Rate & Revenue Caps for Attrition Relief

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Introduction

Most PBR plans feature a multi-year rate case "moratorium"

Long plan terms raise risk of earnings attrition between rate cases

"Attrition relief mechanisms" (ARMs) adjust rates automatically for changing business conditions

Attrition relief adjustments largely insensitive to utility performance

>>> Reduced risks *and* strengthened performance incentives

Remarkable advance in regulatory "technology"

Introduction (*cont'd*)

Two basic approaches to attrition relief provision

Price Caps

Revenue Caps

Several methods established for designing caps

Methods are evolving

Zero sum game, medium-sized stakes

>>> Recipe for controversy

Introduction (*cont'd*)

Presentation discusses

- Differences between price & revenue caps
- Methods for designing caps
- Salient controversies and precedents

Plan of Presentation

Rate Caps
- **Basic Idea**
- **Rate Indexing**
- **All Forecast**
- **Hybrid**
- **Peer Price**
- **X Factor Nomination**

Revenue Caps
- **Rationale**
- **Revenue Decoupling**
- **Revenue Cap Design**

Rate Caps

Rate Caps: Basic Idea

Cap growth in “base” rates for regulated services

Base rates recover cost of utility system (capital & O&M costs)

Several established approaches to price cap design

- Indexation
- All Forecast
- Hybrid
- X Factor Nomination
- Peer Price
- Freeze

Rate Indexing

The Basic Idea

Growth in rates capped by price cap index (*PCI*)

$$\text{growth } Rates = \text{growth } PCI_t$$

Predetermined formula for PCI growth

$$\text{growth in } PCI = P - X + Y + Z$$

P = Growth in external inflation measure
X = X-factor (aka productivity factor)

X factor sometimes expressed as % of inflation

Rate Indexing (*cont'd*)

Salient Precedents

Most common approach to PBR around world

CA, MA, ME, ALTA, ONT, Britain, Netherlands, ANZ

Two widespread approaches to PCI design

- North American
- British

North American Approach to PCI Design

Logic of economic indexes guides PCI design

Index Logic

If an industry earns competitive return,

trend Prices = trend Unit Cost
= trend Cost – trend Billing Determinants [1]

>>> PCI tracks unit cost of base rate inputs

trend Unit Cost = trend Input Prices
- trend Productivity [2]

North American Approach (cont'd)

Key issues in American-style PCI proceedings

(1) Productivity target

(2) Inflation Adjustment

Key Precedents

Originated in railroad & telephone industries (ICC, FCC, CRTC)

ME, MA, CA early *energy* utility adopters

Subsequently ALTA, ON, Norway, Netherlands, New Zealand

Inflation Measures

Indexes

Indexes make comparisons using ratios

$$\text{gasoline price inflation}_{2009} = \ln(PG_{2009}/PG_{2008})$$
$$= \text{growth } PG_{2009}$$

Indexes can summarize multiple comparisons by taking *weighted averages* of comparisons

$$\text{consumer price inflation}_{2009} = \text{growth } CPI_{2009}$$
$$= SUM_i \text{ weight}_i \text{ growth } P_i$$

weight_i = share of product i in consumer budget

Inflation Measures (cont'd)

Desirable features of ARM inflation measures

- External
- Accurate (track industry input prices)
- Simple
- Familiar
- Public domain
- Computed by respected source (*e.g.* Statistics Canada)
- Relevant to consumers

Two kinds of inflation measures widely used in ARM design

1. Industry-Specific
2. Macroeconomic (e.g. CPI, GDP-PI)

Industry-Specific Inflation Measures

Basic Idea: Summarize inflation in prices of utility inputs

Cost share weights

e.g. Energy Distribution

$$P = 0.25 \times \text{growth in } P^{Labor} + 0.25 \times \text{growth in } P^{Other\ O\&M} + 0.50 \times \text{growth in } P^{Capital}$$

Cost shares frozen or industry-based strengthen incentives

Key Precedents: US railroads, SoCalGas, SDG&E, Ontario, Canadian Railroads, Enmax

Industry-Specific Inflation Measures (cont'd)

Case Study: Ontario Power Dx "IRM 1"

Input Category	Subindex
Labor	Ontario Average Weekly Earnings
Other O&M	Industrial Producer Price Index
Capital	Custom index based on …

Electric Utility Distribution Investment Price Index
Bank of Canada long bond yields

Ontario Energy Board, RP-1999-0034 January 2000

Controversy encountered in capital price specification

Industry-Specific Inflation Measures (cont'd)

Case Study: Volume-Related Composite Price Index, Western Grain Revenue Caps

Input Categories

Labor
Fuel
Material
Other Inputs

Canadian Transportation Agency, Decision No. 159-R-2010, April 2010

Industry-Specific Inflation Measures (cont'd)

Case Study: Ontario Gas Distribution Input Price Index

Input Category	Subindex
Labor	Ontario Construction Worker Total Compensation
M&S	Ontario GDPIPI, all goods & services
Capital	Custom index based on …

- Stats Canada deflator for gas distribution capital stock
- Average of Stats Canada yield on long term corporate bonds & return on equity of Canadian utilities

Lowry *et al* "Rate Adjustment Indexes for Ontario's Natural Gas Utilities ", Report for Ontario Energy Board, November 2007

Capital Price Indexes

Distribution is capital-intensive. capital price is key design issue

Capital Cost = Price x Quantity

Capital cost has four components

Opportunity Cost	"Return on capital"
Depreciation	"Return of capital"
Taxes	
Capital Gains	

Each may, in principle, be reflected in price

Key capital cost "drivers"	Construction costs
	Rate of return

Capital Price Indexes (cont'd)

"Geometric decay" approach to capital cost used in most prior proceedings.

Problems:

Current valuation of construction cost

- Volatile
- *Weighted average* of past values more relevant

Includes capital gains term

magnifies volatility

Geometric decay depreciation = "rocket science"

Capital Price Indexes (cont'd)

Problems with geometric decay approach to capital costing prompted PEG to develop alternative cost of service ("COS") approach that mimics rate cases

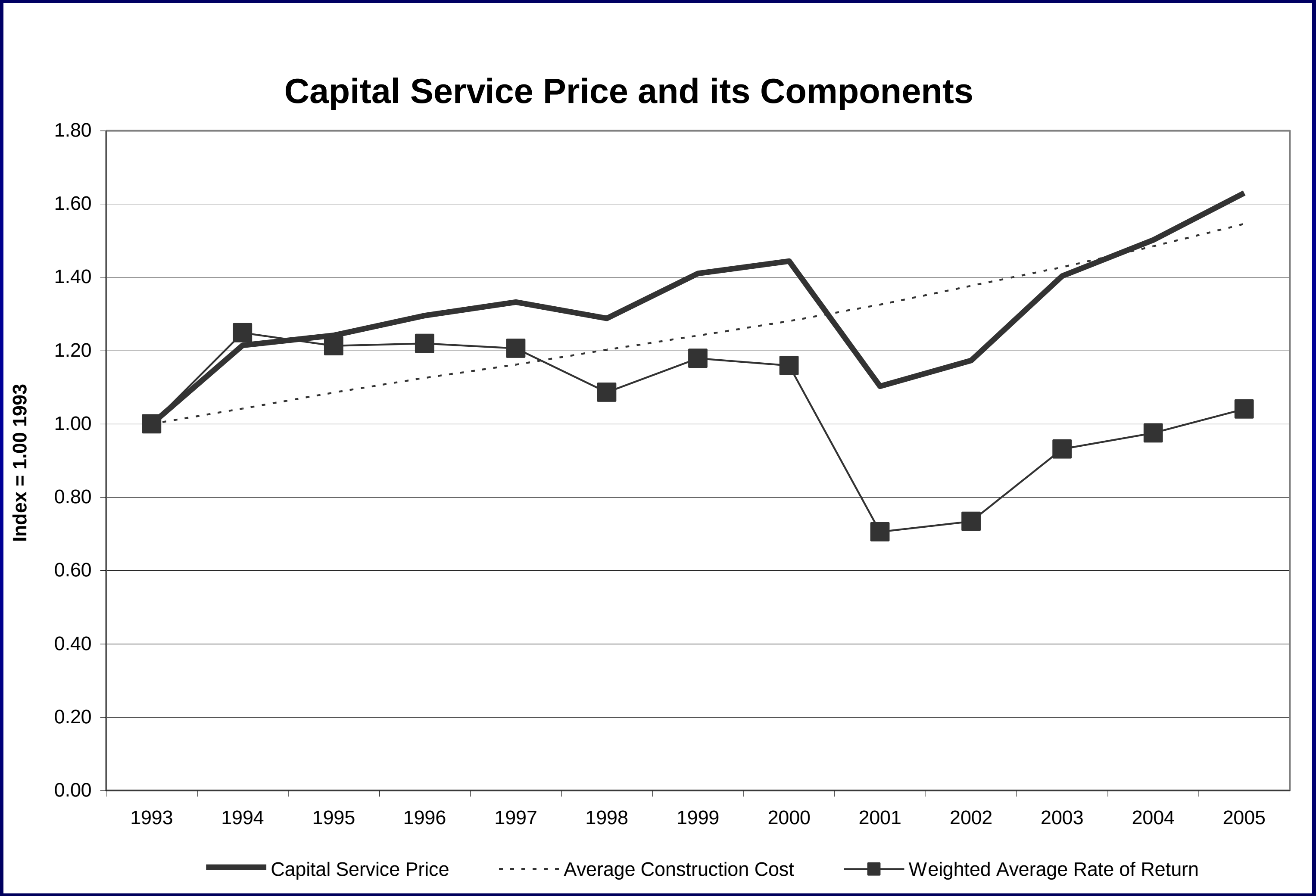
- Historic (book) valuation of plant
- Straight line depreciation
- No capital gains

>>> Weighted average of historical construction costs

Results much more stable than those in previous studies

Precedents: Union Gas, Central Maine Power

COS Example: Power Dx, Northeast US



Macro Inflation Measures

Basic Idea: Use summary government measure of price inflation in national economy

Most macro inflation measures used in PCI design measure inflation in prices of *final* goods and services (outputs)

Consumer price index ("CPI")
Gross domestic product implicit price index ("GDP-IPI")

Both available for Canada & provinces

Some macro measures of *input* price trends available

Industrial Product Price Indexes

Macro Inflation Measures (cont'd)

GDP-IPIs most widely used in PBR

Covers inflation in prices of "final" goods & services:

- consumer products
- government
- capital investments
- exports

In Canada, GDP-IPI sensitive to commodity price inflation given importance of commodities in Canadian exports.

Alternative indexes can finesse this situation:

e.g. GDP-IPI Final Domestic Demand

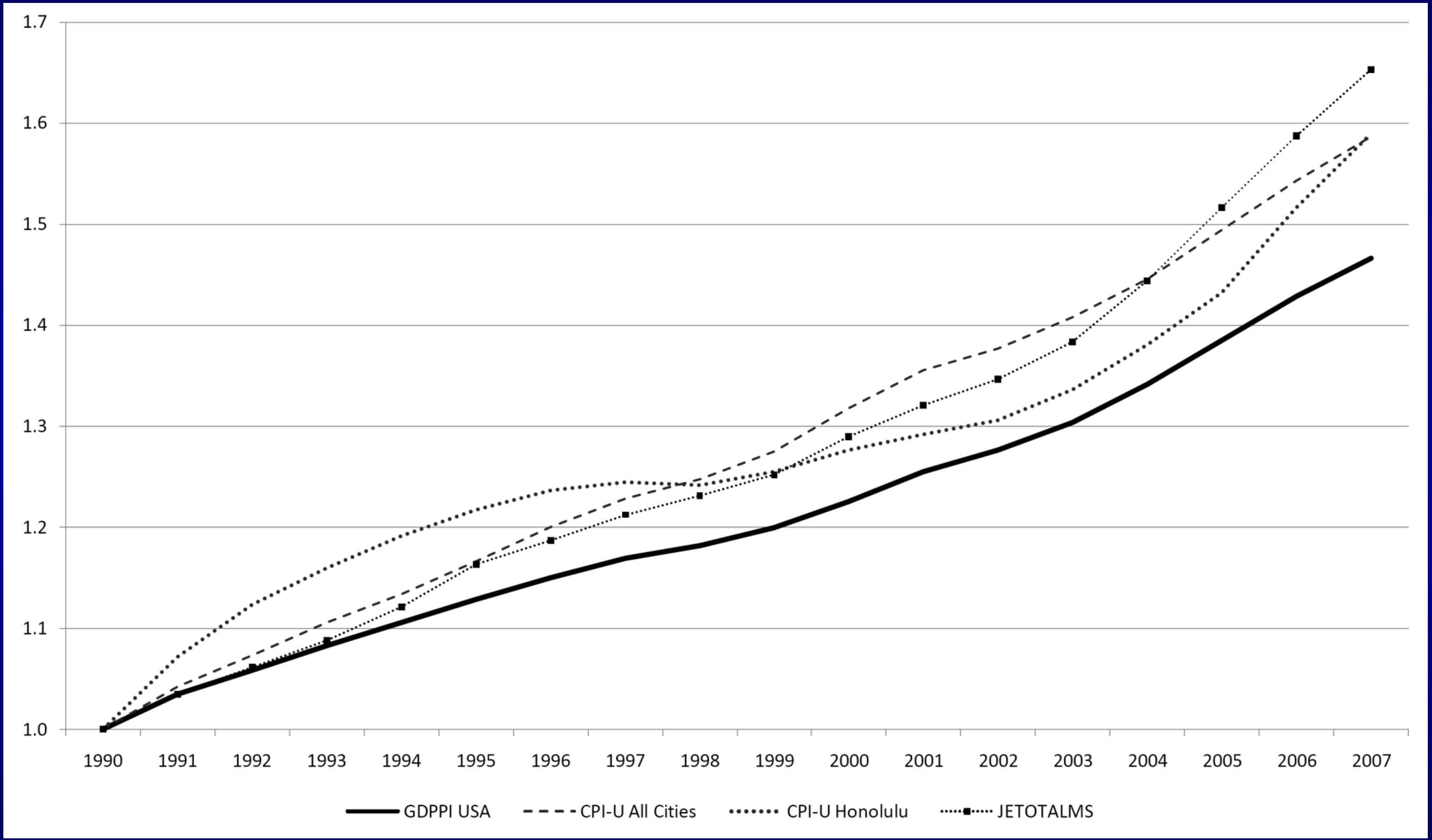
Macro Inflation Measures (cont'd)

Advantages
Familiar
External
Calculated by Stats Canada
Public domain
CPI relevant to consumers

Problem
GDPPI & CPI don't measure input price growth accurately

- Different mix of goods and services
- Underestimate input price inflation insofar as they reflect economy's productivity growth

Growth of Alternative Inflation Measures



Macro Inflation Measures (cont'd)

When PCI has *macro* inflation measure, X factor calibration involves *at least one* extra term

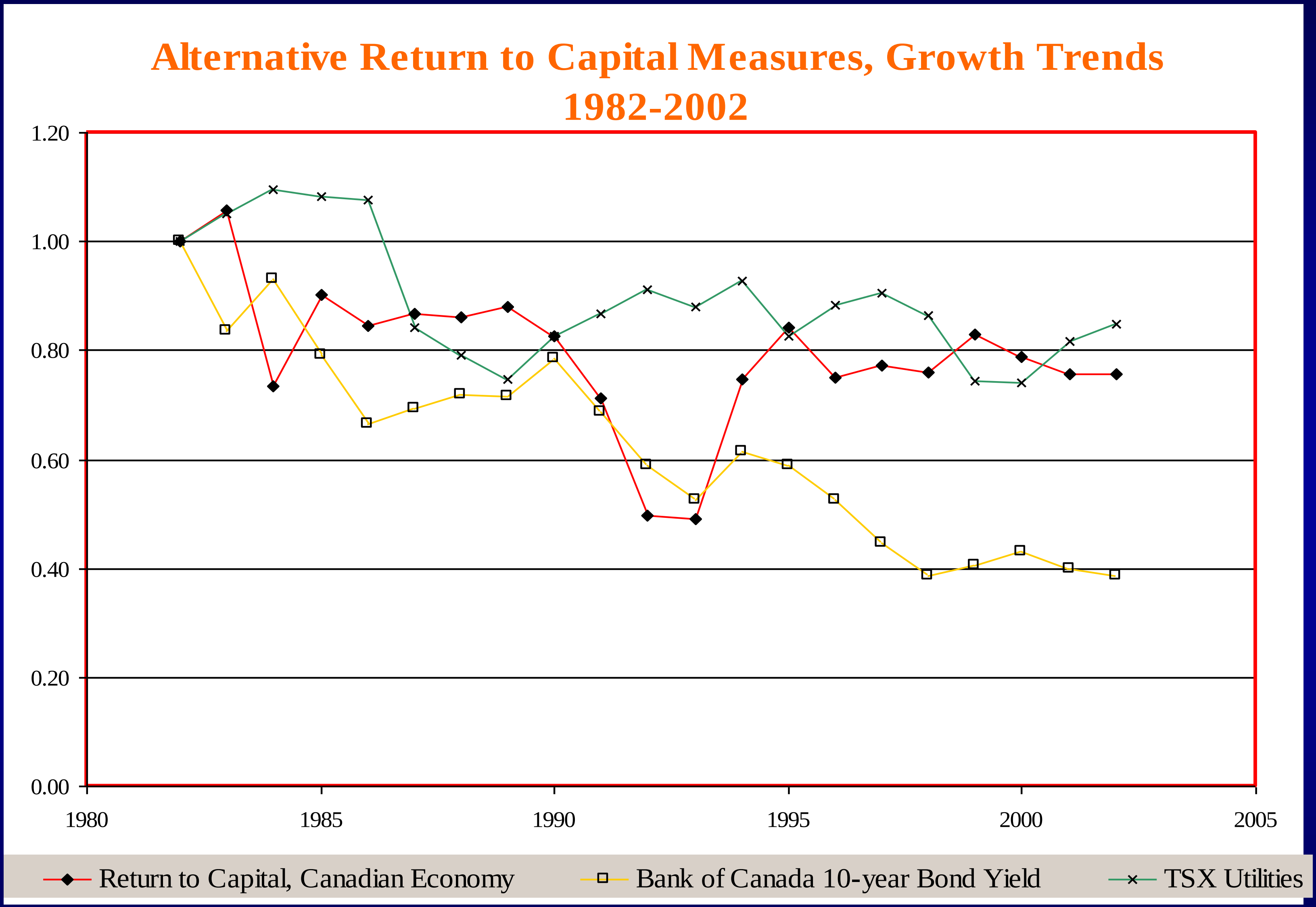
X = trend Productivity + Inflation Differential

Inflation Differential = trend Input Prices – trend GDP-IPI

Inflation differential controversial, higher X in some proceedings

Central Maine Power	Power Dx	ME
Union Gas	Gas Dx	ON

Reasons:
- Falling trend in long bond yields
- Volatility of geometric decay capital prices
- Results sensitive to sample period



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Productivity Research

Introduction

Productivity research used in X factor selection

Stretch factor often added to X

Rationale: share benefits of accelerated productivity growth

Precedents: 0.49 average for energy utilities

X = Base productivity target + Stretch + Inflation Differential

>>> Productivity research used to "calibrate" X factor

Productivity Indexes

Productivity index is ratio of *two* indexes

Productivity = Output Quantity/Input Quantity

Then

growth Productivity = growth Output - growth Input

Output index measures growth in goods & services provided

Input index measures growth in inputs used to provide services

Both indexes can summarize growth in multiple quantities

Productivity Indexes

Input quantity indexes use *cost share* weights

$$\text{growth Inputs} = \text{Sum}_j \text{ weight}_j \text{ x growth Input}_j$$

$$\text{growth Input}_j = \text{growth Cost}_j/\text{Price}_j$$

$$= \text{growth Cost}_j - \text{growth Price}_j$$

Typically 3 input categories

O&M

- Labor
- Materials & Services

Capital

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Productivity Indexes (cont'd)

Weights for output indexes depend on their use

- *Revenue*-share weights best when measuring productivity in *marketing* as well as cost management

  Revenue weights depend on rate design

  Appropriate for *price* cap design

- *Cost elasticity* weights best when measuring only productivity in *cost* management

  Appropriate for *revenue* cap design

  Cost elasticity = % change cost due to 1% change in output

Productivity Indexes (cont'd)

Productivity indexes vary in scope of inputs considered

- Some consider only one input (*e.g.* labor productivity)
- *Multifactor* productivity ("MFP") indexes involve *multiple* inputs
- *Total* factor productivity ("TFP") indexes consider *all* inputs
- *Partial* factor productivity ("PFP") indexes consider *subset* of all inputs

Productivity indexes for PCI design usually pertain to *base rate* inputs (labor, materials, services, & capital).

Productivity Indexes (cont'd)

Productivity index approach to calibration requires choice of peers

- Subject utility
- All Alberta utilities
- Regional or national sample — Canada, US

Industry results generally preferred for stronger incentives

Peers should face similar trends in TFP "drivers"

Surrounding region used for this purpose if large sample of similarly situated utilities (*e.g.* Northeast US)

Productivity Indexes (cont'd)

"All Alberta utilities" approach is interesting option

- Productivity index faces typical local conditions
- Incentives remain strong
- Approach used in first US railroad price cap plan
- Produced extraordinary productivity growth

Sources of Productivity Growth

Economists have decomposed sources of productivity growth

1. Technological change
2. Scale economies

Cost grows less rapidly than output

Rapid growth >>> more scale economies

Impact varies by size of company and industry

e.g. Seems to be more important for *gas* distributors

Sources of Productivity Growth

3. Output Differential

Output growth can have differential effect on revenue and cost when rate designs are not cost causative

Distributor cost driven chiefly by *customer* growth

Distributor revenue driven chiefly by growth in *delivery volume*

Output Differential = growth Volume – growth Customers
= growth Volume/Customer
= growth "Average Use"

Differential matters less if rates are cost causative

i.e. High customer charge

3. Output Differential (cont'd)

Average use "drivers"

- Demand side management ("DSM")
- Appliance efficiency standards and building codes
- Load displacement generation
  - Combined heat & power
  - Customer-sited solar
- Per capita income growth
- Delivered price of energy

Trends in Average Use by US Small Volume Electric Customers

Average Annual Growth Rate	Residential		Commercial	
	Raw	Normalized	Raw	Normalized
1995-2008	**0.56%**	**0.53%**	**0.55%**	**0.52%**
1995-2003	**0.74%**	**0.91%**	**1.16%**	**1.13%**
2003-2008	**0.26%**	**0.28%**	**0.06%**	**0.03%**
Other utilities	**0.29%**	**0.36%**	**0.11%**	**0.07%**
High DSM utilities	**0.03%**	**-0.25%**	**-0.23%**	**-0.25%**

Source: FERC Form 1 data, with weather adjustments made by PEG Research using econometric demand models.

Table 5

Trends in Volume Per Customer of Ontario Power Distibutors

(kWh/Customer)

	All Companies				Ten Largest Companies				Other Companies			
	Residential		General Service		Residential		General Service		Residential		General Service	
Year	**Level**	**Growth Rate**	**Level**	**Growth Rate**	**Level**	**Growth Rate**	**Level**	**Growth Rate**	**Level**	**Growth Rate**	**Level**	**Growth Rate**
2002	10,276		137,899		10,503		141,685		9,726		129,519	
2003	10,445	1.64%	140,350	1.76%	10,225	-2.68%	144,662	2.08%	10,975	12.08%	130,702	0.91%
2004	10,073	-3.63%	141,279	0.66%	10,275	0.49%	144,964	0.21%	9,589	-13.50%	133,129	1.84%
2005	10,403	3.22%	145,919	3.23%	10,586	2.99%	153,441	5.68%	9,966	3.86%	129,500	-2.76%
2006	9,780	-6.18%	144,035	-1.30%	9,959	-6.11%	149,865	-2.36%	9,356	-6.32%	131,180	1.29%
2007	9,882	1.04%	149,678	3.84%	10,045	0.86%	155,856	3.92%	9,495	1.48%	136,139	3.71%
2008	9,629	-2.59%	146,642	-2.05%	9,768	-2.79%	151,727	-2.69%	9,297	-2.10%	135,456	-0.50%
Average Annual Growth Rates												
2002-2008		**-1.08%**		**1.02%**		**-1.21%**		**1.14%**		**-0.75%**		**0.75%**
2005-2008		**-2.58%**		**0.16%**		**-2.68%**		**-0.37%**		**-2.31%**		**1.50%**

Source: Tabulated by PEG Research from OEB data

Table 3

Trends in Average Use of Small Volume Customers of Enbridge and Union

	Residential		Small Business	
Year	Actual [1]	Normalized [1]	Actual [2]	Normalized [2]
1992	2.50%	2.95%	3.20%	3.66%
1993	-0.91%	-0.46%	-0.29%	0.18%
1994	-1.43%	-0.98%	0.29%	0.76%
1995	-2.86%	-2.40%	-0.77%	-0.30%
1996	2.50%	2.96%	4.50%	4.97%
1997	-3.73%	-3.27%	-4.61%	-4.13%
1998	-21.91%	-21.44%	-18.95%	-18.46%
1999	4.40%	4.87%	5.33%	5.81%
2000	9.54%	10.01%	6.77%	7.26%
2001	-9.38%	-8.90%	-8.43%	-7.94%
2002	4.32%	4.80%	5.77%	6.27%
2003	3.94%	4.42%	3.80%	4.29%
2004	-5.67%	-5.19%	-5.41%	-4.91%
2005	-2.94%	-2.45%	-1.16%	-0.65%
2006	-11.56%	-11.07%	-9.49%	-8.99%
2007	7.90%	8.40%	9.52%	10.03%
2008	2.66%	3.16%	6.18%	6.69%
Averages				
1991-2008	**-1.33%**	**-0.86%**	**-0.22%**	**0.27%**
2000-2008	**-1.34%**	**-0.86%**	**0.10%**	**0.60%**
2003-2008	**-1.92%**	**-1.43%**	**-0.07%**	**0.43%**

[1] These are average growth rates in actual and weather normalized deliveries per customer of Enbridge's revenue class 20, and Union's residential revenue classes 01 and M2.

[2] These are average growth rates in actual and weather normalized deliveries per customer of Enbridge's revenue class 48, and Union's small business revenue classes 01, M2 and 10.

Declining average use can reduce price cap productivity target by 100+ basis points!

Sources of Productivity Growth (cont'd)

4. Changes in other business conditions

Change in other business conditions that affect cost also affect productivity

Cost up >>> Productivity Down

e.g.

- Replacement of aging plant
- Rollout of advanced metering infrastructure ("AMI")
- System undergrounding
- System Age
- Service quality

Sources of Productivity Growth (cont'd)

Econometric cost research can identify productivity drivers & quantify their relative importance

Given cost "function" like

$$Cost = a_0 + a_1 P_{labor} + a_2 Customers + a_3 Volume + a_4 Undergrounding + a_4 Trend$$

parameters (a_1 a_2 …) estimated statistically using historical data

Productivity target can be calculated which reflects response of typical managers to utility's specific business conditions.

Precedents: California, Ontario, Australia

Econometric Model of Gas Utility Base Rate Cost: Cost of Service

VARIABLE KEY

L = Labor Price
K = Capital Price
N = Number of Customers
V = Total Deliveries
M = Dx and Tx Line Miles
NIM = % Non-Iron Miles in Distribution Miles
NE = Number of Electric Customers
Trend = Time Trend

EXPLANATORY VARIABLE	ESTIMATED COEFFICIENT	T-STATISTIC
L	0.215	13.99
LL	-0.702	-5.05
LK	-0.125	-8.48
LN	-0.055	-3.98
LV	0.050	4.25
LM	0.005	0.57
LTrend	0.008	2.76
K	0.522	83.70
KK	0.175	10.97
KN	-0.056	-4.93
KV	0.018	1.68
KM	0.042	4.16
KTrend	0.007	6.88
N	0.610	13.63
NN	0.036	0.65

EXPLANATORY VARIABLE	ESTIMATED COEFFICIENT	T-STATISTIC
V	0.085	2.02
VV	-0.039	-0.95
M	0.194	6.31
MM	-0.001	-0.01
NIM	-0.949	-12.17
NE	-0.007	-7.07
Trend	-0.012	-5.94
Constant	8.136	513.61
System Rbar-Squared	0.968	
Sample Period	1994-2004	
Number of Observations	396	

ECONOMETRIC COST MODEL FOR POWER DISTRIBUTION

VARIABLE KEY

L= Labor Price
K= Capital Price
N= Number Retail Customers
V = Retail Deliveries
M = Distribution Line Miles
OH = Percent of Distribution Plant that is Overhead
G= Number of Gas Distribution Customers
GN = 10 year customer growth
F = Forestation
RC = Percent Retail Deliveries that are Residential and Commercial
LF = Monthly Load Factor

Total Distribution Cost

EXPLANATORY VARIABLE	ESTIMATED COEFFICIENT	T-STATISTIC
L	**0.166**	**42.71**
LL	0.087	4.53
LK	-0.066	-5.78
LN	0.034	5.77
LV	-0.042	-8.92
LM	-0.008	-1.91
LOH	0.058	4.54
LG	-0.001	-5.17
LGN	-0.024	-8.02
LFM	0.000	0.03
LRC	-0.005	-0.56
LLF	0.051	3.60
LTREND	-0.004	-9.39
K	**0.585**	**101.47**
KK	0.142	7.74
KN	-0.148	-17.39
KV	0.120	16.46
KM	0.027	4.73
KOH	-0.137	-7.92
KG	0.001	1.77
KGN	0.041	10.03
KFM	-0.003	-1.94
KRC	0.069	4.88
KLF	-0.099	-4.96
KTREND	0.000	-0.81
N	**0.427**	**15.64**
NN	1.096	11.88
NV	-1.114	-12.68
NM	0.109	2.00

EXPLANATORY VARIABLE	ESTIMATED COEFFICIENT	T-STATISTIC
V	**0.313**	**13.13**
VV	1.298	14.23
VM	-0.265	-4.68
M	**0.218**	**12.22**
MM	0.105	1.70
MF	0.021	3.87
OH	**-0.131**	**-2.74**
G	**-0.006**	**-7.13**
GN	**-0.068**	**-5.66**
RC	**0.569**	**14.24**
LF	**-0.140**	**-2.56**
Trend	-0.015	-12.44
Constant	15.045	1019.27

Sample Period Selection

TFP indexes also require selection of sample *period*

Three basic options

1. Short term (*e.g.* last year) — Volatile; Counterintuitive results

2. Medium term (*e.g.* last 10 years) — Reflects investment cycle

3. Long term (*e.g.* last 25 years) — No investment cycle; But may be "stale"

Investment cycles less important in energy distribution

>>> Productivity peers for Alberta utilities should face similar trends in

- Customer growth
- Average Use
- Undergrounding?
- Investment cycle?

Data must be for similar group of services

- Distribution
- Administrative & General

Productivity Measurement Controversies

"Gray areas" in productivity research invite gaming, dueling expert witnesses

e.g. How to measure output growth

Revenue weights? Elasticity weights?

Sample period

How to index capital cost & quantity

Peer group for TFP indexing

Indexing vs. econometrics

Stretch Factor

Recent Productivity Research Results

US Private Business Sector BLS	1.31%	1998-2008
Canada Business Sector Stats Canada	- 0.09%	1998-2008
Canada Utility Sector Stats Canada	0.67%	1998-2008
US Power Distributors PEG	1.03%	1996-2006
US Gas Distributors PEG	1.61%	1994-2004

North American Approach (cont'd)

TFP Precedents

Regulators in several jurisdictions have weighed evidence on industry TFP trends and made judgments

Average: 0.95%

Approved trends higher in Australia & New Zealand, but reflect recent privatizations there

COMPREHENSIVE RATE ADJUSTMENT MECHANISMS OF ENERGY UTILITIES WHICH REFLECT INDEX RESEARCH

Industry	Company	Jurisdiction	Term	Cap Form	Acknowledged Productivity Trend	Inflation Measure (P)	Stretch Factor	X-Factor
Bundled power service	Pacificorp	California	1994-1996	Price Cap	1.40%	Industry specific	NA	1.40%
Bundled power service	Pacificorp	California	1997-1999	Price Cap	1.50%	Industry specific	NA	1.50%
Bundled power service	Central Maine Power (I)	Maine	1995-1999	Price Cap	NA	GDPPI	NA	0.90% (Average)
Gas distribution	Southern California Gas	California	1997-2002	Revenue Cap	0.50%	Industry specific	0.80% (Average)	2.30% (Average)
Power distribution	Southern California Edison	California	1997-2002	Price Cap	NA	CPI	0.58% (Average)	1.48% (Average)
Gas distribution	Boston Gas (I)	Massachusetts	1997-2003	Price Cap	0.40%	GDPPI	0.50%	0.50%
Gas distribution	San Diego Gas and Electric	California	1999-2002	Price Cap	0.68%	Industry specific	0.55% (Average)	1.23% (Average)
Power distribution	San Diego Gas and Electric	California	1999-2002	Price Cap	0.92%	Industry specific	0.55% (Average)	1.47% (Average)
Power distribution	All distributors	Ontario	2000-2003	Price Cap	0.86%	Industry specific	0.25%	1.50%
Gas distribution	Union Gas	Ontario	2001-2003	Price Cap	0.90%	GDPPI	0.50%	2.50%
Power distribution	Central Maine Power (II)	Maine	2001-2007	Price Cap	NA	GDPPI	NA	2.57% (Average)
Gas distribution	Berkshire Gas	Massachusetts	2002-2011	Price Cap	0.40%	GDPPI	1.00%	1.00%
Gas distribution	Boston Gas (II)	Massachusetts	2004-2013	Price Cap	0.58%	GDPPI	0.30%	0.41%
Power distribution	All distributors	Netherlands	2004-2006	Price Cap	1.50%	CPI	NA	NA
Power distribution	All distributors	New Zealand	2004-2009	Price Cap	2.10%	CPI	-0.08% (Average)	0.93%
Gas distribution	All distributors	Netherlands	2005-2008	Price Cap	1%	CPI	NA	NA
Gas distribution	Bay State Gas	Massachusetts	2006-2015	Price Cap	0.58%	GDPPI	0.40%	0.51%
Power distribution	Nstar	Massachusetts	2006-2012	Price Cap	NA	GDPPI	NA	0.63% (Average)
Power distribution	All distributors	Ontario	2006-2009	Price Cap	NA	GDPIPI	NA	1%

Averages	Acknowledged Productivity Trend	Stretch Factor	X-Factor
Price Cap Plans for Power Distributors with Macroeconomic Inflation Measures	1.80%	0.25%	1.32%
Price Cap Plans for Power Distributors with Industry Specific Inflation Measures	0.89%	0.40%	1.49%
Price Cap Plans for Gas Distributors with Macroeconomic Inflation Measures	0.64%	0.54%	0.98%
Price Cap Plans for Gas Distributors with Industry Specific Inflation Measures	0.68%	0.55%	1.23%
All Companies, All Plans	0.95%	0.49%	1.28%

X Factor Precedents

Here is a summary of X factor precedents for price cap plans based on index research

Power Distribution, Industry Inflation Measure	1.49
Power Distribution, Macro Inflation Measure	1.32
Gas Distribution, Industry Inflation Measure	1.23
Gas Distribution, Macro Inflation Measure	0.98
All	**1.28**

Current Canadian X factors

Enmax	0.80 + 0.4 = 1.20%
Ontario Power Dx	0.72 + 0.4 = 1.12%
Union	1.82%
Enbridge	.40-.55 of GDPIPI

Case Study: Ontario Power Dx "IRM 3"

Application: Base Rates (less pensions & benefits)

Rate Adjustment Mechanism:

- *Rate* cap based on indexing research
- growth Rates = growth GDPPI - (0.72% + stretch)
- 0.72% = US Distributor TFP trend 1988-2006
- "Z factor" adjustments for special events

Plan term: 4 years

Service Quality: SQ Monitoring

Ontario Energy Board, "Supplemental Report of the Board on Third Generation Incentive Regulation for Ontario's Electricity Distributors," September 2008

All Forecast Approach to PCI Design

Rate caps based on multiple forward test years

Forecast cost over next 3-5 years

Focus on "controllable costs"

- O&M expenses
- Capital spending

Computation of capital cost otherwise traditional

Typical outcome is rate "stairsteps"

Precedents   CT, NY, OH, ALTA

Case Study: Northwestern Utilities

Term	5 years
Rate Escalation	

Year	Rate Adjustment
1999	0.5%
2000	1%
2001	1%
2002	2%

AEUB Decision U98060 File 1502-1, 1995

Hybrid Approaches to PCI Design

Hybrid approaches combine elements of indexing & forecasts

Britain & Australia

Given forecasts (*e.g.* five year) of growth in

- Revenue requirement
- Billing Determinants
- CPI

Choose X in a CPI – X formula which has equivalent NPV

>>> "RPI – X" regulation

Hybrid Approaches (cont'd)

North America

Basic Approach: Escalate revenue requirement using

Indexation for O&M Expenses

Forecast of capital cost

Convert to rates

Precedents: West Kootenay (dba Fortis BC)

X Factor Nomination Approach

Utility offered "menu" of alternative X factors and other plan provisions (*e.g.* earnings sharing, plan terms)

e.g.	Curtain #1	growth PCI = growth GDPIPI – 2% no earnings sharing
	Curtain #2	growth PCI = growth GDPIPI – 1% earnings sharing

Choice reveals productivity growth expectations

Discourages gaming of deferrable investments

<u>Precedents</u>

FCC Interstate access service for Baby Bells

Peer Price Approach

Basic Idea

PCI = Index of rates charged by of other utilities

Precedents

Northern Indiana PS	Bundled Service	IN
Illinois Power	Bundled Service	IL
National Grid	Power Distribution	MA

Problems

- Hard work to develop
- Few Canadian peers for Alberta power Dx

Revenue Caps

Decoupling True Up Plans

Basic Idea

Decoupling true up mechanism

Helps revenue track allowed cost of service

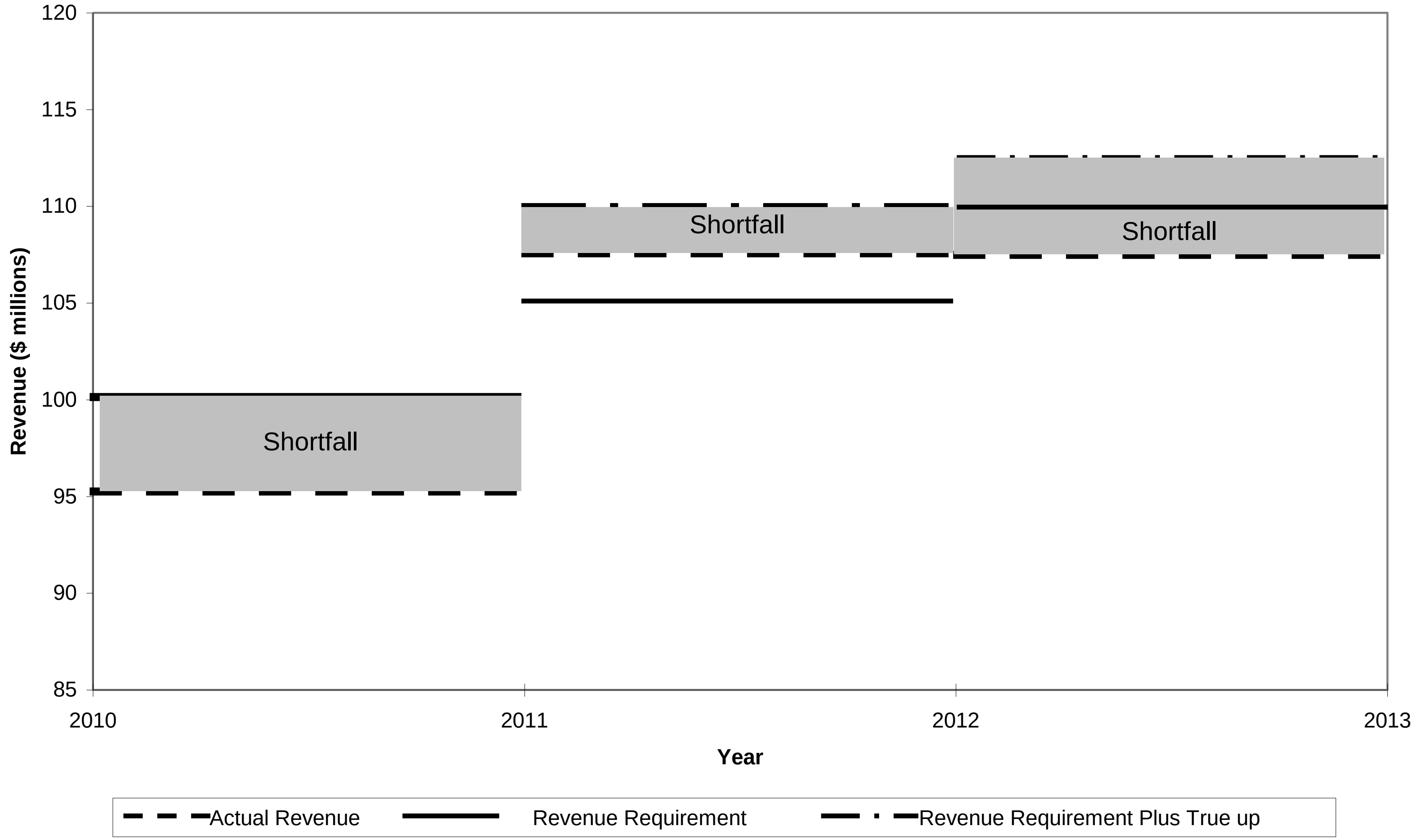
Usually involves balance (variance) account

Revenue adjustment mechanism ("RAM") adjusts rates for escalating cost pressures between rate cases

>>> Revenue cap

Figure 1:

Depiction of Decoupling True Up Mechanism



Decoupling Benefits

Remove utility *disincentive* to promote DSM and LDG

If average use is declining, alleviate earnings attrition between rate cases

- Multiyear rate plans more just and reasonable
- Reduced earnings risk reduces capital cost

Simplify regulation

- Fewer rate cases reduce regulatory cost, strengthen performance incentives
- Less controversy over volume forecasts & lost margins
- Less need for forward test years

Figure 1:
Depiction of Decoupling True Up Mechanism

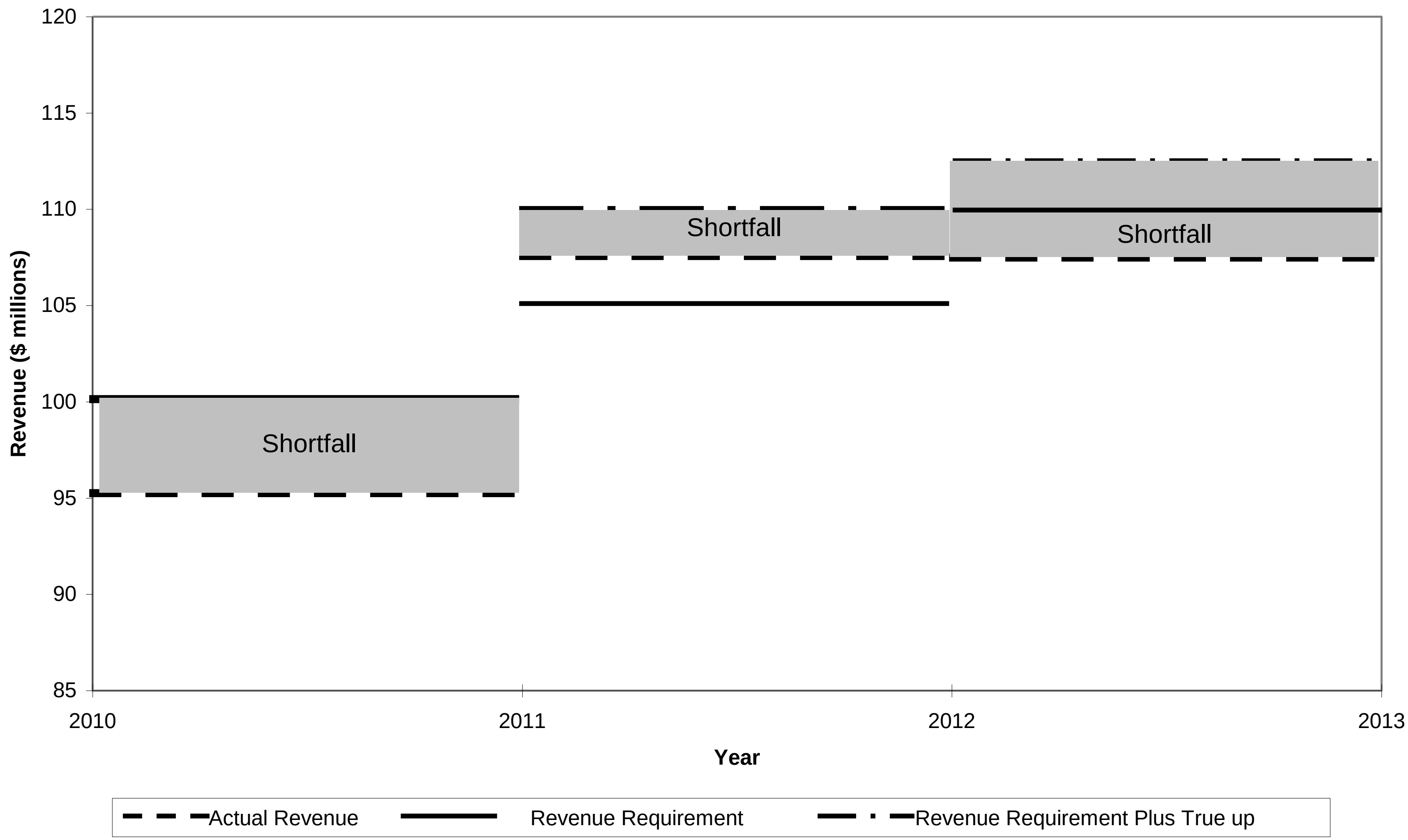
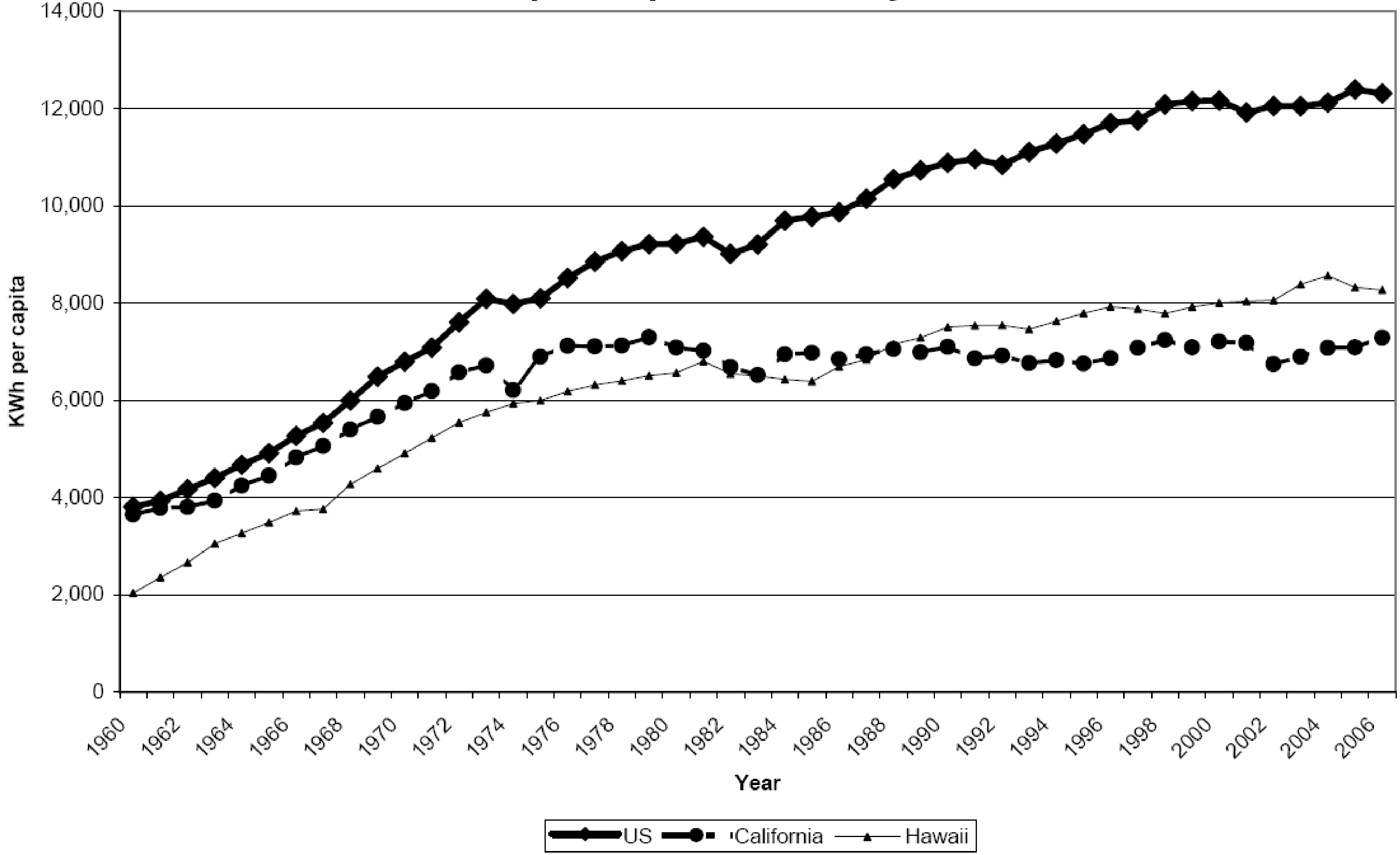
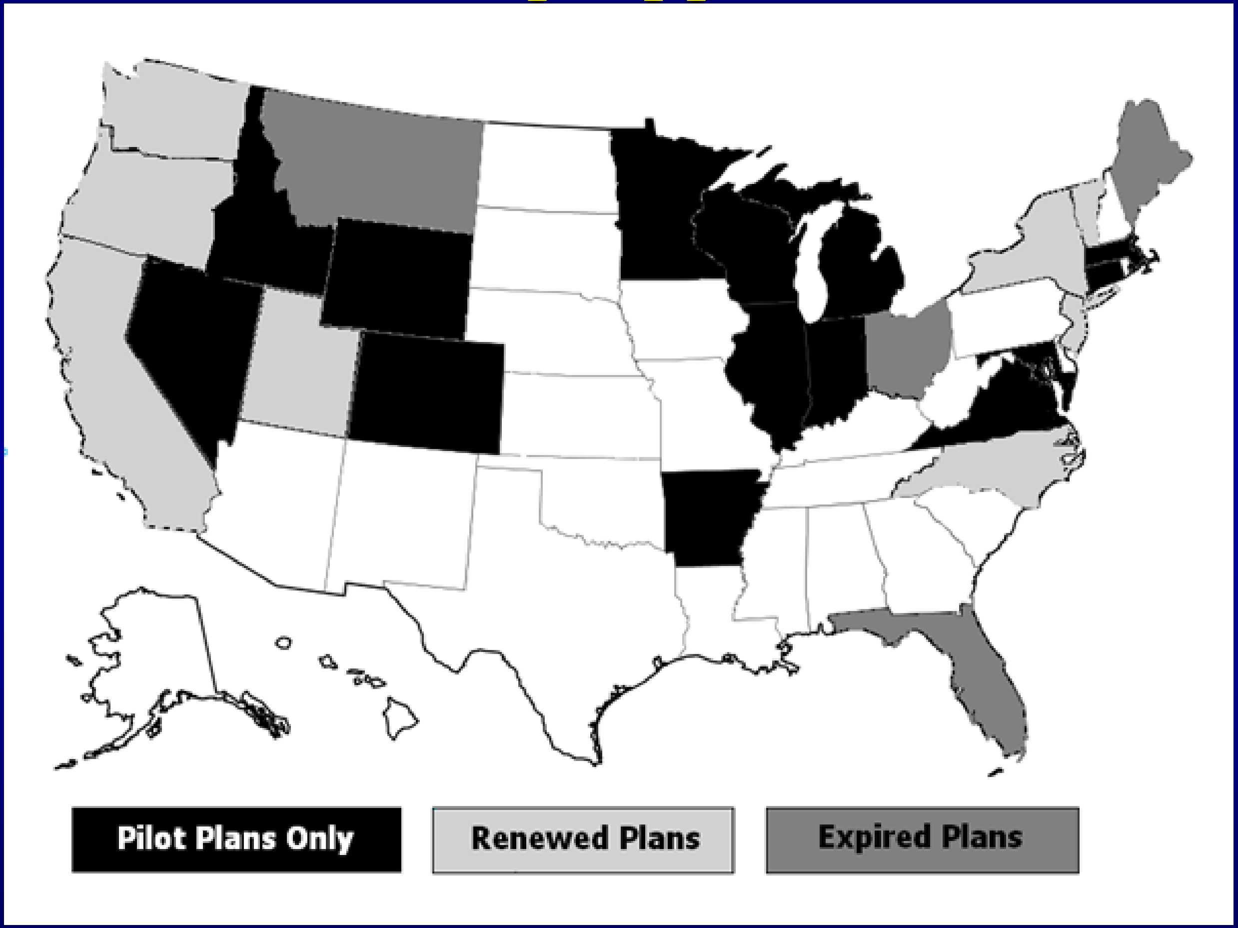


Figure 2

Annual per Capita Electricity Deliveries



U.S. Decoupling Precedents by State: True Up Approach



Revenue Caps

Under decoupling,

growth Rates = growth Revenue Requirement
– growth Billing Determinants

>>> If billing determinants rise, rates would *decline* with fixed revenue requirement

Revenue requirement should, in any event, grow with cost

>>> Utilities experience financial "attrition" without revenue requirement escalation

Solutions: Frequent rate cases ("Groundhog Day" scenario)
Multiyear Revenue Caps

Vast majority of decoupling plans have caps

Revenue Caps (cont'd)

Five well-established approaches to revenue cap design

Formulaic

- Revenue/Customer Freeze
- Inflation-Only
- Full Indexation

All-Forecast

Hybrid

Formulaic Approaches

Basic Idea — Use formulas to make real-time adjustments for changes in business conditions that "drive" cost

Index logic provides rationale for RAM formula

trend Cost = trend Input Prices – trend Productivity + trend Output

Output index *elasticity*-weighted

>>> A fully compensatory RAM provides adjustments for input price, productivity, and output growth

Formulaic Approaches (cont'd)

This logic supports "full indexation" RAM

$$\text{growth Revenue} = P - X + N + Z$$

P = growth in inflation measure
X = X-factor (aka productivity factor)
N = Customer growth
Z = Z-factor

This can be expressed equivalently as

$$\text{growth Revenue/Customer} = P - X + Z$$

Precedents: SoCalGas, Enbridge Gas Distribution

Formulaic Approaches (cont'd)

Simplifications to RAM formula common

If inflation = productivity target

Growth Revenue = growth Customers

Equivalently,

growth Revenue/Customer = 0

>>> Revenue per customer (RPC) *freeze*

Precedents: Idaho Power, PEPCO (MD), many gas LDCs

Problem: Input price inflation typically exceeds customer growth

Formulaic Approaches (cont'd)

Problem: Input price inflation typically exceeds customer growth

Case Study: US Power Distribution Trends 1996-2006

Cost of Base Rate Inputs	2.93%
Base Rate Input Prices	2.72%
MFP, Base Rate Inputs	1.03%
Customers	1.24%

Mark Newton Lowry *et al*, "Revenue Adjustment Mechanisms for CVPS", Exhibit CVPS Rebuttal MNL 2, June 2008.

<u>Formulaic Approaches</u> (cont'd)

If productivity target = customer growth

growth Revenue = P +/- Z

>>> "Inflation only" RAM

Problems: *under*compensates when customer growth *rapid*

GDPPI understates input price inflation
(but not in Canada)

Precedents: Recently expired plans of PG&E, SCG, SDG&E
IPL (1995-99), Trans Mountain (1996-2000)

All Forecast Approach

Attrition adjustment based on multiple forward test years

Forecast cost over *next 3-5 years*

Focus on "controllable costs"

- O&M expenses
- Capital spending

Cost of capital otherwise computed by traditional means

In US applications, typically results in revenue "stairsteps"

Precedents: Numerous RAMs in NY and CA

All Forecast Approach (cont'd)

Pro	Accommodates major plant additions more easily than formulaic approach
	Sidesteps complicated index research
	Cost of old plant easy to forecast
	Customers, utility managers like predictability
	Accomodates separate ROR adjustment
Con	Cost forecasts can be controversial & biased

Hybrid Approach

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Choose CPI – X revenue cap index with equivalent NPV

Hybrid Approach (cont'd)

United States

Different RAM design approaches for different cost components

O&M expenses	Formulaic, typically inflation-only
Capital Cost	Budget calculated with cost of service methods for depreciation & return on rate base Rate of return may be subject to index-based adjustments

Hybrid Approach (cont'd)

Capital Cost	Several methods for setting plant addition budgets - Average of recent historical values - Multi-year forecast - Test year Budgets typically adjusted for construction cost inflation
Precedents	Traditional California approach, Hawaii Terasen Gas

Hybrid Approach: Pro

Uses indexes where indexing least controversial and most needed (O&M expenses)

traditional ratemaking principles where these work best (utility plant)

Accommodates major plant additions

Accommodates separate ROR adjustments

Hybrid Approach: Con

Complicated!

Conclusions

PBR generally preferable approach to utility regulation

Several well established approaches to choose from

Best approach may differ for gas, electric, individual utilities

Not clear that Alberta requires standard approach

Energy distribution lends itself to PBR

- Predictable cost and unit cost trajectories
- Stakeholders can, with practice, identify win-win situations

Conclusions (cont'd)

Risk of controversy may be overblown

Controversy can be mitigated in several ways

- Adopt mechanisms that sidestep methodological issues
- AUC rules on substantive methodological issues
- AUC advised by PBR expert
- AUC expert takes lead on empirical issues
- Arbitration