Cost of Capital

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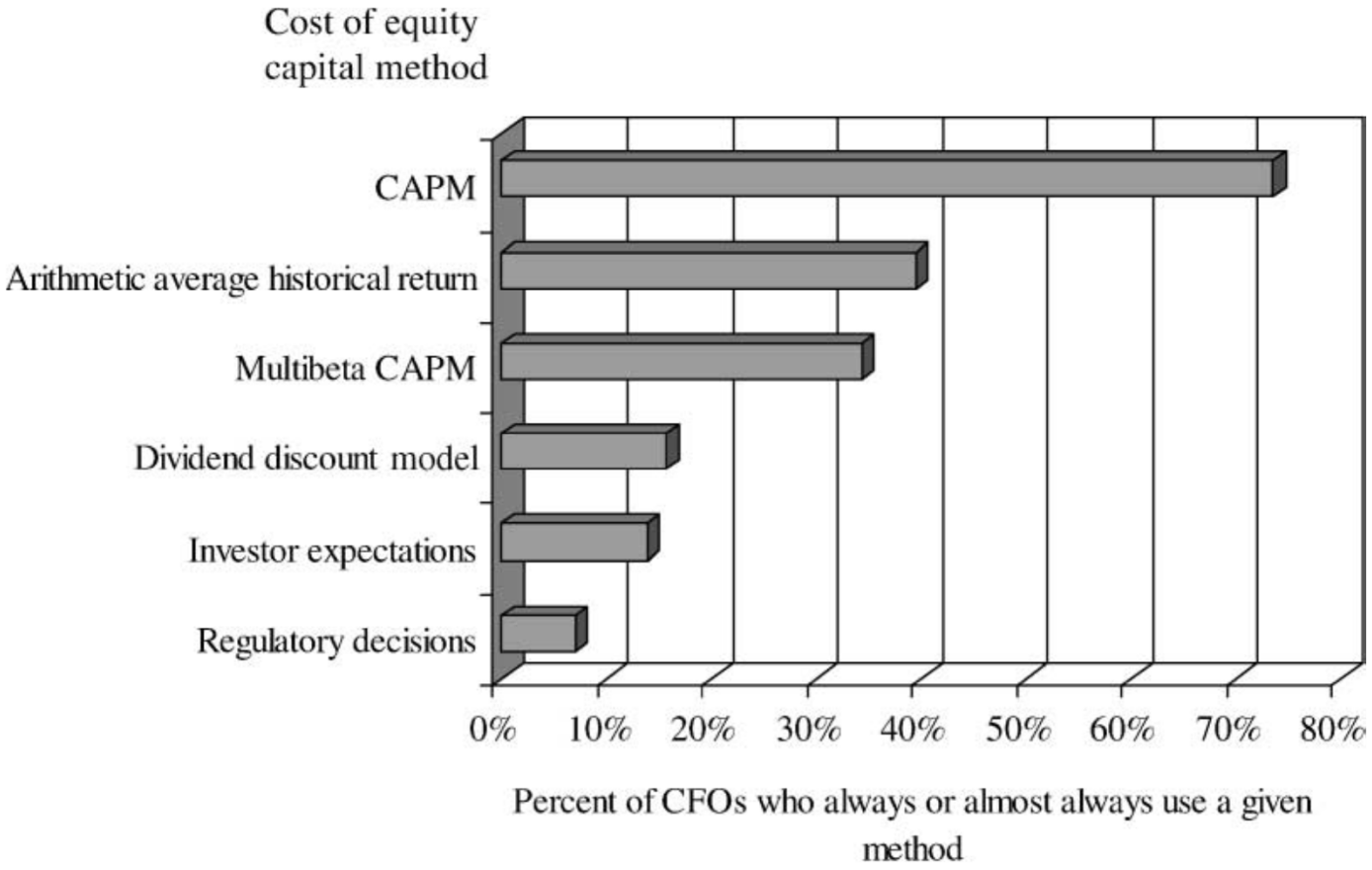
Estimating Opportunity Costs

- **CAPM: A risk positioning model**

$$K = R_F + MRP\beta$$

  - **Three iron laws of finance**
    - **Time value of money**
    - **Risk value of money**
    - **Tax value of money**
    - **CAPM deals with 2 out of 3**
  - **Risk free rate is a long term rate (30 year)**
  - **MRP is the market risk premium that benchmarks the risk-return tradeoff**
  - **Beta is a relative risk coefficient**
- **Discounted cash flow models (DCF) try to estimate the investor's opportunity cost indirectly**

Graham and Harvey (JFE 2001) Survey



Estimating the Market Risk Premium

- **Suppose we assume that the market risk premium is constant**

$$MRP = E(MRP) + \varepsilon_t$$

- **Have to mimimise estimation risk**

	Equities	Bonds
2000	7.41	13.64
2001	-12.57	3.92
2002	-12.44	10.09
2003	26.72	8.06
2004	14.48	8.46
2005	24.13	15.05
2006	17.26	3.22
2007	9.83	3.30
2008	-33.00	13.80
2009	35.05	-4.26

Annual Returns 1926-2009

Annual Rate of Return Estimates 1926-2009						
	U.S.			**CANADA**		
	S&P Equities	Long US Treasury	Excess Return	TSE Equities	Long Canadas	Excess Return
AM	11.80	5.77	6.03	11.39	6.43	4.96
GM	9.77	5.40	4.37	9.69	6.08	3.61
OLS	11.09	5.11	5.98	10.42	5.80	4.62
Volatility[1]	20.48	9.15		18.96	8.87	

Arithmetic is simple average; geometric is compound and OLS is the least squares estimate.
Approximately Geometric Mean = Arithmetic Mean - .5*variance
For example, US variance is about 4%, so AM and GM diverge by about 2%

US & Canadian Risk Premium

	Equity	Bonds	MRP
◆ Canada	11.39	6.43	4.96
◆ US	11.80	5.77	6.03
◆ Difference	*+0.41*	*-0.66*	*1.07*

US bonds are those of the major reserve currency. Traditionally these yields have been suppressed increasing the US MRP, but now?

Fernandez Survey

Table 12. Market Risk Premium used in 2010 and in 2009 by Professors, Analysts and Companies

		2010				2009			
		USA	Euro	UK	Other	USA	Euro	UK	Other
Professors	Average	6.0	5.3	5.0	7.8	6.4	5.4	4.9	8.9
Analysts	Average	5.1	5.0	5.2	6.3	5.5	5.1	5.3	6.3
Companies	Average	5.3	5.7	5.6	7.5	5.5	5.8	5.9	7.3
Professors	St. dev.	1.7	1.7	1.6	4.2	2.4	1.9	1.5	3.8
Analysts	St. dev.	1.1	1.3	1.4	2.2	1.3	1.2	1.2	2.0
Companies	St. dev.	1.8	1.5	1.8	3.2	1.8	1.6	0.8	2.3
Professors	Median	6.0	5.0	5.0	7.0	6.0	5.0	5.0	7.1
Analysts	Median	5.0	5.0	4.5	5.9	5.0	5.0	5.0	6.0
Companies	Median	5.0	5.5	5.5	7.0	5.5	5.5	5.8	7.0
Professors	Respondents	462	194	49	145	448	194	49	140
Analysts	Respondents	104	197	31	269	99	189	29	197
Companies	Respondents	205	543	30	123	189	521	28	109

Supports common view that US market risk premium is higher than in Canada

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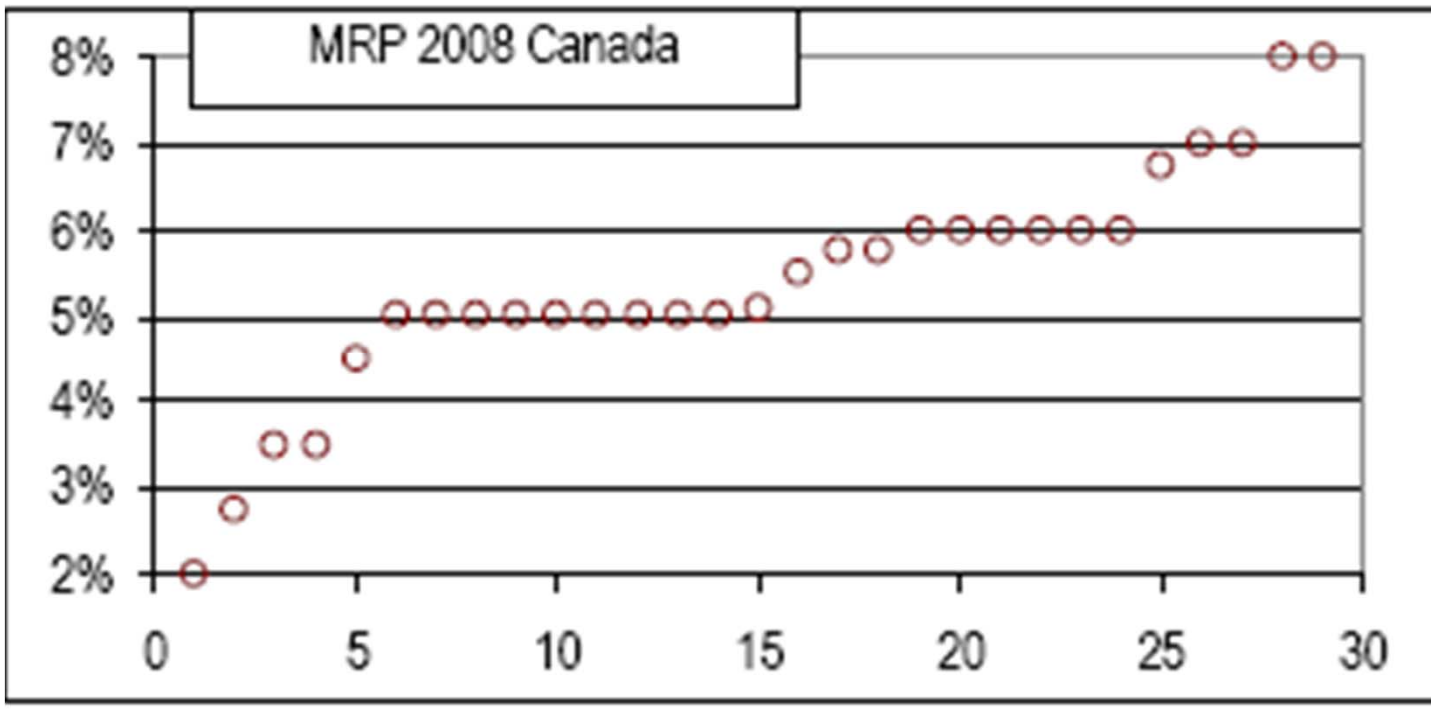
Canadian Finance Faculty



Typically MRP is placed 5.0-6.0%
With 4.5% expected LTC Yield:
market return is 9.50-10.50%

Utility Risk 1

EARNED ROE vs ALLOWED

	Mainline		Foothills		TCPL BC (ANG)		TQM	
	Allowed	Actual	Allowed	Actual	Allowed	Actual	Allowed	Actual
1990	13.25	13.34	14.25	14.25	13.25	13.25	13.75	14.87
1991	13.5	13.65	14.25	14.25	13.38	13.38	13.75	13.94
1992	13.25	13.43	13.83	13.83	13.43	13.43	13.75	13.97
1993	12.25	12.31	11.73	11.73	12.08	12.08	12.25	12.5
1994	11.25	11.16	11.5	11.5	12	12	12.25	12.55
1995	12.25	12.56	12.25	12.25	12.25	12.25	12.25	12.65
1996	11.25	11.83	11.25	11.25	11.25	11.25	11.25	11.83
1997	10.67	11.15	10.67	10.67	10.67	10.67	10.67	10.94
1998	10.21	10.63	10.21	10.21	10.21	10.21	10.21	10.32
1999	9.58	9.64	9.58	9.58	9.58	9.58	9.58	9.94
2000	9.9	9.99	9.9	9.9	9.9	9.9	9.9	9.96
2001	9.61	9.72	9.61	9.61	9.61	6.86	9.61	10.21
2002	9.53	9.95	9.53	9.53	9.53	9.53	9.53	9.8
2003	9.79	10.18	9.79	9.79	9.79	8.21	9.79	10.21
2004	9.56	9.83	9.56	9.56	9.56	9.56	9.56	9.84
2005	9.46	9.66	9.46	10.14	9.46	9.46	9.46	9.92
2006	8.88	8.92	8.88	9.53	8.88	8.47	8.88	8.99
2007	8.46	9.13	8.46	8.89	8.46		8.46	8.74
Average	10.70	10.95	10.82	10.92	10.74	10.59	10.83	11.18
ovrearn		0.25		0.10		-0.14		0.35

TERASEN GAS INC.
COMMON EQUITY RETURNS AND OTHER COMPARISONS
FOR THE YEARS ENDED

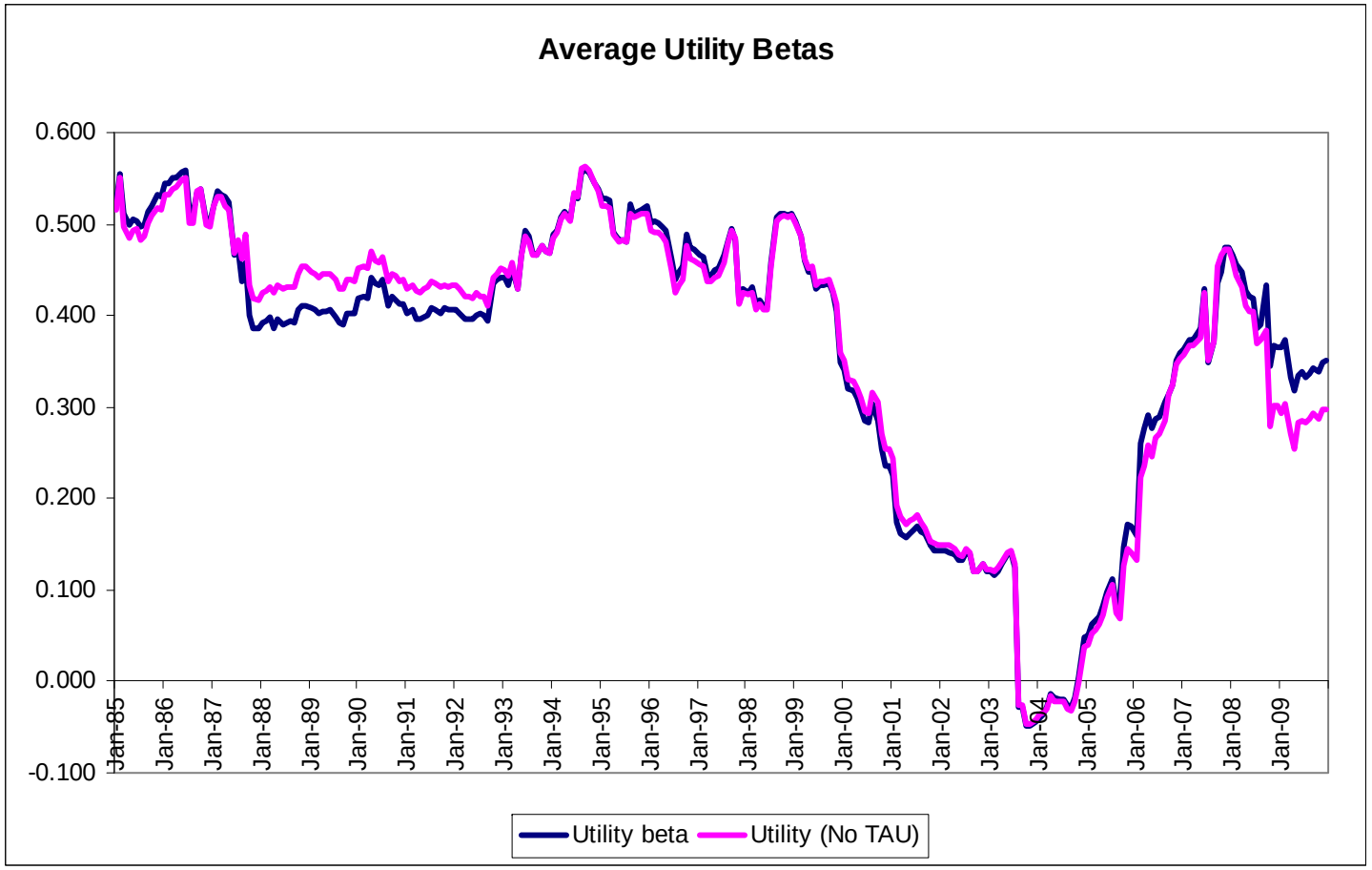
Line No.	Years (1)	ROE Allowed (2)	ROE Achieved Pre-Earnings Sharing (3)	ROE Achieved Post-Earnings Sharing (4)
1	12/31/1992	12.25%	9.060%	N / A
2				
3	12/31/1993	N / A	11.909%	N / A
4				
5	12/31/1994	10.65%	9.727%	N / A
6				
7	12/31/1995	12.00%	12.030%	N / A
8				
9	12/31/1996	11.00%	11.803%	N / A
10				
11	12/31/1997	10.25%	11.266%	N / A
12				
13	12/31/1998	10.00%	9.405%	9.703%
14				
15	12/31/1999	9.25%	10.698%	9.974%
16				
17	12/31/2000	9.50%	10.748%	10.124%
18				
19	12/31/2001	9.25%	9.375%	9.313%
20				
21	12/31/2002	9.13%	9.729%	N / A
22				
23	12/31/2003	9.42%	10.226%	N / A
24				
25	12/31/2004	9.15%	9.344%	9.247%
26				
27	12/31/2005	9.03%	10.784%	9.907%
28				
29	12/31/2006	8.80%	10.472%	9.636%
30				
31	12/31/2007	8.37%	10.729%	9.550%
32				
33	12/31/2008	8.62%	* 10.637%	* 9.628%
34				
35	Notes:			

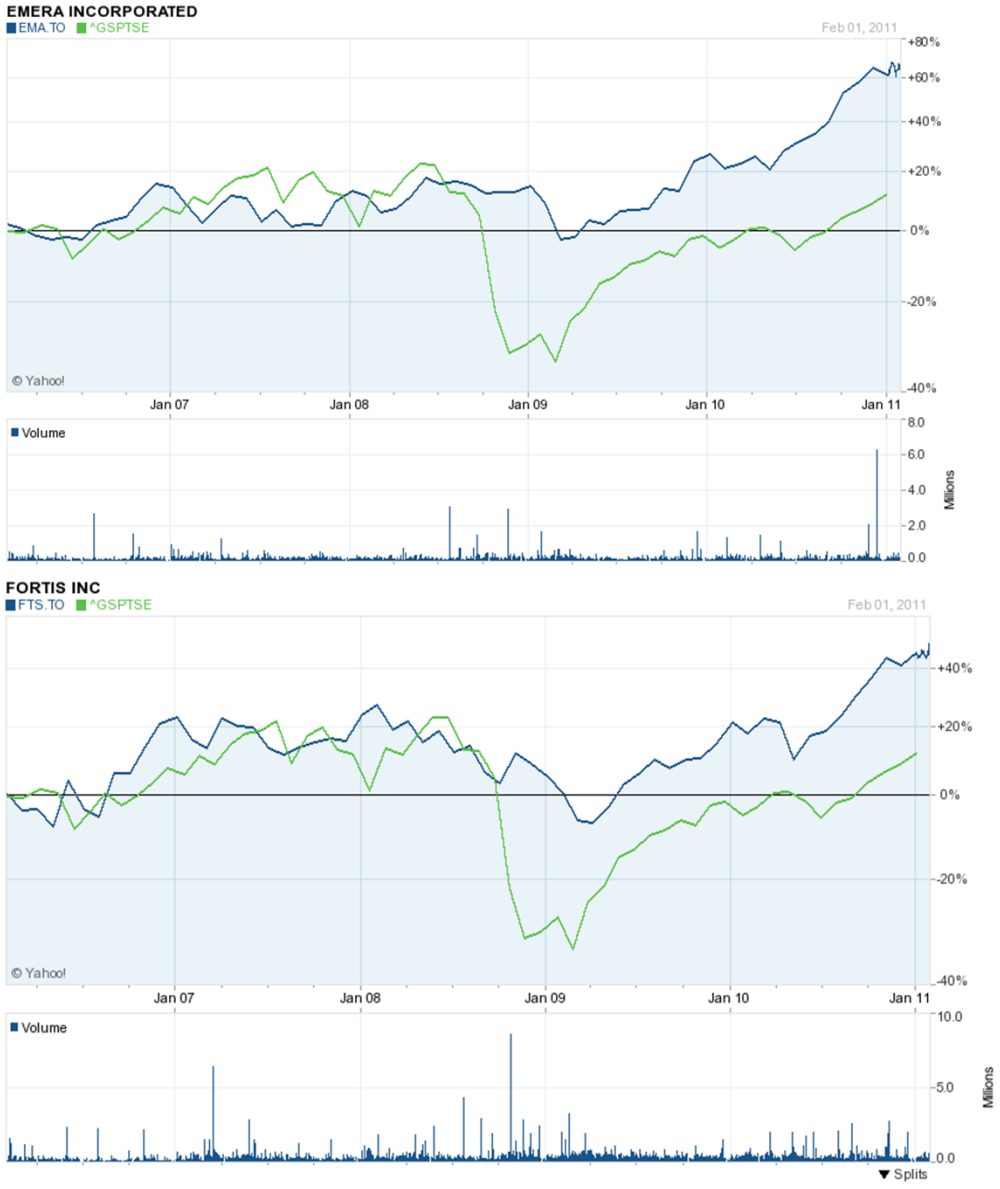
Many are now on multi-year settlements

Utility Risk

- **Very little business risk as they almost always earn their allowed ROE**
  - **Forward test year**
  - **Annual rate hearings**
  - **Deferral accounts**
    - **Removal of commodity charge**
    - **Weather normalisation accounts (Terasen, GMI, ATCO)**
  - **Go back to regulator if unanticipated events (risk)**
- **Investment risk**
  - **Long Canadas had betas of 0.5-0.60 in mid 1990s and were risky**
  - **Utilities have interest rate risk**

Utility Market Risk





BOOTH CAMPUT 2011

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Summary on Fair ROE

- **My forecast long Canada bond yield 4.50%**
- **Canadian market risk premium**
  - **My estimate 5.0% for Canada 6% for US**
  - **Typical range 5-6%**
- **Utility risk**
  - **Very low business risk for utilities**
  - **Typical betas recently about 0.40 I use a range 0.45-0.55**
- **Add flotation cost to get stock price above book value: 0.50%**
- **Overall fair ROE about 7.5-8.0%**
- **Is this fair given events of 2008/9?**

ROE Adjustment Mechanism

- **At 4.50% forecast LTC Yield**
- **NEB (1994)**

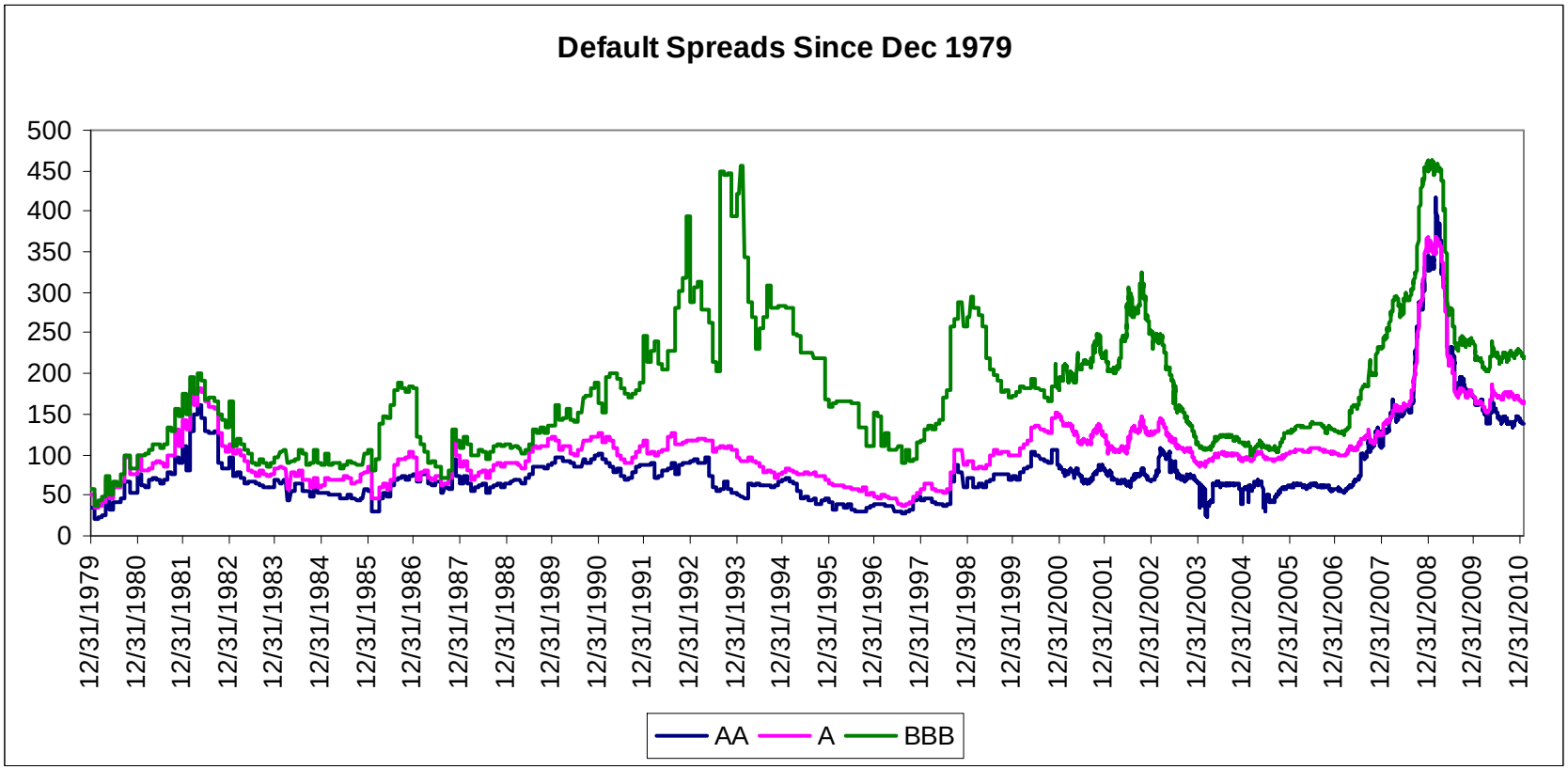
  ROE = 12.25% +0.75 *(LTC yield -9.25%) = 8.68%
- **AUC (2004)**

  ROE = 9.60% + 0.75*(LTC yield – 5.68%) = 8.72%
- **OEB (1997)**

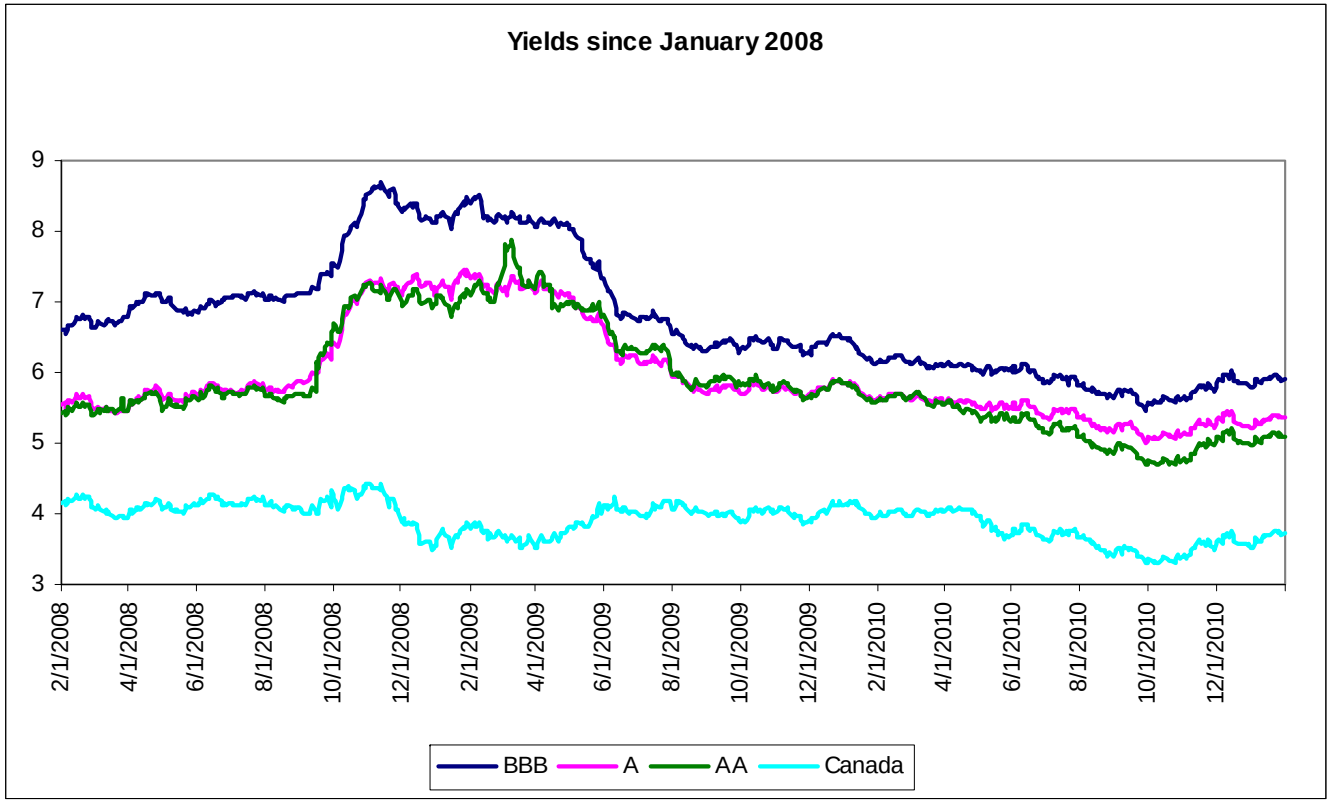
  ROE = 9.35 +0.75* (LTC yield -5.50) = 8.60%

- **Overall ROE Formulae would indicate 8.60-8.72% fair ROE**
- **NEB went off ROE formula TQM (March 2009)**
- **ROE formula generally acceptable until financial crisis**

"A" Spreads: A bond yields minus equivalent Canada yields



Actual Yields



Corporate borrowing costs increased during crisis while LTC yields fell!
ROEs were tied to falling LTC yields as utility borrowing costs increased

Financial Crisis

- **Record high A spreads at +3.60% over LTC yields**
- **Most larger utilities are "A" rated in Canada**
- **At 4.50% forecast LTC and spreads of 3.60% the forecast A yield at 8.10% was very close to the formula ROE, was this fair?**
- **If A yields go up how can ROE go down as it did with the ROE formula?**

ROE REVIEWS 2009

- **AUC:**
  - **Temporary *bonus* ROE 9.0%**
  - **Hearing in 2011**
- **REGIE:**
  - **Temporary *bonus*: ROE 8.95%**
  - **Revert to new formula for 2011 with 50% adjustment to spreads and 75% to LTC yield changes**
- **NEWFOUNDLAND PUB:**
  - **Temporary *bonus* ROE = 9.0%**
  - **Revert to formula for 2011 at 8.38%**
- **BCUC:**
  - **Formula *broken*:**
  - **Terasen Gas allowed ROE = 9.50%**
- **OEB**
  - **Formula *broken* ROE: 9.75%**
  - **Adjustment 50% to LTC and 50% to A spreads**

Regie (GMI 2009)

Parameters	**Bottom of range**	**Top of range**
Risk-free rate	4.23%	4.50%
Market risk premium before financial crisis	5.50%	5.75%
Benchmark gross beta (not adjusted)	0.50	0.55
Adjustment for Gaz Métro's risks	0.25%	0.35%
Issuance costs	0.30%	0.40%
Sub-total n° 1: Result produced by CAPM	**7.53%**	**8.41%**
Adjustment to take account of results of other models	0.25%	0.50%
Sub-total n° 2: Rate of return before adjustment to take account of effect of financial crisis	**7.78%**	**8.91%**
Adjustment to account for the effect of the financial crisis	0.25%	0.55%
Total: Rate of return after adjustment to account for the effect of the financial crisis	**8.03%**	**9.46%**

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OEB ROE Formula

- **EB 2009-0084**

$$ROE_t = 9.75\% + 0.5 \times (LCBF_t - 4.25\%) + 0.5 \times (UtilBondSpread_t - 1.415\%)$$

- **Yield spread adjustment averages out over the business cycle; simply introduces ROE volatility for no obvious gain**
- **Real change is the higher allowed ROE and the 50% adjustment to LTC yields**
- **50% adjustment has repeatedly been rejected before. With a relative risk of 0.50 it implies that the market rate of return is constant!**

OEB Motivation?

- **Concentric Report**
  - **US Consulting firm hired by utilities and used by OEB indicated US utilities were the "same" as Canada and there was a "fairness gap" between the US and Canada**

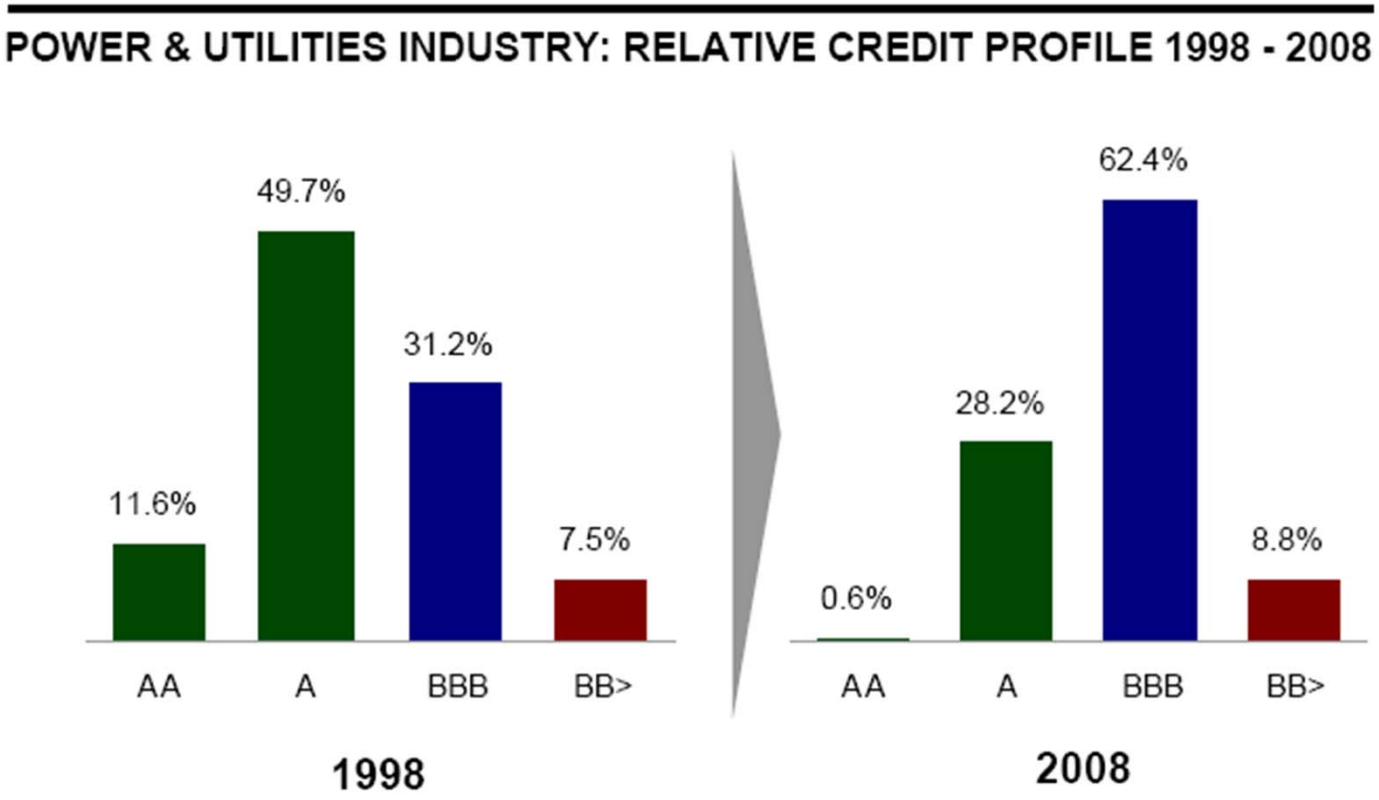
- **Financial markets say the opposite**
  - **US prime is higher than in Canada**
  - **US long treasuries 0.50% higher than LTC yields**
  - **Market risk premium has been 1.0% higher than in Canada**
  - **Financial crisis originated in the US due to lax banking regulation: reflects US attitude to regulation**
  - **Rating agencies rate US utilities riskier than Canadian ones**

Moody's

"Moody's views the regulatory risk of US utilities as being higher in most cases than that of utilities located in some other developed countries, including Japan, Australia and Canada. The difference in risk reflects our view that individual state regulation is less predictable than national regulation; a highly fragmented market in the US results in stronger competition in wholesale power markets; US fuel and power markets are more volatile; there is a low likelihood of extraordinary political action to support a failing company in the US; holding company structures limit regulatory oversight; and overlapping and unclear regulatory jurisdictions characterize the US market. As a result no US utilities, except for transmission companies subject to federal regulation, score higher than a single A in this factor."

Moody's "Infrastructure Finance; Regulated Electric and Gas Utilities," August 2009

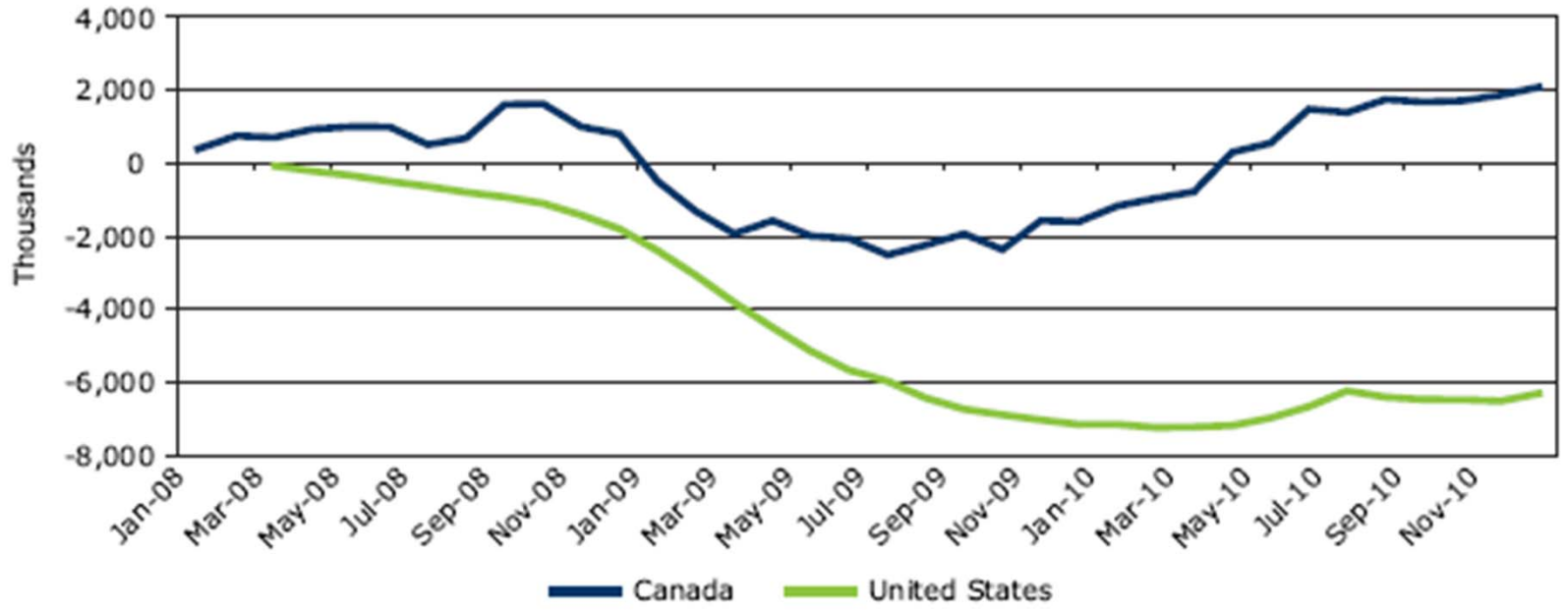
US Bond Ratings



In comparison most Canadian companies are rated A.

US Economic Situation

Net Jobs in Canada versus the United States (January 2008 to December 2010)

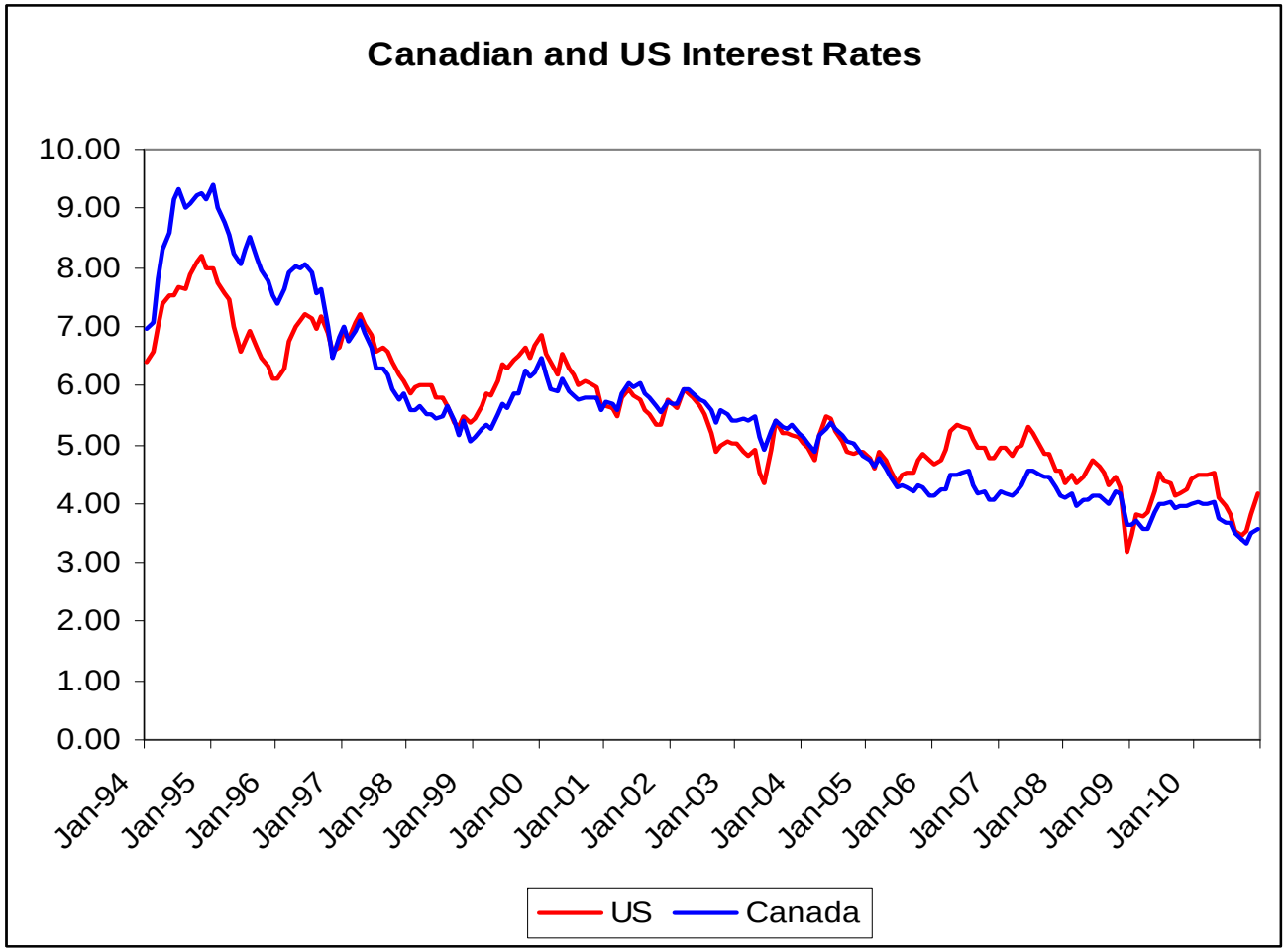


Government Debt

Government Deficits as a % of GDP

	2007	2009	2010	2011
Japan	2.4	10.3	9.6	8.9
US	2.7	12.5	11.1	9.7
Italy	1.5	5.3	5.1	4.3
Ireland	-0.1	11.4	31.9	11.8
Greece	3.7	13.6	7.9	7.3
France	2.7	7.9	8	6
Portugal	2.7	9.4	7.3	5.2
Germany	-0.2	3.3	4.5	3.7
Spain	-1.9	11.4	9.3	6.9
UK	2.7	10.9	10.2	8.1
Canada	-1.6	5.1	4.9	2.9
Advanced	1.3	9.2	10.0	6.8

Canada vs US Government Bond Yields



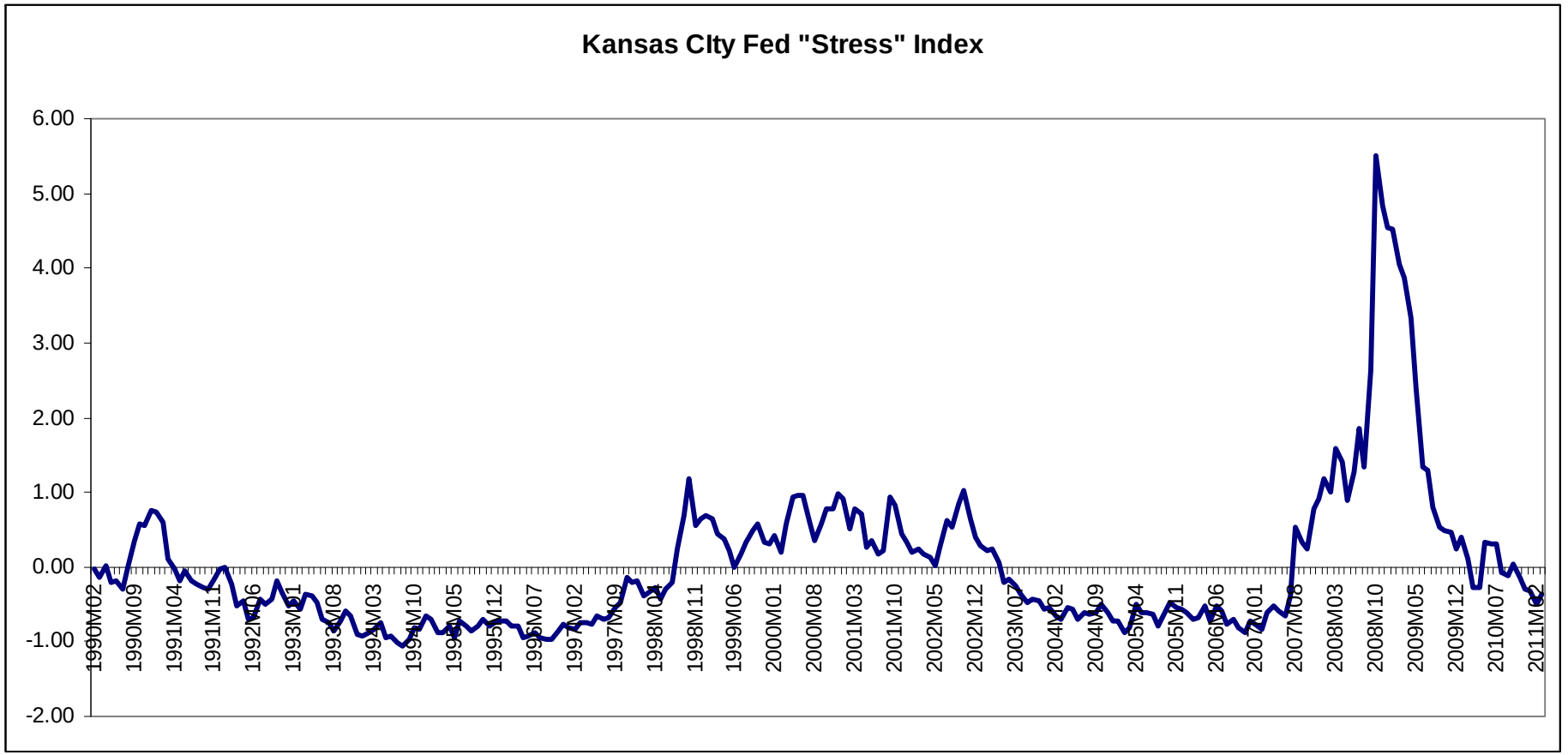
Regie: Gazifere Decision 2010

- **Allowed Gazifere 9.10% and**
  - **75% adjustment to changes in LTC Yields**
  - **50% change to utility bond yield spreads**
- **Actual ROE formula**

ROE= 9.10% + 0.75*(Forecast LTC Yield – 4.25%) + 0.50*(Spread- 1.50%)

- **Lower allowed ROE and retains 75% adjustment to changes in LTC forecast yield**

The Future?



Financial Stress is + and better markets negatives
US is back, close to normal

Prognosis

- **Economy and markets: good**
  - **Canada quickly recovering from recession**
  - **Bond market back to normal**
  - **Equity markets have shown significant recovery**
  - **C$ floating above par**
- **Wide divergence in allowed ROEs coming from different boards**
  - **OEB an outlier at 9.75% and new ROE formula**
  - **Regie with new ROE formula consistent with existing practise**
- **How long can we have widely divergent ROEs for similar risk utilities in Canada?**