred to as incentive regulation (IR) or formula-based ratemaking (FBR).
- Adjusts rates on an annual basis through indexing or establishes a rate adjustment trajectory at the onset of the term.
Context for moving to PBR

• Most utility legislation mandates a form of cost of service regulation - rate base rate of return (RBROR)
• Concerns about cost of service incentives, effectiveness of traditional regulatory tools and regulatory burden have led to examinations of new approaches to economic regulation
• Shifting from pure, vertically integrated, utilities has added complexity to cost structures
• Several thousand pages of supporting information being provided in RBROR rate cases, with little or no effect on ability to control costs
• Legislative provisions have been added in some jurisdictions to encourage incentives for efficiency
Why is PBR used?

- Regulatory tools available for RBROR make it difficult to verify that cost forecasts provided by utilities are reasonable
- PBR should provide stronger incentives for utilities to operate efficiently
- PBR can lessen the administrative burden of setting rates
Regulatory tools of RBROR

- Forward-looking test year of costs and demand with reasonableness assessment
- After the fact prudence reviews for assets in rate base and potential disallowances
- Cost oversight and potential disallowances of past costs for forecast purposes
- Detailed reviews of methodologies used for cost forecasts, transfer prices and depreciation
- Benchmarking studies
- Establish service quality levels and standards (penalties)
Incentive features of RBROR

- Preference to invest in capital assets (rate base) to improve earnings (higher rate base means greater earnings)
- Few incentives to minimize operating, maintenance and administration costs (reduced costs means lower rates)
- Incentives to be conservative, forecast high costs and low demand growth

Regulatory tools are limited in their ability to overcome these incentives, utilities have more information
Competitive market incentives

• Firms make trade-offs between price and quality to respond to customers
• Firms are largely price takers, not price setters
  o Firms cannot influence price and so focus on efficiency
  o Price moves toward the marginal cost of most efficient competitor so focus is on reducing cost
• Firms must continually improve to match or better competition, instead of exerting effort in influencing regulators
• Firms must cope/adapt to externalities and shocks (as do their competitors)
Other ratemaking approaches

- **RBROR time lags (rate freeze):** Utility manages costs for as long as it determines manageable under existing rates, incentive to be efficient to avoid needing to file applications.

- **RBROR forward test years:** Provides incentive for utilities to be more efficient than cost forecasts, also to inflate forecasts.

- **Incentive targets:** Generally use RBROR, but provide rewards (penalties) for utility’s performance on certain targets.

- **Benchmark or yardstick:** Rates are based on rates of similar peer utilities, creates incentive to achieve lower costs than peers, although difficult to find peers.

Combinations of rate making approaches can be used for different aspects of revenue requirement.
What PBR is meant to achieve

- Utilities focused on efficient operations rather than management of regulation
- Regulator focused on prices and service quality rather than trying to decipher complex cost-related information
- Reduction in regulatory burden
- Rate of change in price increases less than expected under cost of service regulation
Basics of PBR

- Start with Phase II cost of service prices
- Focus on changes in prices (not costs) over time and on quality of service
- Set plan to continue to provide opportunity to earn fair rate of return during the PBR period
- Eliminate reviews of costs during PBR period so as not to distort incentives
- Reduce regulatory burden -- eliminate old regulatory filings (some new filings)
- Allow for price adjustments for significant unexpected events
Incentive features of PBR

- Utilities move from being price setters to price takers
- Price changes external to the individual utility’s cost changes because they are set by a formula
- Utility focus on managing costs to provide stronger returns to shareholders because prices are not affected by cost reductions
- Less opportunity to flow through actual costs
- Rate cases to influence price reduced
Calculation of PBR rates

- Example of current Alberta PBR formula for electric distribution utilities (note: other variables or variable names used in other jurisdictions):

\[ R_t = BR_{t-1}(1 + (I - X)) +/\!- Z +/\!- K +/\!- Y \]

- \( R_t \) = Rate current year
- \( BR_{t-1} \) = Base rate from prior year
- \( I \) = Inflation index
- \( X \) = Productivity factor
- \( Z \) = Exogenous adjustments
- \( K \) = Capital factor
- \( Y \) = Flow through and deferral items
BR_{t-1} = Base rate from prior year

- First year “going-in” or “base rates”
  - Sets the rates upon to which the formula is applied
  - Usually accept most recent RBROR application be it historical or prospective, adjustments may be allowed
  - Rate established is usually independent of PBR formula
  - Some jurisdictions (e.g., New Zealand) may adjust going-in rates to provide desired returns over PBR term

- Ongoing, subsequent years
  - Prior year’s rates adjusted by formula during PBR term
  - Options available to re-base rates for future PBR terms
$I = \text{inflation index}$

- Compensates utility for inflation increases
- Try to find indices that reasonably represent how the costs incurred by the utility will change
- Common measure is CPI, however, CPI is a consumer basket of goods not utility costs
  - e.g., watermelon prices unrelated to transformer prices
- Labour index may also be used (average weekly earnings (AWE) used in Alberta PBR plans)
- Gross Domestic Product Implicit Price Index (household and government goods, services and capital) may be used (often Final Domestic Demand version to eliminate net exports)
- Composite index may be used to reflect cost structures of utility (e.g., 50% CPI, 50% labour)
\[ I = \text{inflation index} \]

- CPI is what is known as an output measure
  - Based on changes in retail prices (outputs from firms) not the costs of production inputs
  - Output measures can reflect productivity improvements
    - A $600 1990 computer vs. a $600 2016 computer has productivity improvements reflected in the price
    - 1990 versus 2016 liter of gas is the same, price comparison is pure inflation

- Productivity changes are also captured in the X factor, be mindful that productivity changes are not significantly double-counted
I = inflation index

- Geographically-specific indices may exist
  - Alberta CPI and Alberta AWE used in Alberta PBR plans
- Industry-specific input price indices may exist
  - Electric utility construction price index
- Clear differences in the rate of price changes in the utility industry and the indices selected may require the use of input price differential adjustments
- Some indices fluctuate similarly to one another, which may eliminate the need to develop a precisely-correct complex composite index if a simpler reasonable proxy can be found
$X = \text{productivity factor}$

- Productivity growth is the rate of growth of outputs less the rate of growth of inputs.
- Ideally, over time, utilities should be able to serve more customers or deliver more energy using the same or fewer inputs.
- Under PBR, utilities should compete against an external (industry-wide) productivity measure.
- This is a proxy for competitive market price pressures, if a utility can exceed industry-wide productivity they achieve superior returns.
X = productivity factor

Total factor productivity (TFP) approach:

- A TFP study is a technique that measures the rate of change of all inputs and outputs to derive a single measure suitable for comparison.
- Range from economy-wide down to industry-specific.
- TFP measures growth rates, which makes it possible to apply to any utility, regardless of the current level of productivity.
- Geographic dispersion may be a factor if a region is subject to rates of changes in inputs that differ from the industry average rates of change (e.g., labour costs).
- May need to find reasonable proxy data sets if high quality information is not available for the specific industry segment.
X = productivity factor

Total factor productivity (TFP) approach:

• Usually disaggregate inputs to:
  o Labour
  o Capital
  o Other (materials, rents, services etc.)

• May select a single output measure for simplicity, or use a composite of multiple output measures
  o KWh or GJ
  o Number of customers
  o Peak demand
X = productivity factor

Total factor productivity (TFP) approach:
• Annual fluctuations suggest average of a longer time series is required to arrive at a reasonable expectation for the future

Source: NERA TFP Study
X = productivity factor

Stretch factor:

- A percentage amount added to X factor
- Designed to capture gains in excess of industry average productivity growth
- Firms under RBROR assumed to be less efficient than competitive firms
- Evidence that productivity improvements greater during initial PBR term
- Stretch factor often eliminated after the first PBR term
X = productivity factor

Other methods of setting X:

- Building blocks – forecast inputs and outputs for the utility, set X to provide sufficient revenue
- Econometric approaches – model of indices that can estimate expected productivity
- Efficiency frontier – Review of past performance of specific utilities to see how productive they have been relative to a hypothetical efficient firm, build larger stretch for inefficient firms
- Adopt X factor from other jurisdictions’ PBR plans
Challenges with I-X formula

- Legislation generally requires that utilities have a reasonable opportunity to earn a fair return
- Utilities incur costs they cannot control
- Utilities are capital-intensive
  - Growth revenue may not be sufficient to connect extraordinary numbers of new customers, rates set using historical rate base
  - Cyclical replacement of assets is required
- Ability for utilities to respond to incentives and/or meet productivity expectations is unknown
- Strengthening efficiency incentives may result in utilities allowing service quality to slip

Result – There are other PBR features and additional formula variables, which may mute incentives
Additional formula variables

- **Z = exogenous adjustments**: Material unforeseen events outside control of utility, not picked up by I factor
- **Y = flow-through adjustments**: Recurring events that tend to fluctuate in magnitude and are outside control of utility
- **K = capital factor**: Adjustments for capital additions that cannot reasonably be covered by I-X
- **ESM = earnings sharing mechanism**:
  - Shares superior/inferior earnings between customers and shareholders
  - Often deadband around approved level where earnings not shared
  - Sharing may not be symmetrical, and may have steps
- **S = service quality**: Penalties (or rewards) for not meeting (or exceeding) expected service quality levels
K = capital factor

- $BR_{t-1}(1+I-X)$ provides for the construction of some new capital
  - Historical assets depreciate and retire, yet revenue requirement built into going-in rates continues to escalate
  - Capital is an input to a TFP study, some level of capital construction is expected for a productive utility to produce outputs
  - Connecting new customers provides additional revenue from $BR_{t-1}(1+I-X)$, which helps to cover the capital and O&M-related costs of serving them
  - Utilities may build capital to save on O&M, O&M savings offset additional revenue requirement from new assets
- Most electric and gas utility PBR plans have an allowance for additional capital beyond I-X
K = capital factor

- Alberta – Capital trackers
  - Criteria and accounting tests fund extraordinary projects beyond what I-X cannot – new approach in next PBR plan – KBar
- Ontario – Menu approach
  - Annual incentive IR: No additional allowance for capital
  - Price cap IR (with Incremental Capital Module) – Compare total capital additions to a materiality threshold tied to the amount of depreciation plus a stretch, fund specific projects that exceed the threshold
  - Custom IR: Robust five year forecast to support significant capital needs
- British Columbia – Capital exclusion criteria
  - Projects that exceed materiality threshold are excluded from PBR formula
- Internationally – Forms of building blocks more common (e.g., UK (RIIO), Australia, New Zealand), additional tools for testing forecasts needed
Additional PBR features

- **Length of the PBR term:** longer term produces stronger incentives, rates may deviate more from RBROR
- **Re-openers/off-ramps:** Criteria identified at start of term to flag when the PBR plan may not be operating as expected, may re-opener and adjust plan features or may abandon plan
- **Service quality monitoring:** Enhanced tools compared to RBROR to address incentive to allow service quality to slip
- **Asset monitoring systems/advanced capital module:** Regulator may want additional information on long term asset planning of utilities because utility may have an incentive to focus on short-term capital decisions
Additional PBR features

- **Using revenue caps instead of price caps**: Total revenue for the utility, or revenue per customer, may be escalated by I-X instead of prices, typically to account for significant changes in usage per customer (e.g., more efficient furnaces make it difficult to recover fixed costs on current rates).

- **Rebasing**: Can use RBROR, either on a forecast or actual basis, or may keep existing rates with limited adjustments. The method for setting rates following the PBR term may create incentives to start loading up costs near end of PBR term. Signaling in advance encourages strategic behaviour.

- **Efficiency carryover mechanisms**: Allow utility to apply superior earnings near the end of the PBR term to future rates to provide incentive to not load up on costs near end of PBR term.
Additional PBR features

- **Annual financial reporting**: Required if tools that rely on return on equity are included in plan (e.g., earnings sharing, earnings-based re-openers, efficiency carryover mechanism), accountants may have an incentive to report a certain level of earnings.

- **Tracking specific outcomes (e.g., balanced scorecard)**: Provide incentives for specific outcomes (e.g., customer satisfaction, innovation), may develop rewards or penalties.

- **Hybrid PBR plans**: May only apply I-X to a certain portion of prices, other prices still set using RBROR (typically capital)
  - Eliminates the need for complex tools such as capital trackers or K factors.
  - Creates incentive for utilities to prefer capital alternatives because they get full cost recovery, and may drive savings in costs that are under I-X.
Questions?