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April 17, 2024

The Board of Commissioners of Public Utilities
Prince Charles Building
120 Torbay Road, P.O. Box 21040
St. John's, NL A1A 5B2

Attention: Jo-Anne Galarneau
Executive Director and Board Secretary

Dear Ms. Galarneau:

Re: Newfoundland Power Inc. - 2025-2026 General Rate Application - Expert Evidence

Further to the above-captioned, enclosed please find the Evidence of Laurence D. Booth.

Paper copies to follow.

Yours truly,

Dennis Browne, KC
Consumer Advocate

Encl.
/bb

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FAIR RETURN AND CAPITAL STRUCTURE FOR NEWFOUNDLAND POWER (NP)

EVIDENCE OF

Laurence D. Booth

Before the

BOARD OF COMMISSIONERS OF NEWFOUNDLAND AND LABRADOR

April 2024

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I. KEY POINTS

1) Newfoundland Power's business risk has not increased since 2009. If anything, it has decreased since the competitive threat from fossil fuels has decreased. I still regard it as an average *business risk* Canadian utility with lower-than-average financial risk. In particular, residential electricity costs are not as high as in other Canadian jurisdictions, let alone in large US cities such as New York. Given the monopolistic power of Newfoundland Power (NP), I see very little, if any, long run stranded asset risk. Moreover, any such risk would first have to materialise as an inability of NP to earn its allowed Return on Equity (ROE), and there is no evidence of this. Consequently, although ratepayers are naturally concerned about a possible price spike in the short term, as the cost of Muskrat Falls energy is passed through, I do not see this as a material threat to NP or a significant increase in its business risk.

2) In terms of the economy, the following is key macro data at the time of my 2016 report when the allowed ROE was set at 8.5%, and the 2018 and 2021 reports when the ROE was settled at 8.5% ROE:

	Unemployment		Capacity		T Bill	LTC	"A"		Loan		
	Rate	CPI	Utilisation	BEIR	Yield	YIELD	Spread	KSFI	Officers	VIX	TSX
"January 2016	7.2	2.01	79.7	1.37	0.481	2.05	1.94	0.25	5.39	23.71	12822.1
"September 2018	5.8	2.22	84	1.76	1.51	2.42	135	-0.75	-10.94	12.91	16073.1
"August 2021	7.5	3.72	81.7	1.67	0.18	1.82	131	-0.72	-9.93	17.52	20287.8

My overall assessment was that in 2016 we were suffering from the effects of a short technical recession caused by low commodity prices and a slow down in China. This mainly affected Western Canada, but we were close to the low point of the business cycle. In contrast, in 2018 we were at the top of the business cycle, and in 2021 we were rapidly emerging from a serious recession caused by Covid 19. In contrast, currently we are in a minor slowdown caused by the "hangover effects" of the Covid 19 medicine, which was massive central bank spending which depressed interest rates to ridiculously low levels.[1] In my judgment, we have a more

[1] In December 2021 the nominal LTC bond yield was below 1% and the real bond yield negative.

favourable economic environment than at the time of the three other hearings as is shown by the stock market recently hitting new highs.

3) The fair return standard requires that rates be fair and reasonable. Normally, Canadian boards set both the allowed ROE and common equity ratio, since together they determine the forecast net income earned by the shareholders, while the practise in Canada is that the interest cost is a pass through as the embedded debt cost. NP is currently allowed an ROE of 8.50%[2] on 45% common equity. The forecast net income is therefore 3.83% (0.085* .45) of the future average rate base, which is higher, for example, than that for other Fortis' Canadian regulated utilities. The AUC now allows an ROE of 9% on 37% common equity for a pure transmission or distribution utility, which means a 3.3% net income contribution from the average rate base (0.09* .37). Further, the AUC and OEB parameters apply to smaller utilities, and to electric utilities with some generating capacity as well as customers with a relatively dispersed franchise. I do not regard NP as a small utility. My main recommendation is that if the Board continues to assess NP to have average business risk for a Canadian utility, then the Board regulate it as such and allow an average common equity ratio of 40%. If the Board feels an immediate 5% drop in the common equity is too big a "shock," it could move to a 5% preferred share component or phase in a change at 1% per year. In any case, there is no doubt that a 45% common equity ratio for NP is excessive compared to its Canadian peer group. If on the other hand the Board keeps the 45% common equity ratio, it should not then allow an ROE similar to the 9% recent AUC decision.

4) In terms of the allowed ROE, the Board set this at 8.5% in the 2016 hearing. The same ROE figure was subsequently agreed to by settlement in 2018 and 2021. CulTently I am recommending a 7.70% allowed ROE, which figure is slightly higher than my previous recommendations. However, the estimates provided by Mr. Coyne and Mr. Trogonoski indicate that their average estimate in 2015 was 10.1 %, which is identical to their estimate in

[2] This is close to 9.0% before the earnings sharing mechanism operates.

2024, where they discount the allowed ROEs in 2018 and 2021 as settlement ROEs.[3] In my judgment, the evidentiary basis for an increase in the ROE based on their reports is absent.

5) What matters to NP is not just the allowed ROE, but its actual ROE. In answer to CA-NP-079, NP provided its actual versus allowed ROE back to 1990. Over the last 25 years NP has consistently over-earned its allowed ROE due to the band allowed around its return on rate base. This means that in effect NP's allowed ROE is currently not 8.5%, but is actually closer to 8.9%. My recommendation is that the Board set what it regards as a fair and reasonable ROE, and any excess earned above that amount be shared 50:50 with rate payers. Otherwise, it is difficult to understand what the Board considers to be a fair and reasonable allowed ROE.

6) In 2011, I accepted that the use of the automatic ROE adjustment mechanism should be suspended, since massive bond buying in the US and Europe by central banks had caused a collapse in the long-term Canada (LTC) bond yield. This made the result of the Board's automatic ROE formulae suspect as the forecast LTC yield was below what I then regarded as my threshold rate of 3.8%. Since then, the Alberta Utilities Commission (AUC) has imposed an ROE formula in a 2023 Decision (27084-D02-2023), despite what seemed to be the objections of most parties. There is scant evidence on the part of the company or its witnesses on the use of an ROE mechanism either pros or cons, but I have included a new Appendix E dealing with the evolution of such mechanisms and why they were suspended.

7) Of importance is that the effect of incredibly low long–term Canada (LTC) bond yields is finally passing as we are getting closer to normality in the capital markets as the Bank of Canada, along with other central banks, sells off their enormous stocks of government bonds. However, this process, called "quantitative tightening," is nowhere close to being finished as we have not yet consistently reached my 3.8% forecast LTC yield, which I regard as the "normality" trigger for bond prices and yields to be determined on the basis of fair market value. However, we are getting there, and as we do the validity of the suspended ROE adjustment formulae begin to assert themselves. The NEB's ROE formula, for example, is currently indicating a fair ROE for 2025 of 8.15%, with a forecast LTC yield of 3.8%, and

[3] RFI answer CA-NP-174.

8.44% if augmented with a credit market adjustment based on the spread between A bond yields and LTC bond yields. I would regard both of these as within the range of a fair and reasonable ROE, with the latter almost the same as NP's allowed ROE. If the Board is unwilling to impose an automatic ROE adjustment formula in the current GRA, I would suggest that at the very least one be on the list of issues that the Board wants evidence on for the next GRA.

Q. PLEASE DESCRIBE YOUR QUALIFICATIONS AND EXPERIENCE.

A. I am a Professor of Finance at the University of Toronto's Rotman School of Management, where I also hold the CIT Chair in Structured Finance and where I was the area coordinator for Finance for almost 21 years. I was appointed to U of T in 1978 after completing my undergraduate from the London School of Economics and my MBA, MA in Economics and doctorate from Indiana University in the US. I have had a distinguished academic career with over 100 publications in both academic research journals and applied professional journals, as well as three textbooks including introduction to corporate finance with my co-authors Sean Cleary and Ian Rakita. My active research agenda led me to be the supervisor of 16 Ph.D. students, almost all of whom hold faculty positions at good universities, including Dalhousie. I have won numerous teaching awards, and in 2003 was awarded the Leader in Management Education award for my contributions to research, teaching and professional engagement. I am on the editorial review boards of several academic journals, where I regularly review research papers and evaluate them for publication and conference presentation.

On the professional side, in 1982-84 I entered testimony in a series of cases before the Ontario Securities Commission concerning the regulation of investment dealers and the role of the chartered banks in the securities markets. I first entered rate of return testimony before the CRTC in 1986, when the local telcos were still on cost-of-service regulation. With my late colleague, Professor Michael Berkowitz, I subsequently entered rate of return testimony in various proceedings until Professor Berkowitz's death in 2004. This included the land-mark cases before the BCUC and NEB that led to the adoption of automatic ROE adjustment mechanisms. I then entered testimony on my own in both rate of return, capital structure and business risk cases. The most interesting being the NEB's 2012 hearing into the TransCanada Mainline, which dealt with

the possible stranding of its Northern Ontario Line assets. As well as being qualified as an expert witness before public utility tribunals, I have also been qualified as a financial expert before the Tax Court of Canada and in variety of civil cases concerning financial matters such as private valuations, bond ratings, the preferred share market and investment banking. With a colleague, Professor Eric Kirzner, I have prepared expert evidence on behalf of the Government of Canada (Justice Department) in a variety of cases involving indigenous contract disputes and land claims dating back over the last 150 years.

Q. **HOW IS YOUR TESTIMONY STRUCTURED?**

A. My testimony tends to be quite voluminous as it deals with issues raised over many years, and there are often serious flaws in seemingly simple empirical observations put forward by other experts. Consequently, I have prepared four appendices dealing with the more technical information. Appendix A contains my CV. Appendix B deals with determining the market risk premium. Appendix C deals with the relative risk adjustment used in the standard risk premium model. Appendix D deals with discounted cash flow estimates of the fair return. Finally, Appendix E deals with automatic ROE adjustment models using the model introduced by the NEB (now the Canadian Energy Regulator) in its RII-2-94 decision for test year 1995. This is because the NEB ROE formula is still in use, and the NEB data for the formula is available on the CER's web page.

II. FINANCIAL AND ECONOMIC OUTLOOK

Q. WHY DO YOU START BY CONSIDERING CAPITAL MARKET CONDITIONS?

A. Because the legal standard for a fair rate of return in Canada stemmed from changed conditions in the money market, where we would now understand the money market to mean the capital market. Also, conventional practise is to base the fair ROE on the forecast long term Canada (LTC) bond yield. The Supreme Court of Canada determined a fair rate of return in *BC Electric Railway Co Ltd.,* v. *the Public Utilities Commission of BC et al* ([1960] S.C.R. 837), where the Supreme Comt of Canada had to interpret a statute that provided,

> (a) The Commission shall consider all matters which it deems proper as affecting the rate:
>
> (b) The Commission shall have due regard, among other things, to the protection of the public interest from rates that are excessive as being more than a fair and reasonable charge for services of the nature and quality furnished by the public utility; and to giving to the public utility a fair and reasonable return upon the appraised value of the property of the public utility used, or prudently and reasonably acquired, to enable the public utility to furnish the service:

These statutory provisions articulated the "fair and reasonable" standard in terms of rates; and that the regulatory body should consider all matters that determine whether the resulting charges are "fair and reasonable." To an economist, "fair and reasonable" means minimum long run average cost, since these are the only costs which satisfy the economic imperative for regulation and do not include unreasonable and unfair cost allocations. The statute also articulated that: the "prudently and reasonably acquired" test in terms of the assets included in the rate base; and the imperative is to protect the public interest.

In Canada, "fair and reasonable" has also been taken to include the firm's capital structure decision (debt equity ratio), since this has a very direct and obvious impact on the overall revenue requirement. To allow the regulated utility to freely determine its capital structure will inevitably

lead to rates that are unfair and unreasonable, as otherwise the management of the regulated firm is not fulfilling its fiduciary duties to act in the best interests of its stockholders.[4]

In terms of financial charges, the decision in *Northwestern Utilities* v. *City of Edmonton* (1929) stated that a utility's rates should consider changed conditions in the money market, where a fair rate of return was further confirmed in the BC Electric decision. This decision adopted Mr. Justice Lamont's definition of a fair rate of return put forward in *Northwestern Utilities:*

> ***"that the company will be allowed as large a return on the capital invested in the enterprise as it would receive if it were investing the same amount in other securities possessing an attractiveness, stability and certainty equal to that of the company's enterprise."***

This definition is referred to as a market opportunity cost, in that the fair return is what could be earned by investing in similar *securities* elsewhere. Only if the owners of a utility are given an opportunity to earn their opportunity cost will the returns accruing to them be fair, i.e., they will reward neither the owners with excessive profits, nor ratepayers by charging prices below cost. In this way the fair rate of return in Canada is conventionally applied as a market rate applied to the book value of the utility's assets.

The only qualification is that in the overall utility cost of capital the cost of debt is not the current market opportunity cost, but the embedded debt cost. In this way the debt cost is treated like the acquisition of a capital asset, and prudently acquired, the actual debt cost is included in rates. The only use in Canada of determining the overall utility cost as an opportunity cost is that of the CER, which used the after tax weighted average cost of capital (ATWACC). However, this introduces excessive complexity and unnecessary technical problems.[5]

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[4] In the U.S., utilities are generally allowed to determine their own capital structure within certain limits for historic reasons specific to the U.S. and practices that led to the Public Utility Holding Company Act of 1935 and oversight by the Securities and Exchange Commission. It is my understanding that securities regulators in Canada have never had an equivalent oversight function.

[5] In the NEB decision, in a footnote they included its ATWACC decision in the standard way as a check, which questions why they did it in the first place.

Regardless to any modern financial economist Mr. Justice Lamont's definition of a fair rate of return as an opportunity cost means a market *required* or *expected* rate of return on the book value of equity. This is the rate set in the capital or money market as conditions change.

Q. HOW HAVE MONEY MARKET CONDITIONS CHANGED?

A. The responsibilities of the Bank of Canada (the Bank) are to "promote the economic and financial welfare of Canada" by conducting monetary policy to "foster confidence in the value of money" and promote the safety and efficiency of Canada's financial system.[6] To do this, the Bank manipulates conditions in the financial market "primarily" through changing the overnight rate.[7] In practise, the Bank mainly seems to operate consistent with what is termed the Taylor rule, after Professor John B. Taylor at Stanford University.

The Taylor rule is as follows:

$$r = r^* + i^* + 0.5 * (i - i^*) + 0.5 * (GDP - GDP^*)$$

where r is the Bank's actual policy rate, which in Canada is the *overnight rate* and, in the U.S., the federal funds rate. The inflation rate is then i, and GDP is the growth rate in real gross domestic product. The superscript stars indicate the Bank's target rates, and a and b are coefficients, which Taylor originally set at 0.50. The Bank's target rate of inflation has been 2% in a band of 1.0-3.0% for almost three decades, and was renewed with the Government of Canada as recently as December 13, 2021 as part of a new five-year pact.

For illustrative purposes, assume that the target GDP growth rate and inflation rate are both set at 2% and the target overnight rate at 1%. Consequently, the "normal" overnight rate would be 3%,[8] which is the sum of the target overnight rate of 1% and target inflation of 2%. Now suppose both

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[6] Unlike in the U.S., the Bank has no dual mandate equivalent to that of the U.S. Federal Reserve.

[7] This is what is commonly referred to as "conventional" monetary policy, to distinguish it from "unconventional" monetary policy, which is also known as quantitative easing and bond buying.

[8] The Bank has recently stated that the neutral rate is in a range 2.25-3.25%.

inflation and GDP growth are at 0%. This would be a weak economy, with below target economic growth and inflation. Substituting these values into the Taylor rule we get:

$$r = 1\% + 2\% + 0.5 * (0 - 2\%) + 0.5 * (0 - 2\%) = 1\%$$

So, the policy prescription would be to lower the overnight rate from the "normal" rate of about 3% to 1% to stimulate demand. This reduction is based on 1% for the lower rate of inflation and another 1% for the sub-par economic growth. The lowered short-term interest rate then stimulates interest sensitive demand such as housing, cars, etc., and through them the economy.

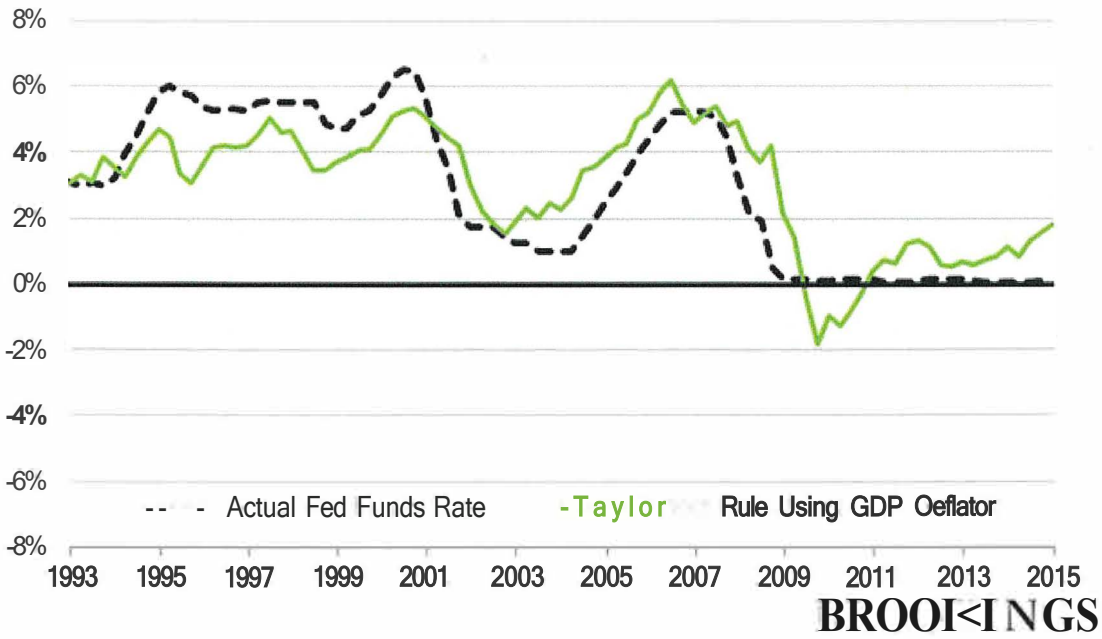
In contrast, suppose the economy was growing at above trend at 4% and inflation was at the top of the Bank's range at 3%. In this case, substituting into the Taylor rule, we get:

$$r = 1\% + 2\% + 0.5 * (4 - 2\%) + 0.5 * (3 - 2\%) = 4.5\%$$

In this case, with a strong economy and rising inflation, the Bank would set the overnight rate at 4.5%, where the higher interest rate slows down interest sensitive demand, and through them the overall economy and inflation. These two examples show how the Taylor rule works in "mimicking" the decision process of a central bank trying to maintain an inflation target. As I will discuss later, these values, while illustrative, are related to where the Bank has been and where it seems to be going. However, at the current point in time there is a discussion around the fact that a rigid application of the Taylor rule implies much higher interest rates than the markets could survive. For example, 4% economic growth and 6% inflation would imply a target rate of 6%.

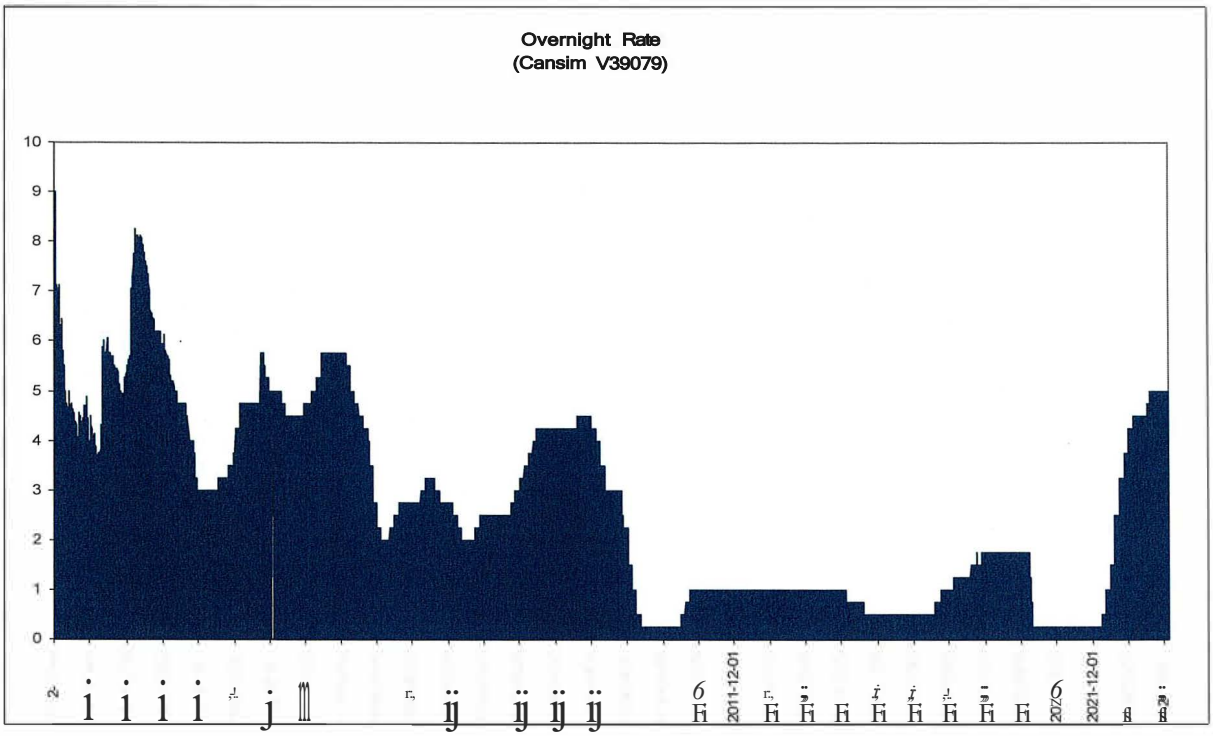
In a presentation at the Brookings Institute in April 2015, Professor Ben Bernanke, the former chair of the U.S. Federal Reserve, produced the following graph that clearly shows how the U.S. target rate (Federal Funds rate) broadly tracked the rate produced by the Taylor rule.

Figure 1: The Original Taylor Rule, 1993-Present



Although simplistic, the Taylor rule points to the two key values that are critical for setting the Bank's policy rate: the difference between the current and target inflation rate, and the output gap, that is, how much spare capacity there is in the economy. It is also why financial markets obsess over these two values as predictors of future financial market conditions and financial costs.

Schedule 1 contains basic macroeconomic data since 1987, where we can clearly see the effect of the Bank's agreement with the Government of Canada to bring down the rate of inflation, since until 2021 it had not exceeded an annual rate of 3% since 1991. However, this came with very significant unemployment into the mid-1990s. Then prior to the financial crisis, we had good economic growth, and for a time the tmemployment rate was below what used to be regarded as the non-accelerating inflation rate of unemployment (NAIRU) of about 6.0%. This created incipient inflationary pressures, so that starting in September 2005 the Bank increased its policy rate from 2.5% to reduce the stimulus injected into the economy. We can see this in the following graph.



Consistent with the Bank's 2% inflation target, the overnight rate should be *at least* 3.0%. Consequently, at 4.5% up until December 2007 the Bank's monetary policy was *restrictive* in increasing borrowing costs and slowing interest sensitive demand. This policy stance was reversed due to the impact of the sub-prime mmigage crisis emanating in the U.S. The Bank conservatively lowered the overnight rate to 3.0% in May 2008, and kept it there throughout the summer before being forced to cut the rate dramatically and rapidly to 0.25% in response to the financial crisis triggered by the failure of Lehman Brothers.

Unlike the U.S,, Canada recovered quickly since there were no fundamental problems in the Canadian economy equivalent to the enormous losses suffered by banks in the U.S., where Citibank, Wachovia, Bank America, and Merrill Lynch each alone lost more than $100 billion. Consequently, the Bank staiied "nonnalising" by increasing the overnight rate in June 2010 in response to obvious signs of recovery. The Bank increased the overnight rate on three separate occasions, each time by 0.25%, to bring it to 1.0% by September 2010. The Prime rate that the chartered banks charge their "best" customers increased to 3.0% in tandem with the overnight rate, and at that time expectations were that the Bank would resume increasing the overnight rate through 2011 as the economy strengthened.

In my 2012 report, I included an assessment ofmy recommended ROE for 2012 of 8.15% based on Summer 2011 data. At that time, I recommended a forecast LTC yield of 4.5% as I was heavily influenced by the June 3, 2011 forecast of the Royal Bank of Canada (RBC) in their Financial Markets Monthly as below.

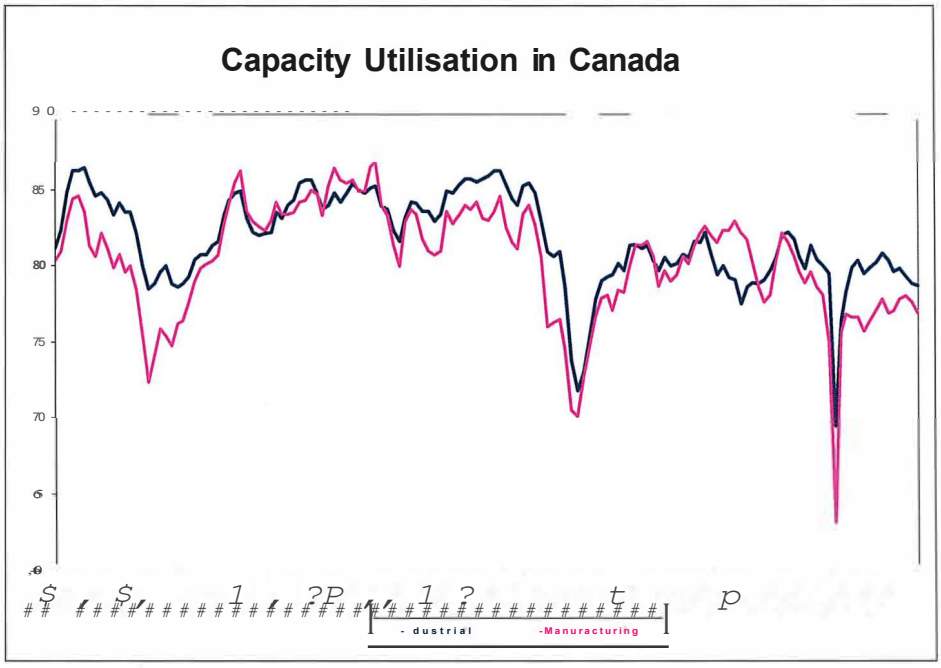
	129!	*19,fil*	129.1	llill		ll9J.	lill.1	llill			lli.1
Canada											
Overnight	0,50	1.00	1.00	**1.00**	**1.00**	**1.25**	1.75	2.25	2.50	2.75	**3.00**
ThreE•month	OSO	0,88	0.97	t. 10	1.20	1.70	2.15	2,40	2.65	2.90	3, 15
I\vo•year	1.39	1.40	1,71	1.85	1,15	2.15	2.40	:uo.	**3.00**	3,35	3,75
Flve,year	2,32	**2.()4**	2,46	**2.65**	2.50	**3,00**	3,30	3.50	3.65	**3.85**	4.05
10•year	***3.08***	**2,75**	3.16	3,25	**3.25**	3.50	. 3.80	**3.95**	4.05	4.15	**4.15**
30•year	J.65	*3.34*	**3.55**	3.80	**3.75**	4.00	**4.30**	4.45	4.50	4.50	4.55
Unite States											
Fed funds	0 to0.2!1	o too.is	o to 0.25	Oto0,25	Oto 0.25	Oto0.25	o to0.25	o to0,25	0.50	**1.00**	1.50
Three•month	0.18	0,16	0.12	**0,15**	**0.20**	**0.20**	0,25	0.35	0.65	1.25	**1,70**
Two•year	**0.61**	**0.44**	0.61	0.70	**0.80**	o.90	**1.10**	**1.25**	1.60	2.00	2.50
Flve,year	**1.79**	1.27	2.01	2.10	**2.00**	2.30	2.60	**2.80**	**3.05**	**3.40**	3,75
10-yoar	2.97	2.48	**3.30**	3.45	**3,25**	3.65	**4.00**	4.15	4.25	4.45	**4,50**
JO•year	1.91	**3,67**	4.34	4.50	4.55	4.60	**4.85**	**4,90**	4.95	5.00	5.05
United Klnqdom											

RBC was forecasting that the LTC yield would be 4.55% by the end of 2012. Two points are relevant. First, the Canadian LTC yields were consistently lower than yields in the U.S. even 12 years ago. Second, at that time the overnight rate was forecast to increase by 2%, whereas the U.S. equivalent, the Federal Funds rate, was forecast to increase by 1.25%. Both are indicative of the fact that although Canada and the U.S. are closely aligned due to the integration of their real economies, this does not mean that their capital markets are perfectly integrated.

However, RBC's forecast was soon made redundant due to factors emanating from outside Canada, which were the second-round effects of the U.S. financial crisis. The first was the Euro crisis, where in addition to the problems in the U.S. and the Eurozone, both the Bank of Canada and the Government of Canada started to worry that at 1.0% overnight rate would encourage so much personal borrowing that it would have negative implications when interest rates returned to normal levels. The conundrum faced by the Bank was that while it wanted to stimulate the economy by maintaining low interest rates, it did not want a U.S. style debt-fuelled housing bubble that might cause future problems.

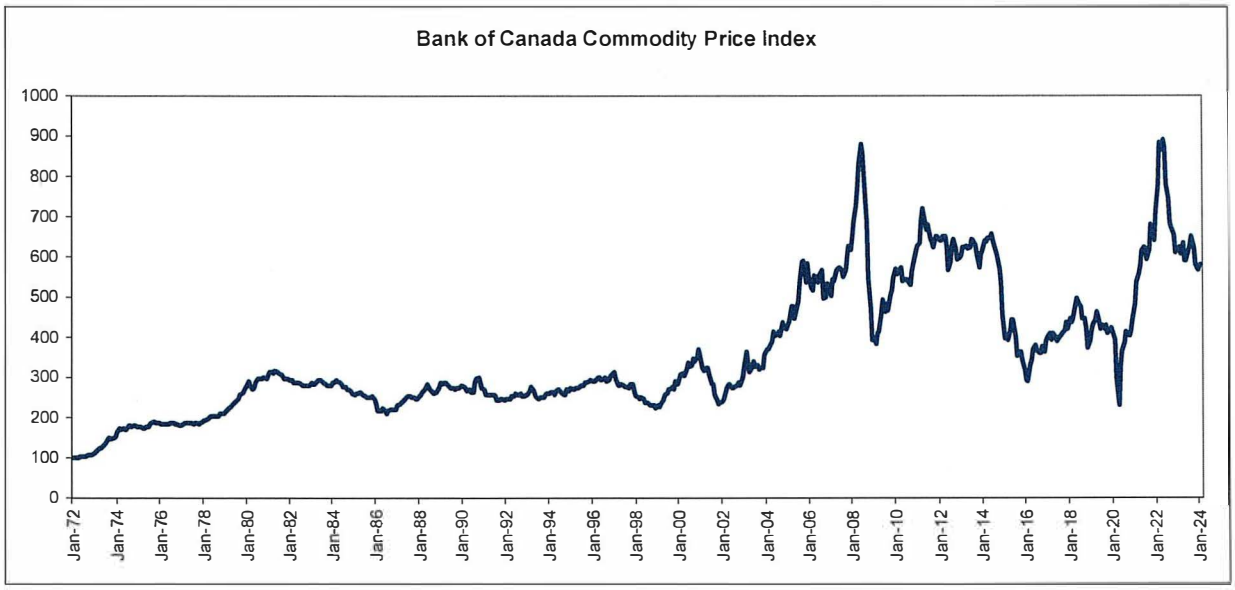
Further, the Canadian economy is not an island, and increasingly the Bank was concerned about the transfer of events from the Eurozone, the U.K., Japan, the U.S., and China into Canada as they all followed expansionary monetary policies to offset their obvious problems. We can see the

impact of events outside Canada in the following graph of the capacity utilisation levels in both the Canadian manufacturing and non-farm sectors.



The sharp drop in capacity utilisation during the recession in the early 1990s is evident, as is the slowdown after the financial crisis in 2009-2010. In both cases, there followed a normal rapid recovery out of recession and a movement towards stabilisation. However, unlike earlier periods, Canada stagnated in 2012-2016 at a relatively "low" level of capacity utilisation as the recovery did not continue apace. Instead, Canada was hit with the after-effects of the Euro crisis and particularly the slow recovery of our major trading partner, the U.S. Then just as the U.S. recovery staited to gather speed, Canada was hit by fears of a slowdown in economic growth in China during 2015, which caused a dramatic drop in commodity prices.

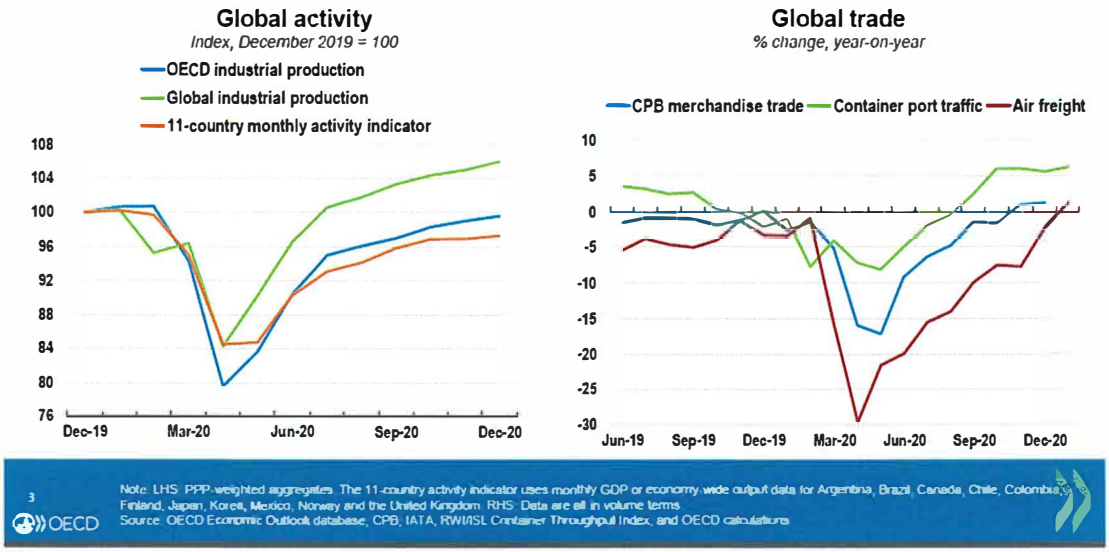
We can see the strong increase in conm1odity prices that sta1ted in 2002 as China staited to industrialise in the following graph of the Bank's commodity price index.



The Great Recession in the United States in 2009 caused these commodity prices to collapse, but they quickly recovered until the sharp sell-off in 2015 on growing fears of a China slowdown. It was this drop in commodity prices that severely affected Canada's resource sector and triggered a "technical" recession in 2015Q2, which in turn weakened capacity utilization. In reaction, the Bank surprised markets by cutting the overnight rate twice in early 2015, from 1.0% to 0.50%. However, fears of a slowdown in China proved overblown, and the election of President Trump in the U.S. increased business confidence, particularly after a significant tax decrease. As the economy strengthened with a moderate recovery in commodity prices and capacity utilization, the Bank increased the overnight rate 5 times until it reached 1.75% in October 2018. By the end of 2019, the overnight rate was still 1.75%, as capacity utilization was below "median" levels, and relatively weak commodity prices were still hurting Western Canada.

Q. WHAT HAS HAPPENED SINCE 2019?

A. The Covid-19 virus caused enormous disruption to the global economy and all countries, including Canada. The following is a graphic from the Organisation for Economic Co-operation and Development (OECD).



After the severity of the transmission of the virus from China began to be appreciated in February 2020, industrial production collapsed 20% across OECD countries. In Canada, industrial production dropped to 63.7% of capacity and manufacturing output to 71.9%. Both levels were much worse than the reaction to the U.S. financial crisis in 2009 and much quicker. By early Summer, RBC was forecasting that 2020Q2 GDP would be 15-30% lower than at the end of 2019 as the unemployment rate jumped to 13.4% in May 2020 from the pre-pandemic low of 5.6% in January 2020.

Things looked very gloomy in April/May 2020, but the seeds of recovery were already being sown. In March, the Government of Canada proposed the Covid-19 Emergency Response Bill with $82 billion in emergency spending and an expansion of the Canada Emergency Response Benefit (CERB) in April. In its 2021 budget, the Government of Canada enacted an expansionary fiscal policy that went well beyond temporary support in order to offset the longer-term impact of Covid-19; it effectively doubled Canada's debt outstanding.[9]

[9] Budget.gc.ca/2021/pdf/budget-2021-2n.pdf

In financial markets the Bank of Canada cut the overnight rate to 0.25% and announced a number of asset purchase programs, including buying approximately:

- 40% of the Treasury bills offered at auction each week
- $5 billion of Government of Canada bonds each week
- $50 billion of provincial bonds
- $10 billion of corporate bonds
- $36 billion banker's acceptances
- $3 billion Canada mortgage bond.

Despite rising infection rates, by July 2021 the unemployment rate had dropped to 7.5%, and it continued to drop throughout the year, ending 2021 at 6.0%. The massive intervention by the Government of Canada resulted in a rapid economic recovery, and by the start of2022 Canada had recovered to 112% of pre-pandemic employment versus 90% in the U.S., with Canada having the largest percentage increase in employment across the G7 countries. In reaction, the Bank removed the main asset purchase programs, and by the end of 2021 the markets were pricing in several increases in the overnight rate through 2022.

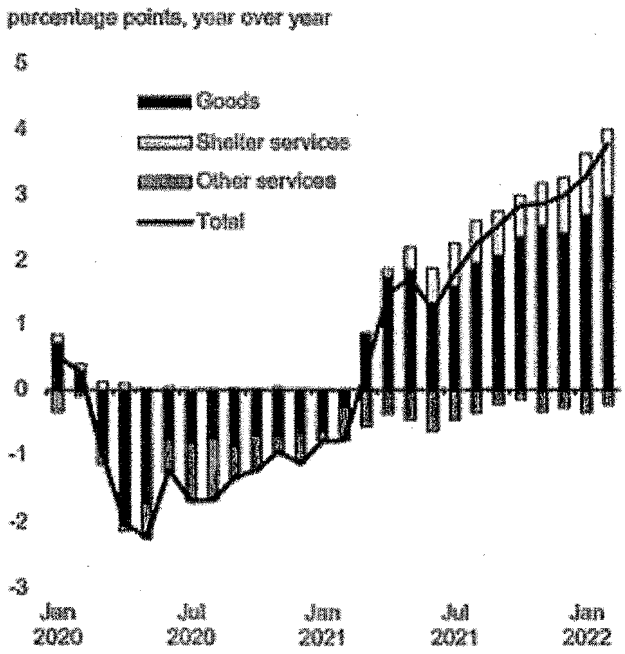
Q. WHAT IS YOUR OUTLOOK FOR INFLATION?

A. The Bank's 2.0% target rate of inflation, within a L0%-3.0% band, was renewed with the Government of Canada on December 13, 2021. However, we now know that there had been significant accumulation of income as savings during the Covid-19 pandemic, consistent with what John Maynard Keynes referred to in the Great Depression as the "paradox of thrift." Simply put, what is good for the individual may not be good for the economy. This was exemplified during 2020 when the Government of Canada indicated that "excess household" saving reached 8% of GDP, the highest of any of the major economies as the Covid-19 lockdown reduced discretionary spending. As this money was taken out of spending, it caused aggregate demand to drop, and with it market prices and inflation.

During 2020 the consumer price index increased by just 0.72%, below the 1-3% range agreed to by the Bank and the Government of Canada. However, the following graph, taken from the Government of Canada's 2022 budget book, indicates that the rapid economic recovery quickly resulted in inflation by the start of2022 breaching the top of the 3% range as rock.bottom interest rates stimulated the Canadian housing market into a bubble.

Chart 12

Deviation of Consumer Price Inflation From Its long-Term Average, Canada



Note: The long-term average is calculated over the period 1997-2019. Last data point is February 2022.
Source: Statistics Canada.

As the economy corrected itself throughout 2021 and 2022 in the face of massive government fiscal stimulus, this excess saving has turned into spending and compounded short-term supply side constraints. Consequently, year over year CPI inflation hit 6.80% in December 2022, down from a high of 8.13% in June 2022, but still excessive. The Bank has admitted it was slow to respond to the increasing inflation threat, but it started increasing the overnight rate in April 2022, and by successive increases had pushed the overnight rate to 5% by July 2023, where it was maintained in the Bank's decision of April 10, 2024.

Of importance is that the Bank does not target the "headline" CPI rate. Instead, it normally focusses on three measures: CPI Trim, which removes the more volatile items; CPI-median, which uses the "middle" number; and CPI-Common, which is a statistical estimate of the core inflation. The result is that currently the Bank has the following numbers. While headline CPI inflation was within its

operating band at 2.8%, both CPI trim and CPI-median are marginally above it. More troubling is that a new core measure takes out the impact of rental and imputed housing costs where shelter costs make up over 40% of the CPI and are clearly affected by the actions of the Bank itself.[10]

In addition to the stimulus to housing caused by the extremely low interest rates during the Covid-19 pandemic, the Government of Canada's open door immigration policy has not helped. As the Bank pointed out in its January 2024 Monetary Policy Report, the vacancy rate has dropped from the more normal 7% level to under 4%, and year over year inflation in rental prices was nearly 8% by the end of 2023.

In addition to the stimulus to housing caused by extremely low interest rates during the Covid-19 pandemic, an additional factor is Canada's open door immigration policy. The Bank has pointed out that vacancy rates, which are normally about 7%, are currently under 4%, and shelter costs finished the year at almost 8%, which tracked the rapid increase in Canada's population.[11] As a result, the Bank is clearly pursuing a "wait and see" policy as the last thing it wants is to lower the overnight rate prematurely and see a quick spring back to inflation. Moreover, a sizeable component of the younger population is hurting from the slowdown and higher rental prices.

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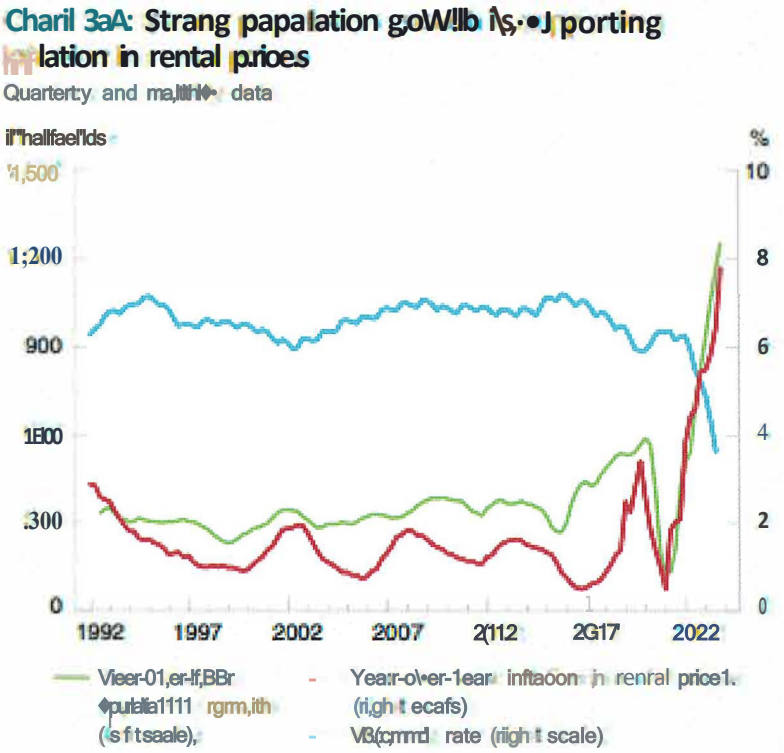
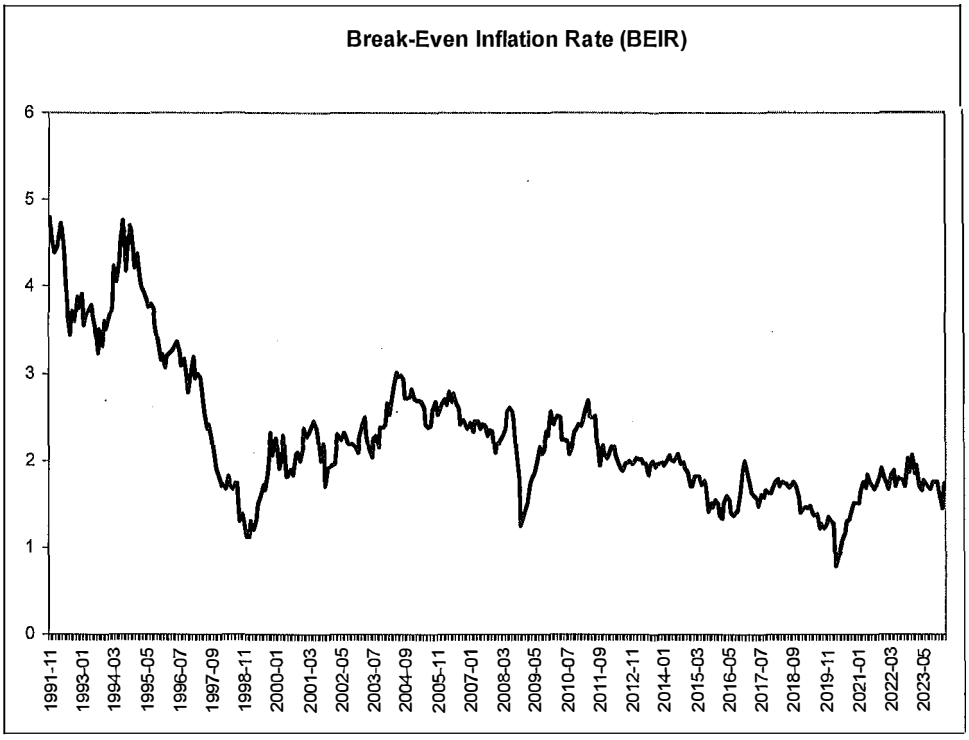
[10] The Bank has downplayed CPI-Common as a statistical model estimated over periods of lower inflation.

[11] In its latest monetary policy report, the Bank points out that housing starts are well below demographic demand, which seems to have come as a surprise to the Government of Canada.



To check if the bond market agrees with the Bank, we can look at the market's pricing of the nominal bond, where the interest rate is fixed, versus the real return bond, which guarantees the investor protection from inflation. The difference between the yields on these two bonds is called the break-even inflation rate (BEIR), since if actual inflation is higher than this, after the fact, you would have been better off investing in the real bond and vice versa. Consequently, the BEIR is a measure of the market's long-run inflation expectations.

The following graphs the BEIR (as a %) since 1991, where we can clearly see the collapse in inflationary expectations in the late 1990s. Since then, the BEIR has generally been slightly above the Bank's 2.0% inflation target, but never above the 3.0% upper limit. In contrast, more recently the BEIR has been slightly below 2.0%, and dropped to a low of 0.79% in March 2020 as the Covid-19 pandemic hit. It has recovered since then, and is currently (March 2024) at 1.74%. My judgment is that the Bank has invested heavily in getting inflation into the 1.0-3 .0% range, and the Bank's cunent Governor does not want to go down in history as the person that let inflation get out of control. Judging by the BEIR, the markets seem to be agreeing.



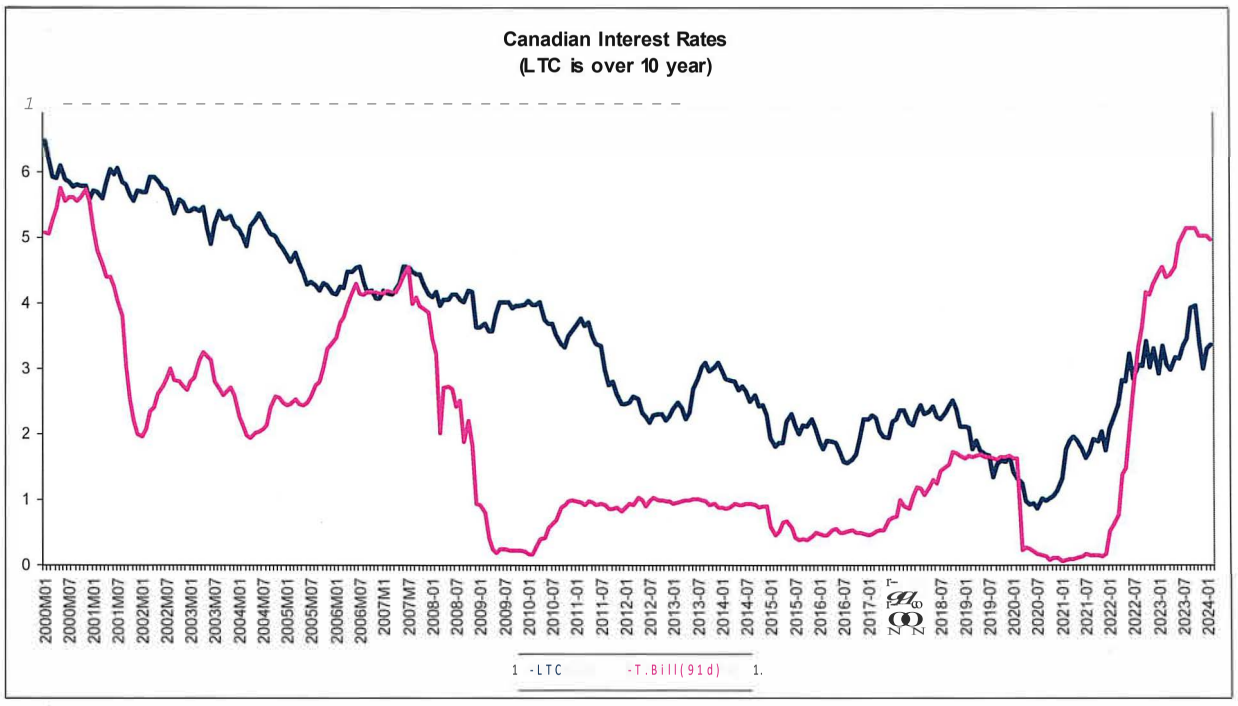
I view the BEIR as confirmatory evidence, consistent with the Bank's commitment to keep inflation at an average level of 2.0% in its agreement with the Government of Canada.

Q. WHAT HAS BEEN THE HISTORY OF THE LTC BOND YIELD?

Schedule 2 provides data on the full range of interest rates across the broad maturity spectrum as of March 27, 2024. The interest rate on the long-term Government of Canada bond (LTC) at 3.40% is 1.6% less than the 5.00% interest rate or yield on the 91-day day Treasury Bill. This is referred to as an "inverted" yield curve, as typically LTC yields are higher than short-term T. Bill yields due to the added risk of holding long term bonds.[12] Normally yields on LTC bonds are not as affected by conventional monetary policy as short-term interest rates, since monetary policy usually works at the "short end" of the yield curve via the overnight rate. In contrast, the yield on the 91-day Treasury Bill yields tracks the overnight rate as a short-term rate. As a result, a smaller yield spread normally reflects the actions of the Bank trying to slow down the economy while a

[12] Long bonds have purchasing power, that is, inflation risk, as well as interest rate risk if sold prior to maturity. With maturity of up to 50 years this is almost all institutional investors.

larger one is stimulative. An invelied yield curve is normally taken as a strong indicator of a slow down or likely recession. The following graph shows the yields on 91-day Treasury Bills and LTC bonds since 2000, where the gap between them is this yield spread.



Note, for example, that T. Bill yields were essentially the same as LTC yields in 2007. This is known as a "flat" yield curve, and indicates the fact that the Bank was pushing up the overnight rate to slow down the economy, since inflation was near the top of the Bank's operating range, particularly in Ontario. The Bank's tightening in 2007 did slow down the economy, and we had a sh01i recession in 2009. However, the cause of this was mainly the failure of Lehman Brothers in the U.S. in September 2008 and the spill-over effects of the U.S. financial crisis.

Regardless, 2009 was a bad year, and throughout it the Bank lowered the overnight rate to stimulate the economy as indicated by the widening yield spread. However, despite the Bank increasing the overnight rate and indirectly Treasury Bill yields in 2010, events in the U.S. trickled over into Canada. In 2011Q4, the U.S. Federal Reserve embarked on the most dramatic

third round of bond buying[13] with an open-ended commitment to buy $85 billion of U.S. government bonds and Federal Agency backed mortgages ***every*** month. In addition to the Federal Reserve, the Bank of England, the European Central Bank, and the Bank of Japan all embarked on ambitious bond buying programs designed to lower long-term interest rates and stimulate housing markets and investment.

At the time I referred to this as "Operation Twist" because the objective was to *twist* or change the shape of the yield curve through "unconventional" monetary policy. QE worked as LTC yields also fell in Canada despite the absence of similar programs by the Bank. The reason was that foreign purchasers were increasingly attracted to LTC bonds due to Canada's AAA bond rating and relatively high yields, particularly after S&P downgraded U.S. bonds from AAA. As a result, the yield spread contracted in Canada not because of Bank tightening, but because the U.S. Federal Reserve operated to lower both short term *and* long-term interest rates. The fact that this is unusual is why it is referred to as unconventional monetary policy.

In 2017 the U.S. Federal Reserve (June 14, 2017) announced it would reduce its holdings of bonds by allowing another $6 billion to mature each month, a process that came to be called "tapering." Canadian Treasury Bill yields started to increase, causing the yield spread to get smaller as markets started to "normalise." This was consistent with a strong Canadian economy and the Bank increasing interest rates. This continued until December 2019 when the actions of the Fed caused investors to assume that it was deliberately driving up interest rates to slow down a U.S. economy as the yield spread went negative.[14]

In hindsight, the fear of rising interest rates and the Fed engineering a U.S. recession seems quaint given that by February 2020 there was talk of a virus coming out of China. By the end of March central banks around the world were reducing policy rates again while governments were engaging in massive fiscal policy expansion to offset the decline in aggregate demand. In Canada, even the Bank resorted to bond buying as well as reducing the overnight rate. The

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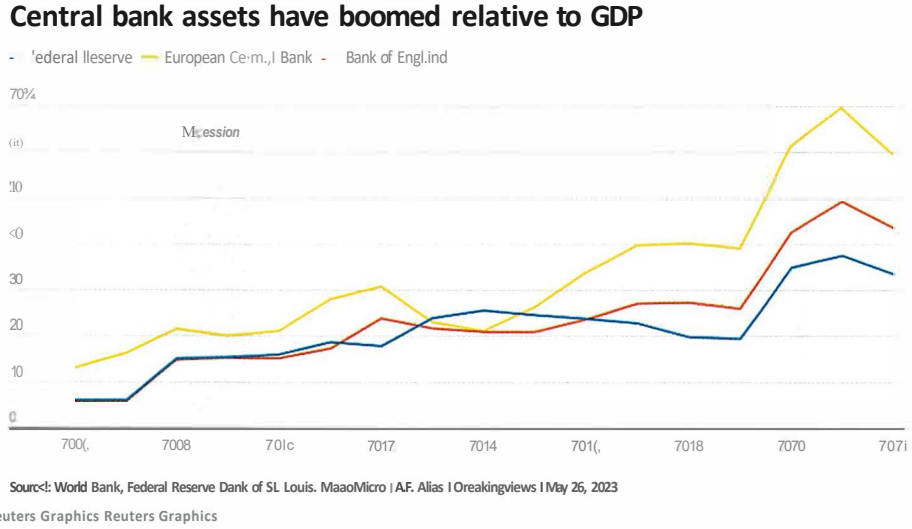
[13] Known as quantitative easing round 3 or QE3

[14] What spooked the markets was the Fed forecasting that a "normal" Federal funds rate was 2.9% when in 2019 the rate was already 2.9% while they were forecasting it going to 3.4% in 2020, that is deliberately slowing down the US economy.

following Reuters graphic shows the growth in central bank balance sheets as they have purchased government bonds to drive down interest rates. [15] The peak was in 2021, and globally there was drop off in 2022. I expect a further decline in 2023. However, central banks still own an enormuous amount of govermnent debt. They have gradually been reducing these holdings to push interest rates up to slow down inflation, but how quickly they do this has enormous implications for interest rates.



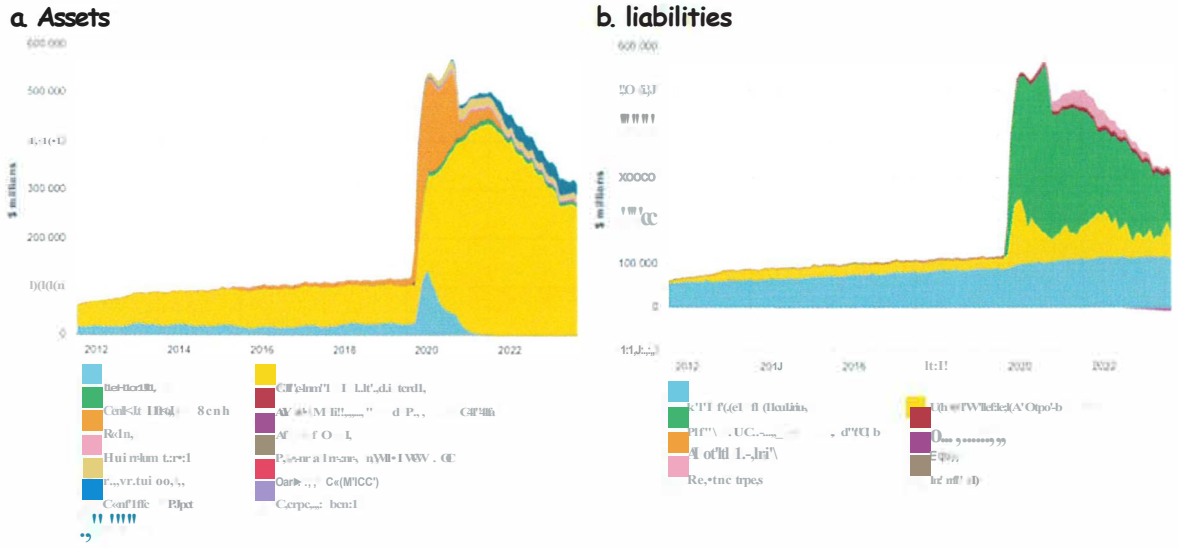
The Bank did not staii serious bond buying until the Covid-19 pandemic in March 2020. Before then it would mainly buy government treasury bills to implement monetary policy. However, as the following graphic indicates, at its peak the Bank held about $550 billion. Staiiing in April 2022 the Bank staiied quantitative tightening, which just means that it did not renew bonds as they matured, thereby pushing up long term interest rates as well as the overnight rate. Only recently have we seen LTC bond yields climb back to the levels of 2011, where briefly in 2023Q4 they breached the 4% level for the first time in over 12 years. [16] At the cunent point in time, the Bank has sold about $180 billion long Canada bonds, reducng their holdings from $480 billion down to $300 billion. Toni Gravelle, a deputy governor at the Bank, indicated on March 21, 2024 that this tightening will continue into 2025 until the holdings are down to $20-60

[15] https://www.reuters.com/breakingviews/central-bankers-face-balance-sheet-reckoning-2023-05-26/

[16] On October 19, 2023 the LTC bond yield f'om the Scotia McLeod index was 4.04%.

billion.[17] So in terms of the debt markets, we are in exactly the opposite position to 2016: instead of lower rates due to quatitative easing, we are into higher rates and quantitative tightening. I am, therefore, confident that the LTC yield will increase over the next 18 months w1less something dramatic happens, for example in Ukraine. Adding $200 billion to the stock of outstanding LTC bonds is not going to cause their interest rates to go down.

Chart 1: Bank of Canada assets and liabilities (month end)



Q. HOW DOES THIS RELATE TO GDP GROWTH?

A. The Canadian economy staiied overheating in the sunm1er of 2021 in response to the enormous fiscal stimulus from the Govenm1ent of Canada and the release of excess savings by consumers. This was exacerbated by the Russian invasion of Ukraine and its impact on resource prices and defence spending. The Bank's conm1odity price index, for example, hit a record high in May 2022. However, the inve1ied yield curve and rapid ramp up in sho1i-term interest rates has slowed the economy in 2023/24. Normally monetary policy works with an 18-month lag, so its

[17] https://www.bankofcanada.ca/wp-content/uploads/2024/03/remarks-2024-03-21.pdf

effects are only now working tlu·ough. In its January 2024 Monetary Policy Report, the Bank had the following projection:

Table 2: Contributions to average annual real GOP growth
Percemage po·nts' †

	2022	2023	2024	2025
Consumption	2.7 (2.5)	1.2 (1.3)	0.3 (0.4)	0.9 {0.9)
Housing	-1.2(-U)	-0.9 (-1.i)	0.4 (0.2)	0.5 (0.7)
Government	0.8(0.5)	0.5 (0.3)	0.6 (0.6)	0.5 (0.5)
Business fixed Investment	0.5 (0.7)	0.1 (0.2)	-0.1 (0.0)	0.3 (0.5)
Subtotal: final domestic demand	2.8 (2.6)	0.9 (0.7)	i.2 (1.2}	2.2 (2.6)
Expons	1.0(0.9)	1.6 (1.6)	0.3 (0.3)	1.3 (0.8)
Imports	-2.4 {-2.4)	-0.3 (0.4}	-0.1 (-0.6)	-0.9 (-0.8)
Inventories	2.4 (2.3)	-1.2 (-1.5)	-0.6 (0.0)	-0.2 (-0.1)
GOP	3.8 (3.4)	1.0 (1.2)	0.8 (0.9)	2.4 (2.5)
Memo items (percentage change):				
Range for potential output	0.5-2.0 (0.5-2.0)	1.4-3.2 (1.4-3.2}	1.0-3.2 (1.0-3.2)	1.0-3.2 (1.0-32)
Real gross domestic income (GDI)	5.3 (5.1}	-1.0 {-1.7)	0.3 (0.7)	1.4 (2.3)
CPI inflation	6.8 (6.B)	3.9 (3.9)	2.8 (3.0)	2.2 (2.2)

* Numbers in parenrooses are from IfIQ projection in !he pmvio111s ,Report.
t Numbers may no! add to total due to roundjnrg.
Souroos: Statistics Canada and Bank of Canada calculatior\S and projec1ions

After 5.0% GDP growth in 2021, 3.8% in 2022, and 1.1% in 2023, the Bank is forecasting 1.5% real growth in 2024, 2.2% in 2025, and 1.9% in 2016. So the Bank's shmt term forecast is a minor slow down, but no recession in 2024, and a resumption to normal growth in 2025/26.

This forecast is broadly consistent with that of the Parliamentary Budget Officer (PBO),[18] who is charged with providing an independent check on government forecasts. The PBO published the following in its March 5, 2024 forecast. Long run the PBO has a 2.1 % real growth rate forecast, and has long run inflation at 1.9% broadly consistent with the BEIR. In terms of interest rates,

[18] Economic and Fiscal Outlook - March 2024 (pbo-dpb.ca)

the PBO has the ten year LTC bond yield at 3.4% for 2024 and then staying around 3.3% out to 2028.

Table 1- Summary of the economic outlook, per cent (unless otherwise stated)

Fiscal year	2022	2023	2024	2025	2026-2028
Real GDP growth	3.8	1.1	0.8	2.4	2.1
Unemployment rate	5	5.8	5.9	5.7	5.5
WTI oil price, $US	95	78	74	70	71
CPI inflation	6.8	3.9	2.4	1.9	1.9
Bank of Canada policy rate	4.25	5	3.5	2.5	2.5

Source

Statistics Canada and Office of the Parliamentary Budget Officer.

Q. WHAT IS YOUR FORECAST FOR THE LONG CANADA BOND YIELD?

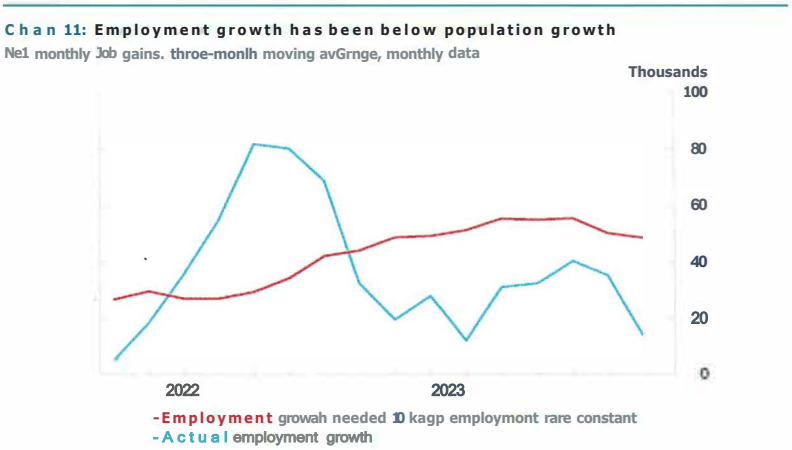
A. RBC's latest forecast (March 2024) is below. My perception is that RBC is generally optimistic in its forecasting. CunTently, it sees the Bank being successful in bringing down inflation, allowing it to lower the overnight rate starting in 2024Q2 to end 2025 at 3.0%, which is higher than the PBO forecast, but approximately where it should be with 2% inflation. In contrast, RBC sees the LTC bond yield staying at about 3.35% till 2025, which I tend to think is low given the Bank's tightening.

Interest rate outlook

Policy rates and government bond yields. end of period

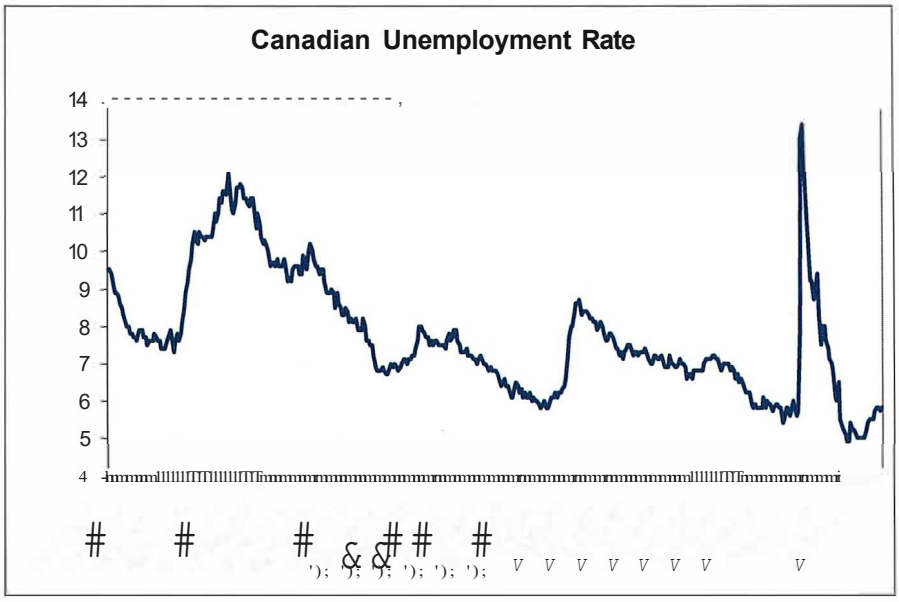
	Q1-23	Q2-23	Q H J	Q4-23	Q1-24	Q2-24	Q!-24	Q4-24	Q1-25	Q2-25	Q3-25	Q4-25
Canada												
Overnight rate	4.50	4.75	5.00	5.00	5.00	4.75	4.25	4.00	3.75	3.25	3.00	3.00
Three-month	4.34	4.90	5.07	5.04	4.95	4.65	4.10	3.95	3.60	3.20	3.00	3.00
Two-year	3.74	4.58	4.87	3.88	4.20	3.80	J,50	3.25	2.90	2.75	2.90	3.00
Five-year	3.02	3,68	4.25	3.17	3.45	3.30	3.10	'3.00	285	2.90	2.90	3.00
10-year	2.90	3.26	4.03	3.10	3.40,	3.25	3.10	3.00	2.90	295	3.00	3.10
JO-year	3.02	3.09	3.81	3.02	3.35	3.25	3.15	3.05	3.00	3.05	3.10	3.15
United States												
Fed funds midpoint	4.88	5.13	5.38	5.38	5.38	5.13	4.88	4.63	4.63	4.38	4.38	4.13
Three-month	4.85	5.43	5.55	5.40	5.33	5.01	4.76	4.53	4.58	4.33	4.33	4.08
Two-year	4.06	4.87	5.03	4.23	4.60	4.50	4.35	4.30	4.15.	4.20	4.20	4.25
Five-year	3.60	4.13	4.60	3.84	4.15	4.05	3.95	3.95	3.95	4.00	4.10	4.20
10-year	3.48	3.81	4.59	3.88	4.15	4.05	3.95	4.00	4.05	4:10	4.20	4.30
JO-year	3.67	3.85	4.73	4.03	4.30	4.20	4.15	4.20	4.25	4.30	4.35	4.40

. The Bank in its Monetary Policy Report showed the following:



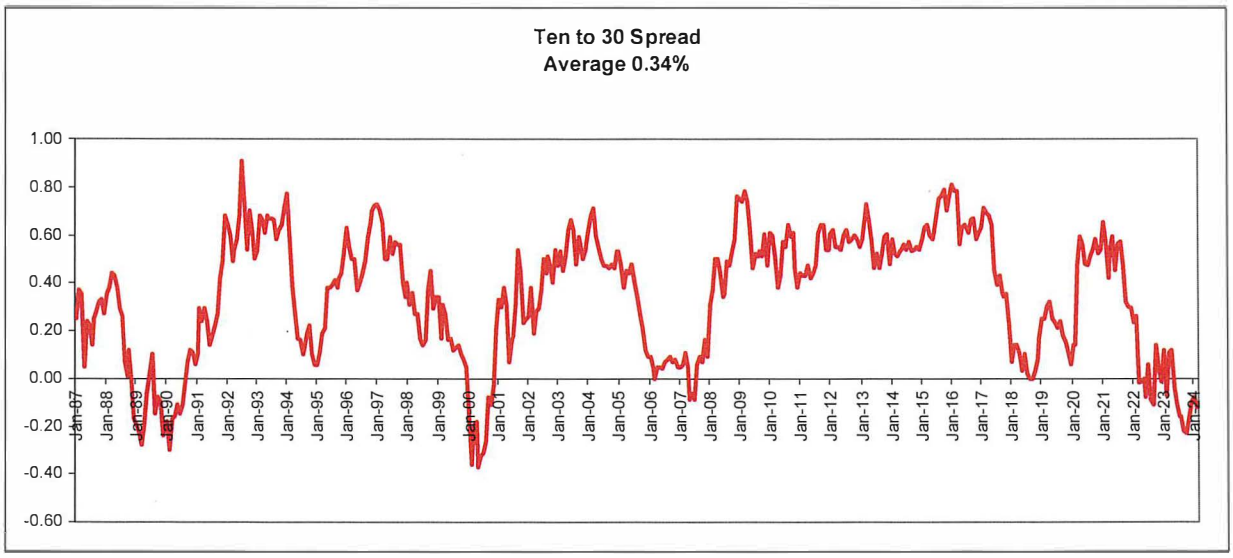
It is important to note that the Canadian economy is still adding jobs despite the apparent slowdown to the tune of an average of about 20,000 jobs a month. However, increasing immigration has meant that the labour force has grown even faster. Interestingly, RBC points out[19] that recent immigrants have a higher participation rate in the labour market than their Canadian born peers, so without them the unemployment rate would be higher and more consistent with a slowdown.

[19] RBC, Immigrants participation in the labour force surpasses those born in Canada, March 28, 2024



As the previous graph shows, the recent unemployment rate is 5.8%, and has increased from the 5% low at the staii of 2023. However, normally even 5.8% would be abnormally low and indicate inflationary pressures, rather than an economic slowdown. The increase in the unemployment rate along with a still small output gap means that the excess demand in the economy evident in 2022 aild the first half of 2023 has gradually been removed. This is also evident in the decline of the LTC yield from its recent high of 4.04% in October 2023 when mai-kets feared that central banks were not getting inflation under control.

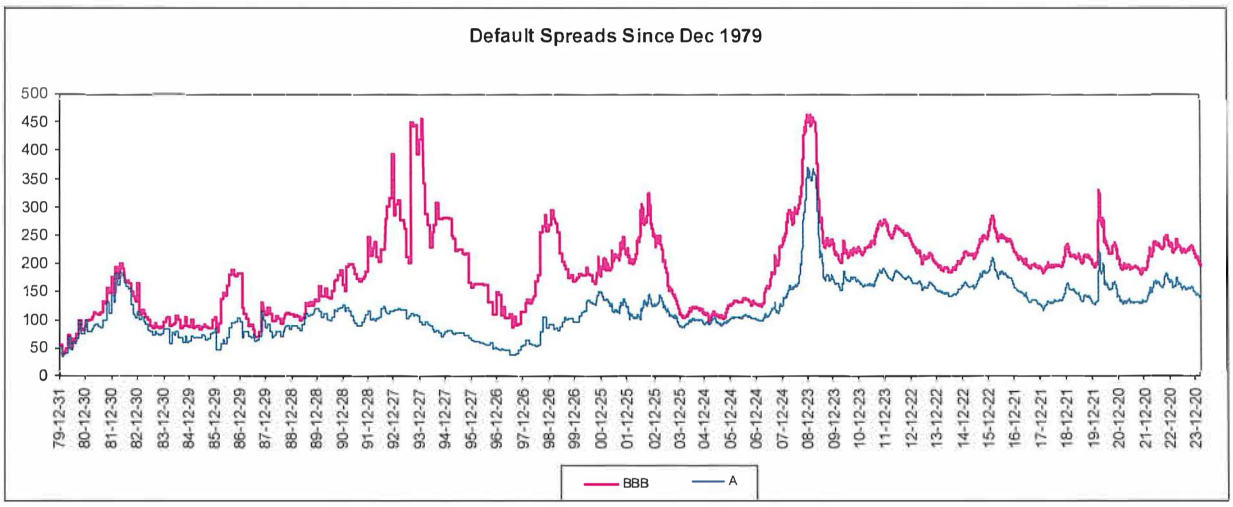
Below is the history of the spread between the 30 and ten-year bond yield. Typically, this has been 0.34%, but when the yield curve inve1is, as currently, this spread gets very small, and so far in 2024 it has been negative, but reversing from the low of -0.23% in 2023. I would expect this reversal to continue as the Bank moves to lower the overnight rate and run off its stock of LTC bonds. CmTently the ten, over ten and 30-year bond yields are all about 3.4 to 3.5%. With the PBO ten-year yield forecast yield at 3.3% for 2028 and adding a more normal spread to the 30-year bond as sh01i term rates decline, I would reconunend the use of an LTC bond yield of 3.8%. This is the rate I regard as no1111al and relatively unaffected by central bank bond buying. It is also the rate I have used before the Board before as my minimum LTC yield. My expectation would be that over the next few years as the Bank rebalances its balance sheet and reduces its stock pile of Government of Cailada bonds, the LTC bond yield would revert to normal levels.



Q. WHAT HAS HAPPENED IN THE CORPORATE FIXED INCOME MARKET?

A. The following graph has the generic credit or default spreads between corporate and government long-term bonds using the A, and BBB indexes maintained originally by Scotia Capital Markets.[20] I refer to these rates, and the spreads derived from them, as "generic" since they are an average of representative bonds in each rating category and are not specific to utilities. Corporate bonds have default risk, since companies can run into financial difficulty, whereas governments borrowing in their own currency like Canada cannot. These yield spreads usually behave in a predictable manner. In a recession, as the risk of bankruptcy increases, investors sell off default-risky corporate debt and their liquidity drops. As a result, their bond prices fall and their yields increase, relative to the long Canada bond yield, causing a wider spread. Conversely, as the economy recovers and this risk recedes, the spread narrows.

[20] The most recent data is from Datastream, which updates the original data from Scotia Capital's Handbook of Debt Market Indices.



We can see the high spreads during the long recession of the early 1990s, the panic of the Asian crisis, the bursting of the Internet Bubble, the financial crisis of 2008-09 and the recent Covid-19 pandemic. Usually, the spread increases the most for BBB bonds, which are the riskiest of the investment grade bonds.[21]

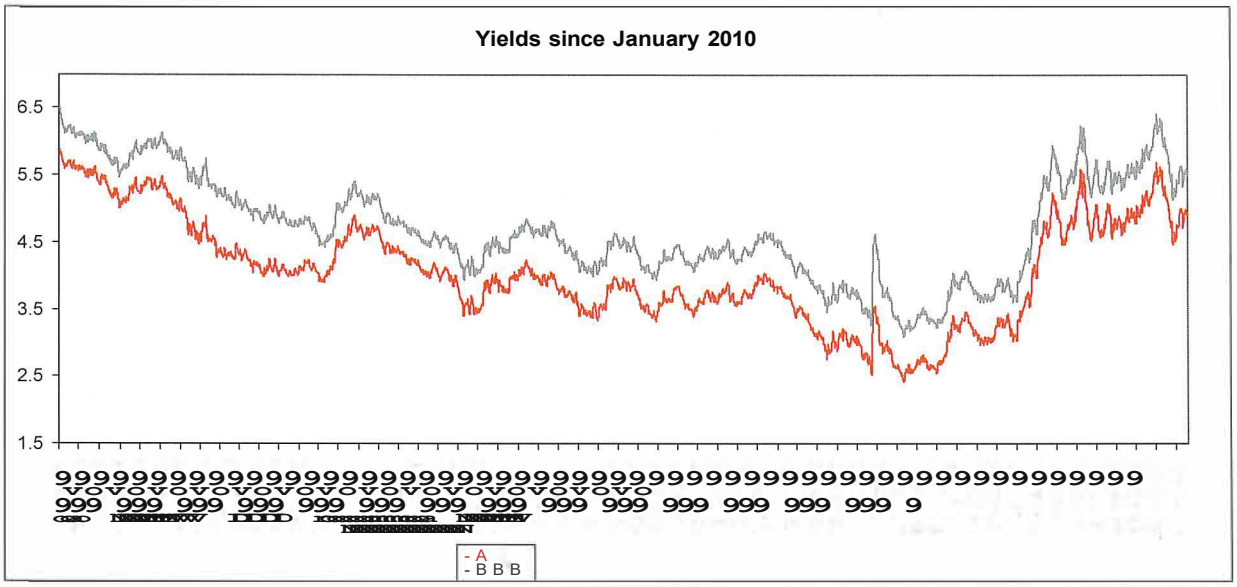
The critical spread for most utilities is the A spread since most Canadian utilities have A ratings. At the time of my 2016 report, A spreads were at a 1.94% premium over similar maturity long Canada bonds. Subsequently, spreads gradually normalized such that in December 2019, which was regarded at the time as the high point, they ended the year at 1.28%.[22] As information about the impact of the Covid-19 virus seeped into the market, investors started moving cash from riskier investments into long Canada bonds, causing their prices to increase and their yields to fall. The worst of the panic was March 24, 2020, when the A spread reached 2.22%. Since then, spreads have returned closer to normal, where in February 2024 the A spread averaged 1.40%. This spread would have been regarded as high before the impact of the U.S. financial crisis in 2008/09.

[21] The lowest investment grade is BBB-, below which bonds are regarded as speculative and not of adequate quality.

[22] Since January 2000, the A spread has averaged 1.48%, which is an increase over what was regarded as "normal" before the long decline in long Canada yields and the 6.32% rate recorded at the end of December 1999.

However, since then spreads have been structurally higher, or conversely LTC bond yields structurally lower.

However, companies do not borrow spreads; they borrow at an interest rate. The graph below shows the trend in actual borrowing costs since 2000 for A and BBB rated issuers.



As the graph shows, A bond yields are now approximately where they were in 2010 before the Euro crisis, the U.S. government downgrade, and the massive bond buying by central banks that started in 2011 H2 and drove down bond yields.

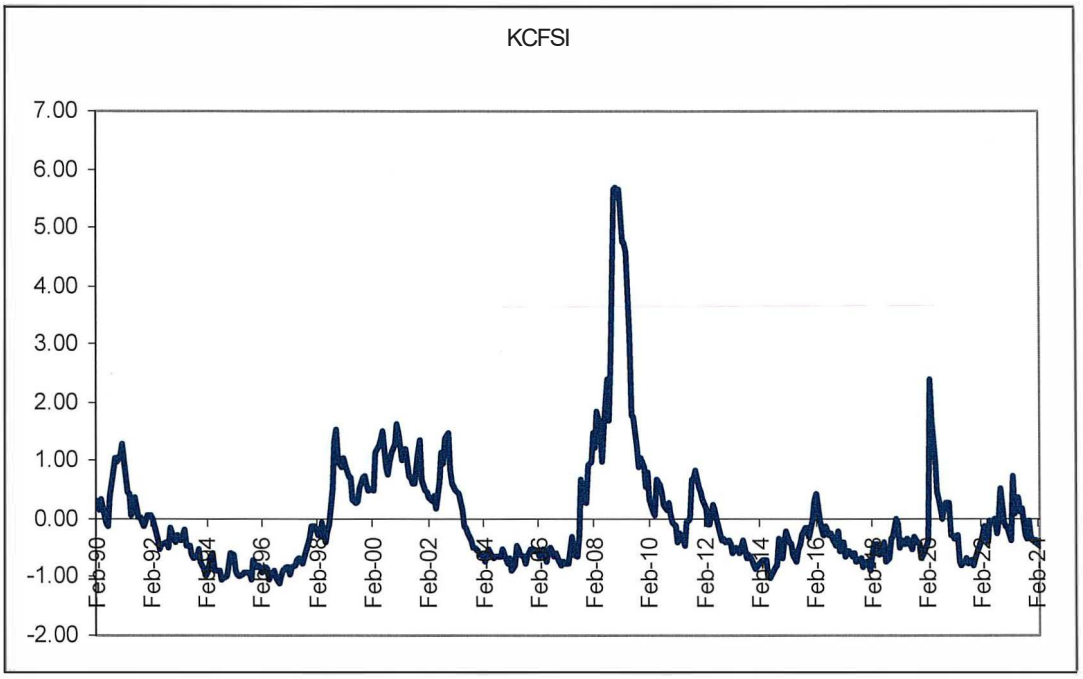
In August 2011, when RBC was forecasting a LTC yield of 4.55%, the A bond yield was actually 4.70% and had dropped down to 2.52% on May 3, 2012 when I filed my 2012 repo1i. At that time the A bond yield was 4.33% and the spread using the Scotia generic yields was 1.81%. As LTC yields have revelied to more normal levels, the A spread has come down. In effect the impact of what I termed "Operation Twist" has dissipated, so that much of the A spread was due to lower LTC bond yields rather than higher default risk.

Q. WHAT HAS BEEN THE GENERAL STATE OF CAPITAL MARKETS?

A. As indicated above, the bond market has been heavily influenced by the actions of central banks, the rush to safety during the Covid-19 pandemic, and the subsequent recovery. It is useful, therefore, to look at broader measures of the state of the financial system. In the U.S, the Federal

Reserve Bank of Kansas City has developed the Kansas City "Financial Stress" Index (KCFSI) which is graphed below. This index is designed to capture a variety of financial indicators in addition to the spreads in the money and bond markets. The additional indicators include the stock market volatility index, the state of bank share prices, and the behaviour of stock and bond returns.

When the KCFSI is above 0, it indicates that capital markets are under stress and that access to markets is "tougher than normal." Similarly, when it is below 0, it indicates relatively easy or "stress-free" capital market conditions.

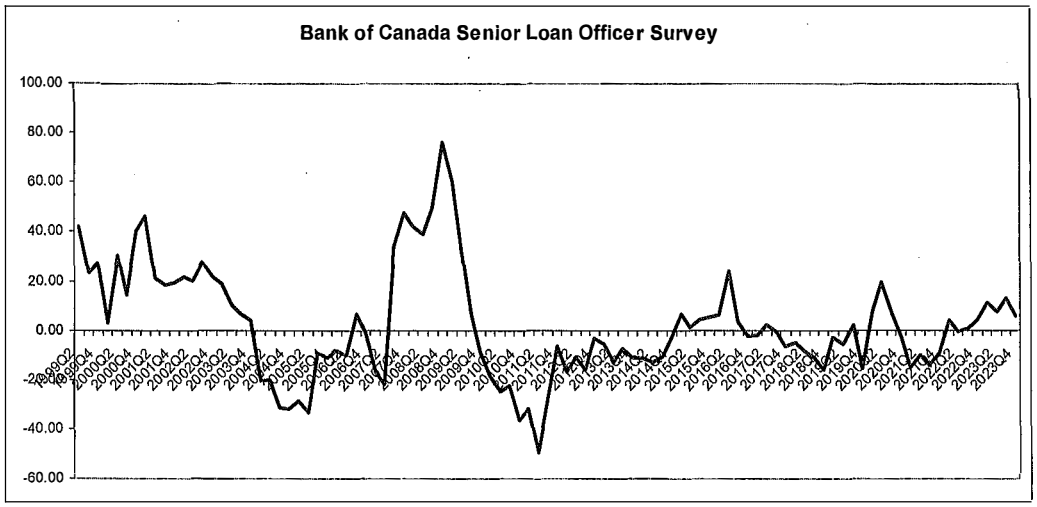


The value of the KCFSI is simply that it captures in one number the impact of a variety of capital market indicators.[23] The major insight of the KCFSI is that it emphasizes the enormous pressure in the U.S. financial system during the financial crisis in 2008/09, and to a lesser extent the Covid-19 pandemic. Unlike the Internet Bubble and crash in 2001, which also increased "stress", the 2008/09 crisis struck at the very core of the U.S. financial system, the banking system, while the Covid-19 pandemic struck everywhere. Here liquidity, or the ability to trade securities at close to

[23] Technically, it captures the common element in all these indicators by using principal components analysis.

their true market value, dried up in many parts of the U.S. capital market, and the U.S. Government had to intervene on a massive scale.[24] Since the financial crisis, financial market conditions have been relatively easy, except for the impact of the Covid-19 pandemic in 2020. However, the tough market conditions of March and April 2020 quickly subsided. Currently, financial market conditions are close to normal as the KCFSI is tracking slightly below 0.

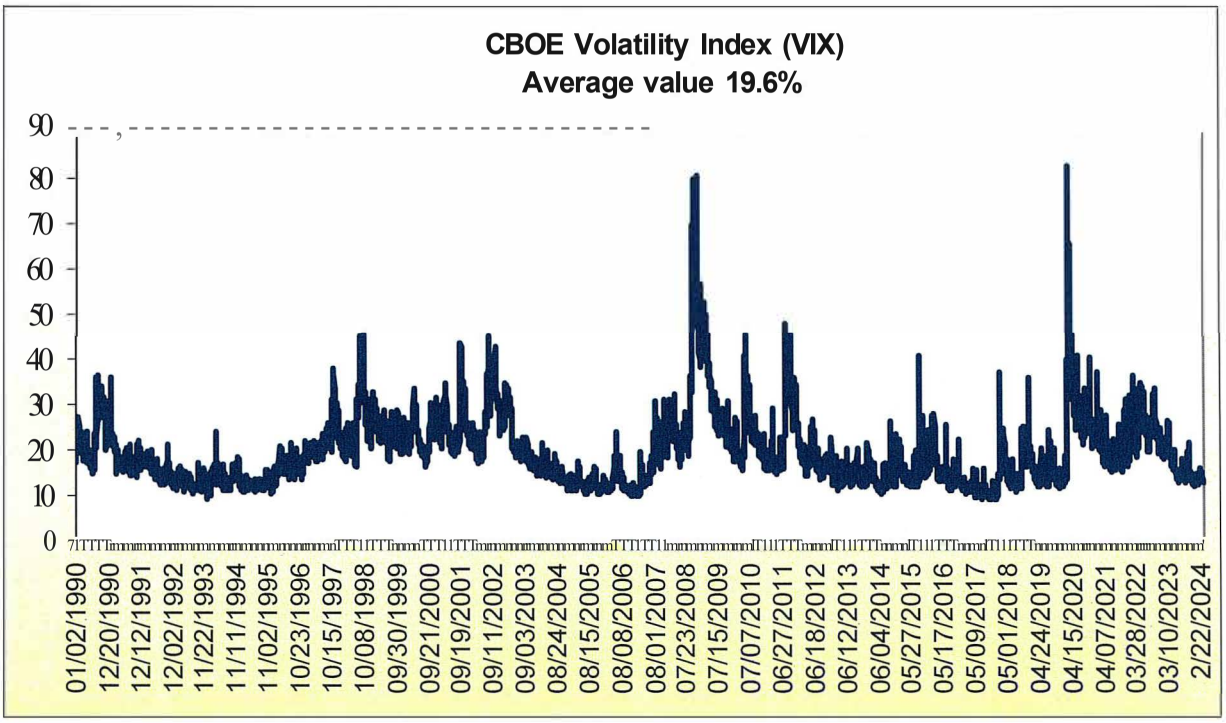
The work by the Kansas City Fed followed pioneering work done by researchers at the Bank. However, the Bank now prefers to rely on alternative measures, one of the most important of which I see as being the Bank's survey of senior lending officers. The following graph shows the results up to the Bank's latest survey (2023Q4) that reflects both the pricing and the availability of credit, where the lower the value the easier the credit market. Lending conditions were particularly easy until the Bank started to increase the overnight rate in 2022. In response to the increasing fear of insolvencies, banks started to restrict credit and charge higher fees. This process peaked in 2023Q3 as LTC bond yields peaked. Since then, pricing and availability have both returned to slightly above normal levels, and I would expect this trend to continue.



A final indicator is the CBOE volatility index, sometimes misleading called the fear index. The graph below shows the index back to 1990. Similar to the other indexes, we can clearly see the impact of the U.S. financial crisis when the VIX went from its normal value of just under 20%

[24] This included bailing out the biggest bank in the U.S. at the time, Citibank, and the biggest insurer, AIG.

up to almost 80%. Fm1her, we can see the impact of Covid-19 when it again jumped to 85% on March 18, 2020, only slightly lower than the peak of 89.5% reached on October 24, 2008. However, the VIX is currently at 13.01 % in the final week of March 2024, which is significantly lower than the log term average, indicating optimism in the equity markets and "no fear".

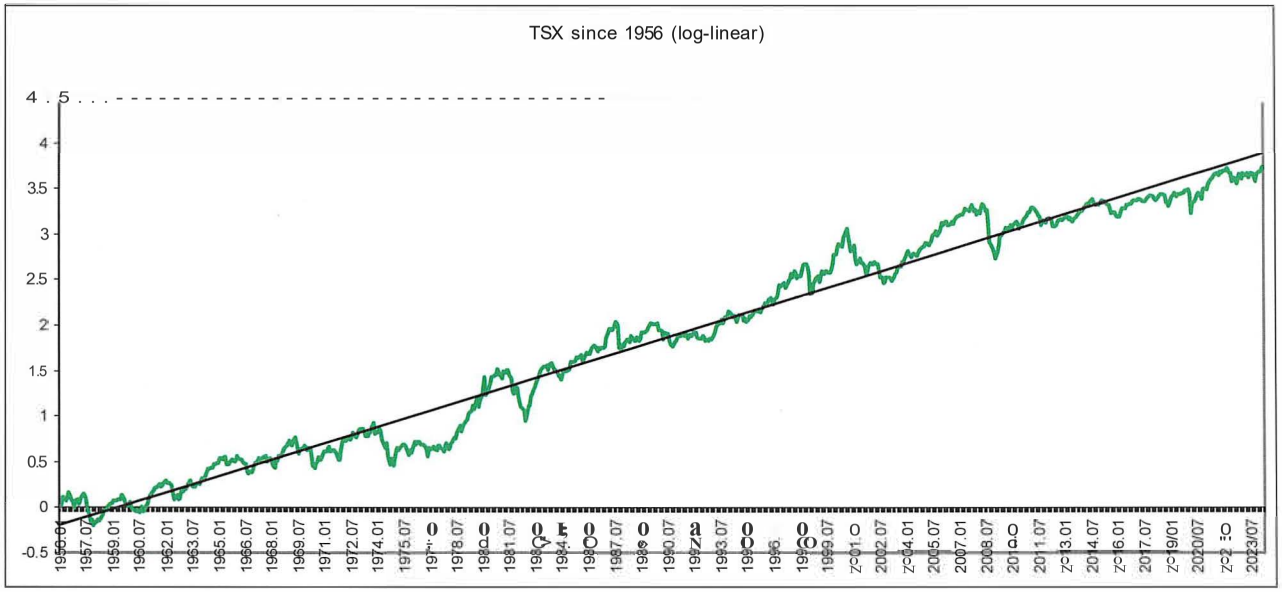


Q. WHAT ARE YOUR CONCLUSIONS ABOUT CONDITIONS IN THE "MONEY MARKET"?

A. The results of the Bank's surveys, credit spreads, the VIX and the KCSFI show that overall business sentiment is approximately normal, with a recovery from concerns in 2023Q4 that the Bank did not have inflation under control. Instead, there is now confidence that inflation will return to the Bank's 2% target by the end of 2024, or 2025 at the latest, and with it a decline in the overnight interest rate.

However, these are slightly backward looking indicators, whereas the stock market is a forward looking indicator. The following graph shows the performance of the TSX since 1956 with an added trend line. It is a log-linear graph, so the slope shows the growth from one year to the next, with the trend line the average growth rate. At the end of March 2024, the TSX hit an all time high

of22,167.00. This is marginally below the trend line fit over the entire period, where the flattening indicates the impact of lower inflation and nominal returns. However, as a leading indicator the TSX is not showing any particular concern.



Q. **HOW WOULD YOU COMPARE CONDITIONS NOW VERSUS 2016 WHEN THE BOARD LAST SET NP'S ALLOWED ROE IN A HEARING?**

A. In 2016 the Canadian economy had stalled mainly due to a slowdown in China that affected resource prices and Western Canada. As a result, I felt we were still "a couple of years" away from the peak in the business cycle. This had been reflected in a weakening equity market over the prior year and higher volatility. In debt markets the U.S. Fed had stopped its bond buying program, but the Bank of Japan and the European Central Bank had not. As a result I was contrasting the situation as one where the taps had been turned off, but the bath was still full of a massive amount of liquidity. Consequently, interest rates were much lower than they would have been but for the massive central bank purchases. At the time of my testimony (January 29, 2016), the LTC yield was 2.05%, but by looking at preferred share spreads it was my judgment that LTC bond yields had been depressed by 1.30%. In addition I added a 0.45% credit spread adjustment because the A spread was 1.91 %. So I effectively regarded the base LTC interest rate as 3.8% (2.05+1.3+0.45).

This was the same judgment I had in 2012, and I have continued with this until the current time when interest rates have increased toward more normal levels.[25]

Currently we are at a different stage in the business cycle, where equity markets are roaring rather than weakening, and where all the standard measures, such as credit spreads, the volatility index, etc., indicate firmer, not weaker, markets. In 2016 I commented:

> *"It is often said that a broken clock is right twice a day. Similarly, although the signals are very similar, we are in the afternoon rather than the morning of the day which is to say we are in the later stages of the business cycle compared to 2011."*

This is the case today, except in reverse; we are back to the morning rather than the afternoon of the business cycle, and there is more optimism toward the future.

[25] I also pointed out that I was "not as confident in this estimate as normal, since much depended on the operation twist adjustment which had been volatile." I therefore placed more weight on my DCF estimates.

III. FAIR ROE ESTIMATE FOR A BENCHMARK UTILITY

Q. WHY DID YOU PRECEDE YOUR ESTIMATES WITH A FINANCIAL MARKET OUTLOOK?

A. Because the fair rate of return comes out of the financial market outlook. That is to say, when professional fund managers decide to invest, they do so against a backdrop of the conditions in the financial market and what is available as a return on other securities. To this extent all financial securities, except derivatives, are substitutes.

Q. WHAT IS THE MOST COMMON WAY OF ESTIMATING A RISK PREMIUM MODEL?

A. The premier model that incorporates the risk return trade-off between Government of Canada default free securities and risky securities is the Capital Asset Pricing Model or CAPM. This is the model used by most boards in Canada, including this one in past decisions. The CAPM simply states:

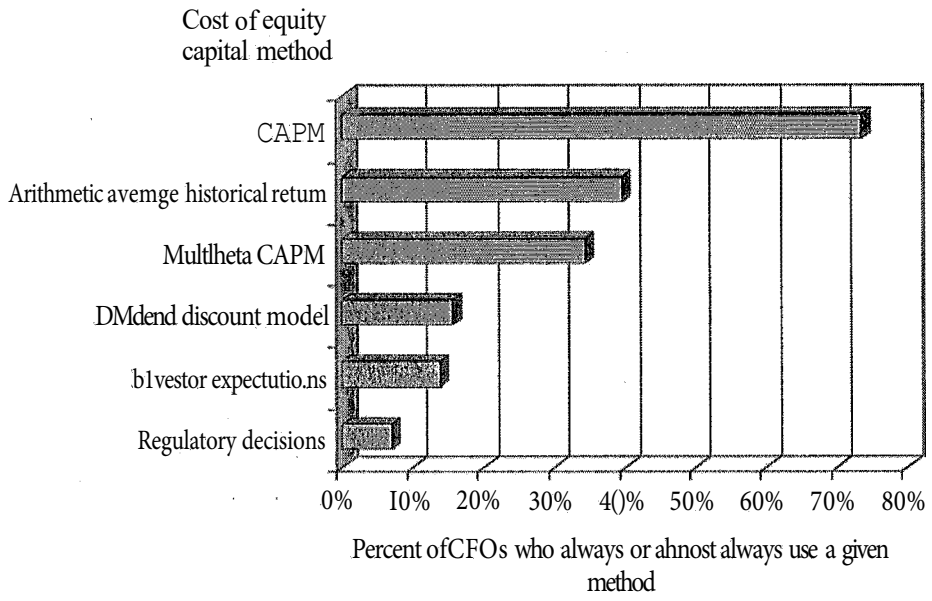
$$K = R_F + MRP * \beta$$

Meaning that the investor's required or fair rate of return (K) or cost of equity capital is equal to the risk-free rate (R_F) plus a risk premium. The contribution of the CAPM is simply to break the risk premium into two components, which are the market risk premium (MRP) and the security's relative risk or beta coefficient (β). In this sense it is simply a refinement of more general risk premium models.

Why the CAPM is so widely used is because it is intuitively correct. It captures two of the major "laws' of finance: the ***time value*** of money and the ***risk value*** of money. I will discuss the third law of finance, the ***tax value*** of money later, but the time value of money is captured in the long Canada bond yield as the risk-free rate. The risk value of money is captured in the market risk premium, which anchors an individual firm's risk. As long as the market risk premium is approximately correct, the estimate will be in the right "ballpark." Where the CAPM gets controversial is in the beta coefficient since risk is constantly changing, as are beta coefficients. This sometimes casts doubt on the model as people find it difficult to understand why betas change.

Further, it also makes testing the model incredibly difficult. However, the CAPM measures the right thing, which is how much does a security add to the risk of a diversified portfolio, which is the central idea of modern portfolio theory.

The CAPM is overwhelmingly the most important model used by a company in estimating their cost of equity capital. The following table comes from a survey of 392 U.S. Chief Financial Officers by Graham and Harvey in the Journal of Financial Economics (2001):



Just over 70% of U.S. CFOs explicitly use the CAPM, while about 35% use average historic returns, which as I discuss in Appendix B is a key input to estimating the market risk premium, and just over 30% use a multi-beta approach. The dividend discount model is known as the DCF model in regulatory hearings and comes in a poor fourth, like investor expectations, which are largely from survey results I also discuss later.

The U.S. survey results are for large U.S. companies and are relatively old. Baker et al[26] performed a similar survey of large and small firms in Canada, with the results in the following table. The most important "factor" was judgment, which is obviously required in any analysis. After judgment, the main two objective models were the cost of debt plus an equity risk premium and

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[26] K. Baker, S. Dutta and S. Saadi, Corporate finance practises in Canada, where do we stand?" Multinational Finance Journal, December 2011.

1 the CAPM. As might be expected, the CAPM is most popular among larger firms, where the Chief
2 Executive Officer has an MBA. Unlike the U.S. survey results, the DCF and multi-beta models
3 rank behind investor expectations, average risk adjusted returns and accounting ROE. Even for
4 large firms and those managed by a CEO with an MBA, the DCF and multi-beta models are simply
5 not as important as the CAPM.

Table 6. How Canadian Fb·ms Estimate Theil· Cost of Equity Capital

This table presents the responses by Canadian manageu on how their firms estimate their cost of equity capital. Respondents indicate the frequency level based on a five-point equal interval scale where 0 =never, I = rarely, 2 =sometimes, 3 = often, and 4 =always. The table partitions the sample by finn size (large and small) and by whether or not the film's CEO holds an l\tBA. *, **indicate significance at the 0.05 and 0.ot levels, respectively.

			Reseonse Mean				
				:Finn Size		CEO with an MBA	
S#	Statement	% of Often or Always	Full Sample	Lnrge	smnll	Ye$	?lo
1	Judgment	60.3	2.33	2.01	2.64***	2.39	2.30
5	Cost of debt plus equity risk premium	52.3	2.01	1.85	2.08	1.89	2.07
3	Capital asset pricing model (CAPM)	36.8	1.52	*1.96*	1.12••	2.36	1.13**'
6	Eamingslprice (E/P) ratio	21.8	1.02	0.53	1.20••	0.83	1.09
9	Based 0ll what our investors tell us they require	20.0	1.00	0.85	1.07	1.56	0.76••
8	Avernge historical retums on common stock adjusted for risk	14.1	0.81	0.46	0.93**•	0.94	0.79
7	Accounting return on equity	17.5	0.73	0.74	0.73	0.22	0.88*"
2	Dividend growth model (dividend yield plus an estimate of growth)	12.9	0.66	0.48	0.74	0.44	0.73
4	Multi-factor asset pricing model	7.1	0.33	0.19	0.40	0.33	0.33
10	By regulatory decisions	*5.9*	0.29	0.19	0.34	0.01	0,38

6

7 In response to persistent criticism of the CAPM by some witnesses, I have started to look at
8 alternatives to the CAPM. The most common in the academic literature are known as multi-factor
9 models. Although not widely used to estimate the equity cost, they are popular amongst academics.
10 The CAPM is regarded as a one-factor model because market risk through beta is the only source
11 of risk. Instead, multi-factor models extend the CAPM to include additional risk factors that have
12 been identified in stock market returns.

13 The current "standard" is to include a size premium (the return difference between Small firms
14 Minus Big ones or SMB) and a value premium (the return difference between High Minus ***Low***
15 value or growth stocks). This is the Fama-French three-factor model (FF3), which states:

16 $$K = R_F + \beta_1 MRP + \beta_{2,} SMB + \beta_{3,} HML$$

17 In this case as well as the market risk premium (MRP), an investor requires a premium for investing
18 in smaller market value firms as well as high value stocks, that is value as opposed to growth

stocks. Why the FF3 factor model is controversial is that while some believe that smaller value stocks are riskier and thus deserve a larger risk premium, others believe that the market consistently miss-prices the opposite type of stocks, that is, larger growth stocks. The reason for this is that they tend to be faddish and sexier for financial advisors to sell. As a result, they tend to be over-valued and earn lower rates of return given their risk. During the Internet Bubble, for example, it was internet stocks, like Nortel and Pets.com that had very high valuations with few hard assets to support them, and yet they crashed when the bubble burst.

I tend to believe the faddish argument, but using the FF3 factor model versus the CAPM for individual stocks nevertheless rarely makes much difference. For example, Estrada (2011)[27] estimated the equity cost for the Dow 30 firms using both the CAPM and FF3 models, where the average equity cost using the CAPM was 9.70% versus 9.50% from using the FF3 factor model. The complete estimates are in Schedule 3, but the general point is that we are just allocating the stock's return to different risk factors. However, the sum of those factors should always (approximately) add up to the same number. Using one model versus another does not somehow increase the overall equity cost to a dramatic extent. The Dow 30 stocks have a beta close to 1.0, since they are a portfolio of large value stocks, where the average ***has*** to add up to 1.0 for all stocks. As we would expect, these stocks tend to have negative exposure to the size premium, since they are all large firms with positive exposure to the value premium since they are generally value stocks. In this respect, they are like utilities that tend to be relatively large value stocks so that the two additional Fama-French factors tend to offset each other.

In terms of the "error" in using one model versus another, the difference ranges from +1.5% to -1.6%, or a range of 3.0%. This is not an insignificant difference, but it stems from the confluence of the size and value premiums.[28] The +1.5% difference is for American Express, which has a 17.7% FF3 Factor equity cost estimate versus the 16.2% for the CAPM. This difference stems from the observation that AmEx is a relatively small value stock and generates a premium for both

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[27] Estrada, Journal of Applied Corporate Finance (Spring 2011). Estrada's estimates are for illustration only, as I do not recommend them or the process he used to get them.

[28] Note also that the range of equity cost estimates is from 4.80% to 17.7% for the FF3 factor model and a slightly smaller 5.3% to 17.5% for the CAPM.

these factors, which offsets the lower beta estimate in the FF3 model. In contrast, Merck is a large growth stock and its much higher FF3 factor beta coefficient is not enough to offset the negative size and growth premiums. As a result, its CAPM equity cost at 9.1 % is higher than its FF3 factor cost at 7.5%. The closest to a regulated utility would be AT&T, where the CAPM equity cost is 7.80% versus a FF3 factor estimate of 7.30%; again, its higher beta is more than offset by the impact of the size and value premiums.[29]

Despite the popularity of these multi-factor models amongst academics, and increasingly in the investment field, they have doubtful value in regulatory hearings. There are two reasons for this. First, they do not make much difference in the overall estimates, Second, they need more inputs, each of which is likely to be extremely contentious in cross examination. While the size of the market risk premium can be estimated with some degree of accuracy, that cannot be said for the size and value premiums. In fact, many believe the size premium has disappeared as coverage of small stocks has increased, while for many the value premium causes theoretical problems.[30] I discuss the multi-factor model mainly because it is the main "competitor" to the CAPM, and while other witnesses frequently criticise the CAPM, they never discuss multi-factor models ***and instead rely on ad hoc models and estimation tecltniques tltat ltave no academic credibility.***

Q. WHAT IS YOUR ESTIMATE OF THE MARKET RISK PREMIUM?

A. As indicated above, usually the critical element of a fair return is the overall return on the equity market, since utilities are simply a subset of the equity market. So, for example, if equity investors want 9% for investing in the equity market as a whole, then their required return for investing in a local distribution utility should be less than that. Since the expected return on the LTC bond is the observable long term expected rate of return, the normal way of estimating this equity return is to add the market risk premium on top of that expected return or yield.

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[29] Note that the beta in the FF3 model is not the same as in the CAPM, since it captures market risk after the size and value effects are removed.

[30] Note that the size premium is for very small firms. The lowest decile was for firms with an average market value under $100 million.

In Appendix B, I estimate the market risk premium of common equities over long-term Canada bonds at 4.87% and the equivalent in the U.S. at 6.58%. These estimates are based on capital market history from 1926 until 2023 so as to encompass various economic periods such as the bleak 1930s of slow growth and falling prices, as well as periods of booms and serious inflation such as the 1970s. While the Canadian data points to a market risk premium of under 5.0%, I continue to give weight to the U.S. evidence for three main reasons. First, most of the restrictions keeping capital within Canada have been removed, resulting in significant capital outflows and higher expected returns on Canadian investments. Second, the fiscal position of the Government of Canada improved dramatically after 1997, removing an inflation premium built into long Canada bond yields. Third, the Canadian bond market has received significant foreign capital inflows depressing yields below where they would have been with a segmented or closed capital market. The result has been lower interest rates in Canada than the U.S. for most of recent history. This has removed the historic bias of a smaller Canadian market risk premium over a higher government bond yield when compared to the U.S.

My Appendix B is a free-standing analysis of the market risk premium, but I consider the survey results of Professor Fernandes[31] particularly relevant as confirmatory evidence. In particular, the extract below from his 2023 survey has the following estimates.[32] With 1,378 responses, the average (median) estimate of the market risk premium in the U.S. was 5.5% (5.5%), whereas with 41 responses it was 6.0% (6.0%) in Canada. In other words, the average and median estimates were both within the 4.8-6.6% range of Canadian and U.S. historic estimates. With so many responses in the U.S., there is bound to be a wide range, but in Canada the range for the market risk premium was 4.0%-8.0%, meaning the extreme high value for the market risk premium from 41 responses from finance professionals in Canada was 8.0%.

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[31] Survey: Market risk Premium and Risk-Free Rate Used for 80 countries in 2023," IESE Business School, April 3, 2023.

[32] The yellow highlighting is in the original.

Table 2. Market Risk Premium (MRP) used for 80 countries in 2023

MRP	Number of Answers	Average	Median	MAX	min
USA	1378	5,7%	5,5%	15,0%	2,0%
Spain 2023	428	6,6%	6,3%	15,0%	3,0%
Andorra	8	8,9%	8,8%	10,2%	7,8%
Argentina	15	28,1%	26,7%	39,8%	7,5%
Australia	39	6,2%	6,0%	15,0%	3,3%
Austria	67	6,8%	6,6%	9,0%	5,0%
Belgium	63	6,4%	7,0%	8,2%	4,0%
Bolivia	10	14,3%	14,8%	17,0%	9,0%
Bosnia	9	16,6%	16,5%	18,9%	14,6%
Brazil	43	9,3%	9,7%	20,0%	4,0%
Bulgaria	10	8,1%	8,3%	9,6%	6,5%
Canada	41	6,0%	6,0%	8,0%	4,0%
Chile	25	6,9%	7,0%	8,1%	5,5%
China	25	8,6%	8,7%	12,0%	4,0%
Colombia	15	9,0%	9,2%	20,0%	3,0%
Costa Rica	9	14,2%	14,7%	17,0%	9,0%
Croatia	13	8,7%	9,0%	10,1%	7,0%
Czech Republic	24	6,6%	6,7%	9,0%	5,3%
Denmark	27	6,2%	5,9%	8,7%	4,8%
Dominican Rep.	8	11,7%	11,6%	13,4%	10,3%
Ecuador	19	20,9%	23,2%	32,2%	3,0%
Egypt	9	14,4%	14,7%	17,0%	10,8%
Estonia	19	6,9%	6,8%	8,9%	6,1%
Ethiopia	8	20,7%	20,5%	23,6%	18,3%
Finland	31	6,2%	6,6%	7,8%	3,5%
France	88	6,0%	6,3%	8,3%	0,3%
Germany	264	5,7%	5,9%	9,0%	0,0%

In Appendix B, I also look at the two other commonly used sources of market risk premium estimates.

- Duff and Phelps, now Kroll, which uses what used to be the Ibbotson and Sinquefield data recently revised their estimate of the market risk premium down to 5.5% from 6.0%[33] This is because the level of U.S. interest rates has increased. The graphic representing their market risk premium is in Schedule 4 as well as Schedule 12 of Appendix B. I repeat it simply because other experts claim to use the Kroll data but never say what the Kroll estimate is from their independent analysis using their own data?

- Professor Aswath Damadoran of NYU also currently estimates the market risk premium for the U.S., and his current estimate is 4.6% lower than his average since

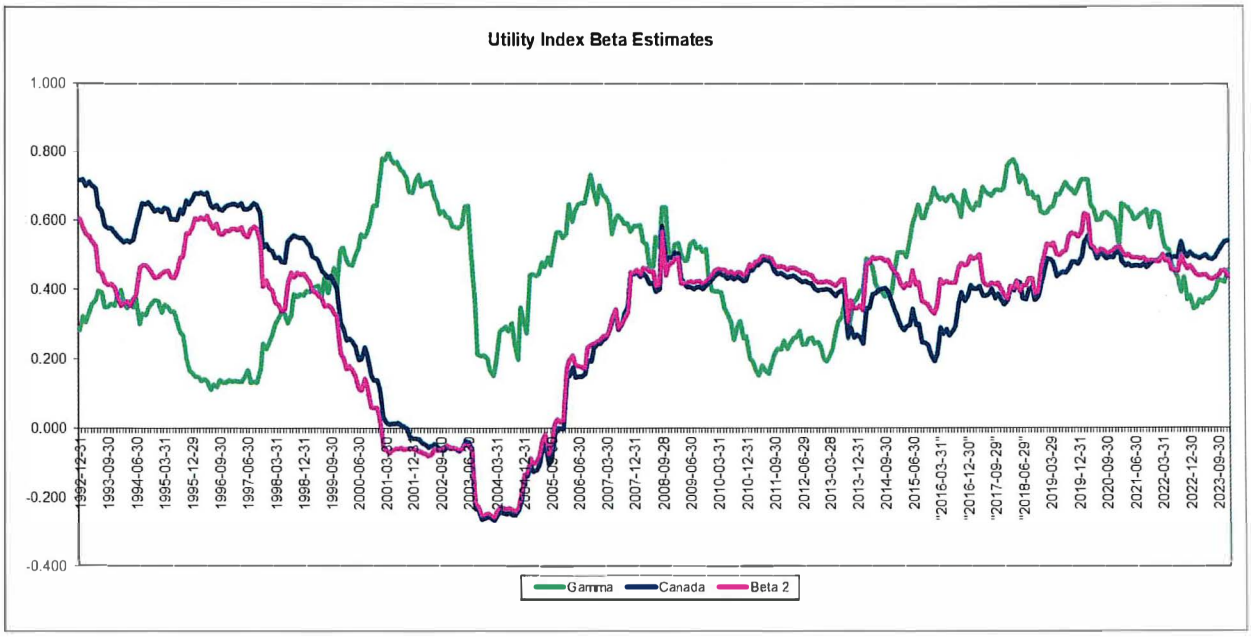
[33] I acknowledge a conflict of interest because I author an appendix for Kroll on the cost of capital in their Valuation Handbook.

2008 of 5.47%. Of interest is that Professor Damadoran uses a two stage forward looking dividend discount model.

The Fernandez survey, Professor Damadoran's estimates, and the Kroll estimate are the three most cited sources for the market risk premium in the U.S. Overall, I judge them as supportive of my own estimates, and even though the U.S. historic evidence suffers from a survivorship bias I judge a reasonable estimate currently to be 5.50-6.0%.

Q. HOW DO YOU JUDGE THE RELATIVE RISK OF A BENCHMARK UTILITY?

A. My Appendix C discusses relative risk adjustments or betas. The following graph is for the utility sub-index beta using data back to 1987.



The beta is estimated in the normal way,[34] with five years of monthly data, both with and without the impact of interest rate changes affecting the long Canada bond. Both beta estimates are very similar, indicating a typical value in the 1990s of about 0.50, then the drop during the tech boom as the stock market was dominated by Nortel, and then a gradual recovery to the current level of almost 0.50. The graph also shows the importance of the defensive characteristics of utility stocks

[34] Schedule 6 has Morningstar's definition of beta and similar to the Financial Post in Appendix C, it is the slope coefficient of a regression of the security's return against the market.

as their "gamma" or sensitivity to interest rates is very strong in tllat they behave similar to the long Canada bond. This characteristic obviously highlights their low-risk status.

I check these beta estimates against other estimates using:

- individual Canadian companies instead of the utility index
- the U.S., instead of the TSX, as the market proxy
- publicly available beta estimates from RBC, Yahoo, Thomson Reuters, CFRA, an independent research company and the Globe and Mail
- a sample of U.S. gas and electric utilities

A full description of these companies is included in Appendix C, but the important point is that they involve a variety of estimation techniques.

* The Globe and Mail uses a three-year estimation window, whereas the rest apparently use a more conventional five-year window.

* Reuters tends to use a U.S. market index for some Canadian firms, with the rest a Canadian index.

Further, there is NO evidence of any Blume adjustment for either the U.S. or the Canadian utilities. In fact, I have never seen this adjustment in any publicly available beta estimates. To check whether any beta "tendency" is statistically observed and consistent with my testimony (with my late colleague Professor Michael Berkowitiz) before the NEB in 2001, and with two published research papers, I estimated the regression tendency for a sample of U.S. electric utilities. This confirmed the published research work that utility betas do not trend towards 1.0 as Blume estimated for *all* stocks. Instead, they gravitate towards their grand mean, which in 2001 Dr. Berkowitz and I estimated at 0.52.

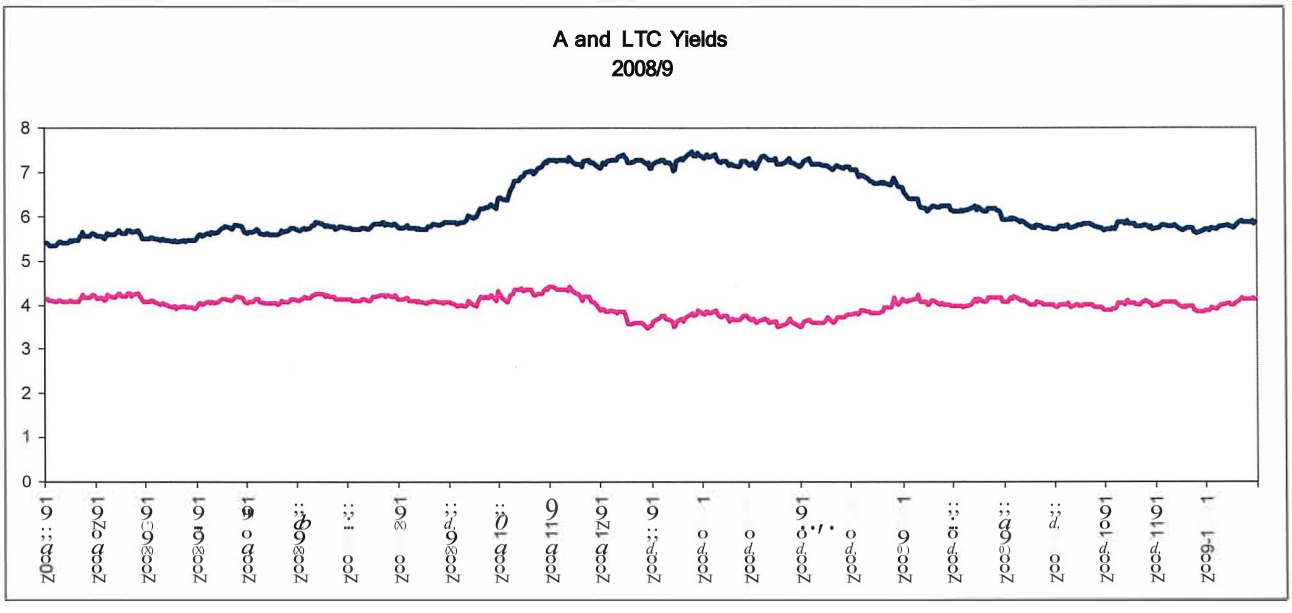
Putting slightly higher weight on the most recent beta estimate for the utility index and the recent US data for electric utilities, I judge a range of 0.50-0.60 to be reasonable, with a mid-point of 0.55. However, I would note that the purest comparison with NP is Hydro One because it is a pure distribution utility in Ontario with a recent modal beta of 0.30. Moreover, it is an electric distribution company. I would regard a beta estimate of 0.55 as conservative for a Canadian T&D utility.

Q. WHAT IS YOUR CAPM ESTIMATE FOR A BENCHMARK UTILITY?

A. With a market risk premium estimate of 5.5-6.0% and a beta range of 0.50-0.60, the range for the utility risk premium is 2.75%-3.6%. Adding these risk premiums to the 3.80% forecast for the long Canada bond and a 0.50% flotation cost allowance gives a range of 7.05%-7.90% and a mid-point of 7.45%. This would be a conventional or generic CAPM estimate for a benchmark utility prior to 2008. Why I reference 2008 is that it was the year of the financial crisis when the NEB ROE adjustment formula was still being used. These were formulae that tied the fair ROE to changes in the forecast Long Canada bond yield.

Q. WHY WERE ROE ADJUSTMENT FORMULAE SUSPENDED?

A. The main reason was the flight to quality that occmTed during the U.S. financial crisis as investors sold risky securities and parked their cash in government securities. This happens periodically whenever there is panic in the financial markets. What then happens is that A spreads widen and LTC yields fall as shown in the following graph. The "problem" is that as long Canada bond yields fell so did the allowed utility ROE for those utilities on an automatic adjustment formula. However, as spreads widened their bonowing costs increased. I discuss this fully in Appendix E.



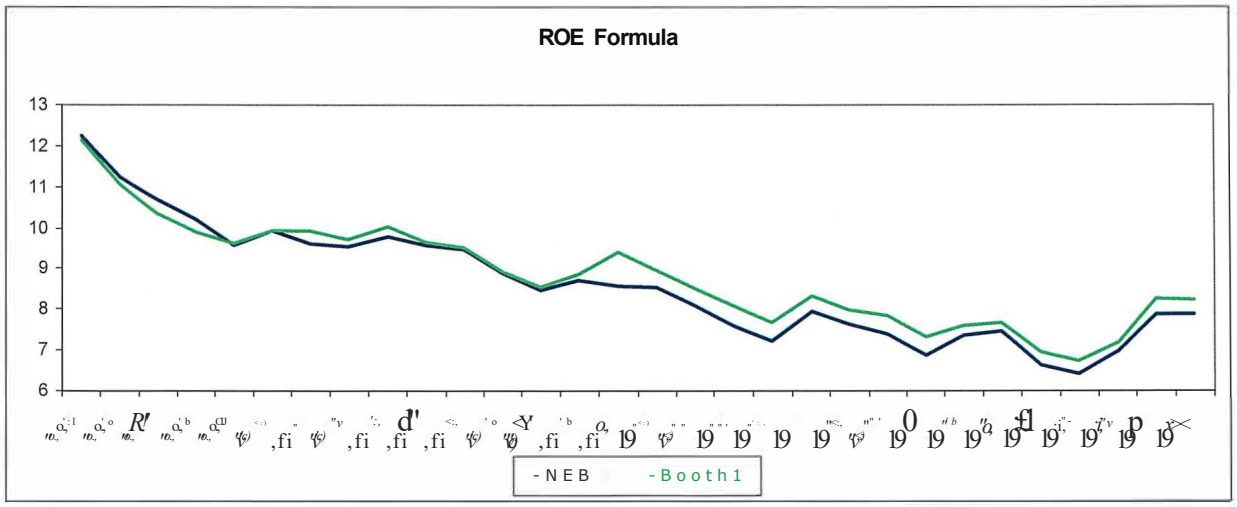
We can clearly see the shock of Lehman Brothers failure in October 2008 as the market realised there was a serious problem. Predictably, "A" bonds were sold off and their yields jumped, causing utility borrowing costs to increase, while LTC yields fell and with them allowed utility ROEs tied to the LTC yield. Although the ROE formulae tied the ROE to *forecast* and not current LTC yields, there was a consensus that the formulae needed to be adjusted. This was particularly true given the timing of the data that was used in the formulaic ROEs. In Ontario the ROE formula for many utilities operates on September data, while that for the National Energy Board works on October data. In other words, right in the middle of the financial crisis when the long Canada bond yields were falling in the rush to safety, utility ROEs were lowered and their borrowing costs increased.

To make the CAPM more sensitive to economic conditions other than just the forecast long Canada bond yield, most refinements moved to incorporate the credit spread between risky corporate debt and default free Government of Canada bonds. As discussed earlier, this reflects current market conditions similar to the VIX and KCSFI, with the added advantage of being automatically expressed as an "interest rate". The normal adjustment which this Board also used was a 50% adjustment to changes in the credit spread.[35] In Schedule 7 are the results of the NEB formula ROE from the NEB's (now CER) website along with a 50% adjustment to changes in the A spread from the 0.93% value of 1994. The actual formula labelled Booth1 is:

$$ROE = 9.90\% + 0.75*(LTC\ Yield - 6.12\%) + 0.50*(Spread - 0.94\%)$$

This is the NEB formula plus the spread adjustment, and the results since 1995 are graphed below.

[35] Rather than the generic spreads, which have a long history, the regulatory practise was to use the yield spread between the Bloomberg A utility index and the LTC yield.



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The adjusted ROE formula dealt with the problem of very high credit spreads during the financial crisis as the 2009 allowed ROE would have been 9.41 % with the modified ROE formula instead of 8.57%. For the 2009 ROE set in October 2008, at the height of the financial crisis, the credit spread was 2.59%. This credit spread was 1.65% in excess of the "normal" credit spread, so 50% of that increased spread added 0.83% to the allowed ROE. This increase was similar to the "add-ons" made in a pragmatic way by some boards such as the BCUC, the AUC and the Regie, and produced a modified NEB formula ROE of 9.41 %.

For 2024, the NEB formula ROE produces a fair ROE including issue cost of 7.88% based on a forecast long Canada bond yield of 3.45%. The adjusted ROE fonnula produces a fair ROE of 8.18%. This is because the credit spread in October 2023 was 1.58%, and high relative to the pre-2008 average for an A credit. As a result, the credit spread adjustment increased the NEB formula ROE by 0.30%. For 2025, with a forecast LTC yield of 3.8% and the current credit spread of 1.40%, the modified ROE formula gives a fair ROE, including issue costs, of 8.40%, which is not too dissimilar to the ctment allowed ROE for NP.

I regard the credit spread adjustment as making the standard risk premium estimate, in part using long run values, conditional on the state of the capital markets. Over the business cycle this adjustment should average out to zero, but currently with the slight slowdown I warrant the CAPM estimate as being marginally low and would add the credit risk adjustment for a conditional CAPM

(CCAPM) rounded estimate of 7.70% which is slightly lower than that produced by the modified NEB formula.

My overall CAPM fair return estimates are, therefore, as follows:

	Low	High
Forecast long Canada bond yield	3.80	3.80
Credit risk adjustment	0.23	0.23
Utility risk premium	2.75	3.60
Adjustment to ROE	0.50	0.50
E timate	7.28	***8.13***

The estimate of 7.7% is in a range from 7.28% to 8.13%, reflecting a 3.9% premium over the forecast LTC yield.

IV. DCF ESTIMATES OF THE FAIR ROE

Q. WHAT IS THE DCF MODEL?

A. DCF stands for discounted cash flow, which is the basic method used for valuing bonds as well as companies by professional investors and corporate executives. It was extensively used in Canada to estimate utility fair rates of return before the mid 1990s when risk premium evidence became more important, and many utilities were placed on automatic ROE adjustment models that could only be implemented within a risk premium framework. This was after land-mark decisions by the National Energy Board and the BC Utilities Commission in 1994/95.[36] The norm, for example, is to value a bond by discounting all the bond coupons and par value to the current point in time to determine its value. It is then possible to take the market value and reverse engineer to estimate the discount rate. This estimate of the bond's discount rate is called the yield to maturity, and is widely published in financial newspapers. This yield to maturity is also referred to as an interest rate.

My Appendix D reviews the process of applying discounted cash flow analysis to value equities where the "standard" DCF model used in regulatory hearings was developed by my late colleague, Professor Myron Gordon, and is commonly called the Gordon or constant growth model in finance textbooks. This model states that if *and only if* there is a long run *constant* average growth rate in dividends per share ***in perpetuity,*** then like the bond valuation model there is a simple equity valuation model: [37]

$$P_0 = \frac{d_1}{K - g}$$

If we rearrange this equation to solve for the discount rate, we get:

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[36] Along with my late colleague, Professor Michael Berkowitz, I was involved in both these hearings.

[37] This equation is derived from the formula for a geometric series, which goes on forever. For convergence the growth rate must be lower than the discount rate, as otherwise it does not converge, and the equation gives an infinite value.

$$K = \frac{d_1}{P_0} + g$$

I show in Appendix D that this model holds for the overall stock market because the stock market is constrained by the growth rate in the economy. However, it causes severe problems when used for individual companies. For example, Standard and Poor's published an annual called the "Analyst Handbook" with critical data aggregated at the industry level for firms in the S&P500 index. For the period from 1967-2023, the following were the critical growth rates in earnings (EPS) and dividends per share (DPS) for the S&P500 firms and U.S. GDP.

	GDP	EPS	DPS
Average	6.42%	12.49%	6.03%
Median	5.99%	10.99%	5.86%
Volatility	3.10%	41.11%	6.13%
Compound	6.26%	6.50%	5.74%
OLS	5.85%	5.98%	5.62%

Over this long period, the average annual growth rate in U.S. GDP was 6.42%, the median was 5.99%, and the compound was 6.26%. These are all slightly different ways of estimating the average growth rate, but they tell a similar story. Volatility is the standard deviation or variability of these annual GDP growth rates, which causes the average to exceed the compound growth rate.

The second two columns are for the average earnings (EPS) and dividends per share (DPS) for the firms in the S&P500 index. First, if we focus on the long run estimates, which are the compound growth rate, we see that both EPS and DPS growth rates are very similar, but in the case of DPS are slightly less than the GDP growth rate. These minor discrepancies could be because the S&P500 is for large firms, since we are ignoring emerging growth stocks until they are large enough to be included in the index, while lately some firms have been buying back shares instead of paying dividends. Also, the DPS is sensitive to the fact that firms delay dividend increases until they know they do not have to cut them, so it is more sensitive to start and end dates. However, it is hard not to escape the fact that both DPS and EPS growth rates will approximate the GDP growth

rate in the long run for the overall stock market. This is logical, since otherwise corporate profits would be a declining share of GDP, when in fact they show no trend over long periods of time.[38]

The second observation is that the average EPS growth rate is so much higher than the average growth rate in GDP and DPS. How can this be? The answer is provided by looking at the volatility, where we see that EPS volatility is much higher than that for either GDP or DPS growth. This is because the higher the volatility, the greater the discrepancy between average and compound growth rates.[39] To illustrate, in 2007 the EPS of the S&P500 was 66.17, and it collapsed in 2008 to 14.88 due to the financial crisis; this was a growth rate of -77.51 %. In 2009 the EPS rebounded to 50.97, or a growth rate of 242.54%. The average of these two numbers is 82.51 %, which indicates a very large growth, and yet in 2009 the EPS on the SPS00 was less than it was in 2007, so there had been no growth at all. In contrast, firms smooth their dividends so that the DPS in 2007 increased to 28.39 in 2008 before being cut to 22.73 in 2009. In this case the DPS growth rates were+ 1.8% and-21.1%, for an average of-9.6%. Both DPS and EPS on the S&P500 index show losses in 2009 relative to 2007, ret the greater volatility of earnings produces a counter intuitive result for EPS.

The upshot of this is ***that any DCF estimate relying on short run earnings growth to proxy for long run DPS growth is biased high.*** The shorter the horizon for the average growth estimates, the bigger the bias. This is before consideration of the well-known bias involved with sell side analyst forecasts discussed in Appendix D. Schedule 7 includes a relatively recent extract referring to analyst bias and the fact that it is relevant and well accepted by investors.[40] However, even if analysts are not biased, by focussing on short term EPS growth this unambiguously over-estimates the long run expected DPS growth, and this is what is needed in the Gordon model. Further, even

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[38] If anything, there is a suspicion that earnings are becoming an increasing share of GDP in both the US and Canada.

[39] This is the same effect as discussed in Appendix B estimating the market risk premium.

[40] There is an enormous literature on the bias involved in analyst growth forecasts. Very few academics judge analyst forecasts to be objective or accurate forecasts of what is expected to happen.

if a multi-stage model is used this does not remove the bias, as it simply moderates it since the biased short-term growth estimate is still used in the first stage of a multi-stage model.[41]

The fact that it is difficult to envisage a situation where dividends and earnings can consistently increase substantially as a share of GDP constrains the DCF estimate for the market to considering short run growth and any departures from the economy's long run growth potential. For Canada I used the end of year dividend yield of 3.15%, with three different types of growth estimates. The first is the experienced growth since 1960 combined with the break-even inflation rate, which gives forecast growth of 5.1 %. The second is a sustainable growth rate using historic earnings retention (b) and average ROE of Corporate Canada. This gives a forecast growth rate of 4.79%. Finally, I use the experienced dividend per share growth of the TSX, which is a compound growth rate of 5.43%. Overall, I judge the fair return for the Canadian equity market to be in a range of 8.1-8.75%. This limits the fair ROE for a lower risk Canadian utility.

For the U.S. I use a similar approach where the sustainable growth rate is higher at 7.98%, but the end of year dividend yield is lower at 1.47%. Using the experienced dividend per share growth rate of 5.74%, the DCF estimate is lower at 7.29%. Taking into account J.P. Morgan's growth rate estimate for the U.S. of 5.30%, I judge a reasonable range for the U.S. equity market to be 6.84%-9.60%. The wider range for the US. reflects the fact that the S&P500 includes the most powerful firms in the U.S., with higher foreign earnings and profitability than normal. With this qualification, these estimates are broadly consistent with those provided by the respondents to Fernandez's survey of the market risk premium in Appendix D.

Q. HOW DO YOU JUDGE RISK PREMIUM VERSUS DCF ESTIMATES?

A. Survey results in both the U.S. and Canada show that DCF estimate of the fair rate of return is not placed in as high a regard as the risk premium or CAPM estimate for individual firms. Partly in response, I have traditionally viewed my DCF estimates as "checks" on my CAPM estimates, since in my view CAPM estimates have usually been in the right "ballpark."

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[41] This bias is even more pronounced for individual stocks since their EPS volatility is higher than for the market as whole.

However, the recent very low long Canada bond yi'elds forced me to re-evaluate this and look at what drives the difference between the DCF and simple CAPM estimates. This is because they should be consistent.

The CAPM equation is as follows:

$$K = R_F + MRP * \beta$$

In words, the required (fair) return is the risk-free rate (Rf) plus the risk premium comprised of the market risk premium (MRP) times the beta coefficient (P),

The risk-free rate is normally directly observable since the practice in Canada is to use the long Canada bond yield as the risk-free rate, while the market risk premium is reasonably objective, particularly now that we have Fernandez' survey data from thousands of professionals in the area. Consequently, the major area of dispute is the relative risk or beta coefficient, and even here there is not much doubt that utilities are lower risk than the market. Hence the big advantage of the CAPM is that it is difficult to make big mistakes. What I also could have mentioned is that the CAPM avoids one of the big problems with DCF estimates in that the forecast inflation rate is automatically incorporated into the long Canada bond yield, since we use the nominal rather than the real yield. This is currently not a significant problem since long run forecast inflation[42] is still low, but part of the reason the DCF model fell out of favour was that it was giving bad signals when applied mechanically in the 1990s, when there was a structural break in the forecast inflation rate.

The classic Gordon growth model,[43] referred to as the DCF model in most testimony before regulatory bodies, is as follows:

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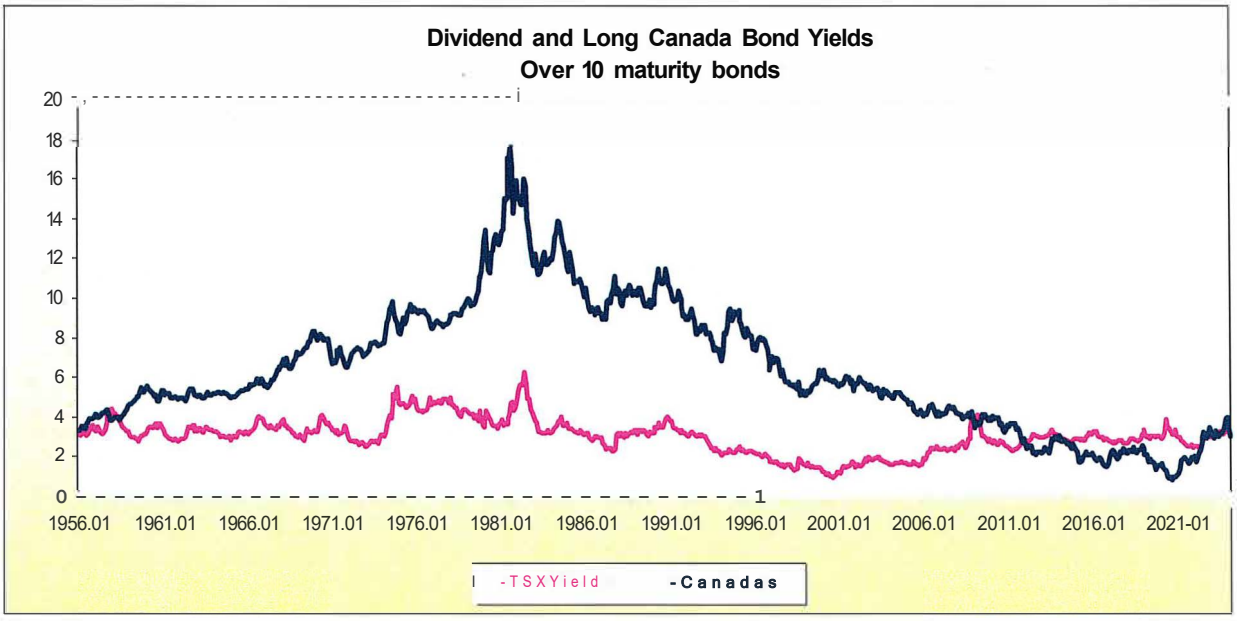
[42] TheBEIR.

[43] Named after the late Professor Myron Gordon of the University of Toronto.

$$K = \frac{d_1}{p} + g$$

In words, the required rate of return is the forecast dividend yield plus the long run growth rate, since it is the long run growth rate in earnings and dividends that drives long run capital gains. Conceptually the DCF model and CAPM should give the same values, but since they approach it from a different perspective there is always estimation en-or. For the DCF model the forecast dividend yield can be estimated with very little error, so the estimation error is with the forecast long run growth rate. As a result, if the CAPM and DCF estimates differ significantly, then it is mainly due to the difficulty in estimating the growth rate in the DCF model and the risk premium in the CAPM.

We can assess the relative value of the DCF and CAPM models by graphing the "known" parts of both models for the overall market, which are the long Canada bond yield and the TSX dividend yield.

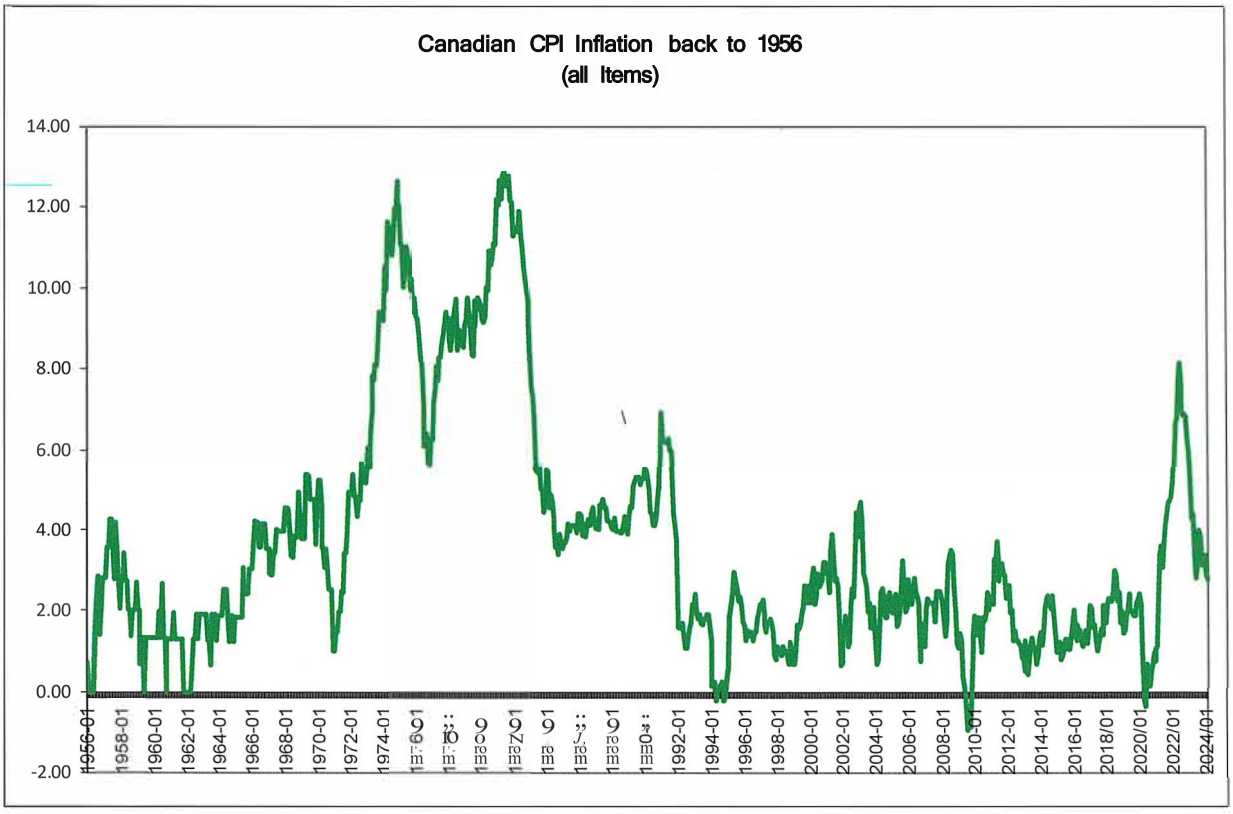


Of note is that the difference between the LTC bond yield and the TSX dividend yield has varied over time. Given that the market risk premium is regarded as relatively stable, this means that the forecast growth rate must have varied considerably over time, which of course was due to

changes in the rate of inflation. Since both the DCF model and CAPM should give the same answer, we can set them equal to each other, which indicates that for the market as a whole:

$$CAPM\text{-}DCF = Rr\ \_\ d\,½ = g\text{-}MRP$$

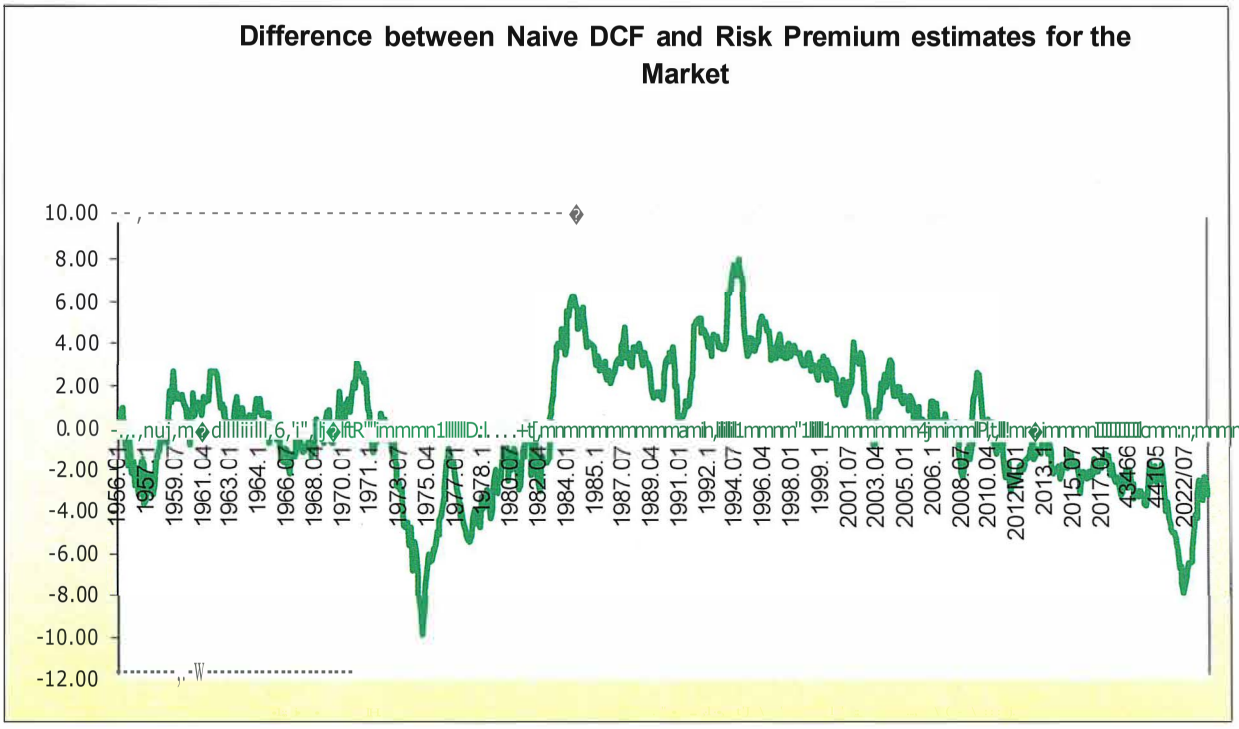
Or in words, the directly observable spread between the long Canada bond yield and the TSX dividend yield is equal to the long run growth in the capital market minus the market risk premium. From the above graph we can see that, except for the very beginning and very end of the period 1956-2010, there is a very large difference between the two, indicating that the expected growth rate was much higher than the market risk premium. The reason for this was the gradual increase and then decrease in the CPI inflation rate over this long time period, as graphed below.



Note, for example, that the increasing and high rates of inflation in the 1960-1980 period coincide with the big difference between the LTC yield and the TSX dividend yield.

This also indicates that it is possible to come up with a simple or nai"ve estimate of the market return by adjusting for the biases in both models. For example, we can assume that for the DCF model the forecast growth rate is the actual CPI inflation rate at the time, based on year over year changes, and then add a 3.0% real growth rate. This gives a simple DCF estimate for the market as a whole. Similarly, we can add a long run market risk premium of 3.5% to the long bond Canada yield for a simple CAPM estimate. For the entire period the average (median) nai"ve DCF estimate is 10.04% (8.58), while the average (median) nai"ve CAPM estimate is 10.16% (9.36%), or a difference of only 0.12% (0.78%) between the two.

To see how robust this simple procedure is, the following graphs the difference between the two estimates (CAPM minus DCF) for every month since 1956.



The graph indicates that the differences were very large from the mid 1970s until 1984, when DCF estimates exceeded risk premium estimates mainly because actual inflation was higher than average. Another way of saying that is that the nominal long term Canada yields were not fully compensating for inflation. Then, until 2010 the opposite happened as DCF estimates were lower than risk premium estimates. In this case inflation dropped and also growth estimates, but real yields were very high as the market was not convinced that the Bank was colml litted to bringing

inflation down. More recently since 2011, we see that DCF estimates are again higher than risk premium estimates because real yields have again been incredibly low, not because of inflation but because of Bank policy.

It is this phenomenon of low real yields in the 1970s and 1980s, high real yields in the 1990s, and low real yields again since 2010, that is a major reason for the negative deviations from 1970-1982 and again after 2010, and the positive deviations afterwards.

The second reason is simply that the real GDP growth rate and the market risk premium have not remained constant since 1956. I testified extensively in the 1990s to the effect that the market risk premium was very low due to the high real interest rates and risks attached to government bonds. Subsequently, I have increased my estimates of the MRP as this risk has been removed. Similarly, the real growth rate has dropped over time and is possibly lower than the 3.0% used in the simple model.

However, the point is that we can "ballpark" the broad range for the DCF estimate for the market just as we can for the CAPM. Currently the TSX dividend yield is 3.15% (end of 2023) and the year over year inflation rate is 3.40%; so with the 3.0% real growth rate, the simple DCF estimate is 9.85%. Similarly with the long Canada yield of 3.00% and a 3.5% market risk premium, the simple CAPM estimate is 6.60. This produces a very significant difference mainly due to the use of the currently high inflation rate rather than the BEIR in the DCF and the low current LTC yield and market risk premium.[44]

Q. WOULD THESE BE YOUR ESTIMATES?

A. No. These are very simple estimates that use average numbers. They are presented simply to show that while the DCF and CAPM estimates are consistent over *long* periods of time, they have both had problems when used mechanically during periods of very high and very low real yields.

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[44] There was no real bond yield and this BEIR before the Government of Canada started issuing real return bonds.

Q. IS THERE ANY OTHER EVIDENCE ON THE VALIDITY OF THESE TYPES OF EXPECTED RETURN ESTIMATES?

A. Yes. What is important is that there is another side to estimating the fair ROE and cost of equity capital. This is that the required rate of return on the pait of the investor (cost of equity capital) is also the expected rate ofreturn. Otherwise, they would not invest. Defined benefit pension funds and all sorts of other investment funds need this data to determine their asset allocation. On July 5, 2019, TD Economics published a repo11 on long term returns of the type needed in defined benefit pension plans.[45] The imp01tant point about the TD Economics forecast is that the going forward risk premium for equities minus long term Canada bonds was 2-4%, and the expected ten-year return on the TSX 4-7.0%. If this seems low, TD Economics expected the return on the S&P500 to be in the same 4-7% range, and these are long run, that is, ten-yeai· forecast returns. The 3% difference between equities and bonds is not the market risk premium, since adjustments need to be made in a regulatory setting, but it is ce1tainly in the right ballpark.

-Table 1: Long-Term Financial Asset Returns (C$)

	1990-1999	2000-2009	2010-2018	2019-2028 Midpoint	2019-2028 Range
Cash 90-Day T-Bill	6.4%	3.1%	0.8%	2.0%	1.5%-2.5%
Canada 10-Year Government Bond Index	10.1%	6.7%	3.7%	2.5%	2.0%-3.0%
ICE BofAML Canada Corporate Index*	10.6%	6.9%	4.5%	3.5%	3.0%-4.0%
S&P/TSX Composite Index	10.6%	5.6%	5.3%	5.5%	4.0%-7.0%
S&P 500 (US$)	18.2%	-0.9%	11.7%	5.5%	4.0%-7.0%
S&P 500 (C$)	20.8%	-4.1%	15.1%	5.5%	4.0%-7.0%
MSCI EAFE (US$)	7.0%	1.2%	3.8%	5.5%	4.0%-7.0%
MSCI EAFE (C$)	9.4%	-2.0%	6.8%	5.5%	4.0%-7.0%
Income	10.7%	4.9%	4.9%	3.4%	2.6%-4.2%
Balanced	11.3%	3.8%	5.8%	4.0%	3.0%-5.0%
Growth	12.1%	2.2%	7.1%	4.9%	3.6%-6.2%

Source: Bank of Canada, Bloomberg, ICE Bank of America Merrill Lynch, Standard & Poor's, Toronto Stock Exchange, TD Economics.
Asterisks('): Denotes that data from January 1990-June 1992 was forecasted.

[45] TD Economics, Canadian Long-Run Financial Market Returns, July 29, 2019.

Q. WHAT ADJUSTMENTS ARE NEEDED?

A. As TD Economics notes, its return forecast is for ten-year or long run/geometric/compound returns, so they must be converted to arithmetic one-year returns. To make this adjustment for very long returns we add half the variance of the arithmetic return as explained in my Appendix B, with data in Schedule 9. Historically the standard deviation of equity returns has been 18.21 % (0.1822), so the variance is 0.0332, and half this is 0.0166 or 1.66%. Similarly, the volatility of the long Canada bond return has been 9.08%. I would suspect that this overstates the future volatility in long bonds since it is unlikely we will see LTC yields at almost 20% again, but this means a variance of 0.0096, and half this is 0.48%. Using the high end of the 'fD Economics ranges and converting to arithmetic returns means a market risk premium of 5.68% as follows:

	Long run	1/2 the variance	Arithmetic
Equities	7.0%	1.66%	8.66%
Long Canadas:	2.50%	0.48%	2.98%

The market risk premium over the 30-year bond instead of the ten-year would then by about 0.38% lower.

TD Economics have "updated" this report,[46] and now expect bond investors to earn 3.5-4.5% and equity investors a 4.5% market risk premium over the 10-year Canada bond yield, for an 8.0% equity return. Although this "update" is not in the form of its earlier document, the end result is similar.

A similar long run Canadian market forecast was made by Edward Jones[47] that produced very similar results. In their case, equity returns are somewhat higher at 6.0-7.5%, but so too are long run fixed income returns, for a difference of 3.0-4.0%.

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[46] J. Orlando et al "Canadian long run financial market returns: levelling up. November 2, 2023.

[47] Edward Jones, Expectations for capital market returns, July 2022.

Expected Long-term Equity Return Ranges			
	Canada	**U.S.**	**Overseas**
Dividend yield	2.5%-3.0%	1.5%- 2.5%	2.5% - 3.5%
Expected adjusted long-term earnings growth	3.5% - 4.5%	4.0%-5.0%	4.5%- 5.5%
Long-term equity returns	6.0% - 7.5%	5.5% - 7.5%	7.0%-9.0%

Source: Edward Jones calculations, February 2021.

Expected Returns for Fixed Income over the Long Term	
	Expected Range
Long-term fixed income	3.0%- 3.5%
Short-term fixed income	2.75% - 3.25%
Cash	2.1%

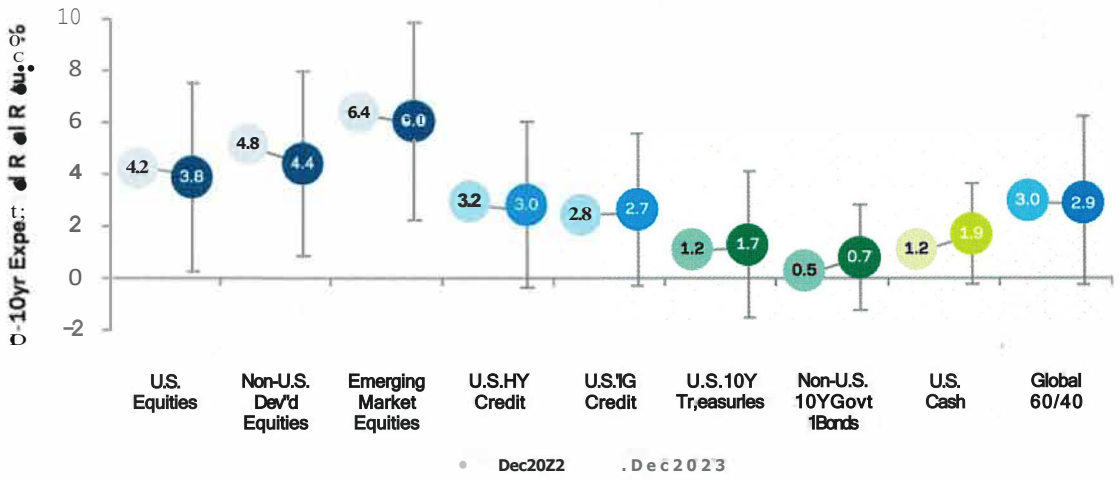
Source: Edward Jones calculations, February 2021.

Q. ARE GENERAL FORECASTS AVAILABLE?

A. Yes. There are now lots of capital market forecasts readily available from reputable firms, and I have looked at several. Most of them are for the U.S. market. The first is from AQR,[48] which is a value investing shop,

[48] 2024 Capital market assumptions for major asset classes, January 6, 2024.

Exhibit 1: Medium-Term Expected Real Returns for Liquid Asset Classes



Source: Bloomberg, Consensus Economics and AQR. Estimates as of December 31, 2023. "Non-U.S. developed equities"' is cap-weighted average of Euro-5, Japan, U.K., Australia, Canada. "Non-U.S. 10Y govt. bonds" is GDP

For U.S. equities they are forecasting **real** returns of 3.8%, a decrease from 2022 of 0.40%, which with 2.0% inflation puts the nominal return at about 6.0%; subtracting the return on ten year US Treasuries of 1.7% gives a market risk premium of 4.30%.

The following is from the Bank of New York Mellon[49] (BNY). BNY is forecasting long run 10 year equity market returns of 7.4% for large U.S. equities (large cap), U.S. aggregate bonds at 4.8%, and sovereign debt at 2.9%, for a premium of equities over government bonds of 4.5%.

[49] 2024 capital market return assumptions.

AGURE1 **Snapshot of 2024 vs. 202310-Year Capital Market Return Assumptions**

ASSET CLASS	tiJU jtH.x.r C@H fKMEI REnIRN	2023 10-Year CMAS EXPECTED RETURN
EQUITY MARKETS		
U.S. Equity	7.4%	6.5%
Int'I. 0011. Mkt. Ex-U.S. Equity	6.3%	6.9%
Emerging Markets Equity	7.3%	9.3%
FIXED INCOME		
U.S. Aggregate Bonds	4.8%	4.t%
U.S. High Yield Credit	5.8%	6.2%
U.S. Intermed. Municipal Bond	3.6%	2.8%
Global Aggregate Ex-U.S.	2.5%	3.0%
EM Sovereign Local Bond	2.9%	4.0%
ALTERNATIVES		
Absolute Rotum	5.0%	4.3%
Hedge Funds	5.5%	4.9%
Commodities	2.2%	2.9%
Private Equity	8.8%	,8.2%
BENCHMARKS		
Global Balanced Multi-Asset Portfolio [2]	6.2%	5.9%
U.S. 60% Stock/40% Bond Portfolio [1]	6.4%	5.5%
U.S. Fed Policy Rate (10y forward avg.)	2.9%	2.5%
U.S. CPI (10y forward avg.)	2.2%	2.9%

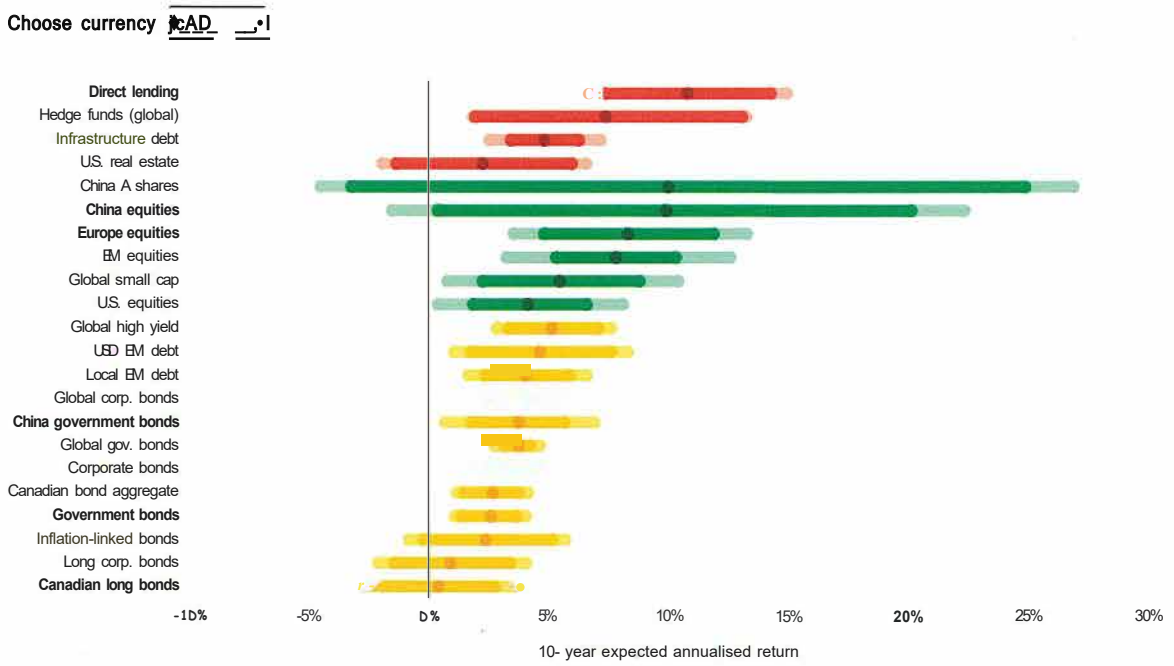
Source: BNY Malkin Itwestor Solutfons. Data as ,of September 30, 2023.

1

2 Blackrock[50] is the largest asset manager in the world. Blackrock's forecast of long run (ten year)
3 returns is below. The expected return is the circled number in the middle of the possible range of
4 values. They have U.S. equities at under 5.0% and Canadian Government bonds at about 2.5%,
5 for an expected return differerence of about 2.5%.

[50] https://www.blackrock.com/institutions/en-us/insights/cha1ts/capital-market-assumptions

Asset return expectations and uncertainty

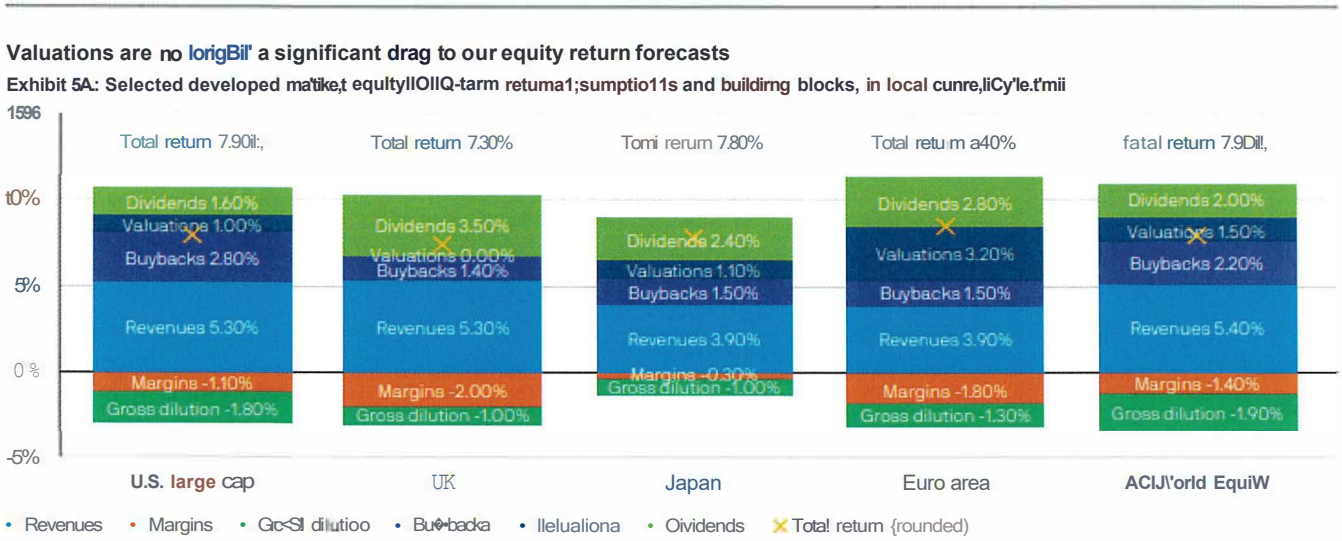


The final forecast is from J.P. Morgan, the largest U.S. bank.[51] For U.S. equities, they have a long run return assumption of 7.0% for large capitalisation stocks, and 5.2% for long maturity U.S. govermnent bonds. So their long run market risk remium is 1.80%.

What is impo11ant to note from this brief review is that these capital market assumptions are from some of the leading financial institutions in the world. Although they are long run, the impmtant big picture is the consensus, similar to that from the Fernandes survey: long run equity returns are in the 6-8% range. Where there are differences seems to mainly be on their expectations for future long run govemnent bond returns. There is no indication of any substantial difference

[51] https://amj pmorgan.com/content/dam/jpm-am-aem/global/en/insights/portfolio-insights/ltcma/noindex/ltcma-full-repo1t.pdf

between these rep01is and my own estimates other than that their equity market returns seem marginally low.



.Q. DOES NP ITSELF ACCEPT THIS RANGE OF VALUES FOR THE MARKET RISK PREMIUM?

A. Apparently yes. In answer to CA-CP-0.65, NP indicated that its own defined benefit pension plan uses a 60:40 debt-equity allocation with a 3.0% expected return on bonds and 7.1 % on equities, for a difference of 4.1 %. The RFI clearly unsettled NP, since they obtained a letter from NP's consulting actuary, Mercer, on February 16, 2024 indicating that conve1iing the long run compound return on equities of 7.1 % to a short run arithmetic average increases the expected equity return to 8.62%. This is the same adjustment I always make, for example to Toronto Dominion's forecast discussed above where the sh01i run expected equity return is 8.66%. They did not make a similar adjustment to the long run bond reh1rn or look sepearately at the LTC government yield, rather than that for all Canadian bonds. However, it is clear to me that Mercer has a view of the market risk premium almost identical to my own. Further, NP itself has adopted this in its own forecasts for its pension fund.

Q. IS THERE ANY OTHER EVIDENCE SUPPORTING YOUR ESTIMATE?

A. Yes. Ultimately, stock market returns are driven by the returns earned by companies and the productivity of the underlying economy. Highly productive, rapidly growing economies are

generally short of financing, so the cost of capital is higher, and vice versa. Below is the average ROE for "Corporate Canada" as estimated by Statistics Canada. This is the quarterly version of the average data in Schedule 1. From 1988 until 2023Q3, the median ROE graphed below has been 9.97%. I regard this as representative of the typical ROEs earned by Canadian firms. These corporate ROEs are obviously tied to the market rates of return earned by investors. For example, in 1925 John Maynard Keynes pointed out[52] that there were two sources of returns from investing in the stock market. The first he called the ***investment return,*** which Keynes defined as "forecasting the prospective yield of an asset over its entire life."[53] In modern terminology this would be the internal rate of return on the firm's cash flows, or an approximate ROE. The second component Keynes called the ***speculative*** return, which involved forecasting the psychology of the market and what Keynes referred to as the change in the "basis of valuation." In modern terminology this would be a change in the price earnings ratio. Keynes discussed this speculative return as being generated by the "state of confidence" and "animal spirits," but he also pointed out it is affected by the level of interest rates.[54]

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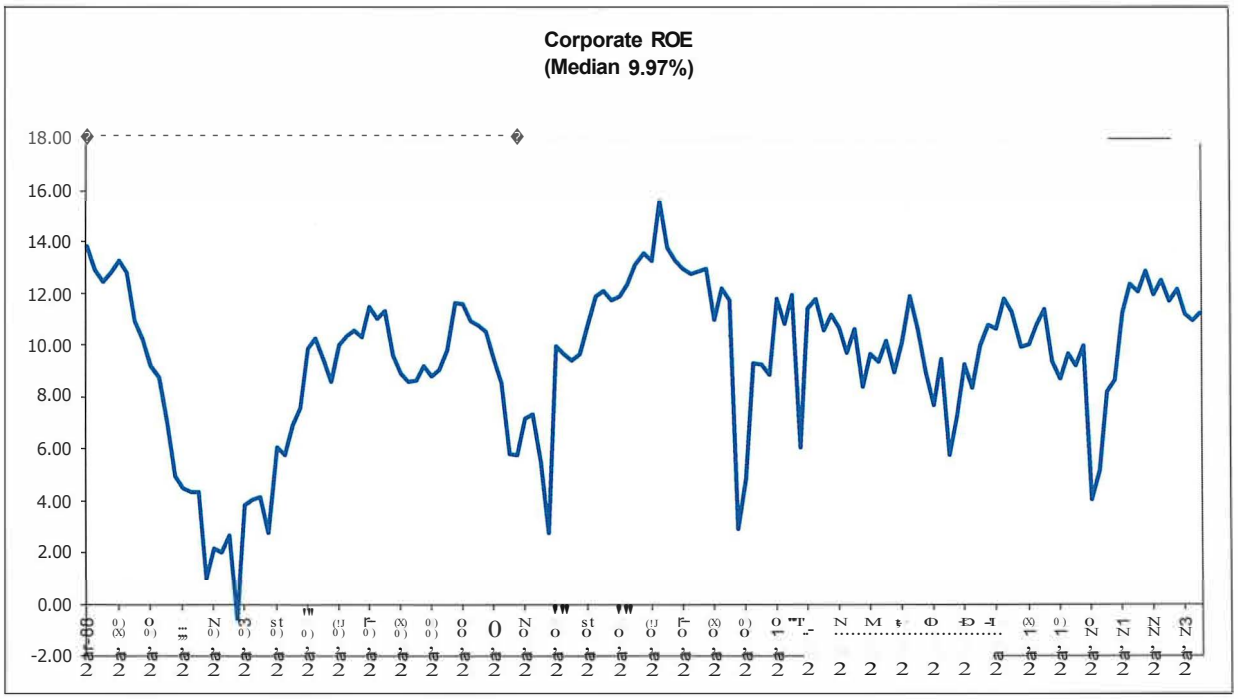
[52] Quoted in John Bogle, The Lessons of History, September 12, 2011, John Maynard Keynes, 1925, Review of Common Stocks as Long Term Investments, Edgar Lawrence Smith

[53] This definition comes from chapter 12 of the General Theory of Employment Interest and Money, Macmillan London, 1936.

[54] Page 149 of the General Theory



Keynes' point would be that a firm may earn an ROE of 10%, but if the valuation of that firm changes by 10% then the investor would earn both a speculative return as well as an investment return. This total return is what we look at when we examine stock market returns over long periods of time. However, in aggregate the change in the basis of valuation cannot go on forever. We caimot continue to have a state of high confidence, any more than interest rates can continue to increase or decrease forever; both will tend to revert to some long run average. However, professional investors, according to Keynes, are mainly concerned with speculative returns or forecasting the change in this basis of valuation six to eighteen months out. In contrast, buy and hold or fundamental investors are mainly concerned with the investment return: finding good companies aild holding them regardless of the speculation in the stock market.

Wanen Buffet is probably the most successful fundamental investor of the last fifty years. He repeated Keynes' argument by stating: [55]

> ***"The most the owners in aggregate can earn between now and judgment day is what their businesses in aggregate earn.*** **(Italics in original). True by buying and selling that is clever or lucky, investor A may take more than his share of the pie at the expense**

[55] Berkshire Hathaway's 2006 Annual Rep011, rep011ed in Fortune (March 20, 2006).

of investor B. And yes, all investors feel richer when stocks soar. But an owner can exit only by having someone take his place. If **one investor sells high, another must buy high. For owners, there is simply no magic- no shower of money from outer space - that will enable them to extract wealth from their companies beyond that created by the companies themselves."**

Buffet's main criticism was for the financial professionals who help individuals to trade so that in aggregate investors lose part of the pie to fees. However, Keynes, Bogle and Buffet all point out the basic fact that short run stock market returns can deviate from the returns earned by firms, that is the investment return or ROE, but in the long run this is all there is!

This discussion herein of what generates stock market returns is provided because in the long run the average stock market return should approximate the average investment return or ROE,[56] that is the speculative return should average out to zero. There are two ways in which we can look at the investment return; the first is to look at average rates of return on equity, and the second is to look at a DCF model for the overall market.

The second way of looking at the investment return is that used by the late Jack Bogle, the founder of Vanguard Mutual funds. He estimated the investment return using the constant growth DCF model, where at the start of each year he added the subsequent five-year earnings growth to the dividend yield. He then took this analysis back to 1900 and provided the graph reproduced in Schedule 5. This marginally understates the investment return since Bogle should have used the forecast dividend yield, but as he noted it did not materially affect the results. He estimated this investment return at 8.8%, or slightly less than the average U.S. stock market return of 9.1 %. However, since he underestimated the investment return, the difference is *de minimis.* Like Keynes, Bogle also noted the persistent tendency for reversion towards the mean, which is another way of saying that high or low stock markets and PE multiples do not last. As Bogle noted (page 11):

> "Over the long run it is the durable economics of enterprise – enterprise - that has determined total return: the evanescent emotions of investing – speculation -so important over the short run, has ultimately proven to be meaningless."

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[56] It is an approximation since it depends on the market to book ratio at the start of the period.

The approach of Keynes, Buffet and Bogle is a standard approach used by fundamental investors who look at individual stocks, rather than trying to time the equity market. The basic message is that the equity market return is tied to the ROE earned by the overall stock market, which has been slightly less than 10% in Canada. More productive economies with more profitable companies will earn more.

Q. ARE THERE ANY DCF ESTIMATES FOR INDIVIDUAL UTILITY SHARES?

A. While the DCF model is appropriate for "pure" utilities, unfortunately these are now few and far between due to mergers and acquisitions activity. However, we can get some insights from the data in my Appendix D, Schedule 13 repeated below, where I estimate the median DCF cost using analyst forecast data at 8.84% for a sample of 13 electric utilities in the U.S., most of which at one time or another have been in "comparable samples" for Canadian electric utilities. However, these estimates reflect the well-known analyst optimism bias where they persistently forecast optimistic growth rates and then gradually lower them to zoom in on the actual growth closer to its realization. Schedule 7 has a recent Economist take on the well-known analyst optimism bias. Using more realistic sustainable growth rates, the median DCF equity cost is 6.75%.

	5 year Growth												
	Past	Future	# Analysts	Yield	K (Estg)	ROE	Retention	SUSTG	K	PBR	DPS	EPS	Beta
Duke Energy	2.41	6.81	13	4.48	***11.60***	8.48	0.24	2.04	***6.62***	1.48	4.06	5.35	0.48
Allele Inc.,	2.49	8.1	7	4.82	***13.31***	5.3	0.37	1.96	***6.87***	1.15	2.71	4.3	0.77
Eversource	7.31	3.25	12	4.68	***8.08***	-2.9	3.13	-9.07	***-4.81***	1.42	2.7	-1.27	0.58
OGE Energy	0.14	-12.34	10	5.06	***-7.90***	9.34	0.20	1.85	***7.00***	1.46	1.66	2.07	0.72
Pinnacle West	16.1	5.9	15	4.99	***8.90***	7.7	0.34	2.59	***7.71***	1.23	2.78	4.19	0.48
Evergy	14.68	2.5	8	4.95	***7.57***	7.315	0.17	1.26	***6.27***	1.17	2.45	2.96	0.56
Alliant	6.95	6.55	6	3.82	***10.72***	11.41	0.35	3.94	***7.91***	1.79	1.82	2.78	0.55
American Electric	6.43	4.2	18	3.52	***7.87***	8.96	0.19	1.73	***5.31***	1.68	3.52	4.36	0.5
Exelon	-6.82	4.2	16	4.04	***8.41***	9.22	0.38	3.55	***7.73***	1.38	1.44	2.34	0.6
Entergy	3.12	6.8	16	4.34	***11.44***	16.69	0.61	10.16	***14.95***	1.85	4.34	11.1	0.71
Southern	3.48	1.39	8	4.2	***5.65***	11.03	0.23	2.56	***6.87***	2.3	2.78	3.62	0.5
POR	1.38	12.5	7	4.68	***17.77***	7.48	0.19	1.44	***6.19***	1.22	1.88	2.33	0.6
Nextera	9.57	7.81	13	3.39	***11.46***	11.58	0.48	5.56	***9.14***	2.38	1.87	3.6	0.52
Average	5.17	4.44	11.46	4,38	8.84	8.59	0.53	2.28	6.75	1.58	2.62	3.67	0.58
Median	3.48	5.90	12.00	4.48	8.90	8.96	0.34	2.04	6.87	1.46	2.70	3.60	0.56

All day based on Yahoo (Feb 27, 2024) which sources its data from S&P
based on Morningstar forecast not S&P

We can assess the validity of sustainable versus analyst growth forecasts by looking at the historic experience. Until 2018, S&P produced an Analyst Handbook that had earnings and dividends for the utility sector similar to that for the SP500 Index as a whole. Fmiher, S&P subdivided utilities into gas, electric and multi-utilities. However, even in the 2018 edition there

was no data for gas utilities after 2015 since they had all been acquired.[57] However, for the overall utility index the growth rates were as follows:

	EPS	DPS	GDP
Average	4.25%	3.10%	6.49%
Median	3.91%	4.10%	5.99%
Volatility	20.46%	12.81%	3.18%
Compound	2.04%	2.37%	6.45%
OLS	1.34%	1.67%	6.11%

Over the period from 1967-2017, U.S. GDP grew[58] on average (median) at 6.49% (5.99%), both slightly above the full period due to the absence of the 2020 negative growth rate. In contrast, these U.S. utilities had average (median) dividend per share growth of 3.1 % (4.10%), with average (median) earnings growth of only 4.25% and 3.91 %. The compound growth rates are even worse at 2.04% for earnings and 2.37% for dividends, while the least squares regression results are worse still at 1.34% and 1.67%. The reason for the latter two is that they implicitly put more weight on the later performance where the utility EPS was $12.01 in 2017, but was also $12.36 in 2009, and $10.48 as far back as 1993. So, there is little evidence of significant earnings growth.

This evidence from the S&P500 utility data is for the larger utilities included in the S&P500 index, and this reflects the problems of holding companies like Duke Energy and PG&E. However, this is also in the minds of investors in utility stocks in the U.S. From this data it is extremely difficult to justify U.S. utilities growing at rates higher than the U.S. GDP growth rate as is implied in the use of analyst growth forecasts. It is also difficult to justify including growth at the GDP growth rate when a multi-stage DCF model is used. I would regard long run growth at 65-68% of the GDP growth rate as being reasonable based on actual experienced median growth rates.[59] This would mean 3.3-3.4% long run growth rates based on a 5% GDP growth

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[57] What is playing out in the utility sector is very similar to what happened prior to the passage of the PUHCA in 1935.

[58] These are nominal growth rates and include inflationary growth.

[59] Actual ratios are EPS (3.91/5.99) or 65% and DPS 4.1/5.99 or 68%.

rate, which is higher than the average sustainable growth rate for these U.S electric utilities of 2.28%. However, a reasonable DCF equity cost is 6.8-6.9% when added to their current typical dividend yield of 4.38%, which recognises their limited growth prospects. An issue cost adjustment of 0.50% is then needed to equate to a fair ROE.

Q. WHAT IS THE EVIDENTIARY SUPPORT FOR AN ISSUE COST ALLOWANCE OF 0.50%?

A. There is none as far as NP is concerned. Theoretically, a firm that earns their cost of equity capital trades at a market to book ratio of 1.0. In the same way a bond that has the same coupon yield as the current market yield trades at its par value. This is because the equity cost is the investor's required rate of return, and if the firm exactly earns what the investor requires then the investor is essentially indifferent as to whether they invest or not. This is why market to book ratios are the litmus test for effective regulation.[60] However, firms incur costs when they raise equity such as investment banking fees, under pricing, and in house costs. If it raises $95, a firm may have to sell shares worth $100. Consequently, it has to earn 100/95 or just over a 0.5% premium over its equity cost. If that equity cost is 7.2% it means the firm has to have an ROE of 7.58%. In this way a 7.58% ROE on the $95 net received by the firm allows it to trade at what the investor has paid for the shares, which is $100.

In long ago hearings, there was considerable evidentiary basis for the issue cost adjustment. The Regie, for example, once required Gaz Metro as it then was to track the issue cost of all of its book equity so that there was an evidentiary basis for this adjustment. The Regie now uses a 0.30% floatation cost allowance. In Bell Canada hearings both myself and my late colleague, Dr. Berkowitz, justified it by the fact that there was an automatic dividend reinvestment plan where shares were bought at a 5% discount.

For the last ten years or so witnesses seem to have settled on 0.50%. However, in answer to CA-NP- NP-086, NP admitted that it has never issued any new common shares to Fortis, and it maintains its equity ratio simply by adjusting its dividend payments to Fortis. So as a matter of

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[60] See Laurence Booth, "the importance of market to book ratios in regulation," NRRI 18-4, Winter 1997.

fact there is no evidence of NP incurring a floatation or issue cost. It is, therefore, questionable as to why NP would be allowed cost recovery for flotation or issue cost when NP incurs no such cost.

Q. WHAT IS YOUR FAIR ROE FOR A BENCHMARK UTILITY?

A. I would judge the fair ROE based on my CAPM estimates to be in a range 7.28-8.13%, or a recommended ROE of 7.70%.

Risk Premium

	Low	High
Forecast long Canada bond yield	3.80	3.80
Credit risk adjustment	0.23	0.23
Utility risk premium	2.75	3.60
Adjustment to ROE	0.50	0.50
Estimate	***7.28***	***8.13***

My DCF analysis was used to directly estimate the overall equity market return which has informed my assessment of the appropriate market risk premium. This is extremely important because it is the basic ingredient in any risk premium approach as it indicates the market's trade-off between risk and return.

DCF & Other return estimates:

Canadian DCF equity market return:	8.10-8.75%
US DCF Equity market return:	6.84-9.6%
Average Canada ROE since 1980:	9.97%
Asset Manager long run equity returns:	7.00-9.00%
DCF Equity cost U.S electric utilities	6.8-6.9%

These DCF estimates are for the equity cost, and the DCF estimates for the U.S. utilities would need a flotation cost adjustment to get the fair rate of return for a regulated utility, similar to that from risk premium models.

A final consideration is that NP's common shares are non-traded, and any equity comes from its parent. This is a common problem in Canada as there are very few pure utilities because most are part of a holding company. The standard way of estimating the beta and equity cost for a private company is by means of an "instrumental variables" approach. This simply uses some critical financial ratios to infer the relationship between these and market betas, and then infers what the beta would be if the company were traded. The classic paper in this area is by Beaver, Kettler and Scholes (BJS).[61]

The key empirical results from Black Jensen and Scholes are the following:

'rADLE 6

SUMMARY STATISTICS FOR INSTlltU:MENTAL VARlABLE EQUATION, PERIOD ONE (DEPENDENT V ARIABt'E, b1)

Variable	*Statistic*
Standard deviation of 11,	.337
Constant	1.016
(T value)	(14.040)
Regression coefficient	
Payout	**-.584**
(T-value)	**(-5.969)**
Growth	**.835**
(T value)	**(2.533)**
Earnings variability	**3.027**
(T va!ue)	(10.21J)
Standard error of estimate	.251
Correlation coeffid.ent (R)	.668
R2	.447

The constant is the global average of all beta coefficients, which is 1.0. This beta value is then reduced by 0.584 depending on how much of the firm's earnings are paid out as dividends. The higher the dividend payout, the lower the beta, that is high dividend paying firms like utilities have lower betas. The beta is then increased for higher growth firms and those with greater

[61] The association between market determined and accounting determined risk measures, Accounting Review 45-4 (October 1970)

earnings variability. Utilities with high dividend payouts, low growth and stable earnings due to regulation, all else constant, have lower betas and require a lower fair return. This was the received wisdom fifty years ago, and not very much has changed since then as the basic market power of utilities remains critical for their risk (beta) assessment.

Consistent with the above data, I recommend a fair return for a ***generic*** Canadian utility to be 7.70%.

V. THE USE OF U.S. ESTIMATES IN CANADA

Q. **WHAT IS YOUR JUDGMENT ON THE USE OF U.S. ESTIMATES IN CANADA?**

A. Mr. Coyne and Mr. Trogonoski base their evidence heavily on returns from U.S. utility holding companies (UHCs); even their North American sample is predominantly American. I can understand this because, as Americans, their point of reference is the U.S. and not Canada. However, I continue to regard such estimates as biased high when applied to pure Canadian regulated utilities for three reasons.

- First, they are mainly from utility holding companies rather than the underlying operating companies. This means they are fmther away from the cash flow and rely on the payment of dividends to service their own debt and to make dividends. If this flow is disturbed, they may have problems servicing their own debt, which makes them riskier than the underlying operating companies.
- Second, U.S. :financial markets exhibit more risk than the Canadian markets and have generated higher risk premia in the past where the realised market risk premium since 1926 has been 1.71 % higher in the U.S. than in Canada. This is demonstrated in my Appendix B, where I estimate the market risk premium for both countries. Moreover, much of this is due to the Ibbotson (now Kroll) data that was specifically stmted in 1926 to catch the run up to the 1929 stock market crash. As the Credit Suisse report shows in Schedule 14 of my Appendix B, if the data is taken back to 1900 the U.S. market risk premium drops to 4.7%. Further, the failure of "light handed" U.S. regulation has been reinforced yet again by the failure of Silicon Valley Bank and two other regional banks in March 2023.
- . Third, although the principles of regulation are largely the same between the U.S. and Canada, as is widely recognised the *implementation* is different, as was demonstrated in the 2000s with the U.S. regulation of their banks and their telecom companies.

I have long regarded having to use proxies to estimate the fair return for a private, non-traded, regulated, Canadian utility as equivalent to looking through a "dirty window".

Q. **WHAT DO YOU MEAN BY A DIRTY WINDOW?**

A. It is almost impossible to find a traded utility with the same characteristics as NP or any pure regulated utility, particularly in Canada. This is because as low risk, cash rich utilities they are the perfect foundation for a holding company where the cash can be used to finance other investments. In Newfoundland the local telephone company Newfoundland Tel attempted to

emulate BCE in 1985 by fonning a holding company Newtel to own the regulated assets and then use the cash to diversify into other businesses. New Brunswick Tel did the same thing with Bruncor. Eventually both merged, and then with the telephone companies in PEI and Nova Scotia to form Alliant. At each stage the traded company became more remote and a poorer proxy for each regulated utility.

For tradition energy utilities, I have traditionally used Emera, Fo1iis, and Canadian Utilities as the best proxies for a generic Canadian utility. Recently, Hydro One has become relevant, and potentially Algonquin Power and Utilities, but the trading history of these utilities is relatively sh01i. However, as these two are potentially added as proxies, Emera, and Fortis are becoming more questionable each successive year. Morningstar, for example, recently stated this about Fortis:

> **Business Strategy &Outlook** Andrew Bischof, CFA, CPA, Senior Equity Analyst. 29 Jul 2021
> Fortis manages regulated electric and gas utilities and independent transmission assets across North America. Acquisitions have made Fortis predominantly a U.S. utility, with roughly two thirds of earnings at its U.S. operations.
>
> Its prized asset in th U.S. is ITC Holdings, which gives Fortis an opportunity to benefit from a long runway of U.S. transmission investmer1t opportunities from aging infrastructure to supporting renewable energy growth. Regulatory treatment is constructive, with ITC's allowed returns on equity being higher than state-allowed returns and forward-looking rate making reducing regulatory lag. In April, FERC issued a supplemental notice of proposed rulemaking that could eliminate the 50 basis point incentive adder that regional transmission organization members receive. Given tmnsmission's role in supporting the Biden administration's renewable policy agenda, we continue to believe transmission will receive favorable regulatory treatment.

Similarly, for Emera Morningstar states:

Florida Drives Emera's Growth Opportunities

Business Strategy & Outlook Andrew Bischof, CFA, CPA, Senior Equity Analyst, 12 Aug 2021

Emera has transitioned to a predominantly U.S.utility that generates a majority of its earnings from Teco Energy after its transformative acquisition. While Emera's Canadian utilities operate under a constructive regulatory framework, Emera's U.S. utilities offer significantly more growth opportunities and higher allowed returns.

We think Emera has made a wise transition away from noncore regulated and unregulated operations and toward investment opportunities at its regulated utilities. We like that management divested its unregulated, no-moat generation unit. We viewed the susceptibility the unit had to volatile commodity prices and capacity prices unfavorably.

It is quite clear that the stock prices of both Emera and Fortis are now being driven as much by their U.S. utilities and regulatory practise as their Canadian operations. Their historic betas still predominantly reflect their Canadian operations, but going forward Morningstar judges this to be no longer true.[62] At least both companies own predominantly regulated utilities and have so far diversified into similar low risk areas.

Q. HAVE YOU ANY EVIDENCE TO SUPPORT THE DIRTY WINDOW PROBLEM?

A. Yes. In Schedule 9 are the earned ROEs of 14 Electric UHCs that have in the past been used in comparable samples to a Canadian operating utility like NP. Over the period 2011 to 2023, NP earned an average ROE of 8.92% compared to the U.S. sample average of9.19%. However, note two important facts. First the average U.S. UHC ROE ranges from the 6.18% of Duke Energy to the 13.38% ofNextera. I suspect that neither of these values would be accepted as a fair ROE in a Canadian jurisdiction. Second, the volatility of the ROE as measured by the standard deviation of the earned ROE has ranged from 0.56% for Allete to 6.57% for Entegy, with an average of 2.69%. In contrast, NP's ROE volatility is 0.16% lower than that of any of these U.S. UHCs.

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[62] Morningstar itself is a U.S. company that took over DBRS, but it does not issue an analyst repo11 on Canadian Utilities, presumably because its main market is now the U.S. and not Canada.

The fact is the holding companies that we look at to judge the risk of a Canadian operating company like NP are all considerably riskier as this Board has decided in the past. Note this is not a U.S. versus Canada comment, since the same now applies to several Canadian utilities that are fast become large multi company holding companies themselves.

American witnesses in their defence will say we impose restrictions when we create our samples to remove, for example, Duke Energy. In my judgment that does not solve the problem for two reasons. First, we are still dealing with holding companies when we estimate betas; for example, go back over usually the previous five years of stock market history. Second, the market and professional investors are not stupid, They know full well that what befell one UHC can happen to another, even if it has not yet happened. And further, except for Allete and Alliant, it has happened to almost all of them at one time or another. The low ROE for each of the 14 U.S. UHCs is Duke 2.8%, Allete 7.19%, Eversource -2.98%, OGE -4.47%, 8.2%, Evergy 7.15%, Alliant 10.77%, AEP 3.46%, Entegy -1.83%, Southern 3.44%, Exelon 5.09%, Portland 5.96%, PNM 0.93% and Nextera 7.94%. In contrast, the lowest ROE by NP during this period is 8.54%.

Schedule 10 contains the price (market) to book ratios for each year of these U.S. UHCs. Over the whole period the average (median) market to book is 1.80 (1.65), indicating that the stock market is happy with the performance of these utilities and that on average their equity cost is less than 9.19%, as otherwise the market to book ratios would be less than 1.0. Scanning the entire history of the market to book ratios does not reveal a single case where the market to book ratio of these U.S. UHCs was significantly less than 1.0. The lowest was 0.91 for PNM in 2011, and 0.99 for Exelon in 2015.[63]

In my judgment, NP is lower risk than any sanlple of U.S. UHCs regardless of the screens used to create a "low risk" sample, and even these U.S. UHCs have an equity cost significantly less than 9.19%. This also seems to be the judgment of the AUC (Decision 27084-D02-2023, paragraph 103) which states:

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[63] Note that Nextera's average market to book is 3.05, which is consistent with its status of having the highest ROE.

> ***"While the Commission finds that the U.S. companies have higher business risks than the Alberta utilities, for the purpose of establishing the comparator group, the Commission accepts the utilities' evidence that it is appropriate to include U.S. utility holding companies. The reasons for this are:*** *(i)* ***the relatively limited number of publicly traded Canadian utility companies;*** *(ii)* ***the prevalence of U.S. business operations among many publicly traded Canadian utilities; and*** *(iii)* ***investors' tendency to consider utility investment opportunities in both the U.S. and Canada. Further, the Commission remains of the view that it is reasonable to consider the U.S. market return data given the globalization of the world economy and integration of North American capital markets. Notwithstanding these findings, none of the Alberta utilities raises capital directly in the equity market, or operates outside of Alberta unlike a number of companies in the comparator group, which are holding companies and can operate anywhere."***

Q. WHY DO YOU JUDGE THE U.S. ITSELF AS HIGHER RISK THAN CANADA?

A. In 2010, we were still reeling from the financial crisis caused by poor bank regulation in the U.S. when I referenced our then Prime Minister commenting at the G20 summit:

> *"Unregulated financial markets do not work. Canada has known that for a long time. I thought frankly, we all knew that from events of many decades ago - but obviously the United States went on a different path"*

It is remarkable enough that our Prime Minister criticized the U.S. so directly, particularly when the principles of regulation for the banking system are under the Bank for International Settlements (BIS) and exactly the same for both the U.S. and Canada. The fact is it was the U.S. that triggered the Great Stock Market Crash of 1929 leading to the Great Depression, and almost every major crisis since then, including the Financial Crisis of 2008/09. The only major exception to this is the recent Covid-19 pandemic crisis that affected almost every country in the world. However, yet again it has been the failure of Silicon Valley Bank (SIB) in the U.S., and to a lesser extent the Signature Bank in March 2023 that revealed failures in the regulation of U.S. banks, and triggered a major collapse in the market valuation of U.S. banks generally, and particularly in smaller regional banks.[64]

[64] In March 2023, the regional U.S. banking sector saw declines of upwards of 70% in market value.

Q. IS IT COMMONLY ACCEPTED THAT U.S. UTILITIES ARE RISKIER THAN CANADIAN ONES?

A. Yes. I have previously referenced two reports by Moody's, one in 2005 and another in 2009, where they reviewed their rating methodology[65] Both of these reports reflected the jolts to the capital market from the Tech wreck and the financial crisis. The first one cited three major factors that determined how it rated the supportiveness of regulation. These were (paraphrasing):

- Protecting the system to ensure reliable supply
- Protecting the consumer from monopoly over-charging or a sudden large rate increase
- Attempting to achieve a balance between satisfying shareholders versus efficiency to hold down prices

Second, in 2009 Moody's reviewed its 2005 report and issued a new one[66] in which they refined their assessment into the following four major areas where the % indicates the weights applied by Moody's:

• Regulatory framework:	25%
• Ability to recover costs and earn profits:	25%
• Diversification:	10%
• Financial strength and liquidity:	40%

Critically, 50% weight is placed on the effect of regulation and particularly the ability of the utility to earn its allowed ROE.[67]

Further, in discussing the U.S. and Canada Moody's stated:

> ***"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***

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[65] Rating methodology: global regulated electric utilities, Moody's March 2005.

[66] Infrastructure Finance; Regulated Electric and Gas Utilities, Moody's August 2009.

[67] DBRS, now DBRS Morningstar, seems to have followed the lead of Moody's and S&P since becoming a major U.S. bond rater.

> ***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 went on to discuss how four of the six investor-owned bankruptcies in the U.S. resulted from regulatory disputes culminating in insufficient or delayed rate relief for the recovery of costs and/or capital investment in utility plant. Moody's further stated: "as is characteristic of the US, the ability to recover costs and earn returns is less certain and subject to public and sometimes political scrutiny." I would emphasise here Moody's phrase "as is characteristic of the US," since this reflects how legal principles are implemented rather than differences in those principles. This phrase betrays an underlying cultural attitude towards risk that has traditionally differentiated the U.S. from Canada.

I would add that Moody's has changed its view of U.S. regulatory protection. On September 23, 2013, Moody's stated:

> *"Our revised view that the regulatory environment and timely recovery of costs is in most cases more reliable than we previously believed is expected to lead to a one notch upgrade of most regulated utilities in the US, with some exceptions. This evolving view is independent of the proposed changes in the methodology that are highlighted in the Summary section that/allows, and would have taken place even if the 2009 methodology were to remain in place without modification."*

The comment basically says that since the regulatory protection afforded U.S. utilities seems to have increased, it will pretty much apply a one *notch* upgrade to their credit ratings ***independent*** of their credit metrics. To the extent that Moody's has traditionally viewed Canadian regulation as more protective than that in the U.S., this comment indicates that we can take Moody's U.S. guidelines and add a notch for Canadian utilities, rather than just reading off from the guidelines. However, we need to be remember that the U.S. is still a different country with different cultural

values, and what lead to the 2001/02 tech wreck and the 2008/09 U.S. financial crisis may in future again reassert themselves as they have done in the past so many times.[68]

Q. DOES S&P HAVE THE SAME OPINION AS MOODY'S?

A. S&P has had the same concerns as Moody's, and here it needs to be stated clearly that they are mainly concerned about whether the regulator protects the bond holders, since their business is to rate the default risk of bonds. In particular, they are concerned when the bonds are issued by an operating company that is part of a holding company. The concern was heightened in the late 1990s when many local telephone companies either took over or were taken over by internet companies and were subsequently downgraded. At that time, telcos were still predominantly regulated since the local loop was still a monopoly and the bond holders had leant the money assuming they would stay low risk. However, this changed when the internet made the local loop a valuable asset for the delivery of non-traditional telco services.

In response, S&P implemented a policy that the credit rating of a regulated telecom cannot normally be higher than the credit rating of its parent. For non-telecom utilities, S&P said it:[69]

> "rarely view(s) the default risk of an unregulated subsidiary as being substantially different from the credit quality of the consolidated entity. Regulated subsidiaries can be treated as exceptions to this rule - if the specific regulators involved are expected to create barriers that insulate a subsidiary from its parent."

In other words, there is a cross subsidy from the regulated to the unregulated entity *unless* the regulated entity is "ring fenced" so that any problems on the non-regulated side do not impact the regulated side. S&P refers to this as "structural insulation techniques," which may involve:

- separate incorporation of the sub
- independent directors
- minority ownership stakes
- regulatory oversight to insulate the subsidiary
- restrictions on holding company cash management programs.

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[68] Different cultural values are probably most heightened in attitudes towards competition, public health, inequality and the welfare state.

[69] S&P, Corporate Ratings Criteria, 2003, pages 44-45.

S&P is very forthright in that the onus lies on the regulators. It states:

> "the bar has been raised with respect to factoring in expectations that regulators would interfere with transactions that would impair credit quality. To achieve a rating differential for the subsidiary requires a higher standard of evidence that such intervention would be forthcoming."

My reading of these remarks is that having been "burned" with these U.S. telecoms, and in light of the lack ofreaction from U.S. public service commissions, S&P now takes a tougher line on all utilities.[70] However, S&P's emphasis on "structural insulation" has the same motivation as Moody's greater emphasis on secured (mortgage) debt. In both cases they create greater security for the bond holders lending to a traditional utility within a holding company. Moreover, unlike the U.S., this is generally not a significant concern in Canada as most regulated operating utilities require approval from the regulator to issue debt and often issue secured debt.

Q. **HAVE CANADIAN REGULATORS CONFIRMED THIS?**

A. Yes. In a 2009 Decision, this Board commented on Ms. McShane's use of U.S. "comparables," and stated (Decision page 17):

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[70] S&P was particularly concerned at the lack of reaction by the FERC in protecting the holders of bonds issued by Enron's pipeline.

> The Board believes tl1clt, in this type of analysis, it is not enough that the chosen co111parables are tl1e best available. If this data is to be relied on it must be shown to be a reari,onable proxy or that reasonable ndjust:monts can be m.„de to account for differences. TI1e evidence showed significant differences in virtually all of the comparahles induding sig11ificat1t levels of non-regulated amI non-utility business as well as riskier generation projects:, earnings volatility, more competitio11 and less regi.uatory support. While it was argued tlmt, on balance, the U.S. comparables are _reasmmble proxies the Board notes the overwhehning evidence of a lack of balance as it was dear that on almost every measure Nm,vfoumUand Power would have to be considered less 1isky than the, U.S. COIIJJJ.i.rables. Tl1e Boarcl heard evidence tl1at the rating agencies consider U.S. companies to be peers foa- Ne:wfoumlland Power but the Board does not conclude from this that th$_{ey}$ are the sinne. Moody's comments acknowledge the differences in **operations** in the U.S. and Camtda:
>
> "NPJ's Baaal ts.mer rathig rejlact. the.fact that the compcmy's opamtiom m•i 11rdusiv4{V lxued in Canada, a jurisdicttrm whc-s r&gulatory and busJrmss envirnments In general are. l"alattvely more. supporttvo tlum those of oth6f' int(.lr>national Jw1sdlctions such as tho United States, In Moody's view. " (Application, 1st Revision, Exhibit 4 - Moody's Credit Opinion, August 3, 2009)

In cross examination, selected extracts from the lOKs of the U.S. utilities were put to the expert witness on behalf of the company, Ms. McShane. The Decision is clear: it is not enough that U.S. utilities be used simply because there are not enough Canadian ones; comparables must be the same to be used without any adjustment. And here the Board found "overwhelming" evidence that Ms. McShane's sample of U.S. utilities were riskier on almost every measure than NP, which the Board regarded as an average risk Canadian utility. A similar process of reading extracts from the lOKs of the U.S. UHCs would generate the same reaction.

The BCUC Decision (page 52) commented on Ms. McShane's use of U.S. comparables. While they felt the examples to be useful, where no Canadian data was available, they also stated:

> The Commission Panel agrees with Dr Booth that "significant risk adjustments" to US utility data are required in this instance to recognize the fact that TGI possesses a full array of deferral mechanisms which give it more certainty that it will, in the short-term, earn its allowed return than the *Value line* US natural gas LDCs enjoy. The Commission Panel notes Dr. Booth's suggestion that the risk premium required by US utilities is between 90 and 100 basis points more than utilities in Canada require may set an upper limit on the necessary adjustment. Accordingly, the Commission Panel will reduce its DCF estimate by between 50 and 100 basis points to a range of 9,0 percent to 10.0 percent, before any allowance for financing flexibility.

As the BCUC Decision clearly indicates, evidence drawn from U.S. utilities is useful, but needs to be adjusted. In subsequent decisions the BCUC has not needed to restate this, since by and large the BCUC's subsequent decisions have been based on subsequent changes.

Finally, the Regie in a 2009 Gaz Metro decision (D-2009-156, page 26) also concluded (paragraph 295) that:

> ***"The evidence therefore does not make it possible to conclude that the regulatory, institutional, economic andfinancial contexts ofthe two countries and their impacts on the resulting opportunitiesfor investors are comparable."***

All of these decisions have had to grapple with the smaller sample of pure regulated Canadian utilities traded in the capital market, as indeed all witnesses have had to do. However, I am not aware of any decision that has explicitly taken estimates from U.S. companies or the U.S. capital market and said that they are appropiate for use in Canada without any adjustment.

Although these decisions are over a decade old, I have yet to see a reversal of these judgments or a substantial increase in allowed ROEs reflecting implicitly a greater reliance on U.S data.

Q. **WHEN CAN YOU USE U.S. DATA IN CANADA?.**

A. I look at U.S. market risk premium data since it is an alternative set of data aimed at the same phenomena: the risk reward relationship in the capital market. I also look at other countries via the Credit Suisse annual in Appendix B. This external data informs my judgment and has lead me to adjust the estimates ftom the Canadian data. Similary, it is useful to look at U.S. gas and electric utilties since the number of Canadian pure play utilities is now limited. However, for an equity cost estimate from another country to be used in Canada, not only must the utilites used be :ym similar, but so too must be the capital market conditions.

Of importance is that in Canada, *Canadians* get the dividend tax credit which lowers the effective tax rate on dividends from *Canadian* securities to 44.82% for a Newfoundland and Labrador

resident who is in the highest tax bracket.[71] In contrast, the dividends from an otherwise identical U.S. utility would pay tax at 53.80% or 9% more. If in fact U.S. utilities are almost identical to Canadian utilities in that that their equity cost is the same and can be used without any adjustment, then most investors would obviously prefer to pay the lower tax rate and thus buy the Canadian utility. They would only buy the U.S. utility if they were the same and the investors do not care about the tax consequences of buying American. Once we consider taxes it is clear that parts of the equity market between the U.S. and Canada are segmented. As a Canadian tax-paying investor, I judge these tax differences to be relevant. I published a key paper in this area in ***1987*** and nothing much has changed since then.[72]

The fact is the Canadian tax system is one where personal and corporate taxes are "integrated," whereas the U.S. is referred to as a classical system and is not integrated. Fmihermore, the fact that personal and corporate taxes are integrated means that Canada is unwilling to extend the dividend tax credit to foreign securities, since the corporate tax that they pay is not to the Government of Canada. As a result, dividends from foreign utilities are taxed at full personal tax rates and high dividend paying shares are predominantly held by Canadian retail investors. It is for this reason that George Lewis of RBC pointed out that in general a typical Canadian utility will have a greater proportion of individual investors.[73]

> ***"The Canadian tax code, in an effort to mitigate the effects of double taxation, taxes dividends received by individuals and corporations at a lower rate than interest income. Since dividends are paid out of after-tax corporate earnings (whereas interest is a tax deductible expense of companies), corporations receive dividends free of income tax, while individuals' dividend income is taxed at a lower effective rate (under the dividend tax credit system) than their interest income. This means that a given dividend yield on a common share results in a***

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[71] https://www.ey.com/en_ca/tax/tax-calculators. The difference applies to all tax rates. For example, someone with $50,0000 in taxable income would pay only 8.42% on Canadian dividend income versus 30% on U.S. dividend income.

[72] Laurence Booth, The Dividend Tax Credit and Canadian Ownership Requirements, Canadian Journal of Economics, (May 1987).

[73] Chapter 11 in Joe Kan (editor) *Handbook of Canadian Security Analysis,* John Wiley & Sons Canada, 2001, page 439.

higher after tax income than the same numerical yield (interest rate) on a fixed income (i.e., bond) instrument."

Q. **WHY DID YOU JUDGE U.S. UTILITIES TO WARRANT 90-100 BPS HIGHER ROE?**

A. The realised market risk premium in the U.S. since 1926 has been 6.58%, whereas in Canada it has been 4.87%, or 1.71 % lower (Appendix B Schedule 9). This is the historic record.[74] Further, recent beta estimates for the major Canadian utilities have been 0.35 (Appendix C, Schedule 5) versus 0.61 for U.S. electric utilities (Appendix C, Schedule 9). So, there is a beta difference of 0.26 between the major Canadian and the sample of U.S. electric utilities. The utility risk premium would then be 0.35*4.87 or 1.7% in Canada versus 0.61 *6.58 or 4.01 % in the U.S. Moreover, currently forecast long-term government bond yields by RBC are 3.34% in Canada and 4.41 % in the U.S., where long term bond yields have invariably been higher in the U.S. for the last 20 years. Adding these together with a 0.50% flotation cost indicates a straight-forward equity cost of 5.01 % in Canada versus 8.45% in the U.S., or a difference of 3.44%. So, the decision of the BCUC seems to be extremely conservative.

The above estimates are *not* what I use to make my recommendation for the reasons stated earlier in my report, but ***every one of the objective inputs into the fair return is lower in Canada than the U.S.*** The only conclusion I can reach from this is that the U.S. capital market is riskier than in Canada, U.S. utilities are riskier than Canadian ones, and the base government bond yield is higher in the U.S. than in Canada. It is difficult to find any objective data indicating higher risk in Canada than in the U.S. This has also been confirmed by yet another failing U.S. bank last year spooking the equity markets.[75]

Q. **HAS MR. COYNE PROVIDED EVIDENCE OF THE DIFFERENT ALLOWED ROES IN THE U.S. VERSUS CANADA?**

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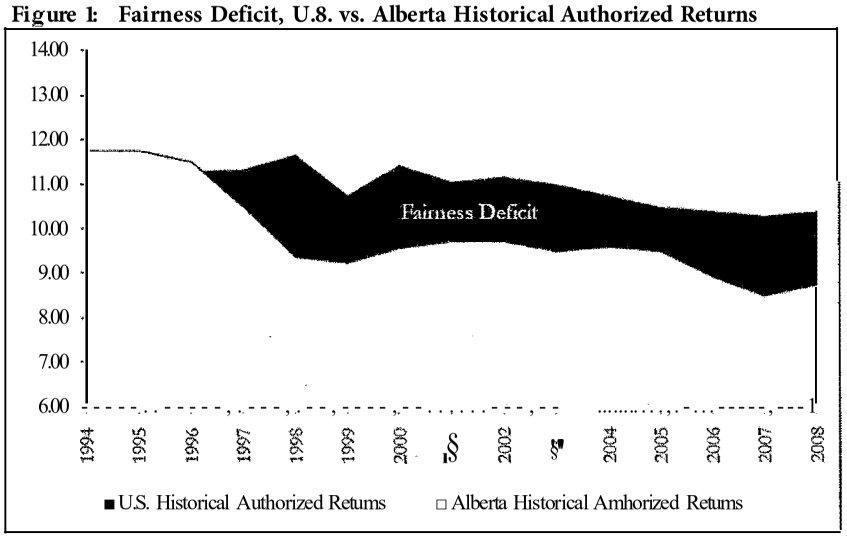
[74] It is based on correctly comparing returns on bonds and equities and not returns on equities with *yields* on bonds. There is no theoretical basis for calculating the market risk premium in this way, and I have not seen any academic research doing so.

[75] Silicon Valley Bank (SIB) failed on March 10, 2023 and Signature Bank on March 11, 2023. SIB was among the top 20 U.S. banks by total assets and had a $1.8 billion loss due to forced selling of assets.

A. Yes. In evidence before the AUC in its 2009 generic cost of capital hearing, Mr. oyne produced the following graphic. If Mr. Coyne's reported authorised (allowed) returns are correct: U.S. allowed ROEs have been consistently higher than in Canada by about 1.5%.[76] At the time he ascribed this to the use of an automatic ROE adjustment formula in Canada. However, the difference preceded the adoption of an ROE formula by the AUC, and was not negated by subsequent cost of capital hearings by the AUC or after the NEB renewed its formula in 2001, the OEB in 2004, or the BCUC in a series of hearings.

Figure 1: Fairness Deficit, U.8. vs. Alberta Historical Authorized Returns



Mr. Coyne described this difference in allowed ROEs as a "fairness deficit," implying that regulators either in the U.S. or Canada had persistently made mistakes in setting the allowed ROE. Since Mr. Coyne used the word deficit, it implies to me that he felt Canadian regulators were negligent and allowing ROEs that did not meet the fair return standard. I prefer to think that both sets of regulators were diligent, and the ROE difference or fairness deficit/gap was the result of the factors just described. The clear implication is that evidence on U.S. equity costs and allowed ROEs cannot automatically be used in Canada without a thorough check on whether the law of

[76] I doubt that allowed ROEs were exactly equal in the period 1994-1996. U.S. utility common equity ratios have also been higher for other reasons.

one price holds and the risk of the utilities and the capital market are identical. I have never seen any evidence put before a regulatory tribunal in Canada to support any of this. [77]

[77] Note that using a risk premium based on U.S allowed ROEs over Treasuries explicitly brings these higher ROEs into Canada. That is not appropriate, since again it implies that Canadian regulated ROEs were unfair over that time period.

VI. THE BUSINESS RISK OF NP

Q. HOW DOES BUSINESS RISK INTERACT WITH FINANCING?

A. I judge the best way to handle capital structure to be the approach adopted by the National Energy Board, the Alberta Utilities Commission, the Regie and the Ontario Energy Board, which is to determine capital structure based on the business risk of the utility. Utilities with higher business risk should then have more common equity, so that less financial risk offsets higher business risk to equalise total risk.

For example, in its RH-2-94 decision that established the ROE adjustment formula, the National Energy Board stated (Decision page 24):

> ***"The Board is of the view that the determination of a pipeline's capital structure starts with an analysis of its business risk. This approach takes root in financial theory and has been supported by the expert witnesses in this hearing. Other factors such as financing requirements, the pipeline's size and its ability to access various financial markets are also given some weight in order to portray, as accurately as possible, a complete picture of the risks/acing a pipeline".***

It then set the common equity ratio of the mainline gas pipelines at 30% and the oil pipelines at 45%.

In its generic hearing in 2004, the AUC set allowed common equity ratios for eleven distinct regulated entities in a range of ROE regulated businesses including gas and electric distribution, a gas pipeline, and electric transmission. Consequently, they included the operations of a transmission and distribution company like NP. The EUB stated (Decision 2004-052, pages 35-6):

> "To determine the appropriate equity ratio for each Applicant, the Board will consider the evidence and, where applicable, the experts' views and rationales in each of the following topic areas:
>
> 1. The business risk of each utility sector and Applicant
> 2. The Board's last-approved equity ratio for each Applicant (where applicable)
> 3. Comparable awards by regulators in other jurisdictions
> 4. Interest coverage ratio analysis; and
> 5. Bond rating analysis."

This approach of the Alberta EUB is substantially the same as the approach used by the NEB. I interpret the NEB and AUC as saying: first look at the business risk, and then examine the :financial implications in terms of market access and bond ratings.

However, an important point that sometimes gets lost is that the overriding criterion is the fair return standard (FRS) and not a particular bond rating. This was recognised by the BCUC when they stated ,in their 2013 generic cost of capital decision (G-20-12, page iii):

> ***"The Commission Panel is supportive of maintaining an "A" category credit rating but only to the extent that it can be maintained without going beyond what is required by the Fair Return Standard."***

The fair return standard trumps the relevance of a particular bond rating since there are other ways of ensuring market access without giving the shareholder an unfair rate of return. Issuing preferred shares, for example, is a way to fine tune the capital structure without awarding a higher ROE or common equity ratio than that which is warranted by the FRS.

Q. **WHAT PRIOR BELIEF WOULD YOU HAVE BEFORE LOOKING AT NP'S BUSINESS RISK?**

A. The third standard in the AUC's criteria is to consider the decision of other regulators. Here the AUC's decision is something of a landmark simply because they considered so many different companies at the same time. In contrast, the NEB's hearing only looked at pipelines, and in most other jurisdictions the capital structure decision is made in the company's general rate hearing.[78]

In its 2023 Decision (AUC 27084-D02-2023) page 64 the AUC stated:

> ***The final approved deemed equity ratio for AltaLink Management Ltd., PiikaniLink L.P., KainaiLink L.P., ATCO Electric Ltd., ATCO Gas, ATCO Pipelines, ENMAX Power Corporation, EPCOR Distribution & Transmission Inc., FortisAlberta Inc., the transmission operations of the City of Lethbridge, the transmission operations of The City of Red Deer, and certain electricity transmission assets of TransAlta Corporation, is set at 37 per cent. The final approved deemed equity ratio for Apex Utilities Inc. is 39***

[78] I generally recommend this since this is where the company specific information is generated.

per cent. These final approved deemed equity ratios are effective January 1, 2024, until determined otherwise by the Commission.

I would, therefore, expect that as a T&D utility with very limited generation that NP would have a common equity ratio of 37% similar to the T&D utilities recently awarded rates in Alberta. Further, in answer to CA-NP-87 NP confirmed that the non-Alberta Fortis electric utilities had the following common equity ratios,

Maritime Electric:	40%
Fortis Ontario:	40%
FortisBC Electric:	41%

Consequently, the range in similar utilities to NP is 37%-41%, with NP being a distinct outlier at 45%; that can only be justified if NP is actually of higher risk than any of these other electric utilities, which I don't see as being the case..

It is also important that while the Board has consistently regarded NP as an average risk Canadian utility, in answer to CA-NP-73 NP confirmed that in PU 7 (1996-97) the Board set NP's common equity in a range of 40-45%. The upper tier of that range at 45% has subsequently stuck without it being clear that NP has suffered increased business risk.

Q HOW DO YOU DEFINE BUSINESS RISK?

A. I agree with the NEB where in RH-4-2001 they differentiated between short run and long run risk. Short run risk is the ability to earn the allowed ROE and reflects the return *on* capital. Long run risk is the return *of* capital and reflects the ability of the utility to recover its investment in plant and equipment, that is, capital recovery risk. The NEB stated that for the TransCanada Mainline (Page 24 of the Decision):

> To date, TransCanada's earnings have not been affected by the excess capacity or increased pipe-on-pipe competition since the Mainline has been allowed to increase its tolls with the result that it has earned its full Revenue Requirement. Nonetheless, there is some uncertainty over the Mainline's future ability to attract sufficient gas volumes, which could have an impact on its earnings. Specifically, the Mainline's ability to recover its full cost of service would be put in jeopardy if its throughput declined to a point where the resulting tolls exceeded what the market could bear. While there is no indication that such an outcome is to be expected, the possibility that it may happen appears to have increased since 1994. Accordingly, the Board is of the view that there has been an increase in pipe-on-pipe competition since 1994, which acts to increase the Mainline's prospective business risk.

At that time the NEB pointed out that the Mainline had been able to earn its revenue requirement (and allowed ROE), but that the possibility that it may not be able to do this in the future had increased. The NEB subsequently increased the Mainline's common equity ratio from 30% to 40% in several hearings to reflect this increase in long run capital recovery risk.

However, long term risks must eventually become short term risks to have any impact. As I stated before the NEB in RH-4-2004:

> ***"If problems occur, then firms bring these problems to the regulator and frequently "compromises" are worked out. This is part of the regulatory bargain and only regulated firms have this capability. For example if a competitive firm suffers a supply shock then the stockholders are directly affected, hut in contrast a regulated firm can have losses put in a deferral account and allocated to future customers or apply to the regulator for other means of protecting the stockholders from loss. Consequently it is unreasonable to expect no action on the part of the regulator to the increased risk after year 11 in the above example."***

The increased risk after "year 11" was the present value of the cash flows beyond year 10, which I arbitrarily referred to as long run risk. The point is that when serious risks do arise it is extremely rare for a Canadian utility not to come before the regulator to ask for some reallocation of costs to keep the shareholder whole.

This is exactly what happened with the Mainline in RH-03-2011 when it came before the NEB asking: for costs to be reallocated from the Mainline to customers of NGTL; depreciation to be reallocated to different zones to avoid stranded costs; and for significant changes to be made to its rate design. The NEB did not allow all of the changes that TransCanada asked for, but the fact is there *was* a hearing, and the NEB did adopt policy measures to deal with the Mainline's problems.

I would expect the same approach to be adopted by any of Canada's regulators if a utility got into serious trouble.[79] That is, regulators in Canada tend to be proactive and responsive to risks faced by a utility they regulate.

Q. **IS THE BOARD AN UNRESPONSIVE REGULATOR?**

A. No. In Appendix A to their October 16, 2015 report, Concentric Energy rates the Board on a point system allocation of their DBRS ratings on the following factors:

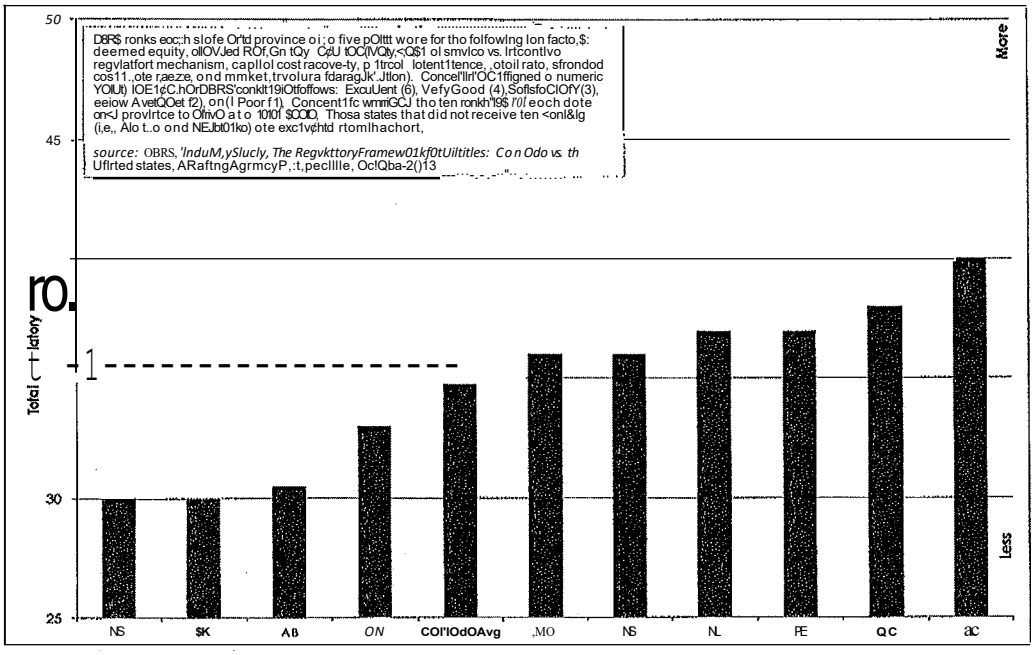
1) Deemed capital structure
2) Allowed ROE
3) Energy cost recovery
4) Cost of service vs incentive rate making
5) Capital cost recovery
6) Political interference
7) Retail rate
8) Stranded costs
9) Rate freeze
10) Market structure

DBRS is Cana a's premier rating agency, and as Morningstar DBRS is now a major rater in the U.S. The rating seems to be based on their credit rating support, and not on protecting the public or the fair return standard. Each factor is rated on a scale from 1-5, with 5 being the best and then seemingly adding up. Although this seems to treat all factors equally, the Board is ranked fourth out of Canada's eleven regulators. Consequently, Concentric sees the Board as one of the most supportive regulators in terms of DBRS 's bond rating and is highly likely to protect NP if it suffers any serious problems.

The following graphic reproduces Concentric's full list of scores that they used at that time:

[79] I have seen similar action by the BCUC with respect to Pacific Notihern Gas, by the New Brunswick Energy and Utilities Board with respect to Enbridge Gas New Brunswick, and by the NSUARB for Nova Scotia Power.

Figure 8: Ranking of Regulatory Jurisdictions - Canada



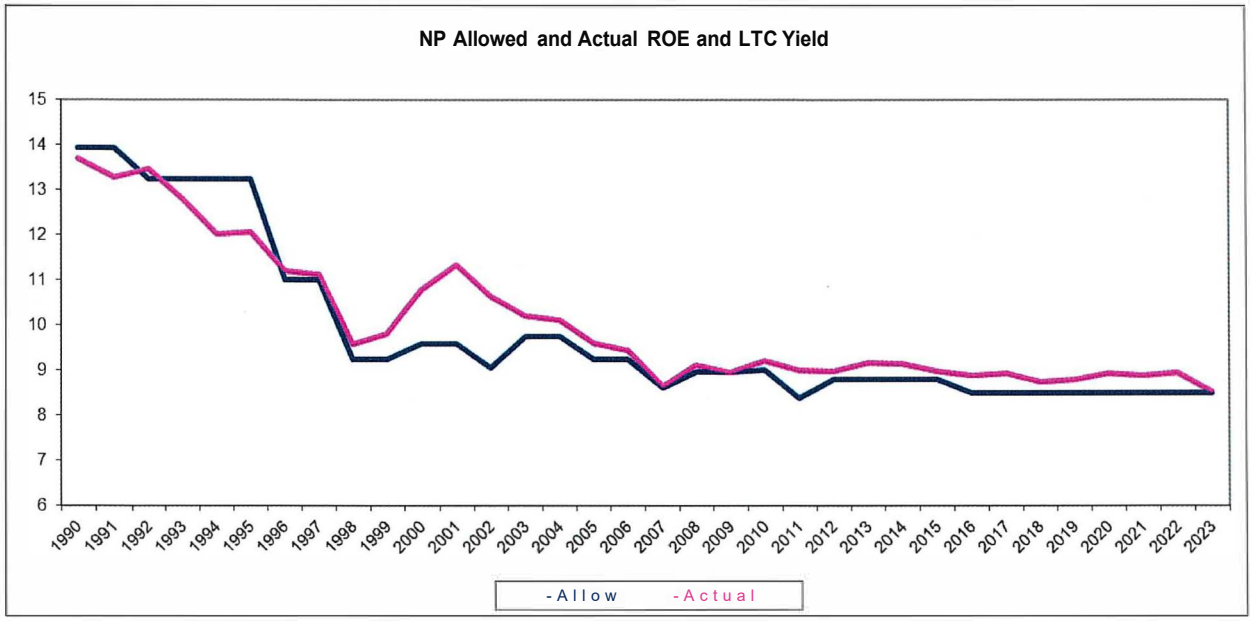
I do not necessarily agree with Concentric's analysis, since there is significant overlap in some of the categories, and the ones that count are the ability of the utility to earn their allowed ROE and the treatment of stranded costs. I would agree with the general assessment that the Board is a supportive regulator, which is indicated by NP's extensive set of deferral accounts that allow it to earn its allowed ROE. However, in my judgement there is very little difference between Canadian regulators because they are all protective towards "their" utility,[80] and I am concerned that some of the criteria used by Concentric very much reflect the bond rater's analysis of what is good for the bondholders, not what satisfies the fair return standard. Obviously, utilities are regulated to

[80] Note that this is what I refer to as the regulatory compact: the regulator reduces the utility's risks and passes this on to rate payers, and in return it is allowed a lower ROE and less common equity, which reduces rates. Obviously, the utility wants both the protection and a higher ROE and more equity.

protect the rate payers, not the bond holders, so I do not put much faith in some of Concentric's analysis.

Q. HOW DO YOU ASSESS NP's BUSINESS RISK?

A. Similar to the NEB, I have traditionally viewed business risk as having a shmi and long run dimension. On short tenn risk I have looked at the ability of the utility to earn its allowed ROE since this reflects the impact of regulatory protection and the allowed deferral accounts.[81] The following graphs NP's allowed versus actual ROE since 1990 as provided in CA-NP-079.



NP has been allowed a band around its rate of return that translates into approximately +/- 0.40% on its ROE. The graph indicates that NP has consistently earned its allowed ROE with an average "excess" of 0.25% over this very long period. However, between 1990 and 1995 it underearned in five years mainly due to severe weather and a reassessment by CRA. Since then, NP has not undereamed in a single year, and since 1995 its over earning has averaged 0.43% with the CRA reassessment in the early 2000's accounting for a significant amount of the overearning in those

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[81] In almost 40 years of looking at regulated utilities' business risk, I have never once seen a witness presented by the utility look at the ability of the utility to earn its allowed ROE. Instead, they tend to focus on generalities and a subjective assessment without any attempt to translate this into a quantitative manner to unceliainty in the earned ROE.

years. Excluding those years, since 2003 NP has still over earned by 0.30%, or near the top of the 0.40% band.

In a dictionary sense, risk is the probability of incurring harm. On the basis of its demonstrated ability at earning its allowed ROE, NP has not suffered any risk whatsoever. In fact, what risk it has suffered has not stemmed from its operations as much as its relations with CRA. More to the point, NP has consistently been allowed a risk premium. In its current 8.5% allowed ROE, the Board included a 6.7% premium over the 1.8% average LTC yield in 2016. This is a bit misleading due to the abnormally low LTC yields at that time. However, the fact is it is not risk when you only earn ***more*** than the risk-free rate, regardless of whether or not there is any variability in that return. In other words, if someone guarantees that you will always earn more than the long Canada bond yield, then you cannot be riskier than the long Canada bond! [82]

Q. ISN'T RISK FORWARD LOOKING RATHER THAN BACKWARD LOOKING?

A. Yes. There seems to be a consistent theme to expert evidence put forward by most companies and their expert witnesses. This is that bad things could happen to the utility, even though so far they never have. Often the conclusion is that the utility is riskier than in its lastrate hearing. In CA-NP-044 in the 2016 hearing, NP was asked to provide extracts from its business risk evidence in the 1990s when it was suffering the most from inter-fuel competition. These extracts are revealing.

- In 1992 Dr. Roger Morin stated, "competition in the energy industry in Newfoundland is increasing."
- In 1996 Mr Ryan stated "Significant changes are developing in the north American electric utility market. Driven by global competition, new technologies and cheap natural gas, utilities are starting to compete with independent power producers and with each other to retain existing customers and attract new ones."
- In 1996 Dr. Roger Morin stated, "the business risks faced by the Company are higher and they have intensified since the Board's last rate decision in 1991."

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[82] This is regarded as a situation of stochastic dominance.

- In 1998 Ms. McShane stated, "It (NP) competes with oil for space and water heating. In contrast to many electric utilities a significant proportion (54%) of the company's sales are for space heating. Recent declines in fuel oil prices make oil a more competitive option."

- In 1998 Dr. Morin stated, "the company continues to be vulnerable to competition in the space and water heating markets from other energy sources, particularly from oil companies."

However, as shown by NP's subsequently demonstrated ability at earning its allowed ROE, these risks have not generated any "losses" to the shareholder where the subpar ROEs were largely based on CRA reassessments that were subsequently reversed. Moreover, this was a time when fuel oil had a very clear cost advantage over electric space heating. The reason is that NP forecasts the future demand on its system and there is only a loss if it suffers a significant ***unexpected*** drop in demand due to competition from other fuels. To the extent that NP is on top of its forecasting and risk assessment, the impact of some customer losses is not material as its ROE history demonstrates.

Q. **WHAT IS NP'S LONG-TERM RISK?**

A. The main one is capital recovery risk. Since most utilities are transportation utilities, the critical question is the underlying supply and demand for the commodity being distributed. If supply or demand changes significantly, then rates may have to rise, and the utility may not be able to recover the cost of its approved capital assets. This is often referred to as the death spiral. Depreciation rates are then set to mitigate this risk to ensure that the future revenues are matched with the future costs of the system.

I would judge these risks to have decreased since the last litigated hearing in 2016. The main reason being that the alternative fuels used to compete with NP are carbon based such as heating oil. As of April 1 2024, there is an additional $15 a tonne of carbon taxes to reach $80, on its way to a forecast $150. This increase reflects the Government of Canada's determination to reduce carbon pollution. Currently electricity has a 10-15% advantage over fuel oil, and the penetration of subsidy supported heat pumps will only increase this in tandem with increased carbon charges on

fuel oil. Given NP's monopoly position in distributing electricity in Newfoundland, it is difficult to see how its risk has not gone down.[83]

Q. WHAT ABOUT THE LONG RUN RISKS OF HIGHER ELECTRICTY COSTS FROM HYDRO?

A. It is important to remember that switching from one fuel source to another is not costless. It can easily cost $25,000 to switch to oil-fired hot water radiators even if fuel oil were cheaper, which it is not. I would judge switching to a wood or pellet burning heat source equally fanciful for most ratepayers. The fact is that in the long run all fossil fuel sources are under threat from current Government of Canada policy. Therefore, the only real question is how high can electricity prices go before people swich to heating oil despite the carbon tax and its other undesirable features.

One way oflooking at this is from the annual cost ofresidential electricity consumption done each year by Hydro Quebec. In Schedule 11 is HQ's analysis of residential costs across Canada, where currently St John's is amongst the lowest. The extreme low costs are for Quebec, BC and Manitoba due to their vast supplies of low-cost Hydro power. The following graphic is the cost comparison as of April 1, 2023 for a 1,000 KWh residential customer. In the Quebec comparison, Montreal is indexed at 100, and then the costs are relative to this monthly cost, so Winnipeg is indexed at 131 and Vancouver 149. Again, the message is the same: St John's is at the low end at 176, similar to Toronto, where most people heat with natural gas. Other Canadian cities have much higher costs, with Charlottetown at 228, Halifax at 234, and Edmonton at 356. Halifax and Edmonton could access natural gas, but even with much higher electricity costs they have not. If one wants to look at sticker shock, I suggest looking at New York City, San Francisco, or Boston.

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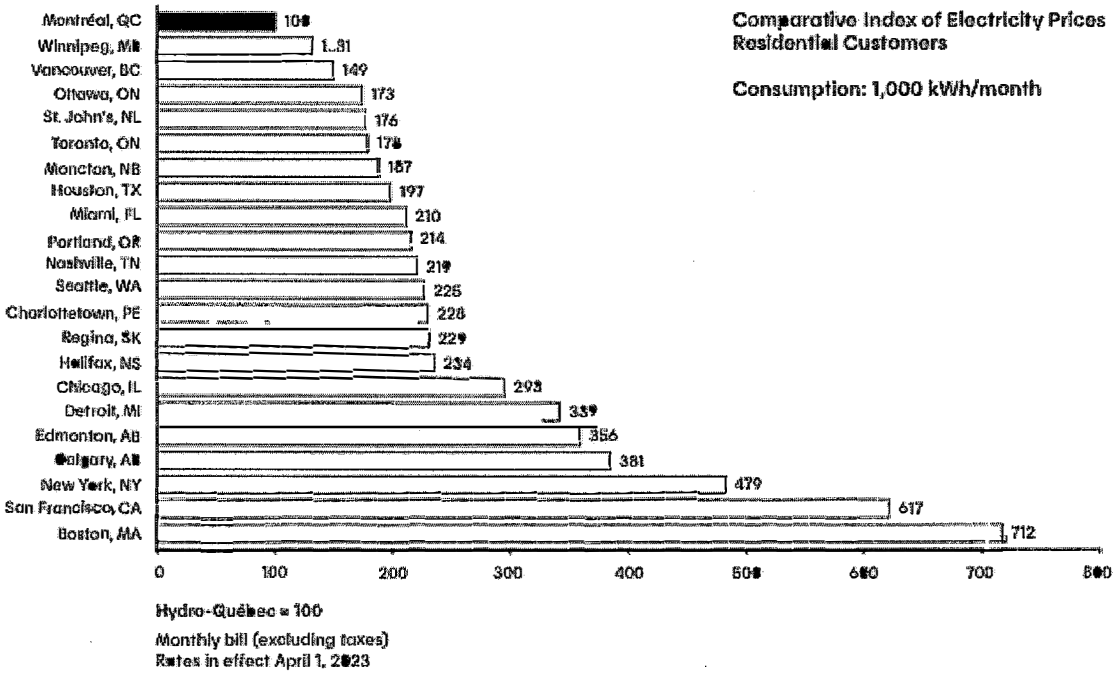
[83] In answer to CA-NP-042 in the 2016 GRA, NP estimated that fuel oil had a 40% cost advantage to electricity in the 1990s, yet only 3.7% ofNP's customers switched from electric space beating.

FIGURE 1



From these cost comparisons, I judge electricity to be competitive in Newfoundland and Labrador, and that it would require very large increases in power costs from Hydro before people even think of switching to alternative fuels. Further, if there is a significant increase in power costs from Hydro, it is important to remember that a 40% increase in the cost of power does not translate into a 40% increase in utility rates, since there should be no change in the actual distribution costs. Finally, the Board and the Government of newfoundland and Labrador have tools to manage any rate shock should the cost of power from Hydro increase significantly, such as changing the depreciation rate, reducing the +/- 0.40% band around the allowed ROE, and changing to a more efficient capital structure.

The fact is that a significant increase in electricity prices from Hydro may be a political issue in the province, as change always is. However, that does not make it an economic issue for NP, and it may pass as Hydro's cost are largely the fixed financial cost, so that in the future they are likely to increase at a lower rate than inflation. In my judgement, there has been a material decrease in NP's business risk since 2016, and any rate shock from higher electricity costs should be considered relative to the costs of alternative fuels and rates elsewhere.

Q. WHAT ABOUT OTHER FACTORS RAISED BY NP AND ITS WITNESSES?

A. Most have not changed in any material sense, but two things are important to consider: the impact of generation risk and the "small size" of NP.

In terms of size, NP constantly claims that it is a small utility, a judgment that depends entirely on the reference utilities. Below is data from Fo11is' latest AIF:

Summary of Operations

The following table and sections describe the Corporation's operations and reportable segments.

	CustOIDI!rli	Peak Demand°'	Electric T&DI.Jnl!S /Ci/:Cl]iri<m.l	Gas T&D Lines {km}	·GeneraU119 Capaaty /MM)	Revenue (Smi/lions/	GWh Sa11l5	Gas Volum"' {P1/	Employees
Regulated IJUlltles									
ITC	—	22 102 MW	26,100	—	—	l.085	—	—	747
UNS c'ierg,	719,000	3,314 MW 115 TJ	23,200	5,100	3,408	3,006	16,173	17	2.00,
Ctntra!Hud n	405,000	1,046 MW 150 TJ	15,200	2,400	65	1,360	4,921	24	1,193
fontsBC Eni:fg;	1,087,000	1.334 TJ	—	51,600	—	1,955	—	213	l.143
Forrt:Al e m	592.000	2.643 MW	90,500	—	—	738	16,976	—	1,234
for11:SC Eleanc	191,000	689 MW	7,300	—	225	528	3,478	—	571
Csr,er 8,;::tnc									
Nc·,dcur,dl;nd Po·,er	275,000	1,474 MW	11,500	—	145	770	5,928	—	680
M;mlme ElcdrTC	89,000	359 MW	6,700	—	90	261	1,479	—	224
Foro,Ont;;◇o	69,000	261 MW	3,400	—	5	113	1,324	—	110
Can©bean Uulme:	34,000	124 MW	700	—	166	394	727	—	263
Foro◇rc,	17,000	50 MW	700	—	88	113	295	—	163
Non-Regulated									
Cori:::ur tc Jnd ◇htr	—	—	—	—	51	84	164	—	99
Total	3,478,000	32.062 MW 1,599 TJ	185,300	59,100	4,243	11,517	51,465	254	9,598

'" *E!em1<:(MW)cNgas(T:f]*

NP has more customers than all of Fortis' Canadian electricity operations except Fo11is Alberta, which has 592,000. NP is larger than F011is BC Electric, which has 191,000, Maritime Electric which has 89,000, and Fo11is Ontario, which has 69,000. NP is small only relative to F011is US operations, and yet size alone does not mean more risk and more common equity, since F011is BC Electric is allowed 41 % common equity, Maritime Electric and F011is Ontario are allowed 40%, and Fortis Albe11a is allowed 37%. In comparison, NP's 45% co1mnon equity is clearly an outlier for a relatively large Canadian electricity distributor in the Fortis family.

In terms of generation Fortis AIF has the following

Summary of Operations

The following table and ,ections describe ,he Corporation's operations and reportable s.egments

	CurtolTM!rs	P<ak Dl!mand [1]		Illectrlc T&DUn1>< /ci,ruir Jan)	6asT&D U>5 {km}	Genl!rattng CapiKlty /MW)	Revl!llue /S m;//ions/	GWh Sall><	6as Volum1>< (PJ/	Employ"''
Regulated Utilit1><										
ITC	—	22.102	MW	26,100	—	—	2.085	—	—	747
UN:OEnerg,	719,000	3,314 115	MW TJ	23,200	5,100	3,408	3,006	16,173	17	2.061
Central Hud ,en	405,000	1,046 150	MW TJ	15,200	2.400	65	1,360	4,921	24	1,193
fo111:BC Energ:,	1,087,000	1,334	TJ	—	51,600	—	1,955	—	213	2.143
Fo111:Alb:rt'	592.000	2.643	MW	90,500	—	—	738	16,976	—	1,234
forti:BC Electri,:	191,000	689	MW	7,300	—	225	528	3,478	—	571
Oth'.rBlearic										
NeM'cuooland Po,,er	275,000	1.474	MW	11,500	—	145	770	5,928	—	680
Mari:lme Bear.c	89,000	359	MW	6,700	—	90	261	1,479	—	224
Foro;Onrerto	69,000	261	MI\I	3,400	—	5	223	1,324	—	22D
Canbidcan Ut:lmes	34,000	124	MI\I	700	—	166	394	727	—	263
ForosTCI	17,000	50	MI\I	700	—	1B	113	295	—	163
Non-Regulated										
Corporate and Other	—	—		—	—	51	84	164	—	99
Total	3,478,000	32.062 1,599	MI\I TJ	185,300	59,100	4,243	11,517	51,465	254	9,598

m Etear!C(MW)ary ;;(T.J)

Note that NP's generation is minimal. In contrast, Fortis BC Electric, the former West Kootenay Power, has 32% of peak demand from its own generation units, Maritime Electric has 25%, and Fortis Ontario has 2%. I do not regard any of these as a significant risk factor in Canada, but generation can be important for some Canadian utilities in the comparison group.

Q. WHY CAN GENERATION BE IMPORTANT?

A. It is not so much the generation itself as the *type of generation.* Below is the amount of generation in each of Mr. Coyne and Mr. Trogonoski's U.S. sample provided in answer to CA-NP-193. Of impo1iance is that every one of the utilities except Eversource has internal generation, that is, they are not pure Transmission and Distribution (T&D) utilities, but are instead integrated utilities with generation, transmission and distribution. I regard NP as a pure T&D utility. What is more, six of the referenced U.S. utilities derive a large amount of their power from nuclear generation.

U.S. Electric ProMy Group	Ticker	*Nuclear Generation (MWh)*	*Net Generation (MWh)*	*Total Sources of Energy (MWh)*	**Generation as% of Total Sources of Energy**	Nuclear Generation ••%of **Net Generation**
Alliant Energy Cor1>oratlon	LNT	0	25,518,039	34,818,810	**73,5%**	**0,0%**
American Electric Power Company, Inc.	AEP	16,623,325	71,404,446	143,172,629	**49.9%**	**23.3%**
Duke Energy Corporation	DUK	73,109,029	208,558,261	261,194,750	**79.8%**	**35.1%**
Entergy Corporation	ETR	38,150,948	115,875,150	158,.g72,629	**73.2%**	**32,9%**
Evergy Inc	EVRG	8,441,882	37,168,225	61,202,890	**60.7%**	**22,7%**
Eversource Energy	ES	*d*	42,073	65,372,294	**0.1%**	**0.0%**
NextEra Energy Inc	NEE	30,768,329	143,386,133	150,688,279	**95,2%**	**21,5%**
OGE Corp	OGE	0	13,575,657	32,640,620	**41,6%**	**0.0%**
Pinnacle West Capital Corporation	PNW	.9,292,628	27,48,,1,942	36,629,353	**75.0%**	**33.8%**
Portland General Electric C.ompany	POR	*d*	13,180,945	26,888,850	**49.0%**	**0.0%**

Source:
S&P Capital IQ; FERC Form 1

Mr Coyne and Mr. Trogonoski state:

> ***"Concentric has previously provided an analysis comparing authorized ROEs for U.S. integrated electric utilities versus transmission and distribution only utilities. The analysis found that authorized ROEs for companies that own regulated generation assets is within the range of 20-30 basis points higher than for companies that do not have regulated generation assets in rate base."***

I would go further and state that the downward adjustment of 0.30% should be larger for utilities with nuclear or coal-based plants than for utilities with hydro plants or gas co-generation plants. This is because the most 'dangerous' plants are nuclear where in the past they have not been allowed into the rate base in some U.S. locations. Similarly, in some jurisdictions coal plants must be taken out of the rate base to meet climate change targets. In contrast, while natural gas is a fossil fuel, it is not as polluting and may become less so in the future due to carbon capture. In addition, natural gas serves a peaking function that cleaner fuels do not.

Of relevance is that in the Nova Scotia Power (NSP) hearing before the NSUARB in 2022 the question was what to do with NSP's coal generating plants that had been approved for use in the rate base, but were no longer "used and useful" after 2030 due to climate emission restrictions in their use. The key question was who should pay for the almost $1 billion book value of these now redundant, but Board approved, coal plants. NSP wanted a new deferral account to still recover their cost from ratepayers, essentially making them pay twice for their power. I suspect that not relying heavily on coal or nuclear facilities reduces an integrated electric utility's risk. More to the point, it reduces NP's risk relative to these U.S. utilities.

The Concentric witnesses argue that given NP's reliance on Newfoundland Hydro, this 'sole supplier risk' offsets NP's lack of significant generation assets. However, both Hydro Quebec

Distribution and Hydro Quebec Transmission in 2013 relied 100% on Hydro Quebec generation when the witnesses reduced the rate of return from U.S. electric utilities to apply to HQD and HQT.

Q. WHAT IS YOUR ASSESSMENT OF NP's BUSINESS RISK?

A. Whatever short term business risk NP faces is removed by its extensive use of deferral accounts as reflected in its consistent ability to over-earn its allowed ROE. Its long term risks have undoubtedly reduced as society has become more concerned about climate change and the burning of fossil fuels. This reduces any lingering competitive risk from fuel oil that may have resulted in fuel switching in the past. Further, although ratepayers should prepare for some possible rate shock in electricity prices, I do not see a realistic alternative or a magnitude of electricity price increases that comes close to prices in other major cities in Canada and the U.S. In this case I judge NP as being of lower risk than in the past, and as low if not lower risk than the other electricity utilities in Canada, all of which have lower allowed common equity ratios.

VII. FINANCING AND CONCLUSION

Q. WHY IS THE COMMON EQUITY RATIO SO IMPORTANT?

A. A firm's capital structure has a direct impact on the overall cost of capital as conventionally defined in finance, since equity costs are paid out of after-tax income, whereas debt costs are tax deductible. Hence, for example, if long term debt costs are about 5.11 %[84] and equity costs are 8.50% as currently allowed NP, then at a 30% tax rate (similar to NP's future cost), the pre-tax costs are actually 12.143% for the common equity (.085/(1-.30)); since the ROE is after tax, it attracts a prior income tax charge compared to 5.11 % for the debt. This means a spread between the two of 7.03%. In terms of the revenue requirement, this means that every dollar shifted from debt into equity costs the rate payers 7.03% times the percentage change in the rate base in additional revenue requirement.

Taxes are critically important in corporate finance because a huge amount of corporate financing activity is tax motivated. A good example is the announcement by the Government of Canada to change the tax status of income trusts and publicly traded limited partnerships. Income trusts had been popular in Canada, since the effective removal of the corporate income tax allowed more income to flow through to investors. On October 31, 2006, after the markets closed, the Federal Minister of Finance, Mr. Jim Flaherty, announced that all new trusts would be subject to a 31.5% distribution tax to put them on the same tax status as corporations and that existing trusts would pay this tax in five years.

The importance of the income tax changes can be understood from the following graph that tracks the price of the exchange traded income trust fund, XTR. Before the Minister of Finance's decision, the income trust ETF was at $15, the day after it had dropped to $13.25, and then on November 2 it had dropped even further to $12.75, before rebounding slightly. Most analysts predicted that the tax changes would cause income trusts to drop in value by 20-25%, but the effect varies across different trusts, depending on the proportion of Canadian to foreign income and the

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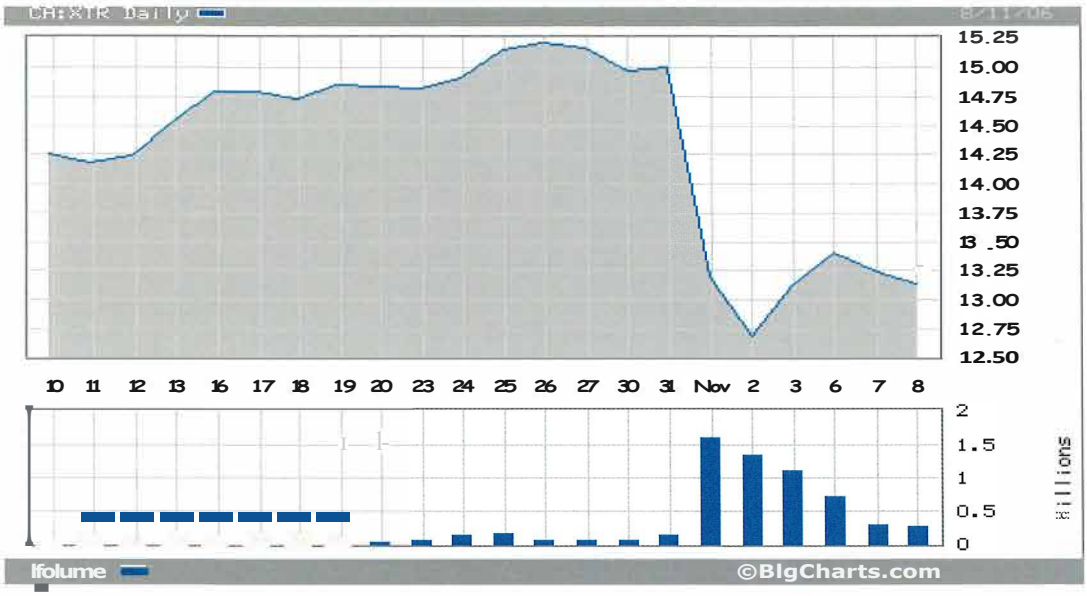
[84] This is essentially NP's embedded debt cost.

type of income, that is, how much is return of capital and how much newly taxable income. Plus the existing trusts would only be taxed in five years.



The price drop vividly demonstrates that the corporate income tax has a huge impact on the valuation of shares. Another way of saying this is that removing the corporate income tax by financing with debt adds of the order of 15-20% to the market value of the firm. We can see this from the fact that the exchange traded fund would sell for $15 without the corporate tax and about $13 with the tax levied in ***five years'*** time. The impact of the time until the tax is levied means that the true value of removing the corporate income tax is much greater than these price changes indicate.

This basic discussion is relevant since publicly traded firms are constantly re-assessing their capital structures ("improving their balance sheets") in light of changing market conditions and the changing risk of financial distress. It also explains why capital structures differ from one finn to another, since both the nature of their assets and expected cash flows are different as well as their forecast of where we are in the business cycle. One finn with mainly hard tangible assets will use large amounts of debt, since these types of assets are easy to borrow against. Another firm that spends significant amounts on advertising will have relatively little debt, since it is harder to bonow against brand names and "goodwill." Another finn will use very little debt, since it is not in a tax paying position and cannot use the tax shields from debt financing. Another firm may use

very little debt simply because it believes that its equity is cheap, because its stock price is so high. Finally, yet another firm may use more debt because it is more optimistic about the state of the economy. In each case, the firm will solve its own capital structure problem based on its own unique factors.

This discussion puts the utility capital structure in perspective, since utilities have the lowest business risk of just about any sector in the Canadian economy. Consequently, they should have the highest debt ratios. There are several reasons for this:

First, the costs and revenues from utility operations are stable so the underlying uncertainty in operating income is very low. As such financial leverage is essentially magnifying almost non-existent business risk, and zero times anything is still zero! This is demonstrated by NP's demonstrated ability to earn its allowed ROE.

Second, in the event of m1anticipated risks, regulated utilities are the **only** group that can go back to their regulator and ask for "after the fact" rate relief. As effective monopolies their rates can be increased in the event of financial problems, while demand is. typically insensitive to these rate increases. In contrast, if unregulated corporations face serious financial problems, they usually compound one another. This is because tmregulated firms encounter difficulties raising capital and frequently suppliers and customers switch to alternates in the face of this uncertainty creating severe financial distress.

Third, the major offset to the tax advantages of debt is the risk of bankruptcy. In liquidation there are significant external costs that go.to neither the equity nor the debt holders. These costs include "knock down" asset sales, the loss of tax loss carry forwards, and the reorganisation costs paid to bankruptcy trustees, lawyers etc. This causes non-regulated firms to be wary of taking on too much debt, since value seeps out of the firm as a whole. In contrast, it is impossible to conceive of NP ripping up its wires and selling them for scrap.

Finally, most private companies have an asset base that consists largely of intangible assets. For example, the major value of Coca Cola is its brand name and of Merck its R&D team. It is extremely difficult for non-regulated firms to borrow against these assets. Growth opportunities have a habit of being competed away; brand names can waste away, while R&D teams have a habit of moving to a competitor. Regulated utilities in contrast largely produce un-branded services and derive most of their value from tangible assets. Unlike intangible assets, tangible assets are useful for collateral, for example in first mortgage bonds, and are easy to borrow against.

Consequently, utilities have very low business risk; have reserve borrowing power by being able to return to. the regulator, minuscule bankruptcy/distress costs, and hard tangible assets that are easy to borrow against. In fact, utilities are almost unique in terms of their financing possibilities,[85] and are prime candidates for using large amounts of debt to utilise their significant tax advantages.

The above ideas are standard in finance. A popular finance textbook is Fundamentals of Corporate Finance, McGraw Hill Irwin (3rd edition) by Brealey, Myers and Markus).[86] In chapter 15 the text discusses capital structure and notes the following:

- (Page 434) "Debt financing has one important advantage. The interest that the company pays is a tax deductible expense, but equity income is subject to corporate tax."
- (page 434 and 435) The interest tax shield is a valuable asset. Let's see how much it could be worth……..If the tax shield is perpetual, we use the perpetuity formula to calculate its present value:

$$\text{Pv tax shields} = \frac{annual tax sheild}{r_{debt}} = T_c D$$

- (page 435, 436) How interest tax shields contribute to the value of stockholder's equity ....

Value of levered firm = value of all-equity firm+ TcD

- (Page 444) For example, high-tech growth companies, whose assets are risky and mainly intangible, normally use relatively little debt. Utilities or retailers can and do borrow heavily because their assets are tangible and relatively safe.

These four particular comments are taken from the discussion of what is commonly referred to as the static trade-off model, where the tax advantages of debt financing are traded off against the costs of financial distress and loss of financial flexibility. They are here referenced simply because there is little disagreement amongst academics that debt is valuable to the firm due to the tax shields it generates.

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[85] When we analyse corporate financial decisions, we normally include a number of explanatory variables and then add a "dummy" variable for whether or not the industry is regulated, since the mere fact of regulation is frequently the most significant feature of a firm's operations.

[86] A similar discussion is in all finance textbooks; the Brealey et al text is a competing text to my own.

These ideas are also common in financial practise. In 2006, Deutsche Bank published a study Corporate Capital Structure, January 2006 with a review of the basic principles for determining corporate use of debt and the results of their survey of chief financial officers with the following relevant results on page 42.

Figure 21: Factors in Oete:nnining Level of Debt

03.2: "How irrµor:tanf are the following factors in detem1ning the appropriate ,level -of debt for your conl)any?" Scale is !'bl In-;iortan.t (O} to Very In-portal1t (5).

We see the impo1iance of credit ratings (market access), ability to continue to make investments (financial flexibility and fear of distress), tax shields, etc. Overall, this survey reinforces the basic "static trade-off' model that firms balance the tax advantages of debt against the restrictions it imposes on their activities and the fear of financial distress. As a result, they have an optimal or target capital structure.

On page 37 of their report, Deutsche bank indicated that 85% of North American firms reported that they had a target capital structure. Why this is important is that this target capital structure represents the trade-off of the factors discussed above and reinforces the academic literature that has modelled this trade off.[87]

Q WHY DO UTILITIES SEEM TO RESIST HAVING AN EFFICIENT CAPITAL STRUCTURE?

A. There are two main reasons. First, as the Alberta Energy and Utilities Board stated (AEUB 2003-061, August 2003, page 103):

> ***"The Board notes that since cost of capital recovery is provided for through its annual revenue requirements, a regulated utility, like AltaLink, would naturally wish to maintain low debt ratios. This allows the utility to minimize the financial risk imposed on equity investors, and to also maintain high debt ratings."***

The use of debt financing is thus like any other efficiency gain in that the gains should be competed away and flow through to the customers. Managers of a utility should operate the utility in a professional manner to reduce costs. However, alternative incentives exist under Canadian corporate law, where the Canada Business Corporations Act (CBCA) has stated that:

> "Every director and officer of a corporation in exercising his powers and discharging his duties shall:
>
> 1) act honestly in good faith with a view to the *best interests of the corporation;* and
>
> 2) exercise the care, diligence and skill that a reasonably prudent person would exercise in comparable circumstances."

Further, the governance guidelines of the TSX (Where Were the Directors, 1994, the Dey Report) indicate that:

> *"We recognize the principal objective of the direction and management of a business is to enhance shareholder value, which includes balancing gain with risk in order to enhance the financial viability of the business.* " **(S** 1.11)

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[87] Note that as discussed above, this does not mean that this target is constant.

This imposes on the directors a fiduciary responsibility to the company's shareholders and not to their customers and other stakeholders.[88] In NP's case this means Fortis Inc. In this context, utilities claiming to be facing more risk to support either high or more common equity are acting like the managers of any other private corporation, which is to say acting in the best interests of their shareholders.

Q. ARE THERE SPECIAL PROBLEMS WHEN UTILITIES ARE PART OF HOLDING COMPANIES?

A. Yes. NP is owned by Fortis Inc., and S&P, for example, rates a subsidiary no higher than its parent on the basis that a parent can "raid" a subsidiary unless it is structurally insulated, or ring fenced from its parent. Although NP does not have an S&P rating, its parent does, and the rating of the subsidiary changes when its parent changes. For example, in 2007 BMO Capital markets (June 19, 2007, Research Note) pointed out:

> ***"Standard & Poor's today upgraded its rating on Terasen Gas Inc. three notches to A from BBB and has assigned a Stable outlook. The rating was also removed from CreditWatch*** witli ***Positive Implications, where it was placed on February 26, 2007, on the announced acquisition of its immediate parent, Terasen Inc., by Fortis Inc. The rating action is not surprising given the new ownership but it is fair to say the rating upgrade is higher than we expected. We believe the rating upgrade is positive for the spreads on Terasen Gas Inc."***

Note that nothing much happened in the regulated operations of Terasen Gas,[89] but it was upgraded three notches from BBB to A simply because it was no longer owned by a "dodgy" U.S. parent.

As indicated above, there are tax and other advantages to a company using debt. For ROE regulated utilities, the tax advantage flows through to rate payers in terms of a lower tax charge in the revenue requirement. However, for utilities owned within a holding company this situation is worse, since the parent has an incentive to finance the utility with as much equity as possible, so that the tax

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[88] Recent changes to the CBCA have broadened this responsibility so that the board of directors can if they wish consider other stakeholders.

[89] Formerly BC Gas, now F011isBC Gas.

advantages to financing with debt are shifted to the parent. In this way it is the parent's shareholders that get the tax advantages to debt financing and not the utility rate payers.[90] This is often called the "double leverage" problem, where the utility assets support debt at both the utility level and then again at the parent level.

Q. HOW DO THESE COMMENTS APPLY TO NP?

A. They are not *as* relevant to the Fortis group of companies as for other Canadian utilities since Fortis' utility subsidiaries are usually ring fenced, that is, protected from inappropriate actions by their parent. In Schedule 12 is an extract from Fortis latest AIF. Notice in the S&P ratings that Fortis is rated BBB+ and generally the unsecured debt of its operating subsidiaries are also rated BBB+.[91] The exceptions are Fortis Alberta and TEP in the U.S., which both satisfy S&P's ring fencing requirements and are raised one notch higher at A-. The operating subsidiaries that issue secured debt are rated two notches higher at A. It is important to remember that the unsecured debt ratings of Fortis' subsidiaries are not really their ratings due to S&P's policies. The true ratings are the higher ring-fenced or secured debt ratings which largely removes the holding company risk problem. With 37% equity financing, Fortis Alberta is rated A- by S&P for its unsecured debt. I suspect that if NP's debt were unsecured, it would also get an A- rating. I have long recommended secured debt financing for Canadian utilities for the simple reason that unsecured debt is similar to going to a bank and asking for a loan to buy a house based on a signature in a loan contract, rather than based on a mortgage.

Q. WHAT ARE YOUR CONCLUSIONS?

A. I see no objective reason why NP should have 45% common equity. In view of the potential of higher electricity prices on final completion of supply from Muskrat Falls, I do not think NP's rate payers should also be asked to pay the higher costs of an additional 5% common equity

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[90] If all Fortis subsidiaries were tightly regulated, there would be little debt capacity at the parent level and it is doubtful that any debt would be investment grade.

[91] In 2016, S&P rated Foltis at A-, which was subsequently downgraded to BBB+. Note that BBB+ is a perfectly satisfactory investment grade bond rating. It is BBB-, which is the lowest investment grade rating, that is questionable.

component that is not needed for a good investment grade bond rating. In 2016, I was concerned about a sudden change in the common equity ratio and suggested that instead the Board deem the 5% preferred share component the same way that the Regie does for Energir, the old Gaz Metro, where they have traditionally allowed 37.5% common and 7.5% preferred shares. If the Board is ultra conservative, it could do this in a staged manner over the next five years with 1% a year. Further, in PUB-7 (1996-97) when the Board set NP's common equity range at 40-45%, it also set the preferred share component at 3-6%. So my recommendation is consistent with past decisions of the Board.

My recommendation is to replace a 5% common share component with preferred shares as an interim solution, and replace them with debt if there is in fact rate shock from higher electricity prices. The preferred share component can be deemed at the cost of Fortis' preferred shares, and NP can be asked to provide evidence on the cost of Fortis preferred share perpetual series F and J, which currently have yields of about 6%. Since both are after tax costs, this translates to an 8.57% pre tax cost compared to NP's 8.5% allowed ROE, or about 12.14% pre-tax, for a reduction in the revenue requirment of about 3.5% for every dollar of rate base financed with the deemed preferred shares rather than common equity. This would be a half-way house to refinancing with debt, which at the pre-tax embedded debt cost of 5.11 % has a 7.0% benefit.

With a rate base of around $1.4 billion, the 5% change in capital structure is $70 million, meaning a reduction in the revenue requirement of just less than $2.5 -5.0% million for the half-way house of deemed preferred hares and versus debt. Both these levels of saving are slightly higher than in 2016 due to the 40% increase in the size of NP's rate base since then.

Q. **DO YOUR RECOMMENDATIONS SATISFY THE FAIR RETURN STANDARD?**

A. Yes. My recommendations are based on the fair return standard. The most basic thing to remember is that my recommendation for a generic ROE of 7.7% is approximately 2.6% over the company's embedded debt cost of 5.11 % and in excess of 4% over current LTC bond yields.

In terms of its "financial metrics," I am extremely reluctant to benchmark my recommendations against guidelines issued by the rating agencies, such as Moody's, for three reasons. ***First,*** DBRS Morningstar has long maintained the exact same "A" rating on NP during both strong and weak

economic conditions in Newfoundland. ***Second,*** the guidelines are heavily based on the degree of regulatory protection, where 50% of the weight applied by Moody's is explicitly for this and not the financial metrics. ***Third,*** unlike competitive firms that use the current cost of both debt and equity to determine their weighted average cost of capital, for Canadian regulated firms the debt cost is a pass through similar to the book cost of capital assets. The only exception to this is the Canadian Energy Regulator, which when adopting the after tax weighted average cost of capital (ATWACC) also looked at the current debt cost, so consistent with the fair return on rate base legal standard it is not just the equity cost that is current, but also the debt cost.

If we take the debt cost as a pass through, the question is what is the equity cost in rate base? This is simply the deemed equity component times the allowed ROE. For Fortis Alberta it is the 37% equity ratio times the 9% cost allowed by the AUC, or 3.3%. This multiplied by the percentage change in financing the rate base gives the amount of net income Fortis derives from Fortis Alberta. In contrast, Fortis derives the current allowed ROE of 8.5% times the 45% common equity component from NP. So ignoring the persistent over-earning by NP that generally adds at least 0.30% to the ROE, this currently means NP generates 3.83% for every dollar of rate base. Even at my recommended 40% common equity ratio, the net income returned to Fortis from NP's rate base is only 3.40%, or still less than that of Fortis Alberta.

Other Fortis utilities (CA-NP-087) are as follows:

Fortis BC Electric:	9.65% on 41 % common or 3.86%
Maritime Electric:	9.35% on 40% common or 3.74%
Fortis Ontario:	8.52-9.30% on 40% common or 3.4-3.72%

Only FortisBC Electric, with its significant generation, is on a par with the profit Fortis earns from NP. Consequently, while credit metrics are useful information for the bond holders, they are not the most important issue.

In its 2023 Decision, the AUC specifically determined the financial metrics that were thrown off by its decision. The results are in Schedule 13. The AUC data is generated from the AUC allowed ROE of 9.0%, an embedded debt cost varied across the different utilities, and an income tax rate of 27%. For NP, its higher embedded debt cost lowers the metrics, particularly the interest coverage ratio as does the current lower allowed ROE of 8.5%, but the higher tax rate (30.5%

forecast) increases the pre-tax equity cost, which increases the coverage ratio. However, the AUC data is an interesting benchmark. For the Alberta utilities a common equity ratio as low as 30% means the interest coverage ratio is still 2.1 and satisfies the new issue coverage ratio in NP' s trust deed to issue first mortgage bonds. On the other hand, NP's current 45% common equity ratio means an interest coverage ratio of 3.2, which vastly exceeds normal Canadian utility industry levels.

Q. **CAN NP FINANCE WITH YOUR RECOMMENDATIONS?**

A. Yes. In 2016 I calculated the following interest coverage ratios. At that time NP had a rate base of$1,060 million for the forecast test year, a 29% corporate tax rate, 6.14% embedded interest cost, an allowed ROE of 8.8% ROE, and a 45% common equity. As a result, the forecast interest coverage was,

			2016		
Rate base		$1,060	cost%	Cost$	pre tax$
Debt	55%	$583	6.14%	35.80	35.80
Common	45%	$477	8.80%	41.98	59.12
		Interest coverage			2.65

This estimate was an approximation, but was comparable to Exhibit 3, page 7 ofNP's 2016 filing, where the interest coverage for 2013-2015 was as below:

	2013	2014	2015
EBIT	89982	91869	92139
Interest	35609	35772	35349
Tax	15768	16268	16469
Net income	38605	39829	40321
Bond interest	35123	36327	35027
Interest Coverage ratio	2.56	2.53	2.63

This estimate includes only the bond or funded interest needed to satisfy the interest coverage ratio (ICR) in the trust required to issue more funded debt or bonds. In contrast and in answer to CA-NP-077, the interest coverage was given as 2.3, or significantly lower, for each year 2013-2015. I assume that this answer included the interest on short term debt as well as the bond interest (funded debt) needed for the new issue test.

Regardless, if all that happened between 2016 and 2023 was the objective fact that the embedded debt cost dropped to 5.11% and the tax rate increased to 30.5%, then the interest coverage ratio increases to 3.02 due to lower interest cost and a higher pre-tax equity cost. The drop in the allowed ROE to 8.5% then causes the interest coverage ratio to become 2.95, which is still in excess of that estimated in 2016 since the drop in the embedded debt cost of over 1% exceeds the 0.30% drop in the allowed ROE, which when increased for the higher tax rate means the pre-tax cost of the equity dropped by even less at 0.16%. Why the interest coverage ratio in CA-NP-077 has not dropped by an equivalent amount is a bit of a mystery.

If the Board had accepted my 2016 recommendation to reduce the allowed common equity ratio to 40% and assuming the embedded interest cost remained at 5.11%, the interest coverage ratio would have been 2.6 slightly lower than the 2.8 in the AUC Schedule 13 due to the AUC's higher allowed ROE of 9.0%.

Q. WHY DON'T YOU USE THE AUC'S ALLOWED ROE OF 9.0%?

A. Because my recommended allowed ROE is almost identical to what I recommended in 2016. Not only that, but so also is the analysis of Mr. Coyne now with Mr. Trogonoski. In answer to CA-NP-174, they were asked to correct any mistakes in my summary of their estimates in 2015 (for 2016), 2018, 2021 and 2023. I extract the actual summaries below, but the important point is their average estimate in 2015 was 10.1%, which is exactly the same as now in 2023. It changed in both 2018 and 2021 when there were settlements, and I accept their answer that other things were traded off to get the settlement, so the only objective data is for the litigated hearings in 2016 and currently, for which their data provides identical results.

The following is a comparison of the "average" results from Figure 1 of Mr. Coyne's 2015, 2018 and 2021 reports on Newfoundland Power and C&T's current report:

	2015	2018	2021	2023
CAPM	9.8%	9.33%	10.60%	10.4
Constant growth DCF	10.7%	9.85%	10.80%	10.2
Multi-stage DCF	9.6%	9.47%	9.90%	9.7
Average:	10.1%	9.55%	10.40%	10.1

They further state in their answer:

a) Tile averages are c011·ectly reported from the prior Concentric evidence, TIle recolmnelIded ROE from each of tllese cases is as follows:

2015 9.5%
2018 9.5%
2021 9.8%
2023 9.85%

The fair return recommendations in each case have been supported by the analytical results but have not been stl'ictly based on a model average, so one could not conclude that the fair return is lower now than in 2015 or 2021.

I would add to their answer that they did lower their fair ROE for NP from their data driven analysis by 0.6% in 2015, but now it is a reduction of only 0.25%. Since the data driven component from interest rates, risk premia, etc., is the same, it is difficult to understand where the reduced judgmental reduction comes from given my own assessment that NP is unambiguously less risky now given the obvious reduction in long run risk.

In my view a fair ROE is 7.70% on a 40% common equity ratio, or a profit from Fortis investment in NP of 3.08% of every dollar in rate base. This is lower than that allowed other utilities within Fortis, but in my judgment regulators tend to err on the side of caution. In both 2018 and 2021 I accepted the settlement's financial parameters even though they were above my own recommendations, and I would expect the Board's decision to follow suit. Consequently, I regard an 8.5% ROE as fair and reasonable.[92] This is particularly true since 8.50% is very similar to what emerges from the adjusted NEB ROE formula in my Appendix E. That is, now that we are through most of the extremely anomalous LTC bond yields, the wisdom of the NEB formula ROE is reasserting itself.

One final comment is that in Appendix E I review the use of automatic ROE adjustment models. The key conclusion is that they largely fell out of favour in 2011 after the U.S. in particular engaged in heavy "quantitative easing," which just means buying long term bonds to lower long-term interest rates. The Bank followed suit in 2020 to offset the implications of the Covid-19 pandemic. Currently the Bank indicates they have sold off $180 billion of their $480 billion

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92 From the April 5, 2024 Grant Thornton Repm1, Newfoundland Power Inc. 2024 Rate of Return on Rate Base Application, the current preferred share yield is slightly lower than the 6.23% they used for 2011.

holdings of long-term bonds, a process called quantitative tightening. The Bank still has to rebalance its holdings toward conventional holdings of short-term instead of long-term securities. Consequently, we are not yet back to normal as far as central bank actions are concerned, and LTC bond yields are still lower than I would expect. How quickly they recover depends heavily on the actions of the Bank.

Q. DOES THAT CONCLUDE YOUR TESTIMONY?

A. Yes

1

SCHEDULE 1

2

3

	Unemployment Rate	Real Growth	CPI Inflation	T Bill Yield	Canada Yield	FX Rate US$	Average ROE
1987	8.81	4.17	4.42	8.17	9.93	0.75	11.19
1988	7.77	4.70	3.94	9.42	10.23	0.81	12.97
1989	7.58	2.47	5.06	12.02	9.92	0.84	11.79
1990	8.16	0.17	4.81	12.81	10.81	0.86	7.48
1991	10.32	-2.1 I	5.61	8.83	9.81	0.87	3.53
1992	11.24	0.88	1.45	6.51	8.77	0.83	*1.56*
1993	11.42	2.50	1.90	4.93	7.88	0.78	3.69
1994	10.43	4.65	0.12	5.42	8.58	0.73	6.57
1995	9.54	2.74	2.22	6.98	8.35	0.73	*9.55*
1996	9.73	1.61	1.48	4.31	7.54	0.73	10.29
1997	9.16	4.25	1.69	3.21	6.47	0.72	10.86
1998	8.35	3.99	1.00	4.74	5.45	0.67	8.83
1999	7.58	5.35	1.75	4.70	5.68	0.67	9.82
2000	6.85	5.21	2.69	5.48	5.92	0.67	10.92
2001	7.23	1.78	2.52	3.85	5.79	0.67	7.41
2002	7.66	2.97	2.25	2.57	5.67	0.65	5.69
2003	7.61	1.84	2.80	2.87	5.29	0.72	9.65
2004	7.18	3.10	1.85	2.27	5.08	0.77	11.62
2005	6.77	3.1 I	2.21	2.71	4.41	0.83	12.70
2006	6.32	2.72	2.00	4.02	4.29	0.88	13.95
2007	6.03	2.13	2,14	4.17	4.32	0.94	12,87
2008	6.15	0.84	2.37	2.62	4.06	0.94	9.44
2009	8.23	-2.86	0.30	0.40	3.85	0.88	8.06
2010	7.99	3.15	1.78	0.50	3.71	0.97	10.14
201 1	7.46	2.77	2.39	0.94	3.22	1.01	9.95
2012	7.29	1.75	2.03	0.96	2.35	1.00	10.54
2013	7.07	2.48	0.94	0.98	2.71	0.97	9.38
2014	6.90	2.86	1.91	0.91	2.65	0.91	10.37
2015	6.90	0.66	1.13	0.50	2.06	0.78	7.51
2016	7.00	1.00	1.43	0.50	1.80	0.75	9.57
2017	6.36	3.04	1.60	0.71	2.18	0.77	10.88
2018	5.86	2.78	2.27	1.40	2.35	0.77	10.36
2018	5.75	1.88	1.95	1.66	1.75	0.75	9.39
2020	9.58	-5.23	0.72	0.42	1.12	0.75	6.49
2021	7.43	-5.07	3.40	0.12	1.77	0.80	9.90
2022	5.28	3.92	6.80	2.30	2.83	0.77	12.05
2023	5.80	1.40	3.88	4.83	3.37	0.74	*11.36*

4

CANADA BOND YIELDS

Overnight money market rates		5.00
Benchmark bonds		
Canada	91 day Treasury Bill yield	5.00
Canada	Six month Treasury Bills	4.94
Canada	One year Treasury Bills	4.74
Canada	Two year	4.16
Canada	Three year	3.90
Canada	Five year	3.53
Canada	Seven year	3.45
Canada	Ten year	3.49
Canada	Long term (30 year)	3.40
Canada	Real return bonds	1.56
Marketable Bond Average yields		
Canada	1-3 year	4.19
Canada	3-5 year	3.58
Canada	5-10	3.48
Canada	Over tens	3.43

Source: Bank of Canada's web site at http://bankofcanada.ca/en/securities.htm, for March 27, 2024.

SCHEDULE 3

Fama-French Application

Company	β_i	β_i^S	β_i^V	3FM	β_i	CAPM	ERP
3M	0.66	0.05	0.18	8.6%	0.76	8.4%	0.2%
Alcoa	2.11	0.59	-0.38	17.1%	2.10	16.2%	0.8%
American Express	1.16	0.38	1.76	17.7%	2.08	16.2%	1.5%
AT&T	0.82	-0.23	-0.22	7.3%	0.65	7.8%	-0.5%
Bank of America	1.55	-1.19	2.50	17.1%	2.30	17.5%	-0.4%
Boeing	1.21	-0.64	0.46	10.7%	1.25	11.3%	-0.7%
Caterpillar	1.67	0.00	0.28	14.6%	1.78	16.4%	-0.1%
Chevron	0.96	-0.58	-0.44	6.5%	0.62	7.5%	-1.1%
Cisco Systems	1.20	0.67	-0.31	11.6%	1.22	11.1%	0.2%
Coca-Cola	0.75	-0.72	-0.01	6.2%	0.56	7.2%	-1.0%
DuPont	1.10	-0.10	0.67	12.1%	1.37	12.0%	0.1%
Exxon Mobil	0.72	-0.20	-0.20	5.2%	0.61	6.3%	-1.2%
General Electric	1.21	-0.36	0.79	12.6%	1.48	12.7%	-0.1%
Hewlett-Packard	1.03	0.48	-0.25	13.9%	1.02	9.9%	0.9%
Home Depot	0.38	0.56	0.41	9.1%	0.71	8.1%	1.0%
Intel	1.46	-0.09	-0.59	10.3%	1.16	10.7%	-0.5%
IBM	0.81	0.35	-0.18	9.1%	0.81	8.7%	0.4%
Johnson & Johnson	0.60	-0.51	0.09	6.3%	0.50	7.0%	-0.7%
JPMorgan Chase	0.49	-0.90	1.51	10.2%	1.04	10.0%	0.1%
Kraft Foods	0.46	-0.17	0.29	7.1%	0.56	7.2%	-0.1%
McDonald's	0.85	-0.58	-0.25	6.5%	0.61	7.4%	-1.0%
Merck	1.36	-0.89	-0.56	7.5%	0.88	9.1%	-1.6%
Microsoft	1.09	-0.04	-0.20	9.2%	0.94	9.4%	-0.2%
Pfizer	0.71	-0.68	0.38	7.4%	0.72	8.2%	-0.8%
Procter & Gamble	0.61	0.27	0.04	6.9%	0.56	7.2%	-0.4%
Travelers	0.71	-0.51	0.12	7.0%	0.64	7.7%	-0.7%
United Technologies	0.87	-0.32	0.32	9.2%	0.95	9.5%	-0.3%
Verizon Communications	0.87	-0.39	-0.43	6.8%	0.60	7.4%	-0.7%
Wal-Mart	0.30	-0.41	0.89	4.8%	0.24	5.2%	-0.5%
Walt Disney	0.89	0.12	0.35	10.7%	1.08	10.3%	0.4%
Min	0.30	-1.19	-0.59	4.8%	0.24	5.2%	-1.6%
Max	2.11	0.69	2.50	17.7%	2.30	17.5%	1.5%
Avg	0.95	-0.22	0.19	9.5%	0.99	9.7%	-0.2%

Cost of Capital in the Current Environment

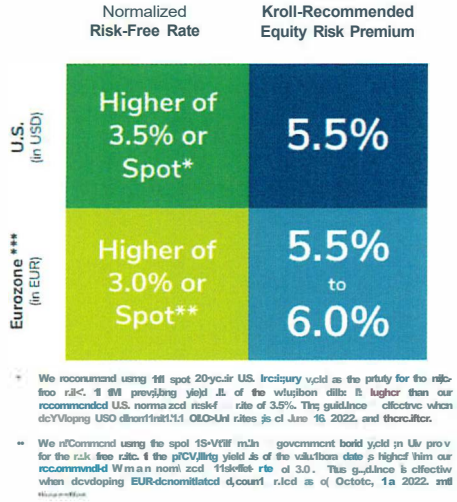
January 2024 Update

"Global economic growth in 2023 handed a pleasant surprise to economists, thanks in part to a resilient U.S. economy and a decline in global energy prices. Although the U.S. economy showed greater resilience than the Eurozone's, real GDP growth in 2023 likely ended in a much better place than originally projected at the beginning of the year for both geographies. Going forward, a scenario of soft landing has become more plausible. although real growth is expected to slow down in 2024 in most regions globally. The good news is that despite the significant increase in interest rates in 2022 and 2023, economies and markets seem to have absorbed the hikes without major disruptions. Inflation has decelerated significantly, at a faster pace than many anticipated, while long-term inflation expectations have also dropped materially, especially in Germany. Investors are pricing significant policy rate cuts in 2024 for major economies. boosting confidence and leading to new record highs in some equity markets. This "risk-on" attitude means equity risk premia is likely to come down, barring a major geopolitical event (e.g.. escalation of the Middle East conflict) or other unforeseen materially negative event."

Carla S. Nunes, CFA - Managing Director, Valuation Digital Solutions/Office of Professional Practice, Kroll

Kroll Cost of Capital Inputs

Data as of January 31, 2024

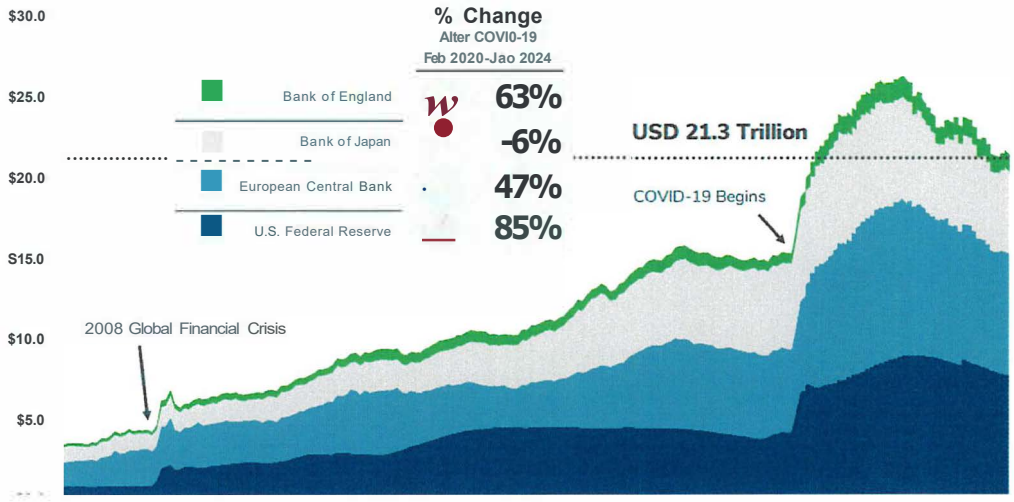


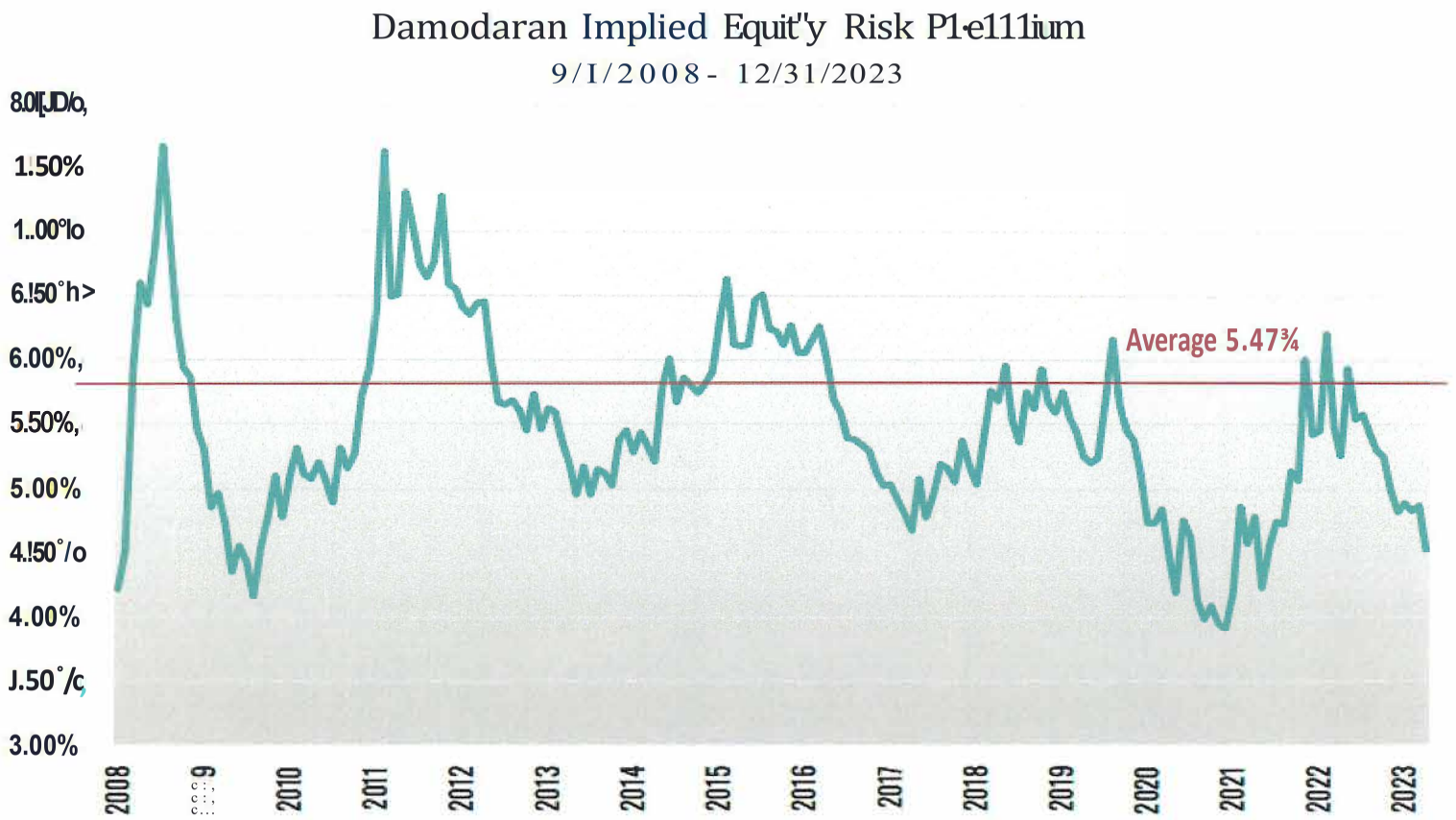
* We recommend using the spot 20-year U.S. Treasury yield as the proxy for the risk-free rate. If the prevailing yield is more than 50 bps lower than our recommended U.S. normalized risk-free rate of 3.5%, Kroll's guidance is effective when developing USD-denominated cash flows. As of January 31, 2024, the 20-year U.S. Treasury yield was 4.34%.

** We recommend using the spot 15-year German government bond yield as the proxy for the risk-free rate. If the prevailing yield is more than 50 bps lower than our recommended normalized risk-free rate of 3.0%, Kroll's guidance is effective when developing EUR-denominated cash flows. As of January 31, 2024, the 15-year German government bond yield was 2.36%.

Total Assets Held by Major Central Banks Over Time

Data as of January 26, 2024

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2008
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Beta

The measure of systematic risk with respect ro the risk-free rate. Systematic risk is the tendency of the value of the fund and the value of a benchmark {in this case, the risk-free rate) to move together. Beta is the ratio of what the excess return of the ftmd would he to the excess return of the risk.free rate if there were no fund spedfic sources of return.

If Beta is...	Then..•
>1	Movements in \'alue of the fund !hat are associated w1"h movements in the vawe of the risk-free rate tend to be amplified.
=1	Movements in value or the fur.d the, ere asrociated with movements m the vaiue m the risk-free rate tend to be 11'esame.
<1	Movements m 'li!W!l 01 the fl.ma lhet am associs100 with movements in the waive of the risk-free rate reno to be dampened.

☞ Note: If such movements tend to be in opposite directions, Beta is negative.

Beta is measured as the slope of the regression of the excess retum on the fund as the dependent variable and the excess retum on the risk-free rate as the independent variable.

The Beta of the market is 1.00 by definition. Morningstar calculates Beta by comparing a portfolio's excess return over T-bms to the risk-free rate's excess retum over T-bi!ls, so a Beta of 1.10 shovvs that the portfolio has performed 10% better than its benchmark in up markets and 10% worse in down markets, assuming ail other factors remain constant Conversely, a Beta of 0.85 indicates that the portfolio's excess return is expected to perform 15% worse than the benchmark's excess return during up markets and 15% better during down markets.

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NEB Formula ROE

		NEB	Booth1
1995	9.25	12.25	12.13
1996	8.03	11.25	11.07
1997	7.14	10.67	10.33
1998	6.53	10.21	9.88
1999	5.69	9.58	9.60
2000	6.12	9.9	9.90
2001	5.73	9.61	9.92
2002	5.63	9.53	9.71
2003	5.98	9.79	10.03
2004	5.68	9.56	9.63
2005	5.55	9.46	9.51
2006	4.78	8.88	8.90
2007	4.22	8.46	8.53
2008	4.55	8.71	8.83
2009	4.36	8.57	9.41
2010	4.3	8.52	8.95
2011	3.72	8.08	8.51
2012	3.06	7.58	8.07
2013	2.59	7.23	7.65
2014	3.52	7.93	8.31
2015	3.14	7.64	7.97
2016	2.75	7.38	7.83
2017	2.1	6.86	7.30
2018	2.76	7.36	7.59
2019	2.87	7.44	7.67
2020	1.79	6.63	6.94
2021	1.49	6.4	6.74
2022	2.26	6.98	7.19
2023	3.45	7.88	8.24
2024	3.45	7.88	8.18

SCHEDULE 8

ment of Lloyd's itself on a hypothetical backer-caused blackout of the entire power grid of the American north-east. It estimated this would cause direct losses to business revenues of $223bn, and a total dent in GDP of over $1trn over five years.

Many insurers are turning to outside expertise. Matt Webb of Hiscox, a specialist insurer, describes an "arms race" between analytics firms such as RMS and Symantec, offering their long-standing modelling prowess (RMS is already well-trusted on hurricane modelling, for example) to help insurers understand their cyber-liabilities.

But even if exposures are better understood, limiting them may prove tricky. Kevin Kalinich of Aon, an insurance-broker, points to the near-impossibility of drawing a line, for example, between cyber-war or cyberterrorism and "normal" hacking. Cyber-crime knows no geographical bounds, unlike, say, a Florida hurricane. Mr Webb reckons that insurance policies will at a minimum need explicitly to recognise that cyber-risks are covered or to exclude them—just as many policies already include exemptions for terrorism or war.

Although insurers are already helping companies with more humdrum data breaches, the industry still lacks a clearly formulated response to a larger-scale cyber-calamity. Inga Beale, CEO of Lloyd's, is optimistic that the market, thanks to its exacting modelling exercises and its unique risk-sharing structure, is better equipped than most. But only a devastating, real-life cyber-attack would test how effective its preparations have been. ■

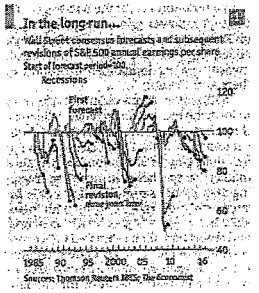
Analyst forecasts

Discounting the bull

Stock analysts' forecasts tend to be wrong in reassuringly predictable ways

"SELL-SIDE" analysts, whose firms make money from trading and investment banking, are notoriously bullish. As one joke goes, stock analysts rated Enron as a "can't miss" until it got into trouble, at which point it was lowered to a "sure thing". Only when the company filed for bankruptcy did a few bold analysts dare to downgrade it to a "hot buy".

Economic research shows that there is some truth to the ribbing. The latest figures from FactSet, a financial-data provider, show that 49% of firms in the S&P 500 index of leading companies are currently rated as "buy", 45% are rated as "hold", and just 6% are rated as "sell". In the past year, 30% of S&P 500 companies yielded negative returns.



Profits forecasts made more than a few months ahead have a dismal record of inaccuracy. According to Morgan Stanley, a bank, forecasts for American firms' total annual earnings per share made in the first half of the year had to be revised down in 34 of the past 40 years. Studying their forecasts over time reveals a predictable pattern (see chart 1).

In theory, a diligent share analyst should do his own analysis—that is, by projecting a firm's future revenue and expenses, and discounting them to the present. Such models, however, are extremely sensitive to different assumptions of growth rates. Since no one can know the future, analysts cheat.

Three statistical sins are common. Analysts can look at comparable companies to glean reasonable profits estimates, and then work backwards from their conclusions. Or they can simply echo what their peers are saying, and follow the herd. Or, most important, they can simply ask the companies they are following what their actual earnings numbers are.

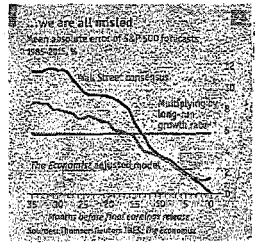
Surveys conducted by Lawrence Brown of Temple University found that two-thirds of sell-side analysts found private calls with company managements to be "very useful" in making their estimates. Analysts' need to maintain relationships with the companies they cover must colour their projections. They are judged primarily on the accuracy of their short-term forecasts, so there is little risk in issuing flattering, if unrealistic, long-term projections. In the short run, however, they have an incentive to issue ever-so-slightly pessimistic forecasts, so companies can "beat" expectations. Since the financial crisis, company profits have exceeded short-term analyst forecasts around 70% of the time.

So are forecasts are useless? Simply taking the market's earnings figures from the previous year and multiplying by 1.07 (corresponding with the stockmarket's long-run growth rate) can be expected to yield a more accurate forecast of profits more than a year in the future.

Yet the very predictability of the errors in analysts' forecasts suggests they could be informative, if they are properly interpreted. Taking forecasts of S&P 500 earnings from 1985-2015, *The Economist* has built a simple statistical model to try to take out the bias that taints Wall Street's prognostications. After controlling for the forecasts' lead time and whether or not they were made during a recession, we find that even our relatively crude model can improve upon the Wall Street consensus for forecasts made more than a quarter in advance (see chart 2).

Adjusting for bias in short-term forecasts is harder. It is tempting simply to accept the errors—after all, they tend to be off by just a little. Data from Bloomberg show that the 320 S&P 500 companies that beat earnings expectations in 2015 did so only by a median of 1.4%. An alternative is to look at crowdsourcing websites such as Estimize. There punters—some amateur, and some professional—are shown Wall Street consensus estimates and asked to make their own forecasts. Estimize users beat Wall Street estimates two-thirds of time.

To some extent, judging Wall Street by its ability to make accurate predictions is silly. Harrison Hong, an economist at Columbia University, reckons that stock analysts should be viewed "more like media". The latest forecasts aggregated by Thomson Reuters suggest that the S&P 500 will yield earnings per share of $130.83 in 2017 and $146.33 in 2018. According to our model, that would imply that they believe the actual numbers will be closer to $127.85 and $134.30. Share analysts want to tell the truth. They just like making it difficult. ■



SCHEDULE9

Earned ROEs: US versus Newfoundland Power

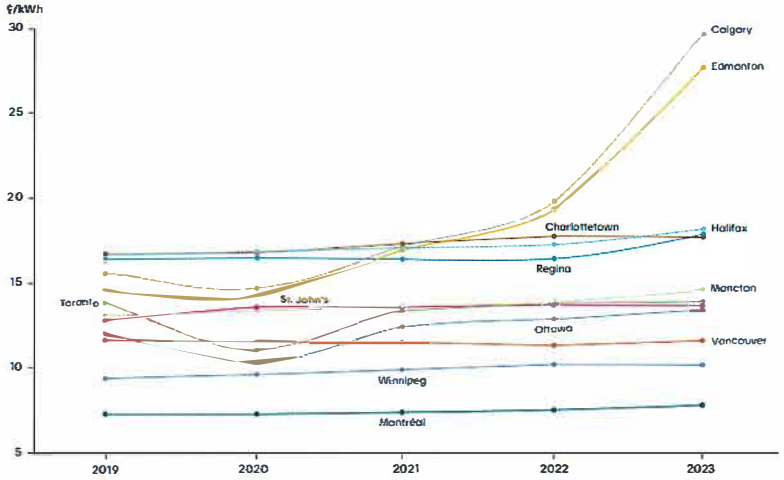
	201 I	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Average	Variability	Var/ROE
Duke Energy	7.53	5.56	6.48	4.58	6.99	5.33	7.39	6.23	8.36	2.8	8.15	5.16	5.79	6. 18	1.55	0.25
Allele Inc.,	9. 13	8.52	8.23	8.45	8.23	8.36	8.69	8.24	8.46	7.7	7.19	7.42	8.98	8.28	0.56	0.07
Eversource	10.09	7.94	8.34	8.37	8.64	8.95	9.07	9.15	7.54	9.03	8.52	9.34	-2.98	7.85	3.32	0.42
OGE Energy	14.13	13.32	13.36	12.6	8.26	9.99	16.97	10.83	10.65	-4.47	19.18	15.72	9.34	11.53	5.74	0.50
Pinnacle West	9.05	9.79	9.94	9.29	9.77	9.42	9.96	9.99	IO.I I	9.95	10.72	8.09	8.2	9.56	0.75	0.08
Evergy	8.9	9.63	9.79	9.83	8.38	9.27	8.38	7.69	7.2	7.15	9.79	8.04	7.64	8.59	1.01	0.12
Alliant	9.87	10.3	I 1.17	11.4	10.56	9.79	11.37	11.68	11.38	11.27	11.29	11.19	10.77	10.93	0.61	0.06
American Electric	13.72	8.42	9.45	9.93	11.79	3.46	10.72	10.31	9.94	10.95	11.58	9.96	7.99	9.86	2.42	0.25
Entegy	15.26	9.28	7.56	9.58	-1.83	-6.73	5.12	10.08	13.02	13. 13	9.91	8.97	17.08	8.49	6.57	0.77
Southern	13.04	13.1	8.81	10.08	11.75	10.8	3.44	9.11	18.15	11.24	8.57	12.09	12.86	I 1.00	3.38	0.31
Excel on	17.86	6.48	7.78	7.16	9.38	4.39	13.54	6.63	9.32	6.06	5.09	7.34	9.22	8.48	3.66	0.43
POR	9.03	8.32	5.92	9.38	8.25	8.39	7.86	8.61	8.4	5.96	9.17	8.49	7.48	8. IO	1.08	0. 13
PNM	11.26	6.61	6. 13	6.85	0.93	7.02	4.74	5.06	4.6	9.27	9.29	7.78	3.87	6.42	2.69	0.42
Nextera			11.19	12.99	12.95	12.41	20.47	21.29	10.59	7.94	9.69	10.85	16.86	13.38	4.34	0.32
Average	***11.45***	***9.02***	***8.69***	***9.04***	***7. 78***	***6.80***	***9.02***	***8.74***	***9.78***	***7.70***	***9.88***	***9.20***	***8.17***	9.19	2.69	0.29
NP	***9***	***8.98***	***9./6***	***9.15***	***8.98***	***8.9***	***8.93***	***8.76***	***8.79***	***8.93***	***8.88***	***8.98***	***8.54***	***8.92***	***0./6***	***0.02***

Price (market) to Book Ratios for U.S Electrics

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Average	Variability
Duke Energy	1.28	1.1	1.18	1.43	1.23	1.34	1.41	1.46	1.5	1.6	1.7	1.64	1.59	1.42	0.19
Allete Inc.,	1.5	1.34	1.6	1.66	1.37	1.7	1.86	1.85	1.9	1.41	1.51	1.38	1.26	1.56	0.22
Eversource	1.62	1.33	1.4	1.72	1.57	1.65	1.82	1.81	2.32	2.12	2.17	1.91	1.37	1.75	0.31
OGE Energy	2.19	2.01	2.25	2.18	1.57	1.94	1.82	1.94	2.13	1.74	2.01	1.78	1.54	1.93	0.23
Pinnacle West	1.35	1.41	1.36	1.68	1.54	1.79	1.85	1.78	1.82	1.54	1.31	1.38	1.28	1.55	0.21
Evergy	1.4	1.25	1.36	1.66	1.64	2.1	1.91	1.36	1.71	1.43	1.69	1.5	1.23	1.56	0.26
Alliant	1.63	1.55	1.75	2.14	1.89	2.24	2.37	2.18	2.7	2.26	2.57	2.21	1.95	2.11	0.35
American Electric	1.36	1.36	1.45	1.76	1.62	1.79	2	1.94	2.37	2.03	2.01	2.01	1.89	1.81	0.30
Entegy	1.42	1.23	1.2	1.54	1.33	1.31	1.69	1.93	2.38	1.86	2.03	1.96	1.56	1.65	0.36
Southern	2.27	2.03	1.94	2.25	2.06	1.98	2.01	1.83	2.44	2.29	2.53	2.49	2.44	2.20	0.23
Excelon	2	1.19	1.07	1.35	0.99	1.26	1.35	1.41	1.39	1.25	1.67	1.75	1.4	1.39	0.28
POR	1.15	1.2	1.32	1.57	1.45	1.67	1.69	1.65	1.94	1.48	1.77	1.59	1.33	1.52	0.23
PNM	0.91	1.02	1.15	1.37	1.38	1.62	1.82	1.85	2.42	2.35	1.83	1.9	1.6	1.63	0.46
Nextera			2.14	2.5	2.15	2.34	2.79	2.43	3.24	4.06	5	4.3	2.65	3.05	0.97
Average	***1.54***	***1.39***	***1.46***	***1.72***	***1.51***	***1.72***	***1.82***	***1.77***	***2.08***	***1.80***	***1.91***	***1.81***	***1.57***	1.80	0.33
Median	***1.42***	***1.33***	***1.38***	***1.67***	***1.56***	***1.75***	***1.84***	***1.84***	***2.23***	***1.80***	***1.92***	***1.84***	***1.55***	1.65	0.28

MAJOR CANADIAN CITIES

OVERVIEW OF CHANGES IN AVERAGE PRICES FOR RESIDENTIAL CUSTOMERS (IN ¢/kWh) - 2019-2023[1, 2, 3, 4]



AVERAGE PRICES FOR RESIDENTIAL CUSTOMERS (IN ¢/kWh)[1, 2, 3, 4]

	2019	2020	2021	2022	2023
Canadian Cities					
Montréal, QC	7.30	7.30	7.39	7.59	7.81
Calgary, AB	15.74	14.83	17.26	19.94	29.80
Charlottetown, PE	16.83	16.83	17.38	17.78	17.78
Edmonton, AB	14.68	14.29	16.99	19.48	27.78
Halifax, NS	16.69	16.89	17.09	17.30	18.27
Moncton, NB	13.10	13.42	13.66	13.94	14.61
Ottawa, ON	12.04	10.29	12.45	12.94	13.48
Regina, SK	16.51	16.51	16.51	16.51	17.89
St. John's, NL	12.80	13.60	13.60	13.76	13.73
Toronto, ON	13.89	11.10	13.43	13.88	13.88
Vancouver, BC	11.62	11.51	11.58	11.39	11.62
Winnipeg, MB	9.37	9.60	9.87	10.24	10.24

1) For a monthly consumption of 1,000 kWh.
2) In Canadian currency.
3) Data from *Comparison of Electricity Prices in Major North American Cities* publications, Hydro-Québec, 2019-2023.
4) Average prices excluding taxes.

(ompany{Securlty	DBRS Mom'ln9star	S&P	Moodly's
Fo.rti.s			
LJnsernredl i!Jeb,t	A Uow), Stable	BBB+, Stable	Baal, Stable
Preference S!t-mes	Pfdl-2 llow), Stable	P-2, Stable	NIA
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me G.reoif Pli:iifils - Furst !,,10rtgage Bo,nds	—	A, Stable	A1, Stable
ifliC ,M.idwesi - IHrsit Mortga,jie Bonds.	—	A, Stable	A1, Stable
ll.CTrafilSmiss&m - !First Mortgage Bond:s.	—	A, Stable	A1, Stable
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MITC - Secured Debt	—	A, Stable	Al, Stable
Ne1,vfotmd1on,1Powe, - First M;lo'rtgage Bo:nds	A, Stable	—	Al,Stable
TfP			
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Table 11. Credit metrics compared to equity ratios – Commission calculations – distribution utilities – income tax rate of 23 per cent (27 per cent for 2018 GCOC decision)

	EBIT coverage		FFO coverage		FFO/debt (%)	
Equity ratio (%)	2023 GCOC decision	2018 GCOC decision	2023 GCOC decision	2018 GCOC decision	2023 GCOC decision	2018 GCOC decision
30	2.1	2.0	3.8	3.4	11.9	11.6
31	2.2	2.0	3.9	3.5	12.2	11.9
32	2.2	2.1	4.0	3.6	12.5	12.2
33	2.3	2.2	4.0	3.6	12.8	12.5
34	2.4	2.2	4.1	3.7	13.2	12.8
35	2.4	2.3	4.2	3.8	13.5	13.2
36	2.5	2.3	4.3	3.8	13.8	13.5
37	2.6	2.4	4.4	3.9	14.2	13.8
38	2.6	2.4	4.4	4.0	14.6	14.2
39	2.7	2.5	4.5	4.1	15.0	14.6
40	2.8	2.6	4.6	4.1	15.4	14.9
41	2.9	2.6	4.7	4.2	15.8	15.3
42	2.9	2.7	4.8	4.3	16.2	15.7
43	3.0	2.8	4.9	4.4	16.6	16.2
44	3.1	2.9	5.0	4.5	17.1	16.6
45	3.2	2.9	5.1	4.6	17.5	17.0

APPENDIX A

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TEACHING AND RESEARCH INTERESTS Main interest is teaching domestic and international corporate finance and asset allocation. Research interests centre on the cost of capital, empirical corporate finance and capital market theory.

ACADEMIC BACKGROUND:

D.B.A., Indiana University, (Finance).
M.B.A., Indiana University, (Finance).
M.A., Indiana University, (Economics).
B. Sc. (Econ)., London School of Economics.

AWARDS & HONOURS

MBA Second Year Instructor of the Year Award, 1996, 1998 (joint) & 2000
Rotman teaching awards 2009, 2010, 2011, 2013, 2014, 2015, 2017, 2018.
Best paper in corporate finance, 1999 SFA meetings,
ASAC Distinguished Professor Address 1990,
Director Financial Management Association 1988-90,
English Speaking Union Fellow, 1974-5
Fulbright 1974,
Elected to Beta Gamma Sigma,
First class honours B.Sc.,(Econ),
CBV (Chartered Business Valuator),
National Post Leader in Management Education Award 2003

ACADEMIC EMPLOYMENT: CIT Chair in Structured Finance (1999-), Professor of Finance, Rotman School of Management, University of Toronto (1987-Present). Visiting Professor Nankai University (China) 1989, the Czech Management Centre (1998) visiting scholar London School of Economics (1985).

TEACHING EXPERIENCE:

Graduate (MBA) courses on The Economics of Enterprise, fhe Economic Environment of Business, Business Finance, Corporate Financing, International Financial Management, Mergers & Acquisitions, Financial Management, Capital Markets & Corporate Financing (EMBA), Applied Asset Management (M Fin), Financial Theory of fhe Firm (Ph.D), Capital Markets Workshop (Ph.D). B.Comm courses in International Business, Business Finance and Introduction to Financial Markets. Executive courses (2-5 days) on Money and Foreign Exchange Markets, Business Valuation, Financial Stral-egy, Equity Markets, Capital Market Innovations, Mergers & Acquisitions and Finance for Non-Financial Managers.

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SERVICE:

Rotman Executive Committee: 1980/2, 1989/90, 1993/4, 2001/3, 2009/10
Finance Area Co-ordinator 1987-91, 1994-2008
External Advisory Board, Health Administration Faculty, 1985-92.
Editorial Board Activities:
- Journal of Economics & Business 1982-87.
- Finance Section Editor, Canadian Journal of Administrative Sciences 1993-2005.
- Journal of Multinational Financial Management 1989-
- Journal of International Business Studies 1992-
- Associate Editor, Multinational Finance Journal, 1995-2013
- Journal of Applied Finance 2003-2007
- Associate Editor: Frontiers of Finance and Economics 2013-
- Managerial Finance 2016-
- Global Finance Journal 2016-
- Investment Management and Financial Innovation 2012-2017

Director at large Multinational Finance Society 1998-2004
Co-Chair 1991 Northern Finance Association meetings.
Chair 1998 Northern Finance Association meetings
Chair 2008 MFS annual meetings.
President Multinational Finance Society, 2010-11
Program Committee FMA meetings, October 1993.
Program Committee SFA meetings November 2002.
Program Committee, MFS meetings 2002-
Program Committee, Global Finance Conference, *2006, 2008,* 2015-
Program Committee, European Financial Management 2006-
Program Committee member, NFA meetings 2008-2018
Program committee member, world finance conference 2016-
Investment Committee, Trinity College, U of T, 2010-2015.
Pension Committee, Governing Council U of T, 2011-14
Special committee on the Supplementary Retirement Arrangement (SRA) University of Toronto, 2011-12
Vice-President Mid-West Finance Association 2012-14.
President Elect Mid-West Finance Association 2014-2015
President Mid-West Finance Association 2015-2016.

Chair MFA Advisory Board, 2016-7
Board member International Centre for Pension Management 2016-
Advisory Board Multinational Finance Society 2011-
Frequent media commentator.
Member of the Senate of Trinity University 2020-

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APPENDIXB
ESTIMATION OF THE MARKET RISK PREMIUM

Introduction

In this Appendix, I estimate the market risk premium which is generally expressed as the premium of the return on equities over that on long term Canada bonds.[1] If the underlying relationship generating returns has remained reasonably constant then the historic realised difference between equity and bond returns is a useful benchmark for the market risk premium. At the very minimum, it constrains the range of estimates that are reasonable and requires an explanation as to why "this time it is different" if a recommendation significantly deviates from these historical values.

In analysing this historic data, however, we need to be aware of some estimation problems and the impact of changes that have occurred in the markets. This simply reflects the fact that every statistic is the result of specific financial and economic phenomena existing at that time.

Different Risk Premium Estimation Procedures

Suppose an investor puts $1,000 into an investment. If the investment doubles, i.e., a 100% return, to $2,000 and then halves, i.e., a -50% return, to $1,000, we can calculate two average or mean rates of return from these two simple rates of return of+ 100% and -50%. The ***arithmetic*** mean (AM) would be the average of these two rates of return, or 25%. However, it would be difficult to convince an investor, who after two years only has the same $1,000 that they started with, that they have earned 25%. Quite obviously, the investor is no better off at the end of the two periods than they were at the start! To counterbalance this potentially misleading statistic, most mutual funds advertise ***compound*** rates of return, which is the nth root of the terminal value divided by the initial value, minus one. In our case, there are two periods, so that n= 2 and

[1] This appendix covers similar material to that covered in Laurence Booth "Equities Over Bonds: But by How Much?" *Canadian Investment Review,* Spring 1995, and Estimating the Equity Risk Premium and Expected Equity Rates of Return: The Case of Canada, *Journal of Applied Corporate Finance* Winter 2019,

the compound rate of return is calculated as $(1/1)^{1/2}$ which is 1, indicating a zero rate of return. This gives the common-sense solution that if you started and finished with $1,000, then your rate of return is zero.

An alternative way of thinking about the compound rate of return is to calculate the continuous rate of return. This is calculated as the natural logarithm of 1 plus the rate of return. So, for the first period when the investment doubled this is Ln (1+100%) or Ln (2) which is 0.693147. Similarly, in the second period it is Ln (1-50%) or Ln (0.5) which is -.693147. The average of these two is zero which is the compound rate of return estimated earlier. We also call this rate of return the geometric mean rate of return (GM).

If we need the best estimate of *next* period's rate of return, this is the AM return. If we need the best estimate of the return over several periods, the AM return becomes less useful and more emphasis is placed on the GM return. If we want the best estimate of the rate of return earned over a very long time, this is the GM return. Moreover, if we ignore intervening periods, then the AM return is the same as the GM return. For example, if we define the period as the prior two periods then over that "two period" $1,000 has grown to $1,000 so both the AM and GM returns are 0%. As a result, the difference between the AM and GM returns is essentially the definition of the period over which a return is earned.

What causes the AM and GM to differ is the uncertainty in the simple rates of return. If these are constant, then both the AM and GM returns are identical. However, the more volatile these rates of return, the larger the difference between the AM and GM returns. There is a large amount of uncertainty (a high variance or var) in the rates of return in the example. As a result, the difference between the AM and GM returns is large: 25% vs 0%. Approximately, the relationship is as follows:

$$\textit{Compound rate of return} = \textit{Arithmetic return} - \textit{(var/2)}$$

In estimating the market risk premium for a regulated utility, I believe that the correct period for calculating rates of return is a **one**-year holding period. The reason for this is primarily because most utilities are regulated based on annual rates of return.

Finally, in addition to the AM and GM rates of return I also estimate a rate of return estimated by an ***ordinary least squares*** (OLS) regression model. This is a statistical technique that estimates the annual rate of return by minimising the deviations around the estimate. It has properties that make it a superior estimate of the average rate of return than either the AM or GM returns and is the standard technique for estimating economic models. It is commonly used, for example, for estimating other annual growth rates, such as the growth rate needed in dividend growth rate models.

Market Risk Premium Estimates Going Forward and Backwards

In Schedule 1 I graph estimates of the average market risk premium using Canadian data and these three estimation techniques.[2] In the top graph starting for the five-year period 1924-1928 the average market risk premium is estimated for each of the AM, GM and OLS methods and is then updated each year with the addition of the new data, so the second observation is for the period 1924-1929. In this way the graph captures the "learning" since 1924. The instability in the 1920s into the 1930's is evident as all the estimates start out very high due to the strong equity markets prior to the great stock market crash before declining precipitously. However, the market risk premium stabilises by the late 1950s, before beginning a long gradual *decrease to 5.04% for the entire period 1924-2023.* This is partly because the importance of the period prior to the 1960's decreases in relative importance with every passing year.

An alternative procedure is to work backwards, that is, start in the five-year period 2019-2023 and then go back in time, which is the lower graph in Schedule 1. In this way, we capture what *current* market participants have experienced, rather than what their great-grand-parents experienced. Note that whereas the previous graph always includes the period 1924-1928 with its exceptionally high experienced risk premium, this graph always includes the most recent five-year period 2019-2023 where the market risk premium was also very high at 11.90% due to the zero average return on bonds and two years where the TSX returned over 20% (2019 and 2021). As we work forward through time, the estimate of the market risk premium drops as the

2 The graphs use data from the Canadian Institute of Actuaries, "Report on Canadian Economic Statistics" 2021 updated for 2023.

importance of the recent period drops so that by the 1980's estimates of the market risk premium are close to zero due to very high bond returns. We then need to go back to the 1950's before the market risk premium gets above 4.0%. Of importance is that even going back almost 50 years we only get a market risk premium just over 2.0% and that is stretching the time of current financial professionals.

In Schedule 2 is the AM risk premium for various holding periods. If we look at the last row, we have the AM risk premium for various start dates finishing in 2023, this is essentially a subset of the data graphed in Schedule 1 and illustrates the experience of market professionals starting at different dates. For example, for the most recent 20-year period the earned market risk premium was 4.42%, as we go back successively by adding an extra ten years of data each time the earned risk premium decreases to 3.17% for someone starting in 1994, and then to 1.11% for someone starting in 1984. If we go back to 1944, we get a market risk premium over 5.00% for a professional who would now be well over 100 years old. Otherwise, the data is simply statistics and not lived experience.

The usefulness of the different holding periods in Schedule 2 is simply to note the variability in the AM estimate of the experienced market risk premium that comes from using sub-sets of the data. A "high" estimate can, for example, be estimated by looking at the last ten years whereas a "low" estimate would be from starting in the early 1980's. In both cases, the choice is the result of a long cycle in Canadian interest rates, rather than any changes in equity market performance.

We can illustrate this problem simply by graphing the behaviour of interest rates, which is the graph in in Schedule 3. Note for example, that there was very little interest rate variability in the 1930's. This was because "modern" monetary policy did not exist in North America until the Federal Reserve's "Accord" with the US Treasury in 1951. Prior to the Accord interest rates were controlled to finance the Second World War debt and not priced to reflect inflation. Subsequently, interest rates started to increase with rising inflation; thereby causing losses to anyone holding long-term bonds. This is because as interest rates go up bond prices and the return from holding bonds goes down. This process ended in the period 1981-1989, after which it has gone into reverse until we reach the recent period of exceptionally low interest rates when the yield on the over 10-year maturity long Canada bond in July 2020, for example, dropped to

0.86% (Cansim series V122487), which was a negative yield given the year over year inflation rate.

Changes in the Market Risk Premium

The fact that estimates of the market risk premium change over time indicates that some adjustments are in order. In my judgment the riskiness of the equity market is relatively stable. In fact, going back as far as 1871, there is substantial evidence that the average real return on US equities has been quite stable[3] However; there is ***no*** support for the assumption that either bond market risk or average bond market returns have been constant. As Schedule 3 shows, from 1924-1956, there was very little movement in nominal interest rates. As a result, the standard deviation of annual bond market returns was only 5.18%. In contrast, from 1957-2023, monetary policy became progressively more important and interest rates more volatile. As a result, the standard deviation of the returns from holding the long Canada bond increased to 10.18%, that is, bond market risk almost doubled. In contrast, equity market risk, as measured by annual volatility actually *declined* from 21.9% to 15.9%.

This changing bond market risk is illustrated in Schedule 4, which graphs the equity market risk divided by the bond market risk. The risk is estimated as the standard deviation or volatility of returns over the prior ten-year period, so the series starts with the first observation for the period 1924-1933. We can clearly see the dramatic decrease in equity relative to bond market risk starting in the 1950s as changing monetary policy made bonds riskier. During this period equities dropped from being six times riskier than long-term Canada bonds to their low point in the early 2000's of very similar risk. Since then, the traditionally higher equity market risk asserted itself again until the period after the 2008/9 financial crisis. For the last ten years equity market risk (volatility) has only been about 30% greater than bond market risk.

However, what is crucial for the investor is whether this risk is diversifiable, that is, what happens when you hold bonds along with equities in a diversified portfolio. Schedule 5 has the Canadian bond market "beta" showing that it was very large during the period from the mid-

[3] See Laurence Booth, "Estimating the Equity Risk Premium and Equity Costs: New Ways of Looking at Old Data", *Journal of Applied Corporate Finance,* Spring 1999.

1980s until the early 2000's when governments had severe financial problems and flooded the market with government debt. This caused both the bond and equity markets to react to a common risk factor: market interest rates. Adding long Canada bonds to an equity portfolio during the 1990's did not reduce risk to the extent that it did in either earlier or later periods. [4]

Clearly for the market risk premium to be constant it must be the case that the relative risk between equities and bonds is constant or at least similar. In Schedule 6 are the results of a regression analysis of the real Canada bond yield against various independent variables. The real Canada bond yield is defined as the nominal yield minus the average CPI rate of inflation, calculated as the average of the current, past, and forward year rates of inflation. [5] The regression model explains a large amount of the variation in real Canada yields, and six variables are highly significant.

The two main "independent" variables capture bond market uncertainty (risk) and the endemic problem of financing government expenditures (deficits). Risk is the standard deviation of the return on the long Canada bond over the preceding ten years. In earlier eriods prior to active monetary policy, interest rates barely moved and the returns on long Canada bonds were stable. As a result, the risk of investing in bonds was very low and as Schedule 4 showed equity market risk was at times up to 6 times that of the bond market. The coefficient on the risk variable indicates that for every 1% increase in bond market volatility, real Canada yields increased by about 0.23%. That is, the approximate 5% increase in the standard deviation of bond market returns before and after 1956 was associated with well over a 1% increase in real Canada yields. In other words, active monetary policy by changing interest rates has increased bond market risk and with it the real return investors require *(demand).*

The deficit variable is the total amount of government "lending" (from all levels of government) as a percentage of the gross domestic product. Statistics Canada reports this as lending but usually it is negative, that is, deficits and government borrowing. As governments run deficits it

[4] During this period, the Govermnent of Canada long-term bond had as much market risk as low risk Canadian utilities. At that time some utilities were allowed a lower return on equity than the prevailing long term Canada bond yield.

[5] Before 1991 there was no real return bond.

increases the *supply* of debt and all things equal means lower prices and higher yields. The coefficient in the model indicates that for every I% increase in government borrowing, real Canada yields increased by about 26 basis points. That is, increased government borrowing by competing for funds with other borrowers drives up real interest rates. For 1992, the deficit was 9.10% of GDP, which was a peacetime record high prior to the Covid 19 pandemic. At the peak of the government's financing problems in 1992 a 9.2% deficit was adding well over 2.0% to the real Canada yield relative to what would have happened with a balanced budget. These two effects can explain the huge increase in real interest rates in the early 1990s. In 1994, for example, when real yields were about 7.42%, the deficit added about 1.9% and the bond market uncertainty another 2.6% or in total close to 4.5% to the real yield. Conversely in 2008 prior to the financial crisis the government deficit had grown to a surplus of 0.25% while bond market risk had declined to 6.35%. So as a result, the real yield dropped to just 2.42%.

In addition to demand (risk) and supply (deficits) there are four indicator or dummy variables. Each of these represents a unique period of intervention in the financial markets. An indicator variable simply inserts a "1" for the years when this special phenomenon was in effect. Duml is for the years from 1940 1951, which were the "war[ll] years, when interest rates were effectively controlled to finance both the Second World War and the post war recovery. For example, in 1944 the government ran a deficit of over 20% of GDP, which normally would have caused a huge increase in interest rates to absorb this supply, except for government controls and the promotion of bond purchases. The coefficient indicates that real Canada yields were reduced by over 5.0% below where they would otherwise have been. Similarly, Dum2 is for the years 1972-1980, which were the oil crisis years, when huge amounts of "petrodollars" were recycled from the suddenly, oil rich, OPEC countries back to western capital markets and oil importing countries. The sign on Dum2 indicates that, but for this petrodollar recycling real long Canada bond yields would have been about 3.6% higher.[6]

Dum3 is for the recent period of unconventional monetary policy and central bank bond-buying since 2010, where countries like the U.S engaged in massive bond buying programs to stimulate

[6] These years can be viewed as a tax on oil importing countries and the inflation that resulted as the "working out" of who pays the tax.

investment and lower mortgage rates. During this period unconventional monetary policy effectively lowered the real yield by about 2.6% below where it would have been without the extreme measures taken in the US, UK, Europe, and Japan. Finally, the covid years 2020, 2021 and 2022 are special unto themselves, since with a budget deficit of over 10% of GDP in 2020, the Bank of Canada started financing the government deficit by directly buying 40% of the Treasury bill auction and $5 billion of Government of Canada bonds at auction. In this way the Bank of Canada joined similar programs elsewhere around the world with massive central bank government bond buying programs. These programs have clearly been effective as the coefficient indicates that real yields in Canada were 6.4% below where they would otherwise have been or an additional 4% below the already depressed real yields due to unconventional bond buying programs elsewhere. The result has been record"low real yields last seen during the peak of the petrodollar recycling crisis of 1972"1975 and the years before the ending of the Accord.

Of importance is that these indicator variables are included due to *known* periods of intervention that have prevented the "normal" application of financial principles in the bond market. Essentially, real yields have not been determined by private sector participants trading off risk versus return, instead they have been determined by government agents for political, rather than underlying economic reasons.

In Schedule 7 is a graph of the unexplained "error" from two models. The first is the error from the real yield model that excludes the financial crisis and Covid 19 indicator variables ("without") and the second includes them both ("with"). What is clear is that there is a very large model over-prediction (negative error) in the period after the financial crisis. In contrast, once Dum 3 and Dum 4 are added this error largely disappears. In other words, the real yields for the last few years have in the main not been determined by private sector participants.

In Schedule 8 is a graph of the real yield produced directly from the real return bond. Unfortunately, this data is not available for earlier periods since these bonds did not exist. However, we can see the huge decline in the real yield as governments have regained control over their budgets, uncertainty in the bond market has declined and monetary policy has been loose. For the period 1991-2000 the real yield was 4.0-4.5%, whereas in the after math of the

financial crisis it has averaged less than 2.0% before collapsing to negative levels during 2020-2021 and then recovering as monetary policy reversed course.

US **Estimates**

The prior discussion indicates that much of the dispute over the market risk premium is related to the behaviour of the bond and not the equity market. However, the Canadian data is one time series of equity and bond market returns and may reflect circumstances unique to Canada. Looking at US data allows an assessment as to whether these estimates are reasonable. Schedule 9 provides US estimates of the market risk premium along with the comparable Canadian estimates for the period 1926-2023.

Regardless of whether we estimate the AM, GM or OLS average, the historic record is that the US estimate of the market risk premium is higher than in Canada. Given the higher "quality" of the US data as well as the volatility of the estimates, many put greater faith in the US estimates. This is also frequently justified by the doubt expressed at the "higher risk"[7] Canadian market having a lower market risk premium, as well as the increasing integration between the two capital markets, which "presumably" moves Canada closer to the US experience.

However, the difference between the US and Canadian AM market risk premium estimates since 1926 of 1.71 % (6.58%-4.87%) is split between a difference in the average equity return of 1.24% and a difference in the average government bond return of 0.46%, that is approximately a 3: 1 equity-bond market split. In explaining this, note that:

- The difference between the equity market returns can partly be explained by the historic efforts of Canadian governments to segment the Canadian equity market from that in the US[8], by the historically slightly lower risk of the Canadian market and the "survivor bias" of the success of the US economy as the great winner of the 20th century, which means their equity returns are probably greater than expected.

[7] Note, however, that the standard deviation or variability of the S&PS00 equity returns was 19.72% or 1.6% higher than that for the Canadian market. Over the whole period, US equities were marginally ***more*** risky than Canadian equities with most of this coming from the pre-war period.

[8] The dividend tax credit only applies to dividends from Canadian corporations where foreign dividends are taxed as ordinary income; foreign withholding taxes apply to foreign source income, while portfolio restrictions have existed in tax-preferred plans.

- The difference in the bond market returns reflects the pivotal role of the US government bond market in the world capital market as the US $ became the world's reserve currency after the Second World War.

However, these historic factors while they may explain the historic differences may not be as relevant for the future. Canada, for example, is in a relatively favourable position as an "AAA" rated borrower that until recently had solved most of its structural deficit problems. Favourable government finances have resulted in low inflation and interest rates, and the removal of the foreign property restriction on tax preferred investments. We can see this in the graph of long-term interest rates in Canada and the US in Schedule 10. In the mid 1990s the nominal yield on long Canada bonds was routinely higher than that on equivalent US treasury bonds. However, this started to change as the Government of Canada moved into a surplus position in 1997 and since the mid 2000's long Canada bonds have usually had lower yields than US Treasuries. This is shown more clearly in Schedule 11 which graphs the yield spread that is, the difference between long term Canadian government bond yields minus those in the US. Typically, long Canada bonds have recently had yields about 0.50% less than equivalent US Treasuries with that difference widening significantly in 2023 to well over 1.0%.[9]

All else constant, this swing of over 1.0% in the Canadian bond yield versus that in the US would raise the estimate of the Canadian equity market risk premium simply because it is now over a lower Canadian bond yield. *As a result, although my direct estimate of the Canadian market risk premium is 4.87% from 1926, I judge it reasonable to adjust this upwards for the changes in the long Canada bond yield relative to that in the US and these other changes. I therefore judge a reasonable range for the historic market risk premium to be 5.5-6.0%.*

Reasonableness of the Estimates

In assessing the reasonableness of the prior statistical work, we can look at what professionals' use. On July 17, 2019, BVWire[10] reported the results of a small survey which indicated the following data sources were relied on by professionals:

[9] Since 2010 the median difference has been 0.42%.

[10] Business Valuation Resources, BVWire 202-2, July 17, 2019.

- 69% Duff and Phelps
- 45% Professor Aswath Damadoran
- 13% Professor Pablo Fernandes

Duff and Phelps purchased the original data from Ibbotson and Sinquefield which has a long history of being used in regulatory hearings and was originally developed at the University of Chicago. [11] Duff and Phelps are now Kroll and base their market risk premium and cost of capital report on this data and market their "Cost of Capital Navigator" product. This is a subscription-based product that provides cost of capital estimates for US and international companies. While this is a subscription-based product they provide their overall market risk premium estimates on their web page, which I reproduce as Schedule 12.

In October 2022 Kroll's estimate of the equity market risk premium was 6.00% over a 3.50% "normalised" 20 year US Treasury yield for an equity market return of 9.50%. This was a 1.5% increase over the value they used for 2021. As they explain in a footnote, normalised is a proxy for a longer term risk-free rate where the currrent rate is abnormally low due to the impact of Covid and central bank intervention However, they note that should the US Treasury yield rise above 3.5% then they would recommend using that value. This subsequently happened in 2023 where in July Kroll reduced their equity risk premium form 6.0% to 5.5%. This was confirmed in January 2024 with the explicit note that it is to be over a 3.5% Treasury yield or the spot rate whichever is higher. Given a normal spread over the 30-year bond of 0.35% this is effectively the same minimum yield on government bonds as the 3.8% forecast yield which I have been using since 2012.12 The important point is that Duff and Phelps (Kroll) recent market risk premium estimates are the same as my own 5.5-6.0% range and have not been increased due to the level of the 10-year yield. Instead they normalise the base for the market risk premium.

Aswath Damodaran is a Professor of Finance at New York University's Stern School of Business. Damodaran teaches corporate finance and valuation and has a keen interest in equity risk premiums. At Schedule 13 is a graph produced by Cornell Capital from his data with the "implied" equity risk premium from 1960 to 2023 for the US. This estimate is based on

[11] R. G. Ibbotson and R. Singuefield, Stocks, bonds, bills, and inflation: year by year historical returns (1926-1974), *Journal of Business* 49-1, pp 11-47.

[12] For the last five years I have been authoring a Canadian appendix for Kroll.

"potential" dividends as a proxy for cash flow and a two stage discounted cash flow model. What is striking is that only rarely does his implied equity or market risk premium exceed 6.0% and for the last ten plus years it has also been in the 5.0-6.0% range. Moreover I would regard his estimates as high for three reasons: 1) his cash yield includes the impact of share buybacks, but not new share issues, so includes one but not the other and is high; 2) he uses analyst growth estimates which even for the overall market may be high, which is why he tapers them with the long run growth rate using the two stage DCF model; and 3) his risk premium is over the ten year US government yield instead of the long term yield as is the practise in regulatory hearings in Canada. His estimates for the market risk premium in 2021, 2022 and 2023 are for 4.24%, 5.95% and 4.6% respectively.

The final source is the annual survey work of Professor Pablo Fernandes [13] and his co-authors. They survey professionals around the world to find out what they use for the market risk premium. The professionals include analysts in companies, investment banks and professors. A key result from his survey and his table 2, part of which is reproduced below. The table indicates that with 1,378 responses the average US market risk premium was estimated to be 5.7 with the typical (median) value of 5.50%. The average market risk premium from the 41 responses in Canada was 6.0% with a median value of 6.0%. Noticeably, the highest value reported by any finance professional in Canada was 8.0% and for the U.S. a whopping 15.0%. With a vastly larger number of people responding in the US the range between the minimum and maximum values is from 2.0% to 15.0%. I suspect that the range is largely due to the difference between thinking of the market risk premium based on AM or GM returns or not thinking at all.

[13] Survey: Market risk Premium and Risk-Free Rate Used for 80 countries in 2023," IESE Business School, April 3, 2023. Previous survey results were reported in "Market risk premium used in 71 countries in 2016: a survey with 6,932 answers, *Journal of International Business Research and Marketing,* 2(6), pp 23-31.

Tabi:e 2. Market Risk Premium 1(MRP) used for 80 countries in 2023

MRP	Number of Answers	Avef'age	Mediam	MAX	min
USA	1378	5,7%	5,5%	15,0%	2,0%
S.oain 2023	428	6,6%	6,3%	15,0%	3,0%
And'on:a	8	8,9%	.8,8%	10,2%,	7,8%
Amenlina	15	28,1%	26,7%	39,8%	7,5%
A'llislralia	,39	6,2%	6,0%	15,0%	3,3%
♦uslria	67	6,8%	6,6%	9,0%	5,0%
Be1cium	63	6,4%	7,0%	8,2%	4,0%
Bolivia	10	14,3%	·14,8%	17,0%	9,0%
Bosmia	9	16,6%	16,51¼	18,9%	14,6%
Brazjl	43	9,3%	9.7%	20,0%	4,0%
Bu'laaria	10	8,1%	8,3%	9.6%	6,5%
Canada	41	6,0%	16,0%	8,0%	4,0%
Chile	25	6,9%	7,0%	8,1%	5,5%
Chin-a	25	8,6%	8,7%	12.0%	4,0%
Cofambia	15	9,0%	9,2%	20,'0%	3,0%
Costa Rica	9	14,2%	14 ,7%	17.0%	9,0%
Croatia	1:3	8,7%	SUI%	10,1%	7,0%
Czech Republic	24	6,6%	6,7%	9,) %	5,3%
Denmark	27	6,2%	5,9%	8,7%	4,8%
Dominican ReP-	8	11,7%	H,6,%	1.3,4%	10,3%
Ecuador	19	20,9%	23,2%	32,2%	3,0%
Egyol	9	14,4%	14,7%	17,0%	10,8%
Estonia	19	6,9%	·6,8%	8,9%	6,1%
Eth.iopia	8	20,7%	20,5%	23:6%	18,3%
fin:land	31	6,2%	16,6%	1,8%	3,5%
France	3:1	6,0%	'6,3%	8,3%	0,3%
Gerimanv	264	5,7%	5,9%.	9,0%	0,0%

A feature of Fernandez's recent surveys is that they also surveyed the use of the risk-free rate in estimating the required rate of return to obtain the overall equity cost for the market. The overall average equity market return was 9.50% in both the US and Canada. Both of these have seen a rerversion to normal from their 2021 values which were generally 2.1 % lower in the US and 2.0% lower in Canada.

Table 4, Km!Required return Io equity (mark&J): RF+ MRP] used for 80 c01.mtri1:s in 2023

US/\	9,5%	Greece	15,0%	Peru	14,1%
Spain 2023	111,1%	Hon<1 Kona	10,fl%	PhllllplnES	13,9%
Andorra	11,S¾	Hunmirv	16J%	Poland	13,4%
Arnentlna	57,7%	Iceland	13,4%	PortUi!Bl	11,6%
Australia	j{],,0%	India	HI,5%	Qatar	9,13%
Austria	'9\5%	Indonesia	14,9%	Romania	16,6%
Bef lum	10,2:%	Ireland	9,6%	Riussla	27,6%
Botivia	20,,1%	Isrnel	10,I\%	Sau di Arabia	12,0%
Bosnia	2.1,1%	Italy	11,1%	Serbia	18,1%
Brazll	2.1,5%	Japan	7,1%	Singapore	8,2%
Bufoarla	11ii;i%	Kenva	28i7%	Slovakia	10,9%
Canada	9,5 %	Korea• !South)	g,3%	Slovenia	11,2%
Chlte	11 ,S%	Kuwal!	8,8%	South Africa	18,1%
China	128,%	Latllia	89%	Sweden	75%
Colombia	20,,ll,%	Li1!iuanla	89%	Switzerland	H%
Costa Rica	18,4%	Luxemboura	89%	Taiwan	8,1%
Croatia	12A%	Malavsia	11,7%	Tanzania	23,0%
Czech Republic	10,9%	Mexico	16,{1%	Thailand	11,1%
Denmark	g,iO¾	Mom1olla	26,G%	Turkev	32,7%
Dominican Reo.	19,2%	Morocoo	13,2%	Uaanda	26,2%
Ecuador	34,5%	MommbiQue	*2111%*	Ukraine	53,3%
Eavot	29,3%	Netherlands	8,1%	United Amb E:mlrates	10,1%
Estonia	[M%	New Zealand	10,9%	Urnited KinQdom	9,8%
Ethiopia	32,2%	Niqeria	30,5%	U1uQuay	*11,1%*
Finland	9,4%,	Norway	9,,2%	Venez.uala	64,3%
France	9,0%	Pakis1an	35,B%	Vietnam	14,8%
Ge1Y11any	fl,2%	Panama	15,4%		

Similar to Duff and Phelps, Credit Suisse now produces an annual "Global Investment Returns Yearbook." The critical equity risk premium data for the US is summarized in my Schedule 13. Between 1900 and 2022 the equity risk premium over bonds was just over 4.7%. This estimate removes the bias for the standard data starting in 1926 where that start date was used simply to capture the period prior to the 1929 stock market collapse.

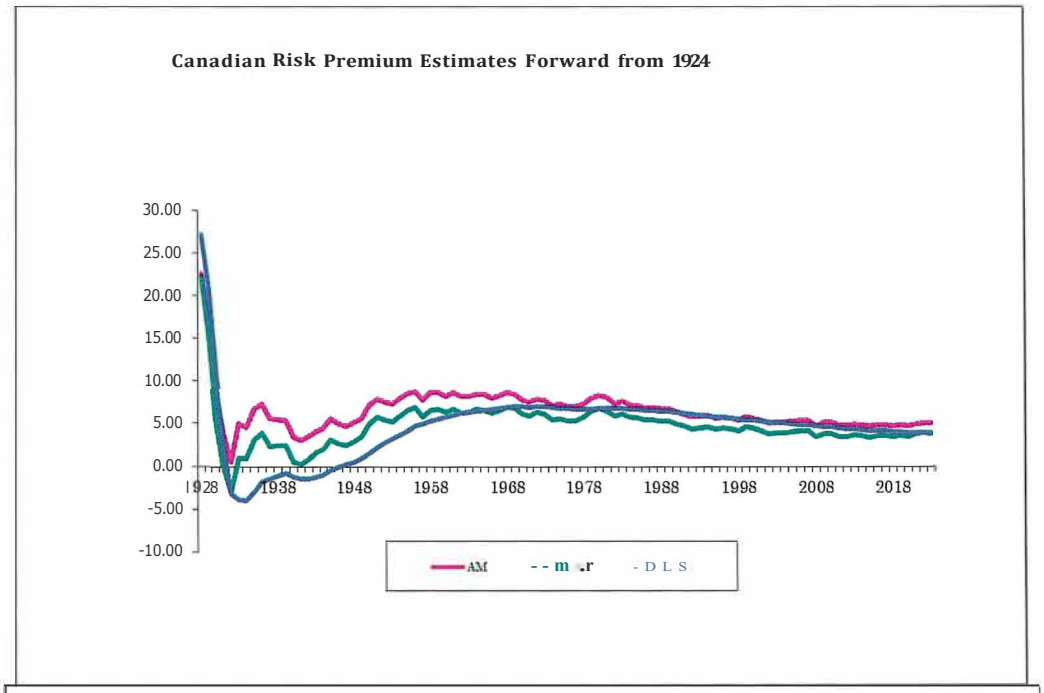
Overall, I would summarise my market risk premium estimate relative to these other commonly used services as:

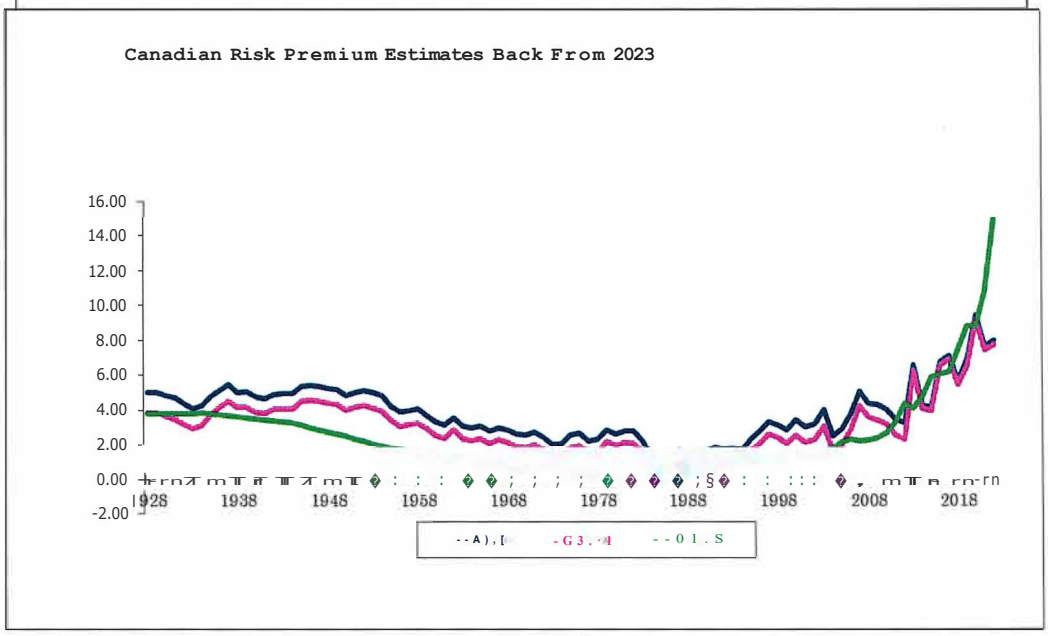
Booth historic range: 5.5%-6.0% mid point:	5.75%
Duff and Phelps/Kroll (US):	5.5%
Damodaran (US):	4.6%
Fernandes survey:	5.7-6.0%
Credit Suisse:	4.7%

Conclusions

Professor Fernandez's survey work, the academic work of Aswath Damodaran and the professional work by Duff and Phelps/Kroll and Credit Suisse all support my own empirical work on Canada and the US. Overall, I judge a reasonable range for the market risk premium as being 5.5-6.0%. The survey estimates of Fernandes and the estimates of Duff and Phelps (Kroll) also support an overall equity market return of 9.0-9.50%, which implies an upper bound for the equity cost for lower risk regulated utilities.

SCHEDULE I

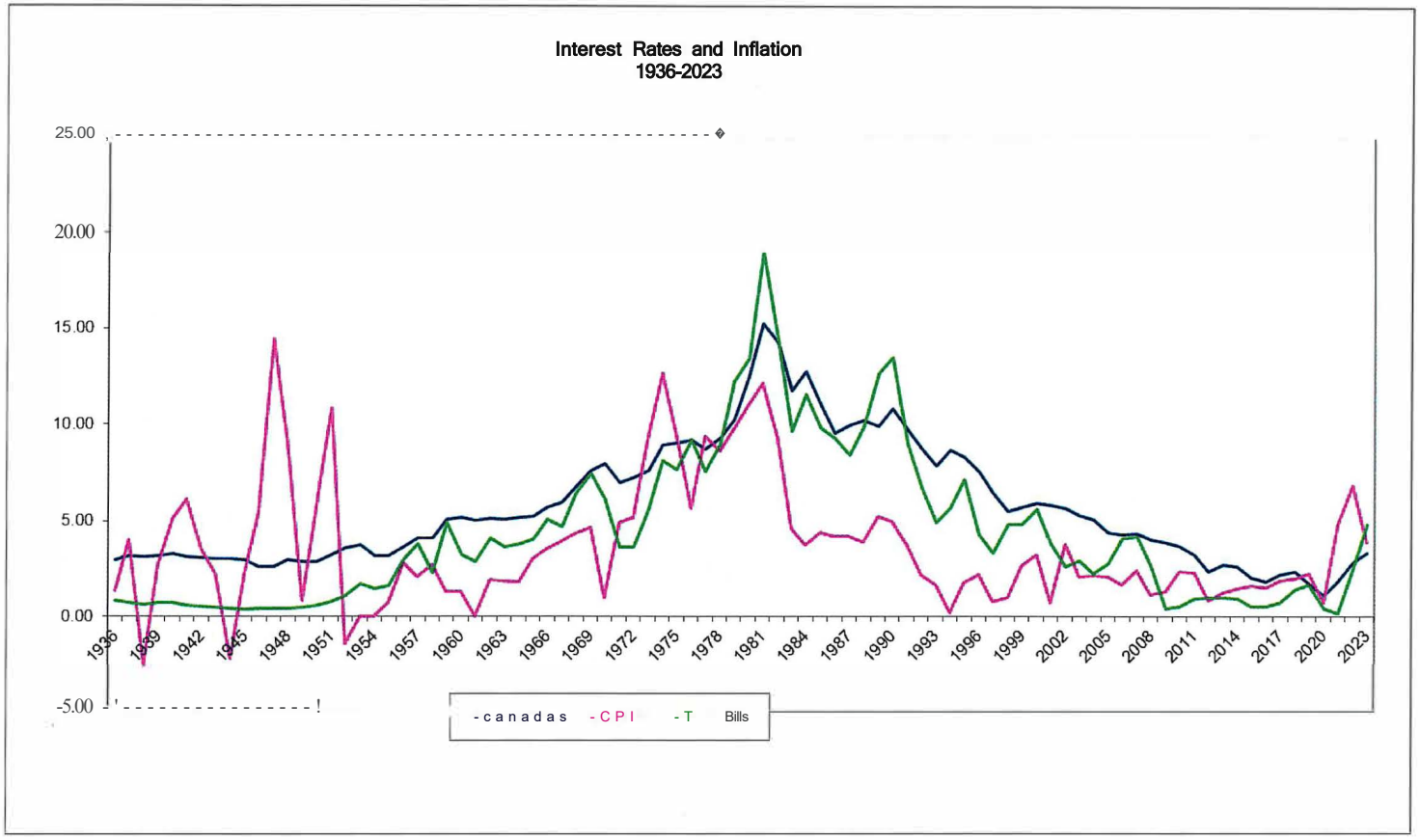

Canadian Risk Premium Estimates Forward from 1924
30.00
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
-10.00
1928
1938
1948
1958
1968
1978
1988
1998
2008
2018
AM
- D L S

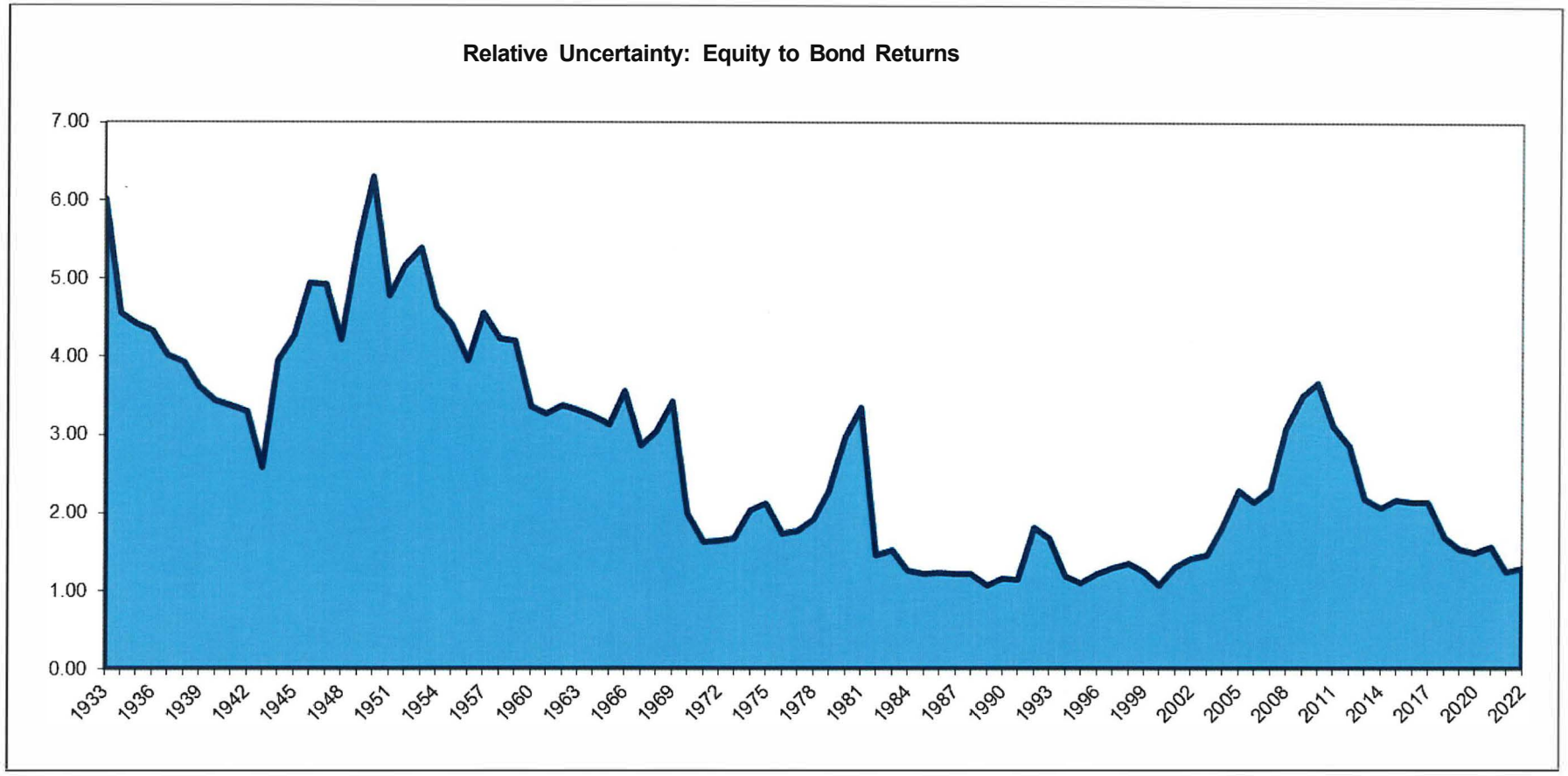

Canadian Risk Premium Estimates Back From 2023
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
1928
1938
1948
1958
1968
1978
1988
1998
2008
2018
- G 3 . - 1
- - 0 1 . S

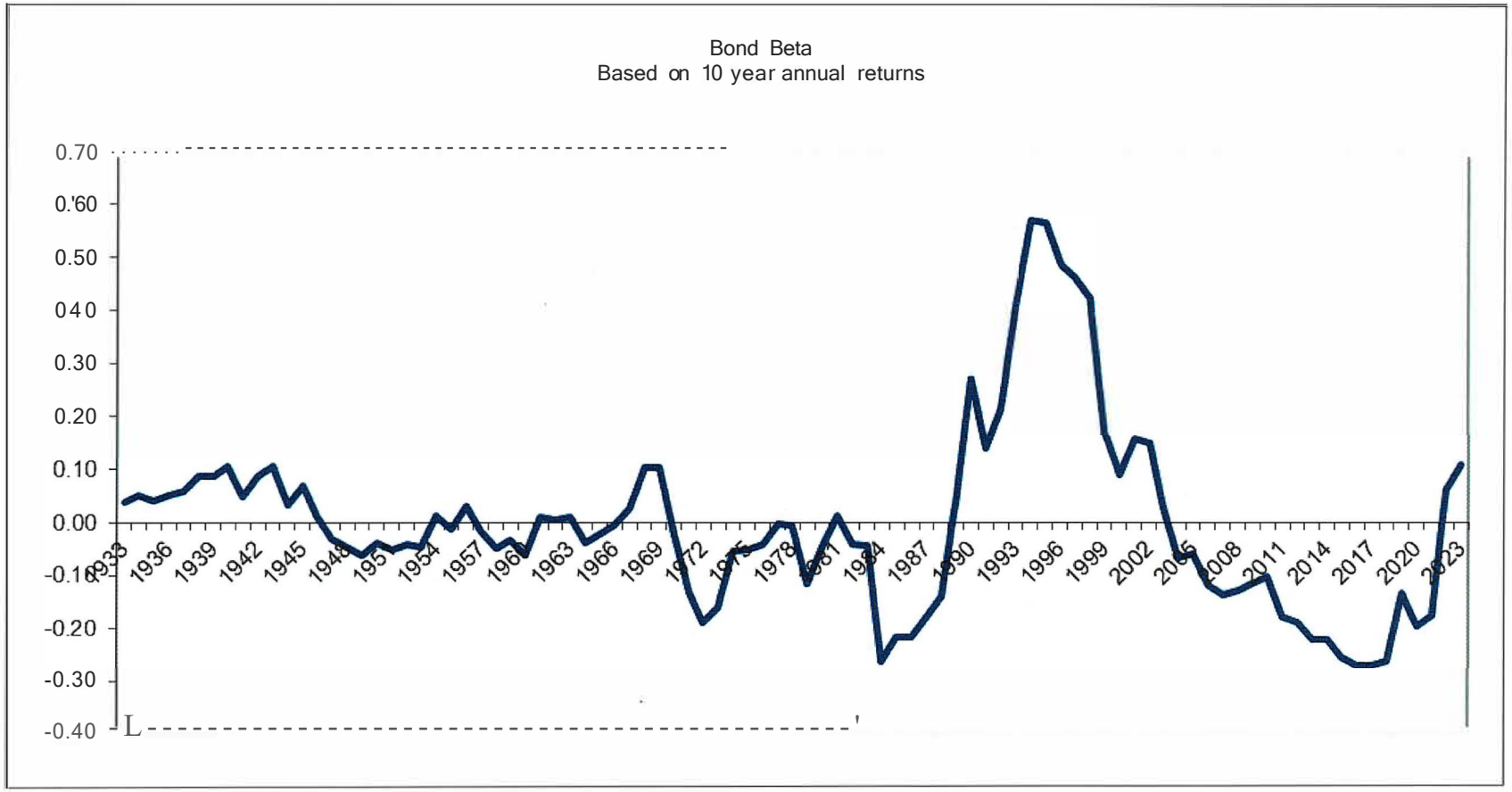
Arithmetic Earned Market Risk Premiums for Different Holding Periods

Start dates on the horizontal and ending dates on the vertical. For example, an investor would have earned a 2.23% arithmetic market risk premium investing from 1964-2013.

	1924	1934	1944	1954	1964	1974	1984	1994	2004	2014
1933	5.00									
1943	4.15	3.74								
1953	7.27	9.68	13.49							
1963	8.26	9.75	12.37	11.24						
1973	7.73	8.41	10.11	8.42	5.61					
1983	7.66	8.19	9.42	8.06	6.47	7.33				
1993	5.85	5.99	6.52	4.78	2.63	1.14	-5.05			
2003	5.20	5.23	5.55	3.96	2.14	0.98	-2.19	0.67		
2013	4.96	4.96	5.20	3.81	2.33	1.51	-0.43	1.88	3.10	
2023	5.04	5.05	5.26	4.09	2.90	2.36	1.11	3.17	4.42	5.86


Interest Rates and Inflation
1936-2023
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
1936
1939
1942
1945
1948
1951
1954
1957
1960
1963
1966
1969
1972
1975
1978
1981
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
- canadas
- CPI
- T Bills


Relative Uncertainty: Equity to Bond Returns
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
1933
1936
1939
1942
1945
1948
1951
1954
1957
1960
1963
1966
1969
1972
1975
1978
1981
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2022


Bond Beta
Based on 10 year annual returns
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
-0.30
-0.40
1933
1936
1939
1942
1945
1948
1951
1954
1957
1960
1963
1966
1969
1972
1975
1978
1981
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023

SCHEDULE6

FACTORS INFLUENCING THE REAL CANADA YIELD (1934-2022)

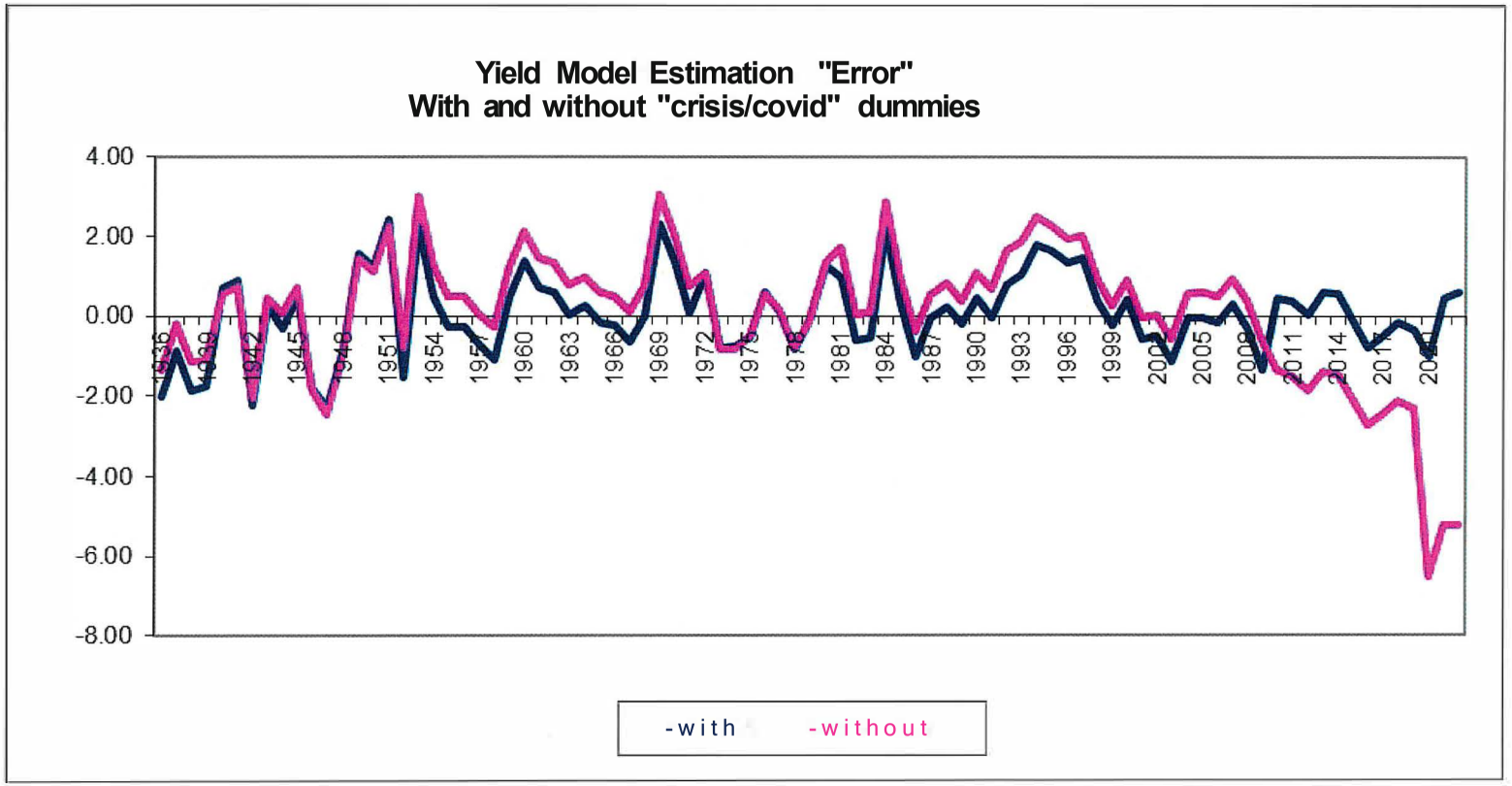
Dependent variable: Long Canada (over 10) yield minus the average CPI inflation rate for the past, current, and forward year.

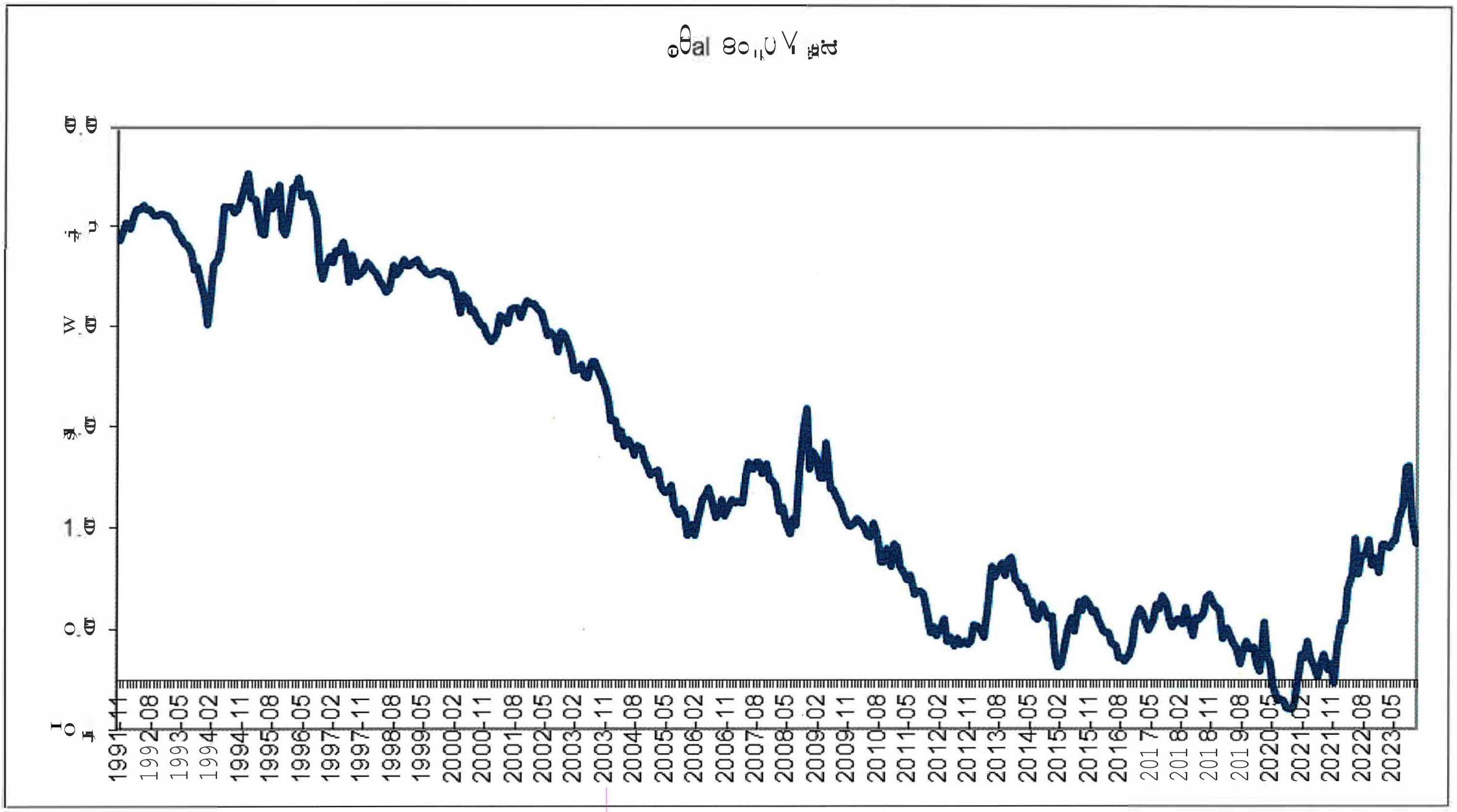
Independent variables:

	Coefficient	T-Statistic
Constant:	1.34	3.33
Risk: standard deviation of return on the Long bond index for the prior ten years.	0.23	4.77
Deficit: aggregate government lending (% of GDP).	-0.26	-8.65
Duml: dummy variable for years 1940-51	-5.29	-12.33
Dum2: dummy variable for years 1972-80	-3.54	- 8.37
Dum3: dummy variable for years 2010-2019	-2.59	-3.40
Dum 4 dummy for 2020 and 2022	-6.35	-7.78

Adjusted R^2 of the regression 83.9%
Data 1936-2023 using latest data available.
Results were very similar with a median regression.

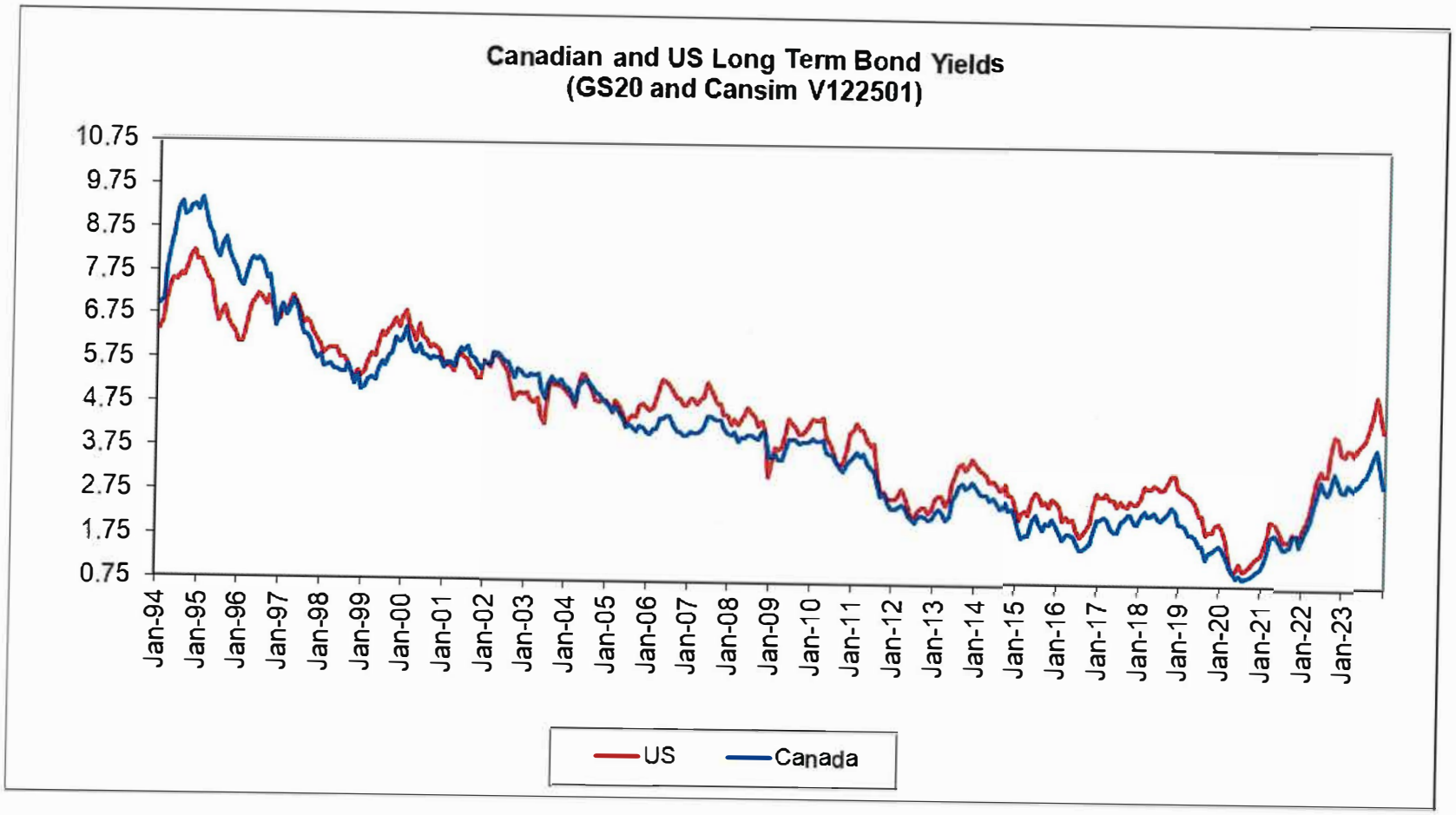
SCHEDULE 7


Yield Model Estimation "Error"
With and without "crisis/covid" dummies
4.00
2.00
0.00
-2.00
-4.00
-6.00
-8.00
1936
1939
1942
1945
1948
1951
1954
1957
1960
1963
1966
1969
1972
1975
1978
1981
1984
1987
1990
1993
1996
1999
2005
2011
2014
-with
-without

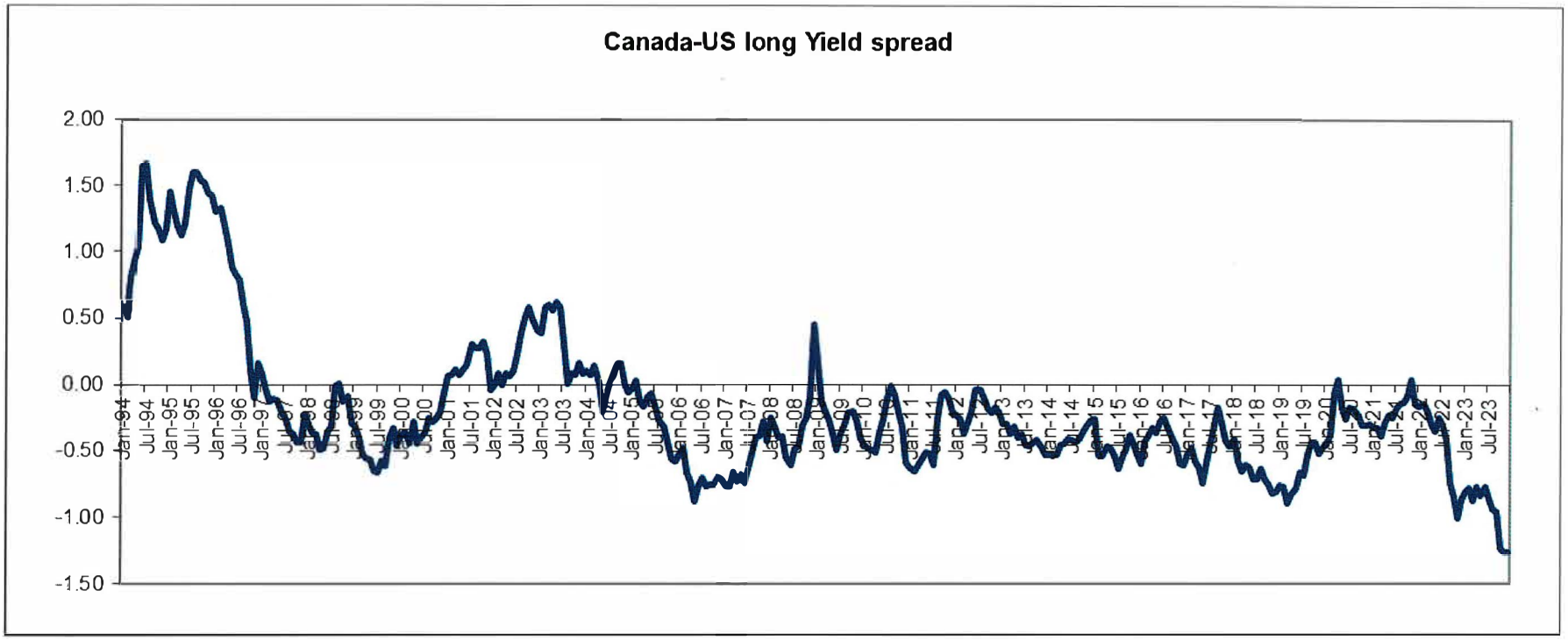

1991-11
1992-08
1993-05
1994-02
1994-11
1995-08
1996-05
1997-02
1997-11
1998-08
1999-05
2000-02
2000-11
2001-08
2002-05
2003-02
2003-11
2004-08
2005-05
2006-02
2006-11
2007-08
2008-05
2009-02
2009-11
2010-08
2011-05
2012-02
2012-11
2013-08
2014-05
2015-02
2015-11
2016-08
2017-05
2018-02
2018-11
2019-08
2020-05
2021-02
2021-11
2022-08
2023-05

SCHEDULE9

Annual Rate of Return Estimates 1926-2023						
	U.S.			CA.NADA		
	S&P Equities	Long US Treasury	Excess Return	TSE Equities	Long Canadas	Excess Return
AM	12.15	5.57	6.58	10.91	6.04	4.87
GM	10.27	5.09	5.17	9.36	5.67	3.69
OLS	11.12	5.65	5.47	10.05	6.25	3.80
Volatility[1]	19.72	10.23		18.12	9.03	


Canadian and US Long Term Bond Yields
(GS20 and Cansim V122501)
10.75
9.75
8.75
7.75
6.75
5.75
4.75
3.75
2.75
1.75
0.75
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
US
Canada

SCHEDULE 11


Canada-US long Yield spread
2.00
1.50
1.00
0.50
0.00
-0.50
-1.00
-1.50
Jan-94
Jul-94
Jan-95
Jul-95
Jan-96
Jul-96
Jan-97
Jan-03
Jul-03
Jan-04
Jul-04
Jan-05
Jan-06
Jul-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jul-18
Jan-19
Jul-19
Jul-21
Jan-22
Jan-23
Jul-23

Kroll Market Risk Premium
(based on Ibbotson Data)

Cost of Capital in the Current Environment

January 2024 Update

"Global economic growth in 2023 handed a pleasant surprise to economists. thanks in part to a resilient U.S. economy and a decline in global energy prices. Although the U.S. economy showed greater resilience than the Eurozone's, real GDP growth in 2023 likely ended in a much better place than originally projected at the beginning of the year for both geographies. Going forward, a scenario of soft landing has become more plausible, although real growth is expected to slow down in 2024 in most regions globally. The good news is that despite the significant increase in interest rates in 2022 and 2023, economies and markets seem to have absorbed the hikes without major disruptions. Inflation has decelerated significantly. at a faster pace than many anticipated; while long-term inflation expectations have also dropped materially, especially in Germany. Investors are pricing significant policy rate cuts in 2024 for major economies, boosting confidence and leading to new record highs in some equity markets. This "risk-on" attitude means equity risk premia is likely to come down, barring a major geopolitical event (e.g. escalation of the Middle East conflict) or other unforeseen materially negative event."

Carla S. Nunes, CFA - Managing Director, Valuation Digital Solutions/Office of Professional Practice, Kroll

Kroll Cost of Capital Inputs

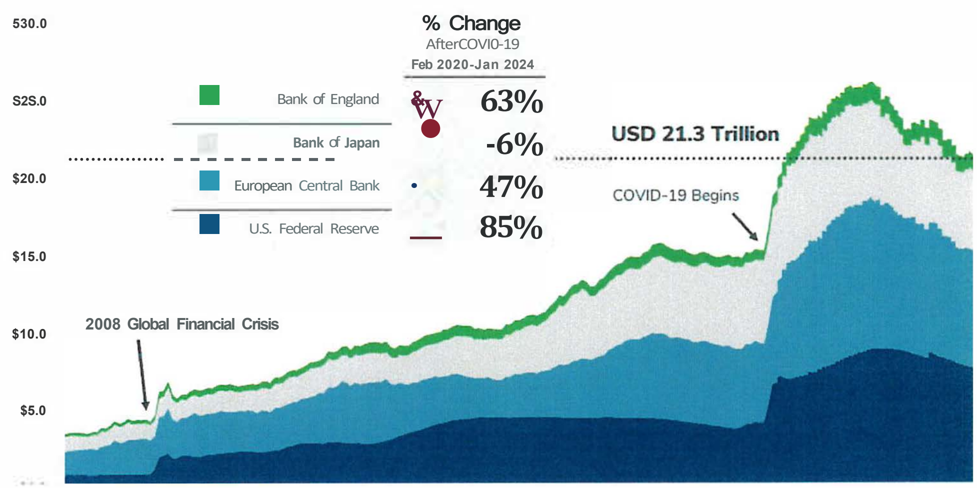
Data as of January 31. *2024*

	Normalized Risk-Free Rate	Kroll-Recommended Equity Risk Premium
U.S. (in USD)	Higher of 3.5% or Spot*	5.5%
Eurozone*** (in EUR)	Higher of 3.0% or Spot**	5.5% to 6.0%

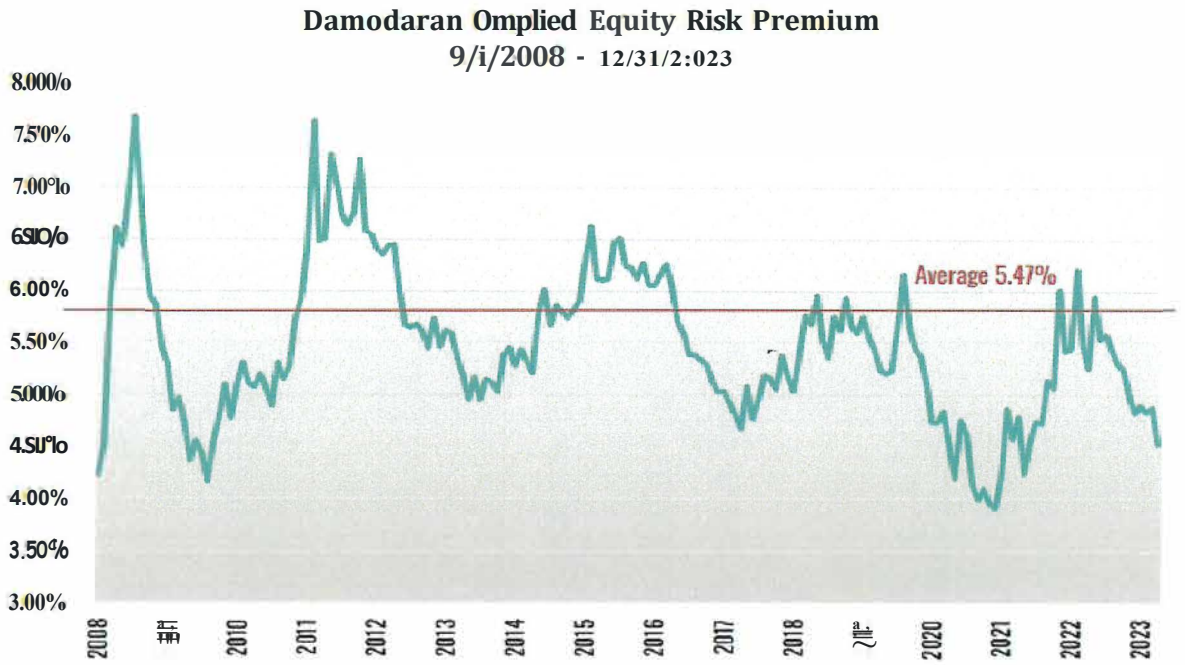
- Worcccmmcnd tmng thP spot 20-Vfiil• US. lruswyyi as lhe proxy fi)r the rr.k-fr« ritt'. 1 the prcv.i,ng vitild ,1l. of the v,ilu,1t10n drtc is h1ghc1 than our mended U.S. normilb:cd nslr.-flt'l? 1ilQ of).S Th15 gu,d.1nce 1l ctfccWe whon dl1Yllopirig USD-ck!nominatcd diKDl.lnl r;1u;,; as ol Jun(! 16. 2022. ;mdthcrciltt'"1'.
- We r=mmcnd using Ule s00115 ycor C-tfimon govc:mmt bond yidd as plmcy fol the mk-frce rilli=. ii the prev••ing yield , 0, the valu.1txln dati: is hii,hcr lt.an ou1 rKOmmCnckd Gen,,;in norm;1b r;skfr11.c riita of J.QQb. Tlus guid;mco is dfec11vc whm dcvt!top1ng £LJR dcnuranalcd dlSCOUM r;1ted a$ al Octobcl' 18. 2022. nd

Total Assets Held by Major Central Banks Over Time

Data as of January 26, 2024



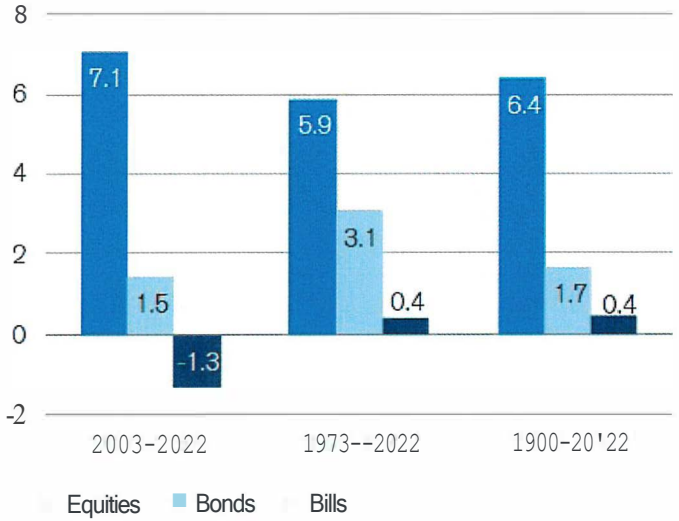
Damodaran Implied equity (market) risk premiums



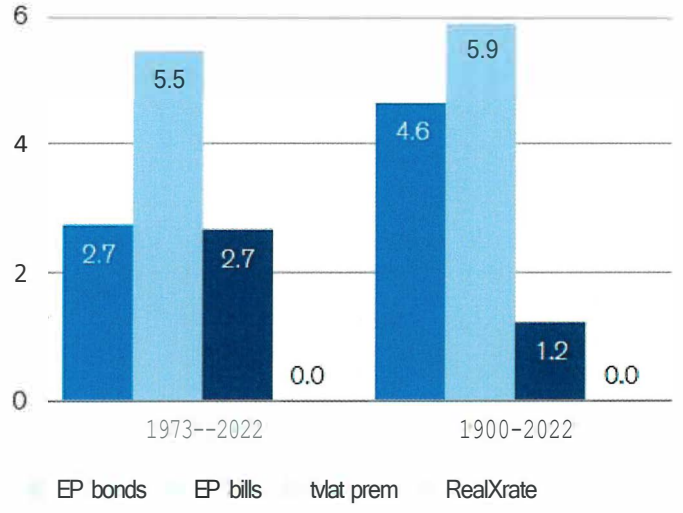
From Cornell Capital Group using Professor Damodaran's data at
https://pages.stern.nyu.edu/-adamodar/New_Home_Page/datafile/histimpl.html.
His 2021, 2022 and 2023 implied equity risk premiums for the US are 4.24% 5.94% and 4.60% respectively.

Damadoran's risk premium is over the ten-year Treasury yield not the 30 year Treasury bond so is high.

Figure 147: Annualized real returns and risk premiums (%) for the USA, 1900-2022



Nole: The lhree asset classes are equities, long-term government bonds, and Treasury bills. All rerums indude reinvested income, are adjusted for inflation, and are ,expressed as geometric mean returns.



Note: EP bonds and EP bills denote the equity premium relaiive to bonds and fo b'lls; Ma-t prem denotes ihe maturity premium for bonds relative to b'lls; RealXRate denotes the inflation-adjusted change in the exchange rate against the US dollar.

From Credit Suisse, Global Investment Returns Yearbook 2023.
https://www.credit-suisse.com/about-us/en/reports-research/csri.html

APPENDIX C

RELATIVE RISK ASSESSMENT FOR A BENCHMARK UTILITY

Introduction

In risk premium models the relative risk coefficient adjusts the overall market risk premium up or down depending on whether the individual security (company) is more or less risky than the overall market. More risky stocks have a relative risk coefficient greater than 1.0 and less risky stocks a relative risk coefficient less than 1.0. Averaging over all securities in the market using market value weights gives a relative risk coefficient *by definition* of 1.0. All risk premium models have this same risk assessment relative to the market, whether they are the capital asset pricing model (CAPM)[1] where the only source of risk is the market risk, or models that introduce other sources of risk. However, even within a two factor model, where the long Canada bond is regarded as risky due to interest rate risk,[2] or the Fama-French three factor model[3] where size and the market to book ratio (in their model termed the book to market ratio) are additional sources of risk, the coefficient on the market is still the main measure of risk. Estrada,[4] for example, shows that for the DOW 30 US stocks the simple CAPM expected return at the time of his study of 9.70% is only 0.20% more than the estimate from the three factor Fama-French Model and that the market risk premium is larger than either the size or book to market premiums.

Since the overall market return is the benchmark, the relative risk assessment is with respect to this benchmark. Statistically this relative risk coefficient is the *expected* or forecast covariance[5] between the security's return and that on the market scaled by the variance of the return on the market. This is called the security's beta coefficient (β) and measures the contribution of the

[1] William Sharpe, "Capital asset prices: a theory of market equilibrium under conditions of risk," Journal of Finance 19, 1964.

[2] Fisher Black, "Capital market equilibrium with restricted borrowing", Journal of Business, July 1972.

[3] Eugene Fama and Ken French, "The cross section of expected stocks returns," Journal of Finance 59, 1992.

[4] "The three-factor model: a practitioners guide," Journal of Applied Corporate Finance, Spring 2011.

[5] The covariance measures the degree to which two securities move together.

security to the risk of a diversified portfolio. We normally estimate actual historic beta estimates by a simple ordinary least squares (OLS) regression of the security's return against that of the market. In any OLS regression the intercept is called *alpha* and the slope coefficient is called *beta,* which is why these terms are used pervasively in finance. However, estimating actual beta coefficients entails the exact same estimation problems as estimating the market risk premium, since *both* use actual or historic returns. *What this means is that any estimate is very sensitive to what happened during the estimation period.* For example, if something like a major stock market crash happens once every 20 years then beta coefficients estimated over the last five years will only capture this 25% of the time. The other 75% of the time the betas will be estimated over a period that does *not* include a major stock market crash.

We overcome this problem when estimating the market risk premium by going back over very long periods of time. This is possible because the basic risk return trade-off in the capital market is regarded as relatively constant. However, for estimating beta coefficients this is more problematic since the risk of a firm or industry changes much more than the overall risk of the market. Instead, we tend to use estimates from similar firms and industries as well as more judgment in understanding the economic and financial factors underlying the beta estimates. In this way we get a better understanding of the *expected* beta coefficient, which is what is required.

Historic Beta Estimates for Canadian utilities

In 2002 the Toronto Stock Exchi,mge outsourced its market indexes to Standard and Poors (S&P) and changed their composition. The great advantage of the sub-indexes is that they include more companies than is normally possible with individual companies since companies are constantly being reorganised as business strategy changes. This is particularly important because many Canadian regulated firms, like Consumers Gas, Maritime Electric, Bell Canada, Union Gas, Pacific Northern Gas, Fort Chicago Energy Partners (Veresen now Pembina), BC Gas, Maritime T&T, Newfoundland Power etc., have all disappeared through corporate reorganisation. Although this means that their individual company betas disappeared, it does not mean that their economic impact has also disappeared. Consumers Gas now shows up as part of Enbridge Inc, BC Gas as Fortis etc., so their economic impact continues to show up in the sub index betas. However, there is a disadvantage, which is that these are not simple averages but *market value*

weighted averages, since this is the way that stock market indexes are normally calculated. As a result, large market value companies have a disproportionate impact on the indexes and may reflect a variety of different business segments.

In Schedule 1 is a graph of rolling betas on the Canadian utility sub index since 1988. Betas are normally estimated over the prior five years since the basic data sources historically used monthly data,6 so the first observation is from January 1988 until December 1992 and then each month as a new return is available the five-year estimation window moves forward a year. This process is repeated using two estimation techniques; the first Beta is the simple beta against the Canadian market index (Canada), whereas the second Beta is Beta2 which also includes the impact of interest rate changes by adding the monthly return on the long Canada bond as a second risk factor. In previous rate hearings one argument for mechanically adjusting betas was this interest rate effect on utilities. However, to all intents and purposes the beta estimates are now almost the same, but it does allow an estimate of the sensitivity of utility shares to interest rates, which I discuss later, and refer to as "gamma."

Using this procedure and 35 years of data (1988-2023) I can pick up the impact of unique events. For example, the utility betas were both in a range of 0.40-0.60 until 1997. The betas then dropped to negative values during 2001-2004 before reverting to more "normal" levels. Did this mean that utility shares had no risk during this period and deserved a negative market risk premium? The answer to this question is no, since a special event: the behaviour of Nortel and the "Internet Bubble" drove the estimates. During the late 1990s, the technology and internet boom were driving North American markets up as the prices of Nortel and JDS Uniphase[7] increased and their market value came to represent 1/3 of the value of the Canadian stock market. When this boom turned. into a crash and Nortel declined from $1,240 to zero with its bankruptcy, Nortel took the Canadian market down with it.

It is important to understand that historic beta estimates measure the risk of a security *relative* to the risk of a diversified portfolio, in this case the **TSX** Composite. Utility betas were pulled down

[6] In Canada this is the TSX/Western data base and in the U.S. the Center for Research in Security Prices (CRSP) data base at the University of Chicago.

[7] JDS Uniphase resulted from a merger of the Canadian fibre optic company JDS Fite! in 1999.

as Nortel and the tech boom dominated the Canadian market driving it up and then down when they crashed, while utility shares were not affected. This accurately estimated a low covariance and low beta during this period. *That is, at that time adding low risk utilities to a portfolio dominated by Nortel and JDS Uniphase significantly reduced that portfolio's risk.* As the effect of the internet bubble and crash passed through the five-year estimation window, utility betas reverted to a more normal pattern. By 2008 the beta estimates covering the period 2004-2008 were largely devoid of the effects of the Internet Bubble since the tech wreck had removed Nortel's influence. As a result, utility shares added their normal amount of risk to a diversified portfolio not because their risk had changed, but because their risk *relative* to the overall market had changed.

Finally, utilities are clearly interest sensitive stocks as the consistent positive ***gamma*** coefficients indicate. This indicates that like the long Canada bond, utility prices tend to go up with interest rate decreases and down with interest rate increases as they tend to be similar interest rate sensitive investments. It is also clear that this interest rate sensitivity exhibits a negative correlation with the beta estimates, that is, beta coefficients tend to fall as gamma coefficients increase. This is because interest rates tend to increase during good times as the stock market booms and then fall in recessions. As a result, utilities are classic defensive stocks where interest rate declines during a recession cushions their share prices.

This statistical result echoes the comment of former RBC utility analyst Maureen Howe who commented that Canadian utilities are[8]

> "like convertible bonds. When interest rates are low, as they currently are, the companies trade on their bond value and are supported by tax-efficient dividend yields. When the 10-year GOC yield rises above 6%-6.5%, the Canadian companies trade on the basis of their underlying earnings and PIE."

I would agree with Howe's comments with the qualification that we have not had Government of Canada (GOC) yields above 6% since 2000. Consequently, the search for yield until recently has led utility shares to largely trade on their interest sensitivity or "income" support.

[8] October 3, 2001, RBC Morning Comment.

In Schedule 2 are the results of two multiple regression estimates of utility risk. The first panel has the estimates for the overall period from 1988 where the utility beta against the Toronto Stock Exchange (TSX) return is 0.30 and the gamma or interest sensitivity against the long Canada bond return is 0.46. This means that over the whole period utilities had 30% of the exposure of an average stock to the market and 46% of the exposure of the long Canada bond to interest rates. Of interest is that both these coefficients are equally significant with T statistics over 7. However as noted previously this period reflects the Internet Bubble and crash which may bias the results.[9] In the second panel are the estimates for the last five-year period ending in December 2023. For this period the beta estimate is 0.44 closer to traditional levels and the gamma again 0.46. Note that in all cases both the beta and gamma coefficients are highly significant, but the gamma coefficient has been marginally less significant over the last five years.

A second criticism sometimes levelled against Canadian beta estimates is the "hollowing out" of the Canadian stock market as many prime Canadian companies like Inco and Alcan have been bought by foreign acquirers. If the Nortel/JDS Uniphase and hollowing out effects distort Canadian beta estimates, we can look at the returns against the U.S. market index. This might reduce the impact due to the "greater diversity" of the U.S. market. To examine this, the graph in Schedule 3 uses the hedged return on the U.S. market as the market index. However, the Internet Bubble effect is just as evident since regardless of whether we view the TSX or the U.S. stock market as the correct market portfolio, utility betas turned negative at that time. Moreover, the most recent simple beta estimate of 0.40 is lower against the U.S. market index than the 0.44 against the Canadian market index. What is clear is that "low" Canadian betas are not due to the hollowing out of the Canadian market.

We can see the same effect in the average beta estimates for the individual firms rather than the index in the graph in Schedules 4, where I have split the few remaining Canadian utility-like stocks into pipeline and utility holding company (UHC) samples. The most recent individual values estimated are in Schedule 5. The low risk UHC sample consists of Canadian Utilities

[9] A median regression that is less sensitive to outliers puts a higher coefficient of 0.37 on the beta.

(CU), Fortis (FTS), Emera (EMA), Gaz Metro (GMI)[10] through Valener (VNR) and where most recently I have added Hydro One.[11] The Pipeline sample consists of TransCanada Corporation (TRP), Enbridge Inc. (ENB), Fort Chicago (Veresen) and Pembina (PPL), which almost doubled its size by purchasing Veresen in 2017. During the internet bubble and crash both samples show very low and negative betas, but once these events passed out of the estimation window they recovered to more normal levels. For the utility holding companies (UHCs) recent average betas have been 0.35, whereas the betas of the pipeline sample have recently been much highe at 1.03, reflecting all the uncertainties surrounding pipeline expansions in both the US and Canada and the expansion of Pembina.

Consistent with the data in Schedules 1-5, I judge the interest sensitivity of these companies has caused them to trade based on their defensive or income characteristics during the most recent period of very low interest rates. As interest rates increase back to normal levels, I would expect their betas to increase as they trade less on their bond values and more as regular equities as they have done over the past year or so. I would therefore expect some tendency for their betas to revert to their long run average level.: for the market this is 1.0, but for regulated firms I have normally judged this to be about 0.50.

U.S. utility stocks as a comparison

Given the diminishing number of Canadian utility stocks I have been forced to look at samples of U.S. utility holding companies. In doing this I have traditionally used the intersection of two samples used previously by Ms. McShane and Dr. Vilbert both of whom have appeared before Canadian boards on behalf of utilities. The intent here has been to avoid cross examination on the risks of these companies as the intersection of these two "samples" might be regarded as a smaller and unambiguously purer set of low-risk U.S. utilities. However, the U.S. has not been immune from the M&A activity that has reduced the number of Canadian UHCs. For example, the sample of U.S. *gas* UHCs that I used as recently as 2016 has been reduced by the purchase by AltaGas of WGL on July 6, 2018, the purchase of Piedmont Natural Gas by Duke Energy on

[10] As of November 29, 2017, GMI is now known as Energir.

[11] Shares in Hydro One were sold into the market in 2015 so until recently there was relatively little data to assess its risk. It is still controlled by the Government of Ontario.

October 31, 2016, and the merger between Vectren and Centre Point Energy on April 23, 2018. Marginally off setting the loss of those three companies is the creation of One Gas (OGS) in March 2014.

Schedule 6 provides a graph of the median and average beta estimates for the US gas companies back to 1990 with the most recent betas in Schedule 7. The graph includes the three "legacy" gas companies which have recently merged or been acquired. The betas are estimated in the same way as for the Canadian betas from monthly holding period returns over a five year time period updated monthly. The estimates from these U.S. gas utilities behave in a similar manner as for the Canadian utility holding companies. This is clear from the observation that they also exhibit an "internet bubble" effect, although not quite as severe as for the Canadian UHCs. However, the most recent average level of the betas from these companies is higher than those for the Canadian utility holding companies at 0.56.

Potentially, there are more US electric than gas utilities to include in a sample to compare with utilities in Canada and they tend to have a longer stock market history. For this purpose, I have looked at 13 US electric utilities that have been used as comparators in Canada. Mr. Coyne and Mr. Trogonoski currently use a sample of ten US Electric utilities as comparators to Newfoundland Power as listed in their Figure 20 below. This is almost the same sample as they used in 2021 in a Nova Scotia Power hearing, except they have now dropped Exelon and included Eversource Energy. In contrast, I use a sample of six US electric utilities that include five of Mr. Coyne and Mr. Trogonoski's (Duke, OGE, PNW, Eversource and EVRG) plus Allete (ALE). My sample was formed similar to my gas sample as a nexus of samples used by US witnesses. In addition, *I* also provide data on the Southern Company (SO) that is often in a US sample and has a stock market history going back to at least 1929. At Appendix A I include Yahoo's brief description of each company where as relatively large holding companies these companies tend to include generation, transmission and distribution as well as merchant functions and other unique operations. This sample may have fit better in a comparison with NSP which is an integrated electric utility with generation, transmission and distribution assets, but does not fit as well with Newfoundland Power which is closer to a pure transmission and distribution (T&D) utility with a small amount of reserve generation.

Figure 20: U.S. Electric Proxy Group

Con1pany	Ticker
Alliant Energy Corp.	LNT
American Electric Power Company	AEP
Duke Energy Corporation	DUK
Entergy Corporation	ETR
Evergy.Inc.	EVRG
Eversource Energy	ES
NextEra Energy Inc.	NEE
OGE Energy Corp.	OGE
Pinnacle West Capital Corp.	PNW
Portland General Electric Cmnpany	POR

Schedule 8 provides a graph of the average beta estimates for all thirteen US electric companies going back to the 1991-1996 estimation period. Again, we see the Internet bubble effect, where prior to 1998 average betas were about 0.55 before collapsing to below zero. They subsequently recovered as this special period drops out of the sampling window, peaking at above 0.70, before trending down to mid 2019 and ending 2023 with the median and average beta about 0.57. It is clear from the graph that US electric company betas are higher than f r the regulated UHCs in Canada. In Schedule 9 are the individual estimates for my sample of six US UHCs which ended 2023 with an average and median beta value of 0.61 brought up by OGE and Alette.

It is interesting to look at the difference between the average beta of my sample of US electric UHCs versus those of Mr. Coyne and Mr. Trogonoski's recent sample, which is in Schedule 10. The clear implication is that the sample averages are basically the same, which should not be too surprising since at times all of the firms in my sample have been used by Mr. Coyne and each beta estimate is estimated from the prior five years of data. However, it also indicates that beta estimates reflect the impact of business, financial and investment risk. Consequently, the way that samples are formed is not as relevant for stock market risk and the cost of capital as it is for

business risk and financial structure, It also points to the limited value of changing samples when investors perceive a lot of the "unique" factors that cause samples to change are in fact common to most utilities as investment risk such that the same firms drop in and out of samples all the time based on unique events that pass.

Adjusted betas

It is usually necessary to adjust the estimated betas, particularly recent ones, since they are only estimates of what happened over a particular time, whereas what is needed is an estimate of what is likely to happen in the future. One such adjustment is justified by the seminal work of Marshall Blume[12] who showed that if there is measurement error when we estimate a very low beta the chances are the "true" beta is underestimated and vice versa. By looking at betas estimated at time T he estimated the following regression equation, where the dependent variable is the beta estimated over a previous period: such as five years earlier (T-5).

$$\beta_T = \alpha_1 + \alpha_2 \beta_{T-5}$$

This is what is commonly referred to as a partial adjustment model where the current value has adjusted from that five years ago to some target or normal value. The alpha coefficients then provide the adjustment coefficients, which Blume estimated as approximately

$$\alpha_1 = 0.33$$
$$\alpha_2 = 0.67$$

The "true" beta is when the betas converge to their common value, so these parameter estimates (.33/(1-.67)) provide the true beta, which is equal to 1. Blume actually estimated his equation over ***all*** stocks so the equation verges on being a tautology, since the average value of betas estimated over ***all*** stocks should be about 1.0.

The result is a *general* adjustment equation for *all* stocks assuming you know absolutely nothing about them, since Blume's analysis did not look at the particulars of the underlying companies.

[12] Marshall Blume, Betas and their regression tendencies, Journal of Finance, June 1975.

For any random stock the adjustment means we adjust the actual beta by taking 2/3 of that estimated and add 0.33. Essentially, this means weighting 1/3 with the average market beta of 1.0 and 2/3 with the actual beta. This procedure means that low betas are *always* increased and high betas reduced *regardless* of whether the true beta is actually the observed low or high beta! That is, the procedure ignores any information that you have about the estimated betas and the firm.

However, low beta estimates for utilities do not mean they are under-estimated and need adjusting upwards toward 1.0, since utility betas are perennially low due to their low risk and this is not caused by estimation error. Instead, as Gombola and Kahl [13] demonstrated utility betas are better mechanically adjusted by weighting with their grand mean. If I were to do this with recent betas in a range 0.36-0.45 and a long run beta of 0.50, we would get an adjusted beta as follows:

Adjusted beta = 0.67 *0.45 +0.33 *.50 = 0.47 for the utility sub index

Adjusted beta = 0.67 *0.36 + 0.33 *0.50 = 0.41 for the individual Canadian UHCs

This type of adjustment is also consistent with the more recent work of Michelfielder and Theodossiou [14] who looked specifically at whether the Blume adjustment mechanism worked for US utility betas. They looked at betas estimated for utility holding companies over 5, 7, 8 and 9-year periods of non-overlapping data. That is, rather than my rolling betas they looked at periods where no monthly return was used twice. They then estimated a Blume type regression model of the estimated beta against the previous period's beta and concluded,

> ***"The diagnostic statistics strongly refute the validity of the Blume equation for public utility stocks. Most of the R^2s are equal or very close to 0.00 and the largest is 0.09. Only one F statistic is significant and all but two slopes are insignijicant....None of the 51 beta distributions display any tendency for the betas to drift toward one"***

[13] This is also accepted in the literature. Gombola and Kahl, "Time series properties of utility betas," Financial Management, 1990, come to the same conclusion.

[14] Michelfielder and Theodossiou, Public Utility beta adjustment and biased costs of capital in public utility rate proceedings," The Electricity Journal, 2013, pp 60-68.

All the significance in these regressions came from the constant; the prior period beta estimate had no predictive power for the future beta regardless of whether the betas were estimated over 5, 7, 8 or 9 years of data.

The work of Michelfielder and Theodossiou is similar to work that myself and my late colleague, Professor Michael Berkowitz, entered into evidence in a TransCanada hearing in 2001. At that time, we had 16 holding companies of utilities, pipelines, and telephone companies (Telcos) in Canada that were regulated on a rate of return basis. We first estimated their betas in the normal way with the reported values in Schedule 8; then we regressed the 2000 betas estimated for the period 1995-2000 against their 1995 betas estimated over the period 1991-1995. This is an almost identical procedure to that used by Blume and gave the following results.

$$Pr = 11.947 - 0.822\text{Pr-.s}$$

Setting the two betas equal implied that their equilibrium beta was 0.52 that is, 0.947/(1 +.822)).

Unfortunately, a quick look at the companies in Schedule 11 reveals that the sample is much reduced: the Telcos are no longer rate of return regulated, while most of the pipelines and utilities have disappeared or substantially changed. However, I have long judged the equilibrium utility beta to be about 0.50, partly based on this early work and partly on the estimates in Schedule 1 adjusted for the impact of interest rate risk. [15]

With the disappearance of many of the Canadian proxies I have been forced to look at US evidence which is why I estimated the betas for the US gas and electric UHCs in schedules 7 and 9. However, only the US electric UHCs have a large number with a long stock market history. In Schedule 12 I reproduce the beta estimates for six electric UHC's with data going back to 1963 where I have only included betas for non-overlapping five-year periods. So, there are 14 separate estimates [16] for six companies from 5-year estimation windows that include unique, non-

[15] A regression of the estimated beta against the estimated gamma coefficient for the utility index indicates a beta estimate with a neutral interest rate forecast of approximately 0.46.
[16] Thirteen for Eversource

overlapping data. I then estimated the following Blume regression equation for these US utility holding companies.

$$/Jr = 0.45 + .05/Jr\text{-}s$$

Setting the betas equal, the equilibrium beta for these US electric utilities is 0.47, but the coefficient on the prior beta is not significant at normal levels. The most that can be said is that the intercept value of 0.45 is probably marginally low and the true value is closer to 0.50. However, consistent with other results in refereed journals there is no evidence of a Blume type adjustment for Canadian or US utilities.

The work of Gombola and Kahl and Michelfielder and Theodossiou is the only published research that I am aware of that specifically looks at the adjustment tendency of utility betas. It is almost a truism that across all stocks there should be a tendency to revert toward 1.0 since this is the average of all stocks. However, this does not mean that this process holds for subsets of stocks that are perennially either low or high risk. A utility with an actual beta of say 0.80 in one period is much more likely to have a beta closer to 0.50 next period than a Blume adjusted beta of 0.87. However, rather than any mechanical weighting I generally prefer to use judgment constrained by the actual historic evidence of the low risk nature of utility holding companies and their long run value of about 0.50.

1s Frequency of beta estimation

Another issue is the frequency over which betas are estimated. The standard in academic work is to estimate them over 5 years of *monthly* data. For example, the standard data base used by US academics (Centre for Research in Security prices or **CRSP)** traditionally only had monthly data. More recently, it has added daily data which is used for certain types of analysis such as an "event study" where we look at the impact of, for example, a dividend announcement. However, it is well known that betas are biased when estimated over high frequencies such as using weekly data. The reason for this is that many stocks do not trade that actively, so their prices are a bit "stale" and do not reflect recent events. Consequently, their betas are downward biased since the prices do not "move". There are "thin trading" adjustments for this, but since the average of all

betas is 1.0, thickly traded betas in comparison are biased high. In other words, as the estimation frequency becomes shorter the betas for larger firms get larger and those for smaller firms smaller.

Hawawini [17] looked at this problem and concluded,

> "This suggests that betas measured over return intervals of arbitrary length will tend to be biased. In patticular, securities with relatively small market values may appear to be less risky than they truly are, whereas securities with relatively large market values may appear to be more risky than they truly are."

What this means is that I don't accept betas that are first estimated over short periods of time, such as weekly observations, and then adjusted to 1.0 using the Blume adjustment. As is well known both these procedures will bias the beta estimate for utilities upwards.

Public market beta estimates

From the prior discussion, betas can be estimated over a variety of time horizons; 5 years of monthly data is the norm, but Michelfielder and Theodossiou, for example, used 5, 7, 8, and 9 years of monthly data. We would therefore not expect all beta estimates from different sources to be the same; this requires that everyone use the same estimation window which is highly unlikely. To look at the range of estimates I collected the following beta estimates as reported by independent organisations CFRA, Thomson-Reuters, Yahoo, the Royal Bank of Canada and the Globe and Mail on February 22, 2024, as well my own estimates with data up to December 2023.

	Hydro	CUL	Emera	Fortis	AQN	UHCs	Enbridge	TRP	PPL	Pipelines
Miff CAP	24.30	9.60	14.60	26.20	7.30		107.00	56.10	25.60	
RBC	0.30	0.60	0.28	0.18	0.45	0.36	0.88	0.74	1.48	1.03
Yahoo	0.26	0.61	0.27	0.27	0.31	0.34	0.89	0.78	1.56	1.08
CFRA	0.30	0.37	0.28	0.18	0.45	0.32	0.86	0.88	1.48	1.07
Reuters	0.62	0.78	0.85	0.47	1.17	0.78	0.67	0.90	0.77	0.78
Booth	0.28	0.61	0.31	0.19	0.42	0.36	0.90	0.71	1.48	1.03
Average	0.35	0.59	0.40	0.26	0.56	0.43	0.84	0.80	1.35	1.00
Median	0.30	0.61	0.30	0.23	0.45	0.36	0.89	0.83	1.48	1.03
Globe and Mail	0.38	0.69	0.30	0.36	0.73	0.49	0.90	0.91	0.91	0.91
Against the SP500 not the TSX										
36 month beta										

[17] Gabriel Hawawini, "why beta shifts as the return interval changes," Financial Analysts Journal, (May-June 1983).

Note the Reuters report estimates the beta for some of these Canadian companies using the US stock market as the benchmark (marked in red), which is why some seem to be lower than estimates from other sources. Further note that I included Algonquin Power and Utilities (AQN) but it is not in my estimation ample, since it suffered a significant financial loss and a 33% drop in its share price in November 2022 due to cost over runs in its non-regulated businesses. With the Globe and Mail's beta estimate based on 36 observations it has a greater impact than that from a normal 60-month (5 year) estimate. This is partly why I prefer to use standard 5-year monthly beta estimates and am hesitant to include AQN in a sample of Canadian UHCs.

For the pipeline sample the average beta estimate is biased low due to Thomson-Reuters use of the US stock market as the benchmark so I place more reliance on the median value of 1.03. The differences across services are relatively minor indicating the reliance on a common vendor providing the betas or similar estimation procedures. I suspect the minor differences are largely due to the time-period over which the betas are estimated and whether they capture good or bad news on approvals for pipeline expansions. For the Canadian UHCs, including AQN the average beta is 0.43 in a range 0.31-0.78 where Thomson-Reuters estimates are an outlier. The median is significantly lower at 0.36. This indicates the continued low risk nature of Canadian UHCs, since the highest average (median) beta is the 0.59 (0.61) for CU. [18] It also indicates that these services do not seem to adjust their beta estimates using the Blume methodology, since with an actual beta of Othe Blume adjustment would normally give a beta of 0.33 as a minimum value, while several betas are lower than this.

The above remarks all seem to be based on betas estimated using the standard five-year monthly data procedure except for the Globe and Mail which uses three years of data estimated over monthly intervals. Using a three-year window makes the estimates more volatile simply because they are more exposed to one unique event such as AQN's dramatic 33% share price drop. However, in this instance while there are differences between the Globe and Mail's estimates and the average from the others the average for the UHCs is similar, while that for the pipelines is slightly lower. In all instances my own beta estimates are virtually indistinguishable from the median value.

[18] The Yahoo beta estimates with pertinent financial data for the Canadian UHCs are in Appendix A.

For the U.S. gas companies their beta estimates are below. The average from the four services and myself is 0.55 with a median of 0.59. Again, my own values are almost indistinguishable from the values from these services. The Globe and Mail's three-year average beta estimate is slightly lower than the average mainly due to the fact it does not cover Spire (SR). Of impotiance is that all these utilities are relatively small with only Atmos Energy at the same size as the Canadian UHCs.

	NWN	NJR	SR	ATO	SWX	OGS	Average	Median
MKTCAP	15	4.1	33	17.2	4.5	3.4	6.12	3.75
RBC	0.57	0.64	0.52	0.66	0.31	0.65	0.54	0.61
Yahoo	0.56	0.65	0.51	0.67	0.31	*NIA*	0.54	0.56
CFRA	0.56	0.65	0.52	0.66	0.31	0.66	0.54	0.61
Reuters	0.51	0.63	0.62	0.44	0.81	0.63	0.60	0.63
Booth	0.58	0.63	0.52	0.65	0.31	0.65	0.54	0.61
Average	0.56	0.64	0.54	0.62	0.4]	0.65	0.55	0.59
Median	0.56	0.64	0.52	0.66	0.31	0.65	0.54	0.60
Globe and mail	0.28	0.63		0.67	0.31	0.66	0.47	0.63

For all 13 U.S electric companies the estimates are below.

	DUKE	OGE	ALE	PNW	ES	EVRG	POR	LNT	AEP	ETR	EXC	NEE	SO	Average	Median
MKTCAP $b	71	6.7	3.3	8	20.3	11.5	4.2	12.5	43.1	21.5	36	116.3	73.3	32.90	20.30
RBC	0.47	0.72	0.76	0.48	0.59	0.57	0.59	0.54	0.5	0.7	0.53	0.51	0.5	0.57	0.54
CFRA	0.48	0.72	0.77	0.48	0.76	0.5	0.6	0.55	0.48	0.71	0.6	0.52	0.5	0.59	0.55
Reuters	0.44	0.57	0.54	0.45	0.5	0.51	0.64	0.52	0.5	0.61	0.5	0.73	0.39	0.53	0.51
Yahoo	0.48	0.72	0.77	0.48	0.58	0.56	0.6	0.55	0.49	0.71	0.6	0.52	0.5	0.58	0.56
Bootl1	0.47	0.74	0.76	0.49	0.65	0.57	0.60	0.57	0.50	0.71	0.54	0.52	0.53	0.59	0.57
Average	0.47	0.69	0.72	0.48	0.62	0.54	0.61	0.55	0.49	0.69	0.55	0.56	0.48	0.57	0.55
Globe and Mail	0.48	0.74	0.77	0.49	0.57	0.57	0.58	0.56	0.49	0.71	0.53	0.52	0.5	0.58	0.56
Starisrical	0.47	0.49	0.49	0.47	0.48	0.48	0.48	0.48	0.48	0.49	0.48	0.48	0.47	0.48	0.48
Blume	0.65	0.80	0.8 I	0.65	0.74	0.69	0.74	0.70	0.66	0.79	0.70	0.71	0.66	0.72	0.70

The same comments as above apply. My own average across all 13 utilities of 0.59 with a median value of 0.57 is almost identical to the values from the other four sources as is the average estimate of 0.58 from the Globe and Mail's using a three-year monthly estimation window. In addition, given the "beta adjustment" estimated above I include this as a statistical estimate of the beta for the next five years which averages 0.48. This is in contrast with the Blume adjustment that assumes an adjustment to the market average of 1.0 and forecasts an average beta of 0.72.

It is also of importance that the way these estimates are derived appears to be consistent with conventional practise since they are all quite similar. Traditionally, one of the biggest data providers in Canada is the Financial Post, where their Corporate Analyzer data base includes ten year financial data for larger publicly listed Canadian companies. Their definition of beta is:

Beta (Corporate Profiles)

Beta factors are derived from a historical regression of percentage share price changes for the selected company on percentage changes in the TSE 300 price index. The unadjusted slope coefficient from this regression is the beta factor. Beta factors may be computed on a variety of weekly or monthly data. Betas shown in FP Analyzer are for 52 weeks, 36 months, 60 months and 120 months.

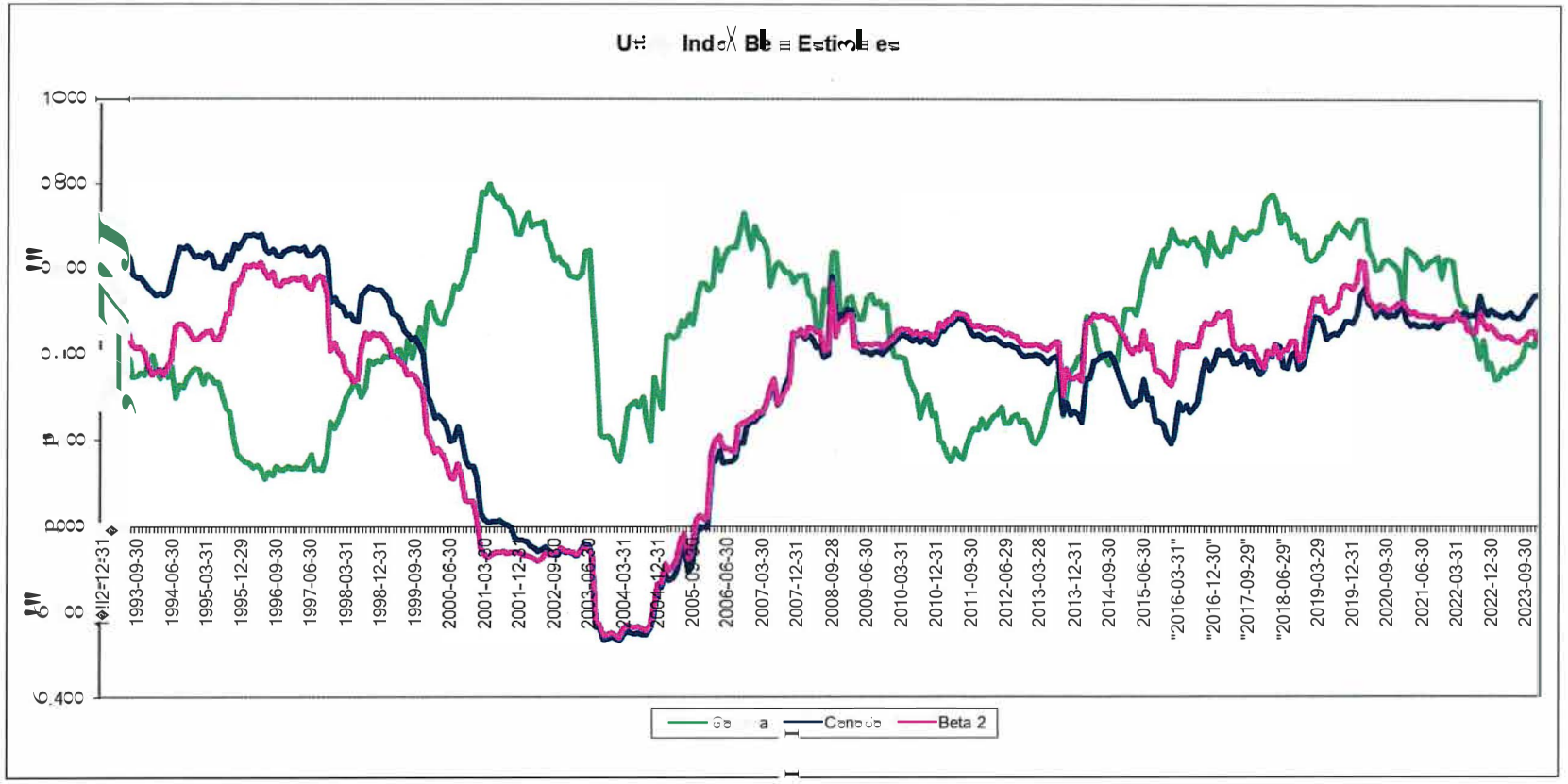
Again there is no discussion of "adjusting" betas using the Blume procedure, in fact they very specifically state the "unadjusted slope coefficient" which is what the beta estimate is. However, the Financial Post does note that different time horizons can be used other than the conventional use of five years of data as well as weekly betas.

Conclusion

What is clear from the above analysis is that the market recognises that Canadian utilities are significantly lower than average risk. This comes through after:

- I recognise that the low values during the internet bubble period were an anomaly.
- I analyse the utility sub index versus individual Canadian firms.
- I check for an interest rate effect that may bias the beta estimates.
- I check for whether or not the use of the TSX underestimates their values by also using a U.S market index.
- I check the Canadian estimates against a sample of U.S. gas and U.S electric companies.
- I check the estimates against those that are publicly available from Yahoo Finance as well as those from Canada's largest bank a major data provider, an independent, research service and the Globe and Mail.
- I recognise that there is no statistical Blume effect in beta estimates for utilities and that estimates over three-year versus five year estimation windows are currently almost identical.

From this type of analysis, I have generally set the generic risk assessment for a Canadian utility in a beta range of 0.45-0.55. The high end of this range is slightly less than the recent value for CU one of the "purest" Canadian utilities, while the low end is a generous estimate based on the impact of the return on the long Canada bond on beta estimates for the TSX utility index. Given the marginal increases in the betas, particularly for some US electric UHCs I would tend to be conservative and increase my normal range to 0.50-0.60 with a mid-point of 0.55 which has historically been slightly about the grand mean of the utility betas of 0.52 as estimated in 2001 before the NEB.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Beta 2

REGRESSION BETA ESTIMATES FOR TEE TSX UTILITY INDEX

Regression Statistics	
Multiple R	0.491
R Square	0.241
Adjusted l	0.238
Standard l	3.218
Observatit	432

ANOVA

	df	SS	*hyS*	F
Regressiol	2	1413.19	706.593	68.2281
Residual	429	4442.87	10.3563	
Total	431	5856.06		

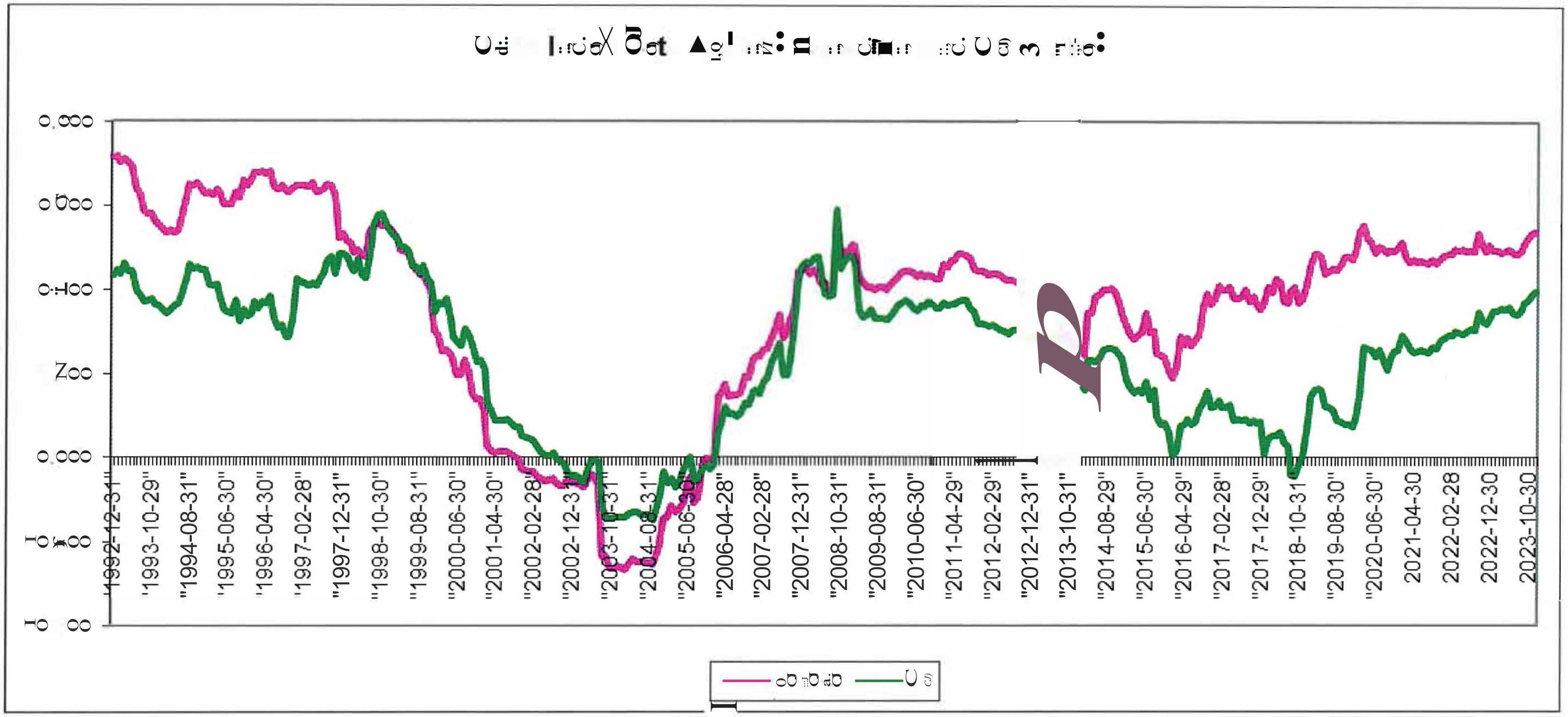
	Coefficient	*mdard En*	*tStat*	*P-value*
Intercept	0.206	0.157	1.314	0.190
TSX	0.303	0.039	7.816	0.000
CANRET	0.460	0.063	7.330	0.000

Regression Statistics	
Multiple R	0.704
RSquare	0.495
Adjusted R Sql	0.477
Standard Error	2.927
Observations	60

ANOVA

	df	SS	*MS*	*F*
Regression	2	478.486	239.2432	27.9311
.Residual	57	488.232	8.56548	
Total	59	966.719		

	Coefficients	*mdardEn*	*t Stat*	*P-value*
Intercept	0.365	0.387	0.945	0.349
TSX	0.436	0.087	5.000	0.000
CANRET	0.455	0.127	3.594	0.001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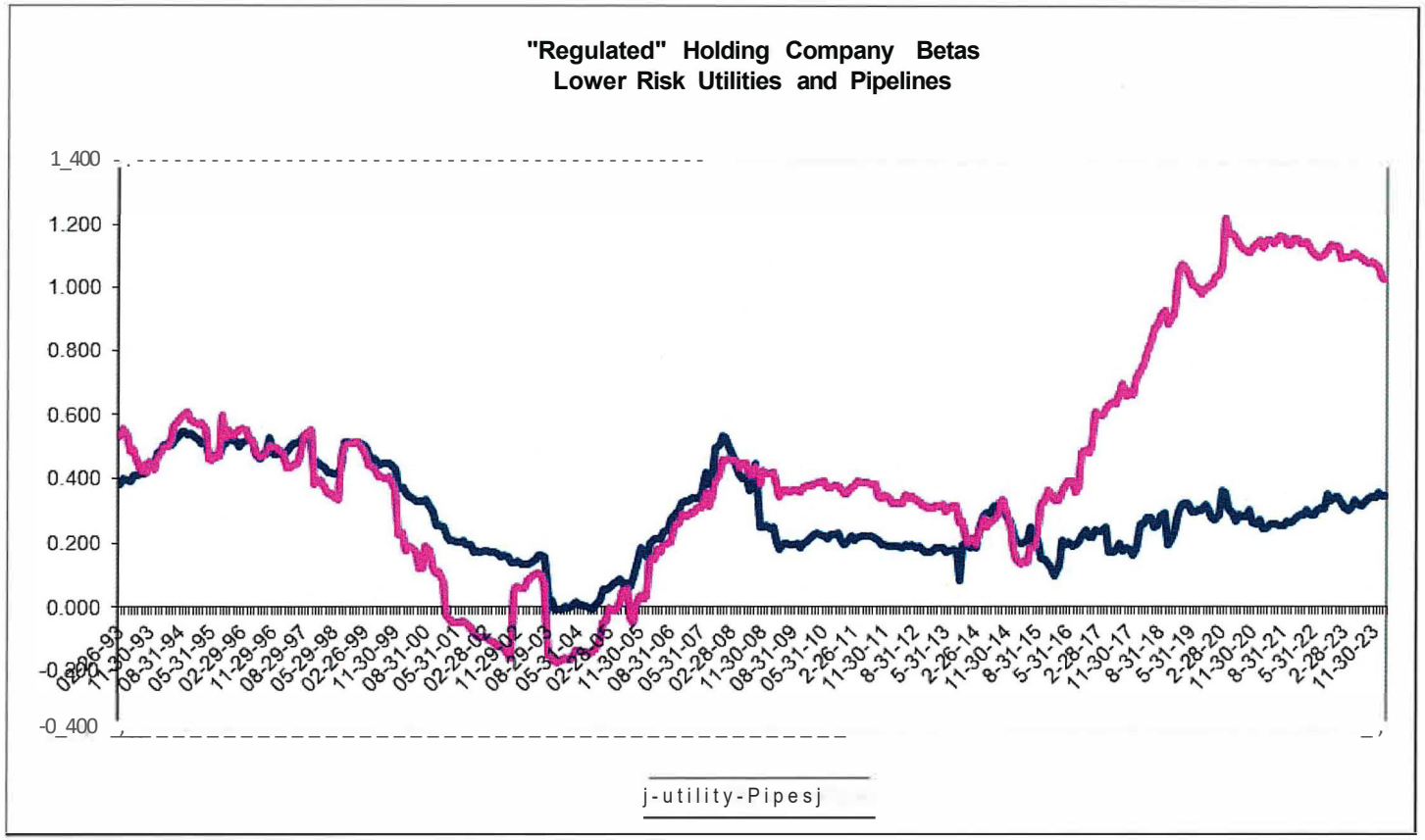
"Regulated" Holding Company Betas
Lower Risk Utilities and Pipelines
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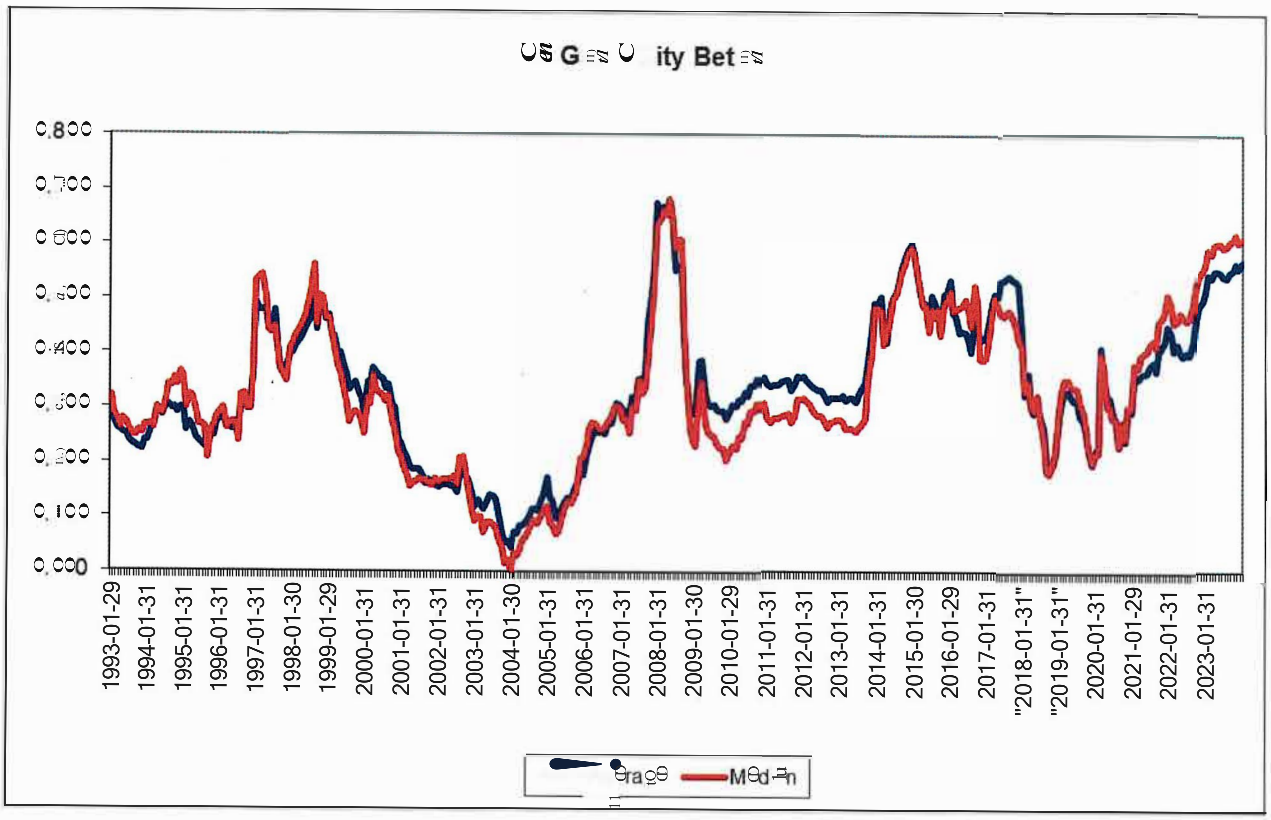
j-utility-Pipesj

Canadian Utility Holding Companies (UHCs) and Pipelines

	Hydro	CU	Emera	Fortis	GMI	UHCs	Enbridge	TRP	VERESEN	PPL	Pipelines
2000-12		0.36	0.28	0.22	0.18	0.26	0.05	0.17			0.11
2001-12		0.25	0.21	0.13	0.10	0.17	-0.13	-0.07			-0.10
2002-12		0.18	0.16	0.13	0.07	0.14	-0.20	-0.08		0.46	0.06
2003-12		0.05	-0.05	-0.05	0.02	-0.01	-0.40	-0.40	0.02	0.11	-0.17
2004-12		0.03	-0.02	0.03	0.16	0.05	-0.32	-0.19	0.10	0.21	-0.05
2005-12		0.21	0.05	0.23	0.19	0.17	-0.18	-0.19	0.19	0.29	0.03
2006-12		0.33	0.09	0.48	0.42	0.33	0.22	0.30	0.33	0.30	0.29
2007-12		0.53	0.21	0.61	0.75	0.53	0.52	0.48	0.33	0.50	0.46
2008-12		0.18	0.14	0.20	0.51	0.26	0.32	0.37	0.51	0.45	0.41
2009-12		0.09	0.16	0.20	0.38	0.21	0.32	0.40	0.44	0.33	0.37
2010-12		0.09	0.22	0.16	0.35	0.20	0.34	0.40	0.37	0.30	0.35
2011-12		0.06	0.21	0.15	0.36	0.19	0.32	0.37	0.35	0.32	0.34
2012-12		0.01	0.23	0.13	0.32	0.17	0.22	0.33	0.40	0.29	0.31
2013-12		0.03	0.25	0.28	0.18	0.18	0.19	0.33	0.22	0.12	0.21
2014-12		0.20	0.32	0.26	0.27	0.26	0.11	0.28	0.34	0.29	0.25
2015-12		0.10	0.08	0.06	0.23	0.12	0.26	0.33		0.46	0.35
2016-12		0.47	0.09	0.00	0.25	0.20	0.41	0.47		0.64	0.51
2017-12		0.49	0.00	0.01	0.15	0.16	0.62	0.57		0.79	0.66
2018-12		0.40	0.14	0.05	0.34	0.23	0.79	0.86		1.11	0.92
2019-12		0.46	0.29	0.07		0.28	0.97	1.02		1.11	1.03
2020-12	0.19	0.55	0.24	0.07		0.26	0.95	0.72		1.76	1.14
2021-12	0.18	0.58	0.28	0.11		0.29	0.97	0.76		1.73	1.15
2022-12	0.26	0.61	0.30	0.20		0.34	0.95	0.83		1.63	1.13
2023-12	0.28	0.61	0.31	0.19		0.35	0.90	0.71		1.48	1.03

Pembina Pipeline (PPL) doubled its market value by buying Versen in 2017 for $9.7 billion
Since September 27 2019 Valener (GMI) is a privately owned private subsidary of Noverco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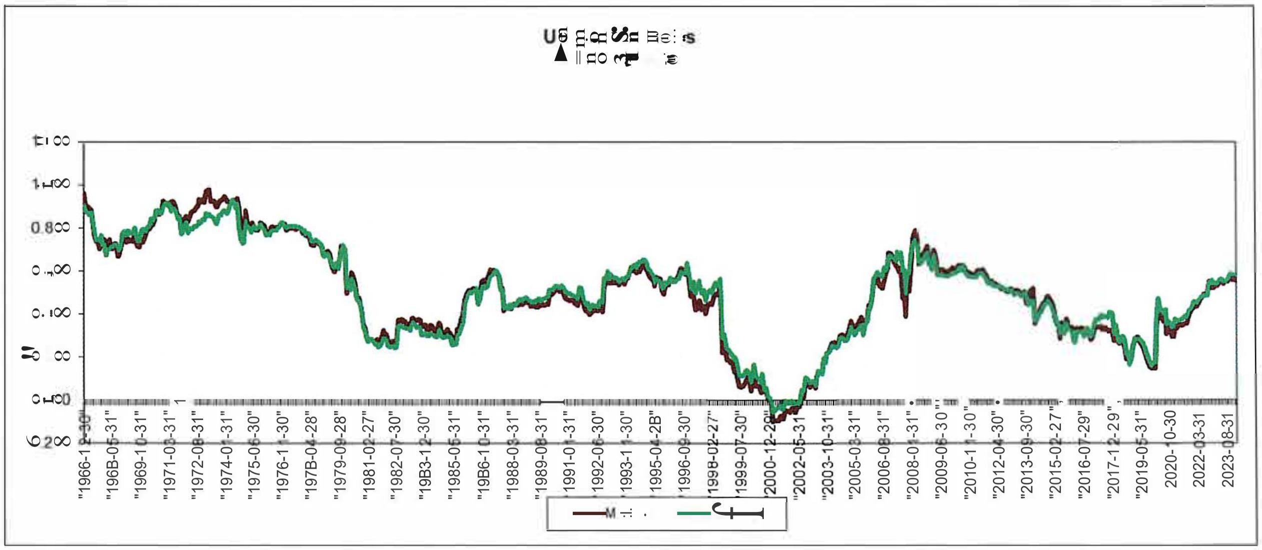
U.S GAS COMPANY BETAS

US Gas Company Betas

	NWN	NJR	SR	ATO	SWX	OGS	Average	Median
2000-12	0.12	0.36	0.21	-0.02			0.17	0.17
2001-12	0.08	0.24	0.05	-0.18			0.04	0.06
2002-12	0.24	0.18	0.12	-0.07			0.12	0.15
2003-12	-0.21	0.03	0.01	-0.01			-0,05	0.00
2004-12	-0,04	0.09	0.13	0.01			0.04	0.05
2005-12	0.06	-0.04	0.15	0.19			0.09	0.11
2006-12	0.14	0.03	0.49	0.45			0.28	0.29
2007-12	0.60	0.44	0.79	0.72			0.64	0.66
2008-12	0.36	0.14	0.10	0.50			0.28	0.25
2009-12	0.24	0.12	0.01	0.49			0.21	0.18
2010-12	0.35	0.22	0.08	0.51			0.29	0.28
2011-12	0.32.	0.25	0.06	0.50	0.72		0.37	0.32
2012-12	0.26	0.23	0.07	0.44	0,69		0.34	0.26
2013-12	0.39	0.44	0.32	0.54	0.73		0.49	0.44
2014-12	0.57	0.62	0.45	0.57	0.73		0.59	0.57
2015-12	0.31	0.53	0.37	0.43	0.59		0.45	0.43
2016-12	0.31	0.39	0.35	0.27	0.47		0.36	0.35
2017-12	0.40	0.43	0.31	0.41	0.62		0.44	0.41
2018-12	0.29	0.23	0.05	0.12	0.41		0.22	0.23
2019-12	0.23	0.31	0.11	0.14	0.17	0.24	0.19	0.20
2020-12	0.44	0.41	0.18	0.30	0.13	0.31	0.29	0.31
2021-12	0.50	0.57	0.31	0.46	0.21	0.51	0.41	0.48
2022-12	0.54	0.65	0.40	0.57	0.21	0.62	0.47	0.55
2023-12	0.58	0.63	0.52	0.65	0.31	0.65	0.56	0.61

SCHEDULE 8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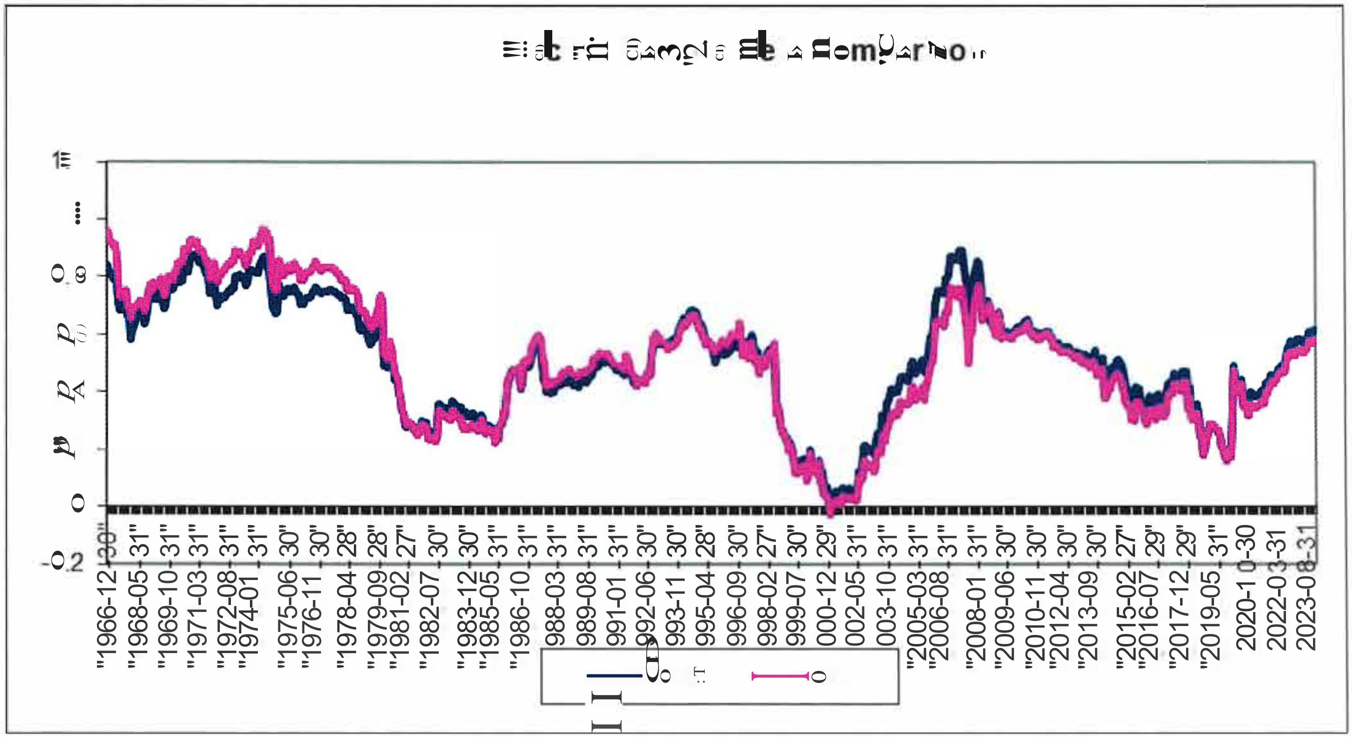
U.S ELECTRIC COMPANY BETAS

	DUK	OGE	ALE	PNW	ES	EVRG	Average	Median
30-Dec-94	0.45	0.43	0.62	1.16	0.43	0,71	0.63	0.53
29-Dec-95	0.54	0.48	0.59	0.47	0.49	0.65	0,54	0.52
31-Dec-96	0.47	0.53	0.46	0.59	0.70	0.73	0.58	0.56
31-Dec-97.	0.48	0.40	0.43	0.47	0.72	0.56	0.51	0.47
31-Dec-98	0.18	0.19	0.14	0.28	0.57	0.19	0.26	0.19
31-Dec-99	0.05	0.01	0.07	0.16	0.41	0.13	0.14'	0.10
29-Dec-00	-0.04	0.05	0.00	-0.13	0.40	0.14	*0.01"*	0.03
31-Dec-01	-0.08	0.02	-0.14	-0.06	0.45	0.17	0.06	-0.02
31-Dec-02	0.18	0.07	0.01	0,15	0.36	0.39	0.19	0.17.
31-Dec-03	0.51	0.18	0.25	0,25	0.41	0.72	0.39	0.33
31-Dec-04	0.64	0.34	0.39	0.33	0.43	0.85	0.50	0.41
30-Dec-05	0.75	0.35.	0.47	0.65	0.46	0.88	0.59	0.56
29-Dec-06	1.26	0.55.	0.95	0,90	0.45	1.10	0.87	0.93
31-Dec-07	0.94	0.71	1.06	0.67·	0.80	0.79	0.83	0.79
31-Dec-08	0.44	0.73	0.82'	0.56	0.69	0.60"	0.64	0.64
31-Dec-09	0.43	0.76	0.66	0.65	0.52	0.64	0.61	0.64
31-Dec-10	0.44	0.78	0.65	0.58	0.51	0.65	0.60"	0.61
30-Dec-11	0.37	0.79	0.66	0.54	0.47	0.59	0.57	0.57,
31-Dec-12	0.32.	0.72	0.63	0.52	0.47	0.55	0.54'	0.54
31-Dec-13	0.28	0.72	0.62	0.51	0.38	0.53	0.51"	0.52
31-Dec-14	0.19	0.68	0.71	0.42	0,48	0.46"	0.49	0.47
31-Dec-15	0.04	0.61	0.61	0.34	0.35	0.26	0.37	0.34
30-Dec-16	0.12	0.65	0.49	0.28	0.29	0.37'	0.37	0.33
29-Dec-17	0.27	0.92	0.48	0.39	0.32	0.43	0.47	0.41
29-Dec-18	0.04	0.54	0.30	0.25	0.24	0.27	0.28"	0.26
30-Dec-19	0.06	0.48	0.13	0.18	0.12	0.18'	0.19'	0.15
31-Dec-20.	0.23	0.67	0.43	0.28	0.26	0.35	0.37	0.32
31-Dec-21	0.34	0.72	0.57	0.29	0.40	0.45	0.46	0.43
31-Dec-22	0.40	0.70	0.74	0.43	0.47	0.48	0.54	0.47
29-Dec-23	0.47	0.74	0.76	0.49	0.65	0.57	0.61"	0.61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SCHEDULE 11

ROLLING BETAS

FIRM	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
BCE INC	0.368	0.370	0.357	0.480	0.432	0.520	0.477	0.608	0.630	0.989	1.240	1.002
BCT TEL	0.29	0.328	0.349	0.548	0.642	0.812	0.739	0.731	0.757	0.975	0.900	1.013
QUEBEC TEL	0.351	0.269	0.250	0.296	0.211	0.552	0.421	0.616	0.572	0.88	0.721	0.892
NEWTEL	0.417	0.375	0.405	0.559	0.470	0.569	0.568	0.585	0.348	0.539	0.438	0.474
BRUNCOR	0.38	0.400	0.412	0.545	0.432	0.577	0.336	0.377	0.427	0.775	0.758	0.781
MARITIME TT	0.367	0.402	0.332	0.359	0.263	0.376	0.274	0.357	0.603	0.785	0.780	0.818
ISLAND TEL	0.26	0.250	0.249	0.189	0.216	0.534	0.441	0.591	0.524	0.71	0.603	0.606
MEAN TELCOS	**0.348**	**0.342**	**0.336**	**0.425**	**0.381**	**0.563**	**0.465**	**0.552**	**0.552**	**0.808**	**0.777**	**0.798**
MARITIME ELEC	0.383	0.405	0.396	0.536	0.672	0.321	n/a	n/a	N/a	n/a	n/a	n/a
TRANSALTA	0.233	0.284	0.271	0.377	0.451	0.491	0.588	0.585	0.462	0.536	0.285	0.259
FORTIS	0.280	0.230	0.271	0.402	0.377	0.563	0.537	0.390	0.310	0.484	0.320	0.216
CDN UTIL	0.418	0.413	0.382	0.456	0.475	0.466	0.501	0.561	0.634	0.616	0.530	0.361
BC GAS	0.528	0.522	0.493	0.425	0.444	0.570	0.627	0.562	0.474	0.479	0.338	0.231
MEAN GAS/ELEC	**0.368**	**0.371**	**0.363**	**0.439**	**0.484**	**0.482**	**0.563**	**0.525**	**0.470**	**0.529**	**0.368**	**0.267**
PAC N GAS	0.362	0.449	0.478	0.404	0.543	0.305	0.492	0.286	0.443	0.573	0.492	0.453
TRANSCDA P	0.657	0.616	0.550	0.492	0.385	0.549	0.538	0.489	0.338	0.544	0.238	0.182
TRANS MNT	0.757	0.662	0.665	0.796	0.588	0.525	n/a	n/a	N/a	n/a	n/a	n/a
WESTCOAST	0.723	0.683	0.667	0.522	0.550	0.562	0.557	0.611	0.531	0.453	0.261	0.134
MEAN PIPELINES	**0.625**	**0.603**	**0.590**	**0.554**	**0.517**	**0.485**	**0.529**	**0.462**	**0.437**	**0.523**	**0.330**	**0.256**
MEAN OVERALL	**0.424**	**0.416**	**0.408**	**0.462**	**0.447**	**0.518**	**0.507**	**0.525**	**0.504**	**0.667**	**0.565**	**0.530**

Taken from Schedule B2 of L. Booth and M. Berkowitz before the National Energy Board
December 2001

U.S Electric Utility betas for 5-year non-overlapping periods 1963-2023

	DUK	OGE	ALE	PNW	ES	EVRG
2023	0.47	0.74	0.76	0.49	0.65	0.57
2018	0.04	0.54	0.30	0.17	0.25	0.29
2013	0.28	0.72	0.62	0.51	0.38	0.53
2008	0.44	0.73	0.82	0.56	0.69	0.60
2003	0.51	0.18	0.25	0.25	0.41	0.72
1998	0.05	0.01	0.07	0.16	0.41	0.13
1993	0.41	0.39	0.61	1.15	0.37	0.59
1988	0.18	0.19	0.14	0.28	0.57	0.19
1993	0.41	0.39	0.61	1.15	0.37	0.59
1988	0.36	0.32	0.53	0.55	0.49	0.37
1983	0.11	0.33	0.38	0.31	0.39	0.47
1978	0.82	0.73	0.56	0.51	0.69	0.36
1973	0.83	0.96	0.77	1.10	0.53	0.70
1968	0.76	0.72	0.87	0.75		0.67

Appendix A. Brief description of US electric utilities from Yahoo.

Mr. Coyne and Mr. Trogonoski's ten companies

Alliant Energy Corporation operates as a utility holding company that provides regulated electricity and natural gas services in the United States. It operates in three segments: Utility Electric Operations, Utility Gas Operations, and Utility Other. The company, through its subsidiary, Interstate Power and Light Company (IPL), primarily generates and distributes electricity, and distributes and transports natural gas to retail customers in Iowa; sells electricity to wholesale customers in Minnesota, Illinois, and Iowa; and generates and distributes steam in Cedar Rapids, Iowa. Alliant Energy Corporation, through its other subsidiary, Wisconsin Power and Light Company (WPL), generates and distributes electricity, and distributes and transports natural gas to retail customers in Wisconsin; and sells electricity to wholesale customers in Wisconsin. It serves retail customers in the farming, agriculture, industrial manufacturing, chemical, packaging, and food industries, as well as wholesale customers comprising municipalities and rural electric cooperatives. In addition, the company owns and operates a short-line rail freight service in Iowa; a Mississippi River barge, rail, and truck freight terminal in Illinois; freight brokerage services; wind turbine blade recycling services; and a rail-served warehouse in Iowa. Further, it holds interests in a natural gas-fired electric generating unit near Sheboygan Falls, Wisconsin; and a wind farm located in Oklahoma. The company was formerly known as Interstate Energy Corp. and changed its name to Alliant Energy Corporation in May 1999. Alliant Energy Corporation was incorporated in 1981 and is headquartered in Madison, Wisconsin.

Duke Energy Corporation, together with its subsidiaries, operates as an energy company in the United States. It operates through two segments, Electric Utilities and Infrastructure (EU&I) and Gas Utilities and Infrastructure (GU&I). The EU&I segment generates, transmits, distributes, and sells electricity in the Carolinas, Florida, and the Midwest; and uses coal, hydroelectric, natural gas, oil, solar and wind sources, renewables, and nuclear fuel to generate electricity. This segment also engages in the wholesale of electricity to municipalities, electric cooperative utilities, and load-serving entities. The GU&I segment distributes natural gas to residential, commercial, industrial, and power generation natural gas customers; and invests in pipeline transmission projects, renewable natural gas projects, and natural gas storage facilities. The company was formerly known as Duke Energy Holding Corp. and changed its name to Duke Energy Corporation in April 2006. The company was founded in 1904 and is headquartered in Charlotte, North Carolina.

American Electric Power Company, Inc., an electric public utility holding company, engages in the generation, transmission, and distribution of electricity for sale to retail and wholesale customers in the United States. It operates through Vertically Integrated Utilities, Transmission and Distribution Utilities, AEP Transmission Holdco, and Generation & Marketing segments. The company generates electricity using coal and lignite, natural gas, renewable, nuclear, hydro, solar, wind, and other energy sources. It also supplies and markets electric power at wholesale to other electric utility companies, rural electric cooperatives, municipalities, and other market participants. The company was incorporated in 1906 and is headquartered in Columbus, Ohio.

OGE Energy Corp., together with its subsidiaries, operates as an energy and energy services provider that offers physical delivery and related services in the United States. It operates through Electric Company Operations and Natural Gas Midstream segments. The company generates, transmits, distributes, and sells electric energy. In addition, it provides retail electric service to approximately 889,000 customers, which covers a service area of approximately 30,000 square miles in Oklahoma and western Arkansas; and owns and operates coal-fired, natural gas-fired, wind-powered, and solar-powered generating assets. OGE Energy Corp. was founded in 1902 and is headquartered in Oklahoma City, Oklahoma.

Entergy Corporation, together with its subsidiaries, engages in the production and retail distribution of electricity in the United States. The company operates in two segments, Utility and Entergy Wholesale Commodities. The Utility segment generates, transmits, distributes, and sells electric power in portions of Arkansas, Louisiana, Mississippi, and Texas, including the City of New Orleans; and distributes natural gas. The Entergy Wholesale Commodities segment engages in the ownership, operation, and decommissioning of nuclear power plants; and ownership of interests in non-nuclear power plants that sell electric power to wholesale customers, as well as provides services to other nuclear power plant owners. It generates electricity through gas, nuclear, coal, hydro, and solar power sources. The company sells energy to retail power providers, utilities, electric power co-operatives, power trading organizations, and other power generation companies. The company's power plants have approximately 24,000 megawatts (MW) of electric generating capacity, which include 5,000 MW of nuclear power. It delivers electricity to 3 million utility customers in Arkansas, Louisiana, Mississippi, and Texas. Entergy Corporation was founded in 1913 and is headquartered in New Orleans, Louisiana.

Eversource Energy, a public utility holding company, engages in the energy delivery business. The company operates through Electric Distribution, Electric Transmission, Natural Gas Distribution, and Water Distribution segments. It is involved in the transmission and distribution of electricity; solar power facilities; and distribution of natural gas. The company operates regulated water utilities that provide water services to approximately 241,000 customers. It serves residential, commercial, industrial, municipal and fire protection, and other customers in Connecticut, Massachusetts, and New Hampshire. The company was formerly known as Northeast Utilities and changed its name to Eversource Energy in April 2015. Eversource Energy was incorporated in 1927 and is headquartered in Springfield, Massachusetts.

Next Era Energy, Inc., through its subsidiaries, generates, transmits. distributes, and sells electric power to retail and wholesale customers in North America. The company generates electricity through wind, solar, nuclear.natural gas. and other clean energy. It also develops, constructs, and operates long-term contracted assets that consists of clean energy solutions. suet, as renewable generation facilities, battery storage projects, and electric transmission facilities; sells energy commodities; and owns, develops, constructs, manages and operates electric generation facilities in wholesale energy markets. The company had approximately 33,276 megawatts of net generating capacity; approximately 90,000 circuit miles of transmission and distribution lines, and 883 substations. It serves approximately 12 million people through approximately 5.9 million customer accounts in the east and lower west coasts of Florida. The company was formerly known as FPL Group, Inc. and changed Its name to NextEra Energy, Inc in 2010. NextEra Energy, Inc. was founded in 1925 and is headquartered in Juno Beach, Florida.

Pinn.acle West Capital Corporation, through its subsidiary, Arizona Public Service Company, provides retail and wholesale electric services primarily in the state of Arizona. The company engages in the generation, transmission, and distribution of electricity using coal, nuclear, gas, oil, and solar generating facilities. Its transrnissfon facilities include overhead lines and underground lines, and distribution facilities. as well as owns and maintains transmission and distribution substations. The company was incorporated in 1985 and is headquartered in Phoenix. Arizona.

Portland General Electric Company, an integrated electric utility company, engages in the generation, wholesale purchase, transmission, distribution, and retail sale of electricity in the state of Oregon. It operates six thermal plants, three wind farms, and seven hydroelectric facilities. As of December 31, 2023, the company owned an electric transmission system consisting of 1,254 circuit miles, including 287 circuit miles of 500 kilovolt line, 413 circuit miles of 230 kilovolt line, and 554 miles of 115 kilovolt line; and served 934 thousand retail customers in 51 cities. It also has 28,868 circuit miles of distribution lines. Portland General Electric Company was founded in 1889 and is headquartered in Portland, Oregon.

Evergy, Inc., together with its subsidiaries, engages in the generation, transmission, distribution, and sale of electricity in Kansas and Missouri, the United States. The company generates electricity througl1 coal, hydroelectric, landfill gas, uranium, and natural gas and oil sources, as well as solar, wind, other renewable sources. It serves residences, commercial firrns, industrials, municipalities, and other electric utilities. The company was incorporated in 2017 and is headquartered in Kansas City. Missouri.

The companies not in Mr. Coyne and Mr. Togonoski's sample that I examine are the Southern Company and Alette.

.The Southern Company, tt,rough its subsidiaries, engilges in the generation, transmission, and distribution of electricity. The company also develops, constructs, acquires. owns, and manages power generation assets, including renewable energy projects and sells electricity in the wholesale market: and distributes natural gas in Illinois, Georgia, Virginia, and Tennessee, as well as provides gas marketing services, gas distribution operations. and gas pipeline investments operations. In addition, it owns and operates nuclear, coal, hydro, cogeneration, solar, wind, battery storage, and fuel cell facilities. Furt11er, the constructs, operates, and maintains approximately 77,900 miles of nawral gas pipelines and 14 storage facilities with total capacity of 157 Bcl to provide natural gas to residential, commercial, and Industrial customers. The company serves approximately 8.9 million electric and gas utility customers. Further, it develops distributed energy and resilience solutions; deploys microgrids for commercial, industrial, governmental, and utility customers: and offers digital wireless communicätions and fiber optics services. The Southern Company was incorporated in 1945 and is headquartered in Atlanta, Georgia.

ALLETE, Inc. operates as an energy company. The company operates through Regulated Operations, ALLETE Clean Energy, and Corporate and Other segments. It generates electricity from coal-fired, biomass co-fired/ natural gas. hydroelectric, wind, and solar. In addition, the company provides regulated utility electric services in northwestern Wisconsin to approximately 15,000 electric customers, 13,000 natural gas customers. and 10,000 water customers, as well as regulated utility electric services in northeastern Minnesota to approximately 150,000 retail customers and 14 non· affiliated municipal customers. Further, it owns and maintains electric transmission assets in Wisconsin, Michigan, Minnesota, and Illinois. Additionally, the company focuses on developing, acquiring, and operating clean and renewable energy projects; and owns and operates approximately 1,200 megawatts of wind energy generation facility, as well as involved in the coal mining operations in North Dakota; and real estate Investment activities in Florida. It owns and operates 162 substations with a total capacity of 9,980 megavolt amperes. The company serves taconite mining, paper, pulp and secondary wood products, pipeline, and other industries. The company was formerly known as Minnesota Power, Inc. and d1anged its name to ALLETE, Inc. in May 2001. ALLETE, Inc. was incorporated in 1906 and Is headquartered in Duluth, Minnesota.

Appendix B Yahoo Beta estimates and financial data for Canadian UHCs (February 22 7, 2024)

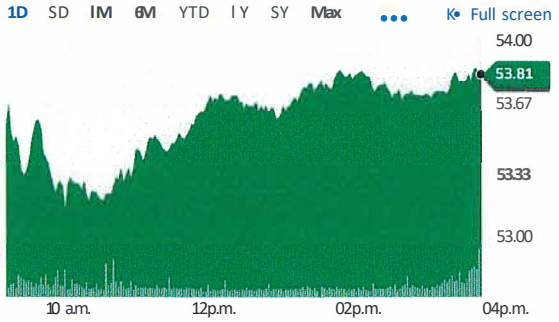
Fortis Inc. (FTS.TO)
Toronto - Toronto Real Time Price. Currency in CAD

Add to watchlist

53.81 +0.02 (+0.04%)
At close: 04:00PM EST

summary | Chart | Conversations | Statistics | Historical Data | Profile | Financials | Analysis | Options | Holders | Sustainability

Previous Close	53.79	Market Cap	26.399B
Open	53.65	Beta (SY Monthly)	0.18
Bid	53.79 X 0	PE Ratio (TTM)	17.36
Ask	53.80 X 0	EPS(TTM)	3.10
Day's Range	53.16 - 53.84	Earnings Date	May 01, 2024
52 Week Range	49.82 - 62.00	Forward Dividend & Yield	2.36 (4.39%)
Volume	2,007,414	Ex-Dividend Date	May 16,2024
Avg. Volume	1,495,766	I y Target Est	58.00



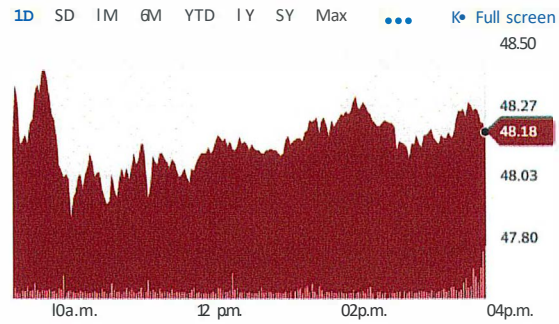
Emera Incorporated (EMA.TO)
Toronto - Toronto Real Time Price. Currency in CAD

Add to watchlist

48.18 -0.01 (-0.02%)
At close: 04:00PM EST

summary | Chart | Conversations | Statistics | Historical Data | Profile | Financials | Analysis | Options | Holders | sustainability

Previous Close	48.19	Market Cap	13.2218
Open	48.06	Beta (SY Monthly)	0.28
Bid	48.20 X 0	PE Ratio (TTM)	11.10
Ask	48.20 X 0	EPS(TTM)	4.34
Day's Range	47.89 - 48.43	Earnings Date	Feb 26, 2024
52 Week Range	43.67 - 59.52	Forward Dividend & Yield	2.87 (5.96%)
Volume	813,355	Ex-Dividend Date	Jan 31, 2024
Avg. Volume	1,097,428	I y Target Est	54.25



Canadian Utilities Limited (CU.TO)

Toronto - Toronto Real Time Price. Currency in CAD

Add to watchlist

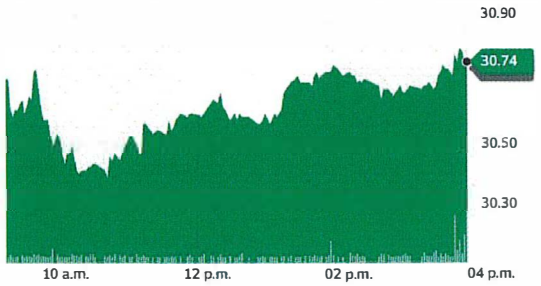
30.74 +0.02 (+0.07%)

At close: 04:00PM EST

Summary | Chart | Conversations | Statistics | Historical Data | Profile | Financials | Analysis | Options | Holders | Sustainability

Previous Close	30.72	Market Cap	8.523B
Open	30.53	Beta (5Y Monthly)	0.61
Bid	30.72 x 0	PE Ratio (TTM)	14.10
Ask	30.74 x 0	EPS (TTM)	2.18
Day's Range	30.40 - 30.80	Earnings Date	Feb 29, 2024 - Mar 04, 2024
52 Week Range	28.13 - 39.87	Forward Dividend & Yield	1.81 (5.90%)
Volume	615,913	Ex-Dividend Date	Jan 31, 2024
Avg. Volume	493,221	1y Target Est	35.36

1D 5D 1M 6M YTD 1Y 5Y Max Full screen



Hydro One Limited (H.TO)

Toronto - Toronto Real Time Price. Currency in CAD

Add to watchlist

41.06 +0.41 (+1.01%)

At close: 04:00PM EST

Summary | Chart | Conversations | Statistics | Historical Data | Profile | Financials | Analysis | Options | Holders | Sustainability

Previous Close	40.65	Market Cap	24.598B
Open	40.93	Beta (5Y Monthly)	0.30
Bid	41.05 x 0	PE Ratio (TTM)	22.69
Ask	41.06 x 0	EPS (TTM)	1.81
Day's Range	40.43 - 41.10	Earnings Date	May 03, 2024 - May 07, 2024
52 Week Range	32.79 - 41.15	Forward Dividend & Yield	1.19 (2.92%)
Volume	599,682	Ex-Dividend Date	Mar 12, 2024
Avg. Volume	920,126	1y Target Est	40.50

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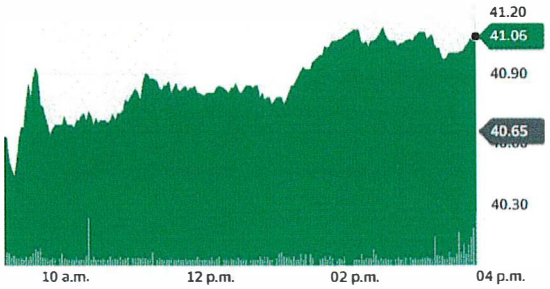

Algonquin Power & Utilities Corp. (AQN.TO)

Toronto· Toronto Real Time Price. Currency in CAD

(Add to watchlist)

7.90 -0.06 (-0.75%)

At close: 04:00PM EST

summary | Chart | Conversations | Statistics | Historical Data | Profile | Financials | Analysis | Options | Holders | Sustainability

Previous Close	7.96	Market Cap	5.444B
Open	7.97	Beta (SY Monthly)	0.45
Bid	7.89 x 0	PE Ratio (TTM)	N/A
Ask	7.90 x 0	EPS(TTM)	-0.49
Day's Range	7.86 - 7.96	Earnings Date	Mar 08, 2024
52 Week Range	6.75 - 12.31	Forward Dividend & Yield	0.58 (7.31%)
Volume	2,319,217	Ex-Dividend Date	Dec 28, 2023
Avg. Volume	2,526,116	Iy Target Est	9.87

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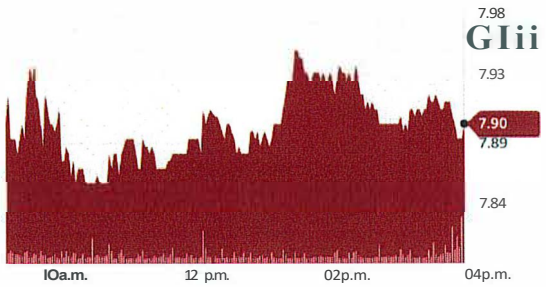

TC Energy Corporation (TRP.TO)

Toronto - Toronto Real Time Price. Currency in CAD

(Add to watchlist)

53.78 -0.04 (-0.07%)

At close: 04:00PM EST

Summary | Chart | Conversations | Statistics | Historical Data | Profile | Financials | Analysis | Options | Holders | Sustainability

Previous Close	53.82	Market Cap	55.796B
Open	53.81	Beta (SY Monthly)	0.75
Bid	53.75 x N/A	PE Ratio (TTM)	19.56
Ask	53.75 x N/A	EPS(TTM)	2.75
Day's Range	53.49 - 53.93	Earnings Date	Apr 26, 2024 - Apr 30, 2024
52 Week Range	43.70 - 57.02	Forward Dividend & Yield	3.84 (7.13%)
Volume	2,302,792	Ex-Dividend Date	Mar 27, 2024
Avg. Volume	5,837,622	Iy Target Est	54.92

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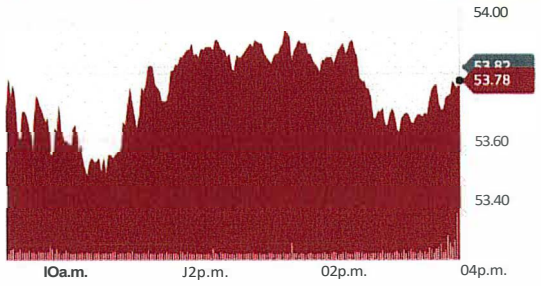


Enbridge Inc. (ENB.TO)

Toronto - Toronto Real Time Price. Currency in CAD

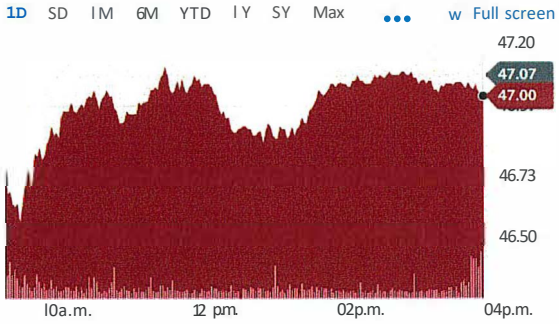
Add to watchlist

47.00 -0.07 {-0.15%)

At close: 04:00PM EST

Summary | Chart | Conversations | Statistics | Historical Data | Profile | Financials | Analysis | Options | Holders | Sustainabilit:

Previous Close	47.07	Market Cap	99.9038
Open	46.92	Beta (SY Monthly)	0.88
Bid	47.00 X 0	PE Ratio (TTM)	16.55
Ask	47.02 X 0	EPS(TTM)	2.84
Day's Range	46.57 •47.10	Earnings Date	May 03, 2024 - May 07, 2024
52 Week Range	42.75 •54.05	Forward Dividend & Yield	3.66 (7.78%)
Volume	7,4S2,151	Ex-Dividend Date	Feb 14, 2024
Avg. Volume	7,1S8,S72	Iy Target Est	53.41



Pembina Pipeline Corporation (PPL.TO)

Toronto - Toronto Real Time Price. Currency in CAD

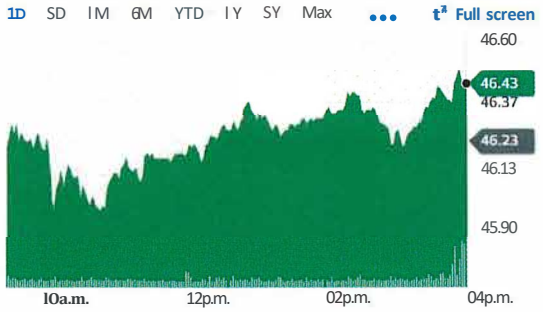
Add to watchllst

46.43 +0.20 (+0.43%)

At close: 04:00PM EST

Summary | Chart | Conversations | Statistics | Historical Data | Profile | Financials | Analysis | Options | Holders | Sustainability

Previous Close	46.23	Market Cap	25.5078
Open	45.56	Beta (SY Monthly)	1.48
Bid	46,38 X 0	PE Ratio (TTM)	21.40
Ask	46.44 X 0	EPS(TTM)	2.17
Day's Range	45.97 •46.52	Earnings Date	Feb 23, 2024
52 Week Range	38.79 •46.95	Forward Dividend & Yield	2.67 (5.78%)
Volume	2,984,775	Ex-Dividend Date	Dec 14, 2023
Avg. Volume	2,595,603	Iy Target Est	52.36



Appendix B. Yahoo Beta estimates and financial data for US Gas companies (February 23, 2024)

Southwest Gas Holdings, Inc. (SWX)
NYSE · Nasdaq Real Time Price. Currency in USD

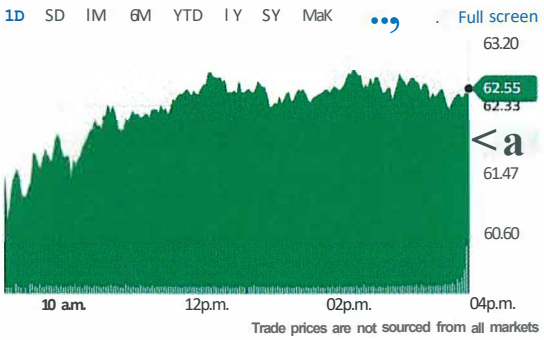
Add to watchlist)

62.55 +0.68 (+1.10%)
At close: 04:00PM EST

62.15 -0.40 (-0.64%)
After hours: 05:SIPM EST

summary | Chart | Conversations | Statistics | Historical Data | Profile | Financials | Analysis | Options | Holders | sustainability

Previous Close	61.87	Market Cap	4.4748
Open	61.29	Beta (SY Monthly)	0.31
Bid	61.79 K 900	PE Ratio (TTM)	**N/A**
Ask	66.18x 1100	EPS (TTM)	·3.23
Day's Range	60.88 •62.80	Earnings Date	Feb 28, 2024
52 Week Range	53.79 · 68.03	Forward Dividend & Yield	2.48 (4.01%)
Volume	2,265,832	Ex-Dividend Date	Feb 14, 2024
Avg. Volume	384,015	Iy Target Est	69.60



Spire Inc. (SR)
NYSE · Nasdaq Real Time Price. Currency in USD

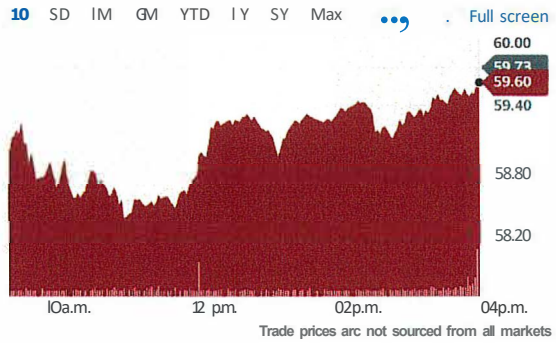
Add to watchlist)

59.60 -0.13 (-0.22%)
At close: 04:00PM EST

60.02 +0.42 (+0.70%)
After hours: 6:25PM EST

Summary | Chart | Conversations | Statistics | Historical Data | Profile | Financials | Analysis | Options | Holders | Sustainability

Previous Close	59.73	Market Cap	3.2778
Open	59.06	Beta (SY Monthly)	0.51
Bid	59.25 X 800	PE Ratio (TTM)	16.06
Ask	S9.95x 1100	EPS(TTM)	3.71
Day's Range	58.42 •59.65	Earnings Date	May 01, 2024 - May 06, 2024
52 Week Range	53.77 •72.59	Forward Dividend & Yield	3.02 (5.06%)
Volume	439,130	Ex-Dividend Date	Mar 08, 2024
Avg. Volume	590,145	1y Target Est	63.00



Northwest Natural Holding Company {,NWN)

NYSE - Nasdaq Real Time Price. Currency in USO

Add to watchlist)

39.76 +0.89 (+2.29%)
At close: 04:00PM EST

39.75 -0.01 (-0.03%)
After hours: 07:22PM EST

summary | Chart | Conversations | Statistics | Historical Data | Profile | Financials | Analysis | Options | Holders | Sustainability

Previous Close	38.87	Market Cap	l.462B
Open	38.51	Beta (SY Monthly)	0.56
Bid	37.10 X 800	PE Ratio (TTM)	14.41
Ask	40.00 X 900	EPS (TTM)	2.76
Day's Range	38.09 •39.77	Earnings Date	Feb 23, 2024
52 Week Range	34.95 •49.09	Forward Dividend & Yield	1.95 (5.02%)
Volume	772,047	Ex-Dividend Date	Jan 30, 2024
Avg. Volume	269,371	l y Target Est	45.33

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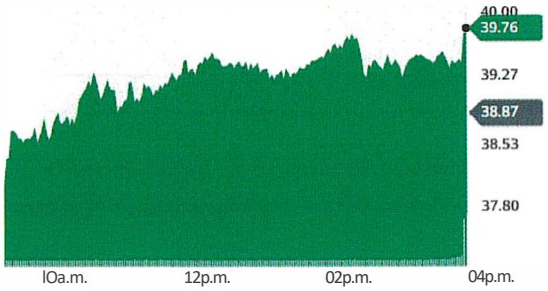


Trade prices are oat sourced from all markets

New Jersey Resources Corporation {NJR)

NYSE - Nasdaq Real Time Price. Currency In USO

Add to watch list)

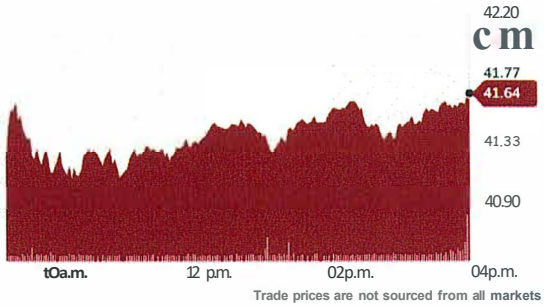
41.64 -0.37 (-0.88%)
At close: 04:00PM EST

41.64 0.00 (0.00%)
After hours: 6:20PM EST

Summary | Chart | Conversations | Statistics | Historical Data | Profile | Financials | Analysis | Options | Holders | Sustainability

Previous Close	42.01	Market Cap	4.093B
Open	41.60	Beta (SY Monthly)	0.65
Bid	**41.43 X 800**	PE Ratio (TTM)	**17.14**
Ask	**41.93 X 900**	EPS(TTM)	**2.43**
Day's Range	41.10 · 41.64	Earnings Date	May 02, 2024 • **May 06, 2024**
52 Week Range	**38.92 · 55.84**	**Forward** Dividend & Yield	**1.68 (4.00%)**
Volume	**346,282**	Ex-Dividend Date	**Mar 12, 2024**
Avg. Volume	**533,988**	l y Target Est	**48.17**

10 SD IM 6M YTD I Y SY Max ••• . Full screen



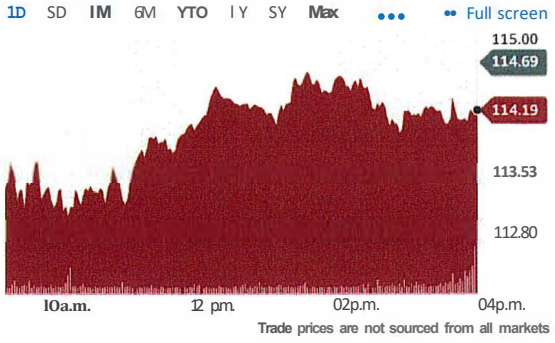
Trade prices are not sourced from all markets

Atmos Energy Corporation (ATO} (Add to watchlist)
NYSE - NYSE Delayed Price. Currency in USD

114.19 -0.50 (-0.44%) 114.19 0.00 (0.00%)
At close: 04:00PM EST After hours: 4:31PM EST

summary Chart Conversations Statistics Historical Data Profile Financials Analysis Options Holders Sustainability

Previous Close	114.69	Market Cap	17.224B
Open	**113.67**	Beta (SY Monthly)	0.67
Bid	**113.74 X 800**	PE Ratio (TTM)	**18.24**
Ask	114.64 X 800	EPS(TTM)	6.26
Day's Range	113.03 • 114.61	Earnings Date	**May 01, 2024 · May 06, 2024**
52 Week Range	**101.00 · 125.28**	Forward Dividend & Yield	**3.22 (2.81%)**
Volume	**871,354**	Ex-Dividend Date	Feb **23, 2024**
Avg. Volume	1,031,620	Iy Target Est	**121.89**

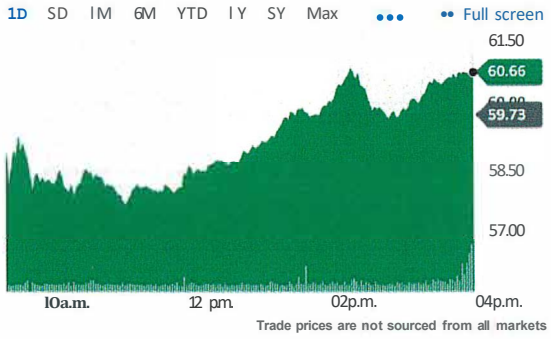


ONE Gas, Inc. (OGS) (Add to watchlist)
NYSE - NYSE Delayed Price. Currency in USD

60.66 +0.93 (+1.56%) 60.66 0.00 {0.00%}
At close: 04:00PM EST After hours: 06:07PM EST

Summary Chart Conversations Statistics Historical Data Profile Financials Analysis Options Holders Sustainability

Previous Close	59.73	Market Cap	3.364B
Open	58.76	Beta (SY Monthly)	N/A
Bid	60.52 X 900	PE Ratio (TTM)	14.80
Ask	60.56 X 800	EP5(TTM)	4.10
Day's Range	57.74 •60.83	Earnings Date	May 06, 2024
52 Week Range	55.50 •83.89	forward Dividend & Yield	2.64 (4.37%)
Volume	972,313	Ex-Dividend Date	Feb 22, 2024
Avg. Volume	512,580	Iy Target Est	60.43



Appendix C. Yahoo Beta estimates and financial data for US Electric companies (February 23, 2024)

Duke Energy Corporation (DUK)
NYSE - NYSE Delayed Price. Currency in USD

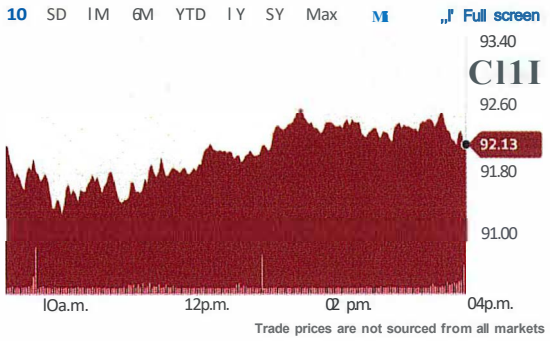
(Add to watchlist)

92.13 -0.86 (-0.92%)
At close: 04:00PM EST

92.13 0.00 {0.00%)
After hours: 7:S9PM EST

Summary | Chart | Conversations | Statistics | Historical Data | Profile | Financials | Analysis | Options | Holders | Sustainability

Previous Close	92.99	Market Cap	71.006B
Open	92.29	Beta (SY Monthly)	0.48
Bid	91.75 X 800	PE Ratio (TTM)	17.38
Ask	93.12 X 800	EPS(TTM)	5.30
Day's Range	91.30 •92.59	Earnings Date	May 07, 2024 • May 13, 2024
52 Week Range	83.06 • 100.39	Forward Dividend & Yield	4.10 (4.41%)
Volume	4,131.400	Ex-Dividend Date	Feb 15, 2024
Avg. Volume	3,257,490	Iy Target Est	103.44



Evergy, Inc. (EVRG)
NasdaqGS - NasdaqGS Real Time Price. Currency in USD

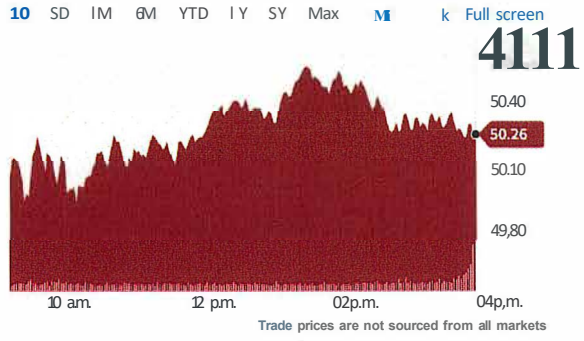
(Add to watchlist)

50.26 -0.35 {-0.69%)
At close: 04:00PM EST

50.26 0.00 (0.00%)
After hours: 8:00PM EST

Summary | Chart | Conversations | Statistics | Historical Data | Profile | Financials | Analysis | Options | Holders | Sustainability

Previous Close	50.61	Market Cap	11.546B
Open	50.32	Beta (SY Monthly)	0.56
Bid	**50.00x 1100**	PE Ratio (TTM)	**16.98**
Ask	50.65 X 900	EPS(TTM)	2.96
Day's Range	49.95 •50.56	**Earnings Date**	Feb 29, 2024
52 Week Range	46.92 •63,93	Forward Dividend & Yield	**2.57 (5.08%)**
Volume	**1,184,951**	Ex-Dividend Date	**Nov 21, 2023**
Avg. Volume	**2,989,375**	Iy Target Est	**54.33**



OGE Energy Corp. (OGE)

NYSE · NYSE Delayed Price. Currency in USD

Add to watchlist

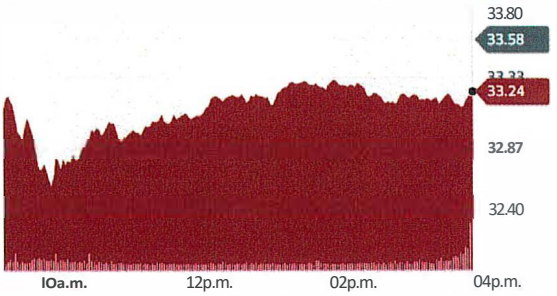
33.24 −0.34 (−1.01%)
At close: 04:00PM EST

33.06 −0.18 (−0.54%)
After hours: 7:53PM EST

summary | Chart | Conversations | Statistics | Historical Data | Profile | Financials | Analysis | Options | Holders | Sustainabiliti

Previous Close	33.58	Market Cap	6.658B
Open	33.21	Beta (SY Monthly)	0.72
Bid	32.39 X 1400	PE Ratio (TTM)	**16.06**
Ask	**34.02 X 1100**	EPS(TTM)	**2.07**
Day's Range	**32.60 · 33.33**	Earnings Date	**May 02, 2024 · May 06, 2024**
52 Week Range	**31.25 · 39.09**	Forward Dividend & Yield	**1.67 (4.98%)**
Volume	**1,819,263**	Ex-Dividend Date	**Apr 05, 2024**
Avg. Volume	**1,487,076**	Iy Target Est	**34.69**

1D SD IM 6M YTD IY SY Max ••• . Full screen



Trade prices are not sourced from all markets

Pinnacle West Capital Corporation (PNW)

NYSE · NYSE Delayed Price. Currency 111USD

Add to watchllst

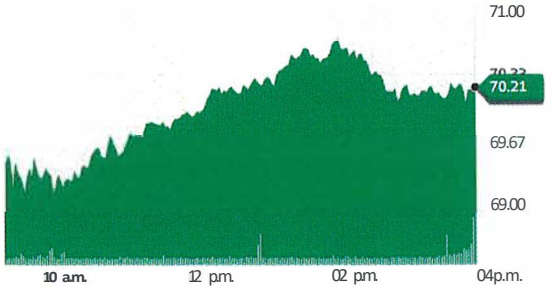
70.21 +0.04 (+0.06%)
At close: 04:00PM EST

70.21 0.00 (0.00%)
After hours: 6:25PM EST

Summary | Chart | Conversations | Statistics | Historical Data | Profile | Financials | Analysis | Options | Holders | sustainability

Previous Close	70.17	Market Cap	7.962B
Open	69.70	Beta (SY Monthly)	0.48
Bid	69.10 X 900	PE Ratio (TTM)	16.76
Ask	70.20 X 1400	EPS(TTM)	4.19
Day's Range	69.20 • 70.74	Earnings Date	Feb 27, 2024
52 Week Range	65.20 • 86.03	Forward Dividend & Yield	3.S2 (5.02%)
Volume	l,30S,250	Ex-Dividend Date	Jan 31, 2024
Avg. Volume	1,162,003	I y Target Est	77.00

1D SD 1M 6M YTD IY SY Max ••• . Full screen



Trade prices arc not sourced from all markets

ALLETE, Inc. (ALE)

NYSE - NYSE Delayed Price. Currency in USD

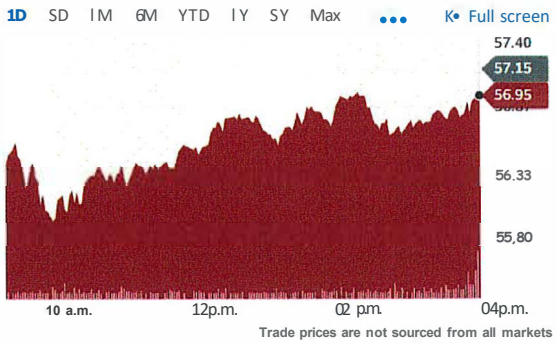
Add to watchlist

56.95 -0.20 (-0.35%)
At close: 04:00PM EST

56.85 -0.10 (-0.18%)
After hours: 6:59PM EST

Summary | Chart | Conversations | Statistics | Historical Data | Profile | Financials | Analysis | Options | Holders | Sustainability

Previous Close	57_15	Market Cap	3.2798
Open	56.75	Beta (SY Monthly)	0.77
Bid	54.29 X 1800	PE Ratio (TTM}	13.24
Ask	57.76 X 800	EPS(TTM}	4.30
Day's Range	55.99 · 56.98	Earnings Date	May 01, 2024 · May 06, 2024
52 Week Range	49.29 · 66.69	Forward Dividend & Yield	2.82 (4.93%}
Volume	371,690	Ex-Dividend Date	Feb 14, 2024
Avg. Volume	387,370	I y Target Est	62.41



Eversource Energy (ES)

NYSE - NYSE Delayed Price. Currency in USD

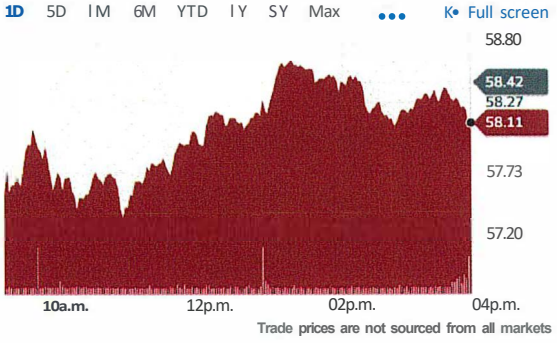
Add to watchlist

58.11 -0.31 {-0.53%)
At close: 04:00PM EST

58.25 +0.14 {+0.24%)
After hours: 6:18PM EST

summary | Chart | Conversations | Statistics | Historical Data | Profile | Financials | Analysis | Options | Holders | Sustainability

Previous Close	58.42	Market Cap	20.328
Open	57.77	Beta (SY Monthly}	0.58
Bid	56.10 X 1000	PE Ratio (TTM}	N/A
Ask	62.12 X 1000	EPS(TTM)	-1.26
Day's Range	57.36 · 58.60	Earnings Date	May 01, 2024 · May 06, 2024
52 Week Range	52.03 - 81.36	Forward Dividend & Yield	2.86 (4.90%}
Volume	3,344,883	Ex-Dividend Date	Mar 04, 2024
Avg. Volume	3,1S7,706	I y Target Est	66.00



Portland General Electric Company (POR)

NYSE· NYSE Delayed Price. Currency in USO

(Add to watchlist)

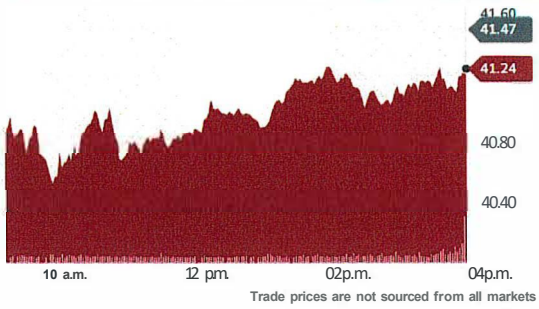
41.24 -0.23 {-0.55%}
At close: 04:00PM EST

41.24 0.00 {0.00%}
After hours: 04:02PM EST

Summary | Chart | Conversations | Statistics | Historical Data | Profile | Financials | Analysis | Options | Holders | Sustainability

Previous Close	41.47	Market Cap	4.1726
Open	40.89	Beta {SY Monthly)	0.60
Bid	39.25 x 900	PE Ratio (TTM)	17.70
Ask	43.95 x 1000	EPS(TTM)	2.33
Day's Range	40.57 - 41.27	Earnings Date	Apr 26, 2024 - Apr 30, 2024
52 Week Range	38,01 - 51.58	Forward Dividend & Yield	1.90 (4.58%)
Volume	555,663	Ex-Dividend Date	Mar 21, 2024
Avg. Volume	1,027,246	I y Target Est	46.94

1D SD IM 6M YTD I Y SY Max ••• ,I' Full screen



Trade prices are not sourced from all markets

American Electric Power Company, Inc. (AEP)

NasdaqGS - NasdaqGS Real Time Price. Currency h USO

(Add to watchlist)

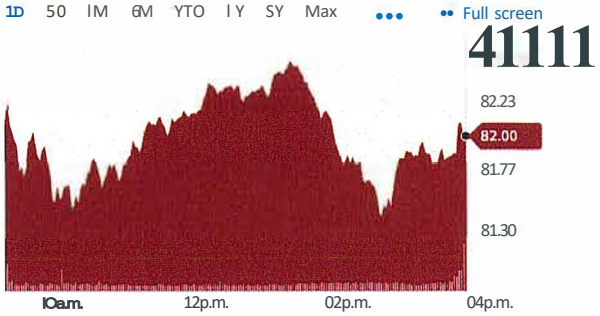
82.00 -0.56 (-0.68%)
At close: 04:00PM EST

82.00 0.00 {0.00%}
After hours: 08:00PM EST

Summary | Chart | Conversations | Statistics | Historical Data | Profile | Financials | Analysis | Options | Holders | sustainability

Previous Close	82.56	Market Cap	43.1226
Open	82.05	Beta (SY Monthly)	0.49
Bid	82.00 x 800	PE Ratio (TTM)	18.94
Ask	81.85 X 900	EPS(TTM)	4.33
Day's Range	81.44 - 82.51	Earnings Date	Feb 27, 2024
52 Week Range	69.38 - 96.05	Forward Dividend & Yield	3.52 (4.26%)
Volume	4,126,205	Ex-Dividend Date	Feb 08, 2024
Avg. Volume	3,614,491	I y Target Est	86.72

1D 50 IM 6M YTO I Y SY Max ••• •• Full screen



Trade prices are not sourced from all markets

Entergy Corporation (ETR)

NYSE · NYSE Delayed Price. Currency in USO

Add to watch list)

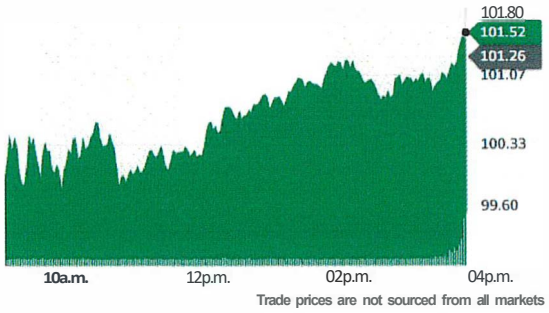
101.52 +0.26 (+0.26%)
At close: 04:00PM EST

101.52 0.00 {0.00%)
After hours: OS:OSPM EST

Summary | Chart | Conversations | Statistics | Historical Data | Profile | Financials | Analysis | Options | Holders | Sustainability

Previous Close	101.26	Market Cap	21.469B
Open	100.29	Beta (SY Monthly)	0.71
Bid	100.06x 800	PE Ratio (TTM)	14.61
Ask	101.08 X 900	EPS(TTM)	6.95
Day's Range	99.82 •101.56	Earnings Date	Apr 24, 2024 - Apr 29, 2024
52 Week Range	87.10 •111.90	Forward Dividend & Yield	4.52 (4.46%)
Volume	1.592,073	Ex-Dividend Date	Feb 08, 2024
Avg. Volume	1,394,621	Iy Target Est	109.97

1D SD IM 6M YTD I Y SY Max ••• Full screen



Trade prices are not sourced from all markets

Alliant Energy Corporation (LNT)

NasdaqGS •NasdaqGS Real Time Price. Currency in USD

Add to watchllst)

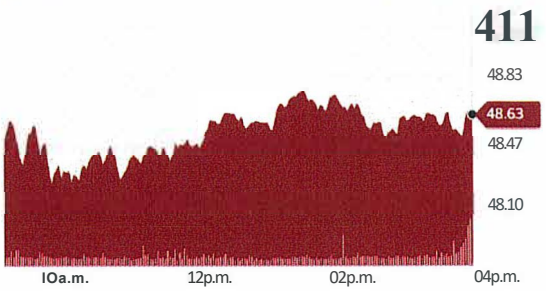
48.63 -0.46 (-0.94%}
At close: 04:00PM EST

48.60 -0.03 (-0.06%)
After hours: 8:00PM EST

summary | Chart | Conversations | Statistics | Historical Data | Profile | Financials | Analysis | Options | Holders | Sustainability

Previous Close	49.09	Market Cap	**12.454B**
Open	48.80	Beta (SY Monthly)	0.55
Bid	47.89 X 900	PE Ratio (TTM)	17.68
Ask	48.58 X 800	EPS(TTM)	2.75
Day's Range	48.25 · 48.80	Earnings Date	May 02, 2024 · May 06, 2024
52 Week Range	**45.15** · 56.26	Forward Dividend & Yield	1.92 (3.91%)
Volume	1,415,542	Ex-Dividend Date	Jan 30, 2024
Avg. Volume	1,984,931	Iy Target Est	52.96

1D SD IM 6M YTD I Y SY Max ••• Full screen



Trade prices are not sourced from all markets

NextEra Energy, Inc. (NEE)

NYSE · NYSE Delayed Price. Currency in USO

Add to watchlist

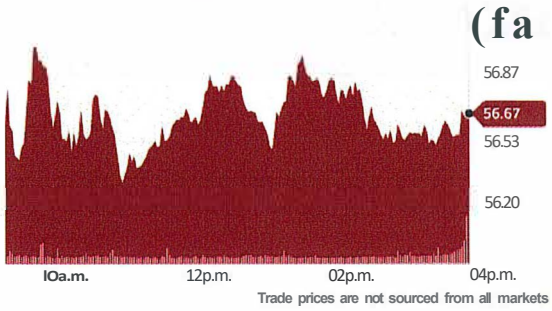
56.67 -0.43 (-0.75%)
At close: 04:00PM EST

56.55 -0.12 (-0.21%)
After hours: 7:58PM EST

Summary | Chart | Conversations | Statistics | Historical Data | Profile | Financials | Analysis | Options | Holders | Sustainability

Previous Close	57.10	Market Cap	116.311B
Open	56.79	Beta (SY Monthly)	0.52
Bid	56.52 X 800	PE Ratio (TTM)	15.87
Ask	56.62 X 1000	EPS(TTM)	3.57
Day's Range	56.32 · 57.08	Earnings Date	Apr 23, 2024 • Apr 29, 2024
52 Week Range	47.15 •79.78	Forward Dividend & Yield	2.06 (3.61%)
Volume	10,266,090	Ex-Dividend Date	Feb 26, 2024
Avg. Volume	10,937,720	ly Target Est	71.87

1D SD IM GM YTD I Y SY Max ••• •• Full screen



Trade prices are not sourced from all markets

The Southern Company (SO)

NYSE · NYSE Delayed Price. Currency in USO

Add to watch list

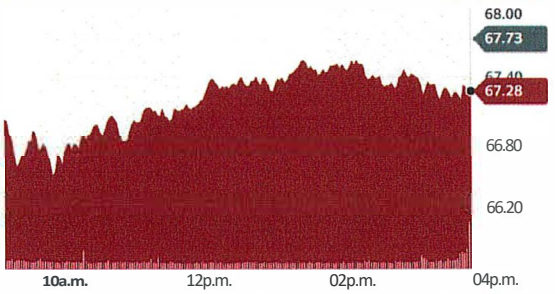
67.28 -0.45 (-0.66%)
At close: 04:0IPM EST

67.00 -0.28 (-0.42%)
After hours: 7:30PM EST

summary | Chart | Conversations | Statistics | Historical Data | Profile | Financials | Analysis | Options | Holders | sustainability

Previous Close	67.73	Market Cap	73.337B
Open	67.17	Beta (SY Monthly)	0,50
Bid	67,24 X 800	PE Ratio (TTM)	18.74
Ask	67.26 X 1000	EPS (TTM)	3.59
Day's Range	66.54 •67.58	Earnings Date	Apr 25, 2024 • Apr 29, 2024
52 Week Range	61.56 •75.80	Forward Dividend & Yield	2.80 (4.13%)
Volume	3,500,365	Ex-Dividend Date	Feb 16, 2024
Avg. Volume	4,622,638	ly Target Est	74.42

1D SD IM 6M YTD I Y SY Max ••• •• Full screen



Trade prices are not sourced from all markets

APPENDIXD

DISCOUNTED CASH FLOW ESTIMATES

The DCF Model

The standard alternative to risk premium models is the discounted cash flow model. This model infers the required rate of return by replicating the actions of an investor in valuing the firm's securities. To do this we need to define the costs and benefits attached to an investment. The cost is simply the price of the security *(P_0,* price at time zero) and the benefits, the stream of cash inflows expected at time t in the future *(CJ.* However, since the investor can always invest in alternative investments, future expected cash flows are not of equal value. As a result, future cash flows are "discounted," or reduced in value to reflect this "opportunity cost." This is the basic idea behind using the discounted cash flow model,

$$P_0 = \frac{CF_t}{(1+K)^t}$$

where K is the discount rate or investor's required rate of return.

Once we estimate the stream of future cash inflows, we can equate them to the current price and solve for the investor's required rate of return. For example, this is the standard way of valuing bonds. At the end of every business day investment banks simply take the coupon payments on a government bond, its terminal value and use the last trading value for the bond to solve the above equation for the bond's "yield to maturity." This yield to maturity is published in the newspaper as an objective measure of the investors' required rate of return for a default free security. I use this DCF estimate as part of my risk premium estimates. However, we can take this a stage further and estimate the DCF required return on equity directly using the same procedure.

The expected equity cash flows are the future expected dividends. Unlike the stream of cash flows on a bond the dividends are not contractual and are more difficult to forecast, particularly

for individual stocks. Consequently, the DCF model is only used for low-risk dividend paying stocks or the market, where the expected dividends can be assumed to grow at some long run average growth rate *g*. In this case, each dividend is expected to grow at the rate *g*, so we can substitute $d_1 = d_0 * (1+g)$ into the valuation equation. Taking this process to infinity and using the value of a geometric series, we can solve to get:

$$P_0 = \frac{d_1}{K - g}$$

This says the stock price is equal to the expected dividend per share, divided by the investor's required rate of return, minus the dividend growth expectation, *g*. The advantage of this formulation of the problem is that we can easily rearrange the equation to obtain,

$$K = \frac{d_1}{P_0} + g$$

This states that the investor's required rate of return (cost of equity capital) can be estimated as the expected dividend yield plus the expected growth rate in dividends. This is the direct analogy with the yield to maturity on a bond. This formulation of the model is often called the Gordon (or dividend discount) model after my late colleague Professor Myron Gordon of the University of Toronto.

However, it is important to note that the expected dividend yield plus growth equation ONLY holds if the constant growth model also holds since it is simply a rearrangement of it. *This means that the constant growth rate assumption to infinity also holds.* Otherwise, the use of the formula for a geometric series does not hold since if g>K the series does not converge. In practise this means that the formula is only useful, as mentioned above, for very low risk companies and the overall market since for other firms short run growth rates from security analysts for example are often more than any reasonable equity cost.

Further, it is important that the constant growth rate assumption essentially applies to earnings

book value and sales as well, at least as an approximation. It is then straightforward to show that increased dividends primarily come from increased future earnings, which are generated by the firm retaining some of its current earnings for re-investment. If we set X as the earnings per share and denote b as the fraction of earnings retained within the firm, then $(1-b)X$ is the dividend and bX, the retained earnings.[1] Provided the assumptions of the DCF model hold, it is straightforward to show that dividends and earnings will then grow at a long run growth rate estimated as the product of the firm's retention rate *(b)* and its return on common equity *(r),* which is referred to as its *sustainable growth rate.*[2] Note that while K is the return that investor's require, r is the actual return on equity *(ROE)* the firm is expected to earn.[3] These are different concepts.[4]

An example may help to make these assumptions clear. Suppose as in Schedule 1, the firm's book value per share is $20 and its return on equity expected to be 12%. In this case, its earnings per share are expected to be $2.40 and with a 50% dividend payout rate, its dividends per share and retained earnings are both expected to be $1.20. Moreover, since $1.20 has been retained and reinvested within the firm, next period's book value per share increases to $21.20. As a result, the firm is expected to earn $2.544 in the following year, i.e., 14.4 cents more. This additional 14.4 cents comes from earning the 12% return on equity on the $1.20 of retained earnings. The increase in earnings per share, dividend per share and retained earnings is 6% each year and is calculated directly as the product of the firm's return on equity of 12% and its retention rate of 50%. Moreover, the value of the firm's common stock can be calculated from equation (1), which also increases at this 6% rate, since only the dividend per share is expected to change.

---

[1] This assumes that the only change in shareholder's equity comes from retentions, that is, everything flows through the income statement.

[2] This is consistent with industry practise and the Financial Post's definition in Schedule 3.

[3] There is an additional term (sv) if the firm repeatedly sells shares at a premium to its book value, but this term is small and rare for utilities as mature cash flow positive industries. Further it is usually dwarfed by estimation problems.

[4] "br" growth is the third way of estimating dividend growth in Kolbe, Read and Hall, Estimating the rate of return for public utilities, MIT Press, 1984, page 55.

The importance of Schedule 1 is in showing some of the implications of the dividend growth model. First, note that if the investor's fair rate of return is 10%, the stock price in Schedule 1 is $30, determined as the expected dividend of $1.20 divided by the discount rate minus the growth rate (or 0.04). This price exceeds the book value of $20 by 50%. This is because the firm's return on equity *(r)* is 12% and the investor's required or fair rate of return (K) is only 10%. This is the reason why economists look at market-to-book ratios to infer the investor's opportunity cost. If market-to-book ratios exceed one for a regulated company, most economists immediately assume that the firm's return on equity exceeds the return required by stockholders, implying that the regulator should lower the firm's allowed rate of return. This is a standard proposition. For example, in Kolbe, Read and Hall (1984) they state (page 25)

> ***"on balance we believe that setting the allowed rate of return equal to the cost of capital is the policy that best meets the criterion of fairness."***

In our example the *ROE* exceeds the required rate of return by 2% which results in a market to book ratio of 150% and indicates that the ROE is excessive and should be lowered.

Second, it is the return on equity that drives the growth in both dividends per share and earnings per share, provided that the dividend payout is constant. If the dividend payout is gradually increased over time, then it is possible to *manufacture* a faster growth rate in dividends than earnings per share, from the same underlying level of profitability. For example, in Schedule 2 the same data is used as in Schedule 1 except that the dividend payout starts at 50% and then increases by 2% per year. By the end of year 5 earnings per share have only risen to $2.99 instead of the $3.03 in Schedule 1, because less money has been reinvested within the firm. As a result, there is less capital to generate earnings. Thus the earnings in Schedule 2 only grow at a 5.6% compound growth rate, down from the 6% of Schedule 1. Conversely, since more of the earnings are being paid out as dividends, dividends per share are up to $1.73 instead of $1.52. This is a 9.6% compound growth rate, rather than the 6% in Schedule 1.

In the short-run, Schedule 2 demonstrates that the growth in dividends per share can be artificially manipulated by increasing the dividend payout. This is not sustainable in the long run,

since the dividend payout cannot be increased indefinitely. Moreover, the manipulation can be detected by performing the basic 'diagnostic' check of tracking the behaviour of the firm's dividend payout over time, and the firm's return on equity. However, if the analyst is not aware of the change in the dividend payout, estimating the fair rate of return by adding this manipulated dividend growth rate to the expected dividend yield will overstate the investor's required rate of return. It is important in this case to base the estimate of the investor's required rate of return on a long run sustainable growth rate, estimated from the underlying growth in earnings and dividends and the two components of growth.

The third implication of Schedule 1 is that the DCF estimate using the historic growth rate is appropriate only when the assumptions of the model hold. This means that non-dividend paying firms, firms with highly fluctuating earnings and dividends, and firms with non-constant expected growth cannot be valued accurately using the formula. Usually, these assumptions hold for *pure* regulated utilities since the allowed rate of return applies to the book value of equity both old as well as on new investments. However, it may not hold for utility holding companies (UHCs) that may own a variety of different operating divisions with added debt at the parent level. For non-regulated firms and UHCs, these assumptions are frequently violated. As a result, estimating the investor's required rate of return by using the formula $K=d_1/P_0 + g$, is tenuous and subject to significant measurement error.

DCF Estimates for the "Market" as a whole.

In terms of DCF estimates we can go from the broad to the specific. By broad, I mean the market, since by holding a diversified portfolio, an investor reduces the possibility of gains from one firm being the result of losses by another. In Schedule 4 is a graph of the dividend yield on the TSX Composite (Cansim V122628 plus recent date from the TSX) along with the yield to maturity on the long Canada (LTC) bond. The dividend yield on the TSX Composite finished out the year (December 2023) at 3.15, while the LTC yield[5] was 3.0%. This is an unusual situation that has

[5] The over ten yield, cansim V122487.

persisted since the 2011 Euro crisis prompted massive central bank intervention in the bond market. It is unusual since equities are a claim on real resources and in the "long run" should grow in line with the growth rate in profits and GDP. In contrast, the yield on the long Canada bond is fixed and is all an investor can earn when the bond is held to maturity. As a result, we would expect the TSX dividend yield to be ***below*** that on the long Canada bond. This inversion of normal market relationships is indicative of the recent anomalous level of long Canada bond yields.

In forecasting a DCF estimate for the overall stock market it is normal to start with GDP forecasts and then adjust for the state of the economy and the equity market. For example, in 2012 RBC[6] used what they termed a "Grinoid-Kroner-Siegel" supply side model for forecasting the fair rate of return on the US market. Schedule 5 is their description of the model. However, despite the new name this is simply a Gordon or constant growth rate DCF model with minor adjustments.

First, the basic constant growth model is the dividend yield plus the forecast nominal growth rate of the economy split into its two parts: inflation and the real growth rate. This part of the DCF equation implicitly assumes that aggregate profits and dividends increase in line with GDP consistent with the basic DCF model. Second, are the two minor tweaks where RBC adjusts for the change in the number of shares outstanding plus a pricing adjustment. We don't normally adjust for changes in the number of shares since we normally estimate the growth rate based on a current firm's share price. However, as a claim on aggregate profits this is needed if in aggregate some shares are being repurchased and new shares issued as new firms enter the market. The final term is a subjective assessment of whether the market is over or undervalued. This is not normally done in a DCF model since the basic assumption is that the discount rate and thus price earnings multiple is constant, so the price increases in line with dividends and earnings.

[6] RBC Capital markets, U.S Equity Strategy Weekly, July 18, 2012.

In 2012 RBC's estimated "DCF" equity cost for the U.S market started with a 2.1 % dividend yield and 4.3% nominal growth rate comprising 2.1 % inflation and 2.2% real growth. They then estimated net share issuance of -0.5% that is share repurchases were exceeded by new shares issued to the tune of 0.5%. As a result, the future dividends were allocated to a greater number of shares implying a 5.9% DCF base expected return. They then assessed the U.S market as being over-valued and deducted 1.0% for the then currently high market values to get a forecast return of 4.9%. Their numbers are below.

S&P 500 10 year Return Forecast	
+ Dividend yield	2.1%
- Net Share Issuance	-0.5%
+ Inflation	2.1%
+ Real Earnings Growth	2.2%
+ Change in PE	-1.0%
= Total Equity Return	4.9%

Source: RIBC Capital Markets

- On a positive note, assuming 15% price vollatillty going forward, the 4.9% per annum return forecast is likely to be realized over a 10-year horizon.

Morgan asset management adopted a similar approach in their 2021 capital market assumptions as below.7 Morgan starts with top line revenue growth from nominal GDP but add a margin factor to indicate whether earnings will grow faster than revenues. For 2021 they added 0.1 % to get earnings growth of 5.3% similar to RBC. They then added 0.1 % for their forecast that share buy-backs would exceed new share issues to get 5.4% growth in earnings per share. With a 1.8% dividend yield this gives an adjusted DCF estimate of 7.2% from which they subtracted 3.0% for what they felt was an over-valued U.S stock market to get 4.1 % for the US, 5.2% for the

7 J. P Morgan, Long-Term Capital market Assumptions, J.P Morgan Asset Management, 2021.

Eurozone, 5.1 % for Japan and 6.7% for the UK. J.P. Morgan's forecast is heavily dependent on their judgment as to the over or under valuation of the stock market. Personally, I am not willing to make that call as it assumes market irrationality. lfthe market adjustment is ignored Morgan's estimates are 7.2%, 7.4%, 6.9% and 8.2% for the four regions.

This year, our equity return assumptions decline across most regions

EXHIBIT SA: SELECTED DEVELOPED MARKET EOUIT"Y LONG-TERM RETURN ASSUMPTIONS AND BUILDING BLOCKS

Equity assumptions	U.S. large cap	Eurozone	Japan	UK
Revenue growth	5.2	4.4	3.4	5.3
• Margins impact	0.1	1.5	!.5	0.2
Earnings growth	5.1	5.9	**5.0**	5.5
• Gross dil ut ion	·2.0	·2.0	·2.0	·2.0
• Buybacks	2J	J.J	t.5	J.2
EPS growth	5.4	4.9	4.4	**4.7**
• Valua1iofl impact	·3.0	·22	·1.9	·1.5
Price return	2.4	2.7	2.6	3.1
• Dividend yield (OY)	**18**	2.5	2.5	3.5
Total return. loG!I currency	4.1	5.2	**5.1**	**6.7**
Cha.n,ge vs. 2020 LfCMAs	**-1.5**	·0.6	**·0.4**	**0.6**

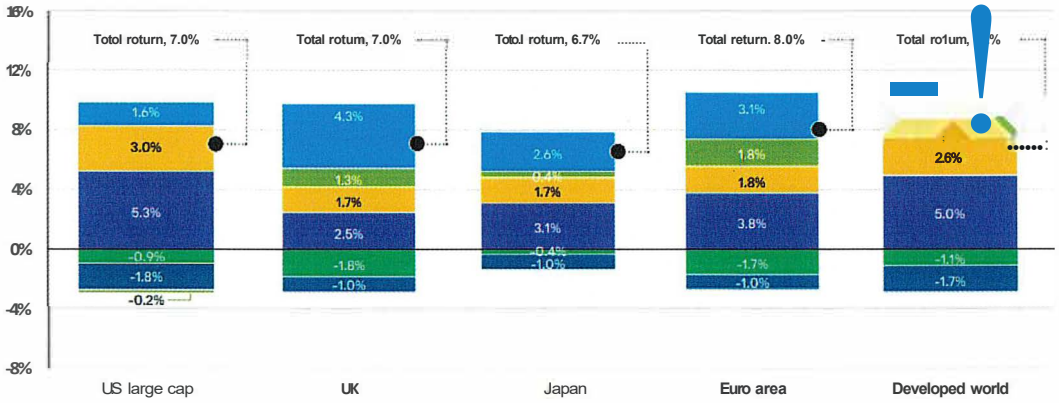
Source: J.P. Morg;in ASset M nagemenl: e,lirn3n s as or Seplember 30. 2019, a 1 SeplemtJer 30. 2020.
Componem, mav not add up 10 lotals due la rounding.

The J.P Morgan estimate has been updated in 2023 in a less interesting format as below. [8]

[8] J. P Morgan, 2024 Long-Term Capital market Assumptions, J.P Morgan Asset Management, September 2023.

Valuations tailwinds subside, but equity return forecasts remain compelling

Exhibit 4A: Selected developed market equity long-term return assumptions and building blocks, in local currency terms



The first part of each column is the dividend yield, followed by share repurchases, profit margin changes, revenue, gross dilution, and a valuation adjustment. J.P Morgan's 2024 total long run expected return on the US equity market is 7.0%

Both RBC and J.P Morgan assume that dividends and earnings in the economy will grow at the long run nominal GDP growth rate. It's difficult to make an alternative assumption when the growth rate is infinite, and any deviation would mean that they would either constantly increase or decrease as a share of GDP. The real Canadian growth rate since 1961 is in Schedule 6 and has averaged 3.03% annually up until the final quaiter of 2023. The Bank of Canada's operating band for inflation centres on 2.0% and despite short run inflationary pressures putting it at 3.4% in December 2023, it continues to decline and dropped to 2.95% in January 2024 or within the Bank's operating band of 1.0%-3.0%. The CPI inflation rate since 1914 is in Schedule 7 and shows how successful the Bank of Canada has been in targeting a 2% inflation rate over the last thirty years or so. It is clear that both the Government, and the Bank of Canada, are fully committed to bringing the CPI inflation rate back down to the mid-point of the Bank's operating range of 2.0%. If the experienced growth rate over the last 60 years reflects the future growth rate, then we can expect long-run growth in dividends and earnings of 5.1% (1.02 * 1.0303).

This is probably a tad low for two reasons. First, inflation won't come down to the Bank's target rate until the end of 2024. Second, the real growth rate estimate is probably marginally low once we account for the shift to a knowledge-based economy as it has become more difficult to estimate the value of productivity changes in GDP. Of note is that one side benefit of the pandemic has been a boost to the application of modern technology. This has resulted in a range of artificial intelligence (AI) applications as well as the well-known "Zoom" phenomenon and led to the dominance of tech stocks in the stock market. McKinsey Global Institute has recently estimated that the application of these technologies could raise productivity in Western Europe and the US by 1.0%.[9] With these caveats and a TSX dividend yield of 3.15% at the end of 2023 a ballpark figure for a DCF estimate for Canada is **8.41**% ((1.0315*1.051)-1).

An alternative estimate of future growth for the overall market is to use the *"br"* or sustainable growth rate. In Schedule 8 is the dividend payout of the firms listed in the TSX Composite (and earlier the TSE300 index) since 1956. We can clearly see the effects of two major recessions. The first in the early 1990's reflected the impact of the Free Trade Agreement with the U.S that caused TSX earnings to collapse and the payout to exceed 100%. The second was in the early 2000's when the bursting of the internet bubble and collapse of Nortel caused TSX earnings to go negative. Both exaggerate the normal dividend payout since it is the earnings volatility that is creating the very high and negative payouts. Consequently, the better estimate of the payout is to focus on the median payout of 52% which was also the general level prior to the pandemic.

In Schedule 9 is the earned ROE from Statistics Canada for all Canadian firms. Again, we can see the business cycle as very low profitability in the mid 1990's and again in 2003 and 2009 which caused problems with the TSX payout estimate. The median ROE is 9.97%. Combining the median retention rate (I-dividend payout) and median ROE gives a sustainable growth rate of 4.79% slightly lower than the inflation plus real growth estimate. This provides a DCF estimate of **8.10%.**

[9] The pandemic's productivity dividend, *Bloomberg Business Week,* May 10, 2021.

Finally, we can look at the growth rate of the TSX dividends directly rather than indirectly by looking at their payout and profitability. Below are three estimates for the annual dividend and earnings per share growth since 1956 on the TSX.

	DPS	EPS
Average growth rate:	5.83%	19.25%
Ordinary least squares growth rate:	5.36%	10.04%
Compound growth rate:	5.43%	5.19%
Volatility	9.75%	72%

Note that corporate earnings are much more volatile than dividends. In 2020 for example, TSX earnings dropped by 52% due to the covid pandemic, but then rebounded by 155% in 2021. In contrast, dividends still increased by 3.46% in 2020 and then by a further 2.28% in 2021. This volatility means that short run earnings always grow faster than dividends, historically by almost 4X, but in the long run the compound growth rates are very similar: 5.43% versus 5.19% very much in line with nominal GDP growth.[10] With the 3.15% end of December 2023 dividend yield these imply a DCF cost of equity of *& 75%* using the historic compound growth rate of dividends on the TSX.

In Schedule 10 is a graph of the dividend yield on the S&PS00 index which finished 2023 at 1.47% while Schedule 11 is a graph of the dividend payout rate for the firms in the S&P500 index. The median dividend payout since 1956 is 43%, slightly lower than in Canada. This means that typically 57% of the earnings for S&P500 firms are reinvested to generate future growth in earnings. However, note from the graph that the S&P500 firms suffered significant problems in 2007-2009 during the financial crisis, which was not as evident in the Canadian data. In contrast, there is no evidence of the serious problems suffered by Corporate Canada in the recessions in the early 1980s, 1990s and 2000's.

In Schedule 14 is the S&P ROE data for the S&P500 firms since 1977, where the median ROE

[10] This is the same statistical result as when stocks drop by 50% and then increase by 100%, where the compound growth rate is 0%, but the average growth rate 25%.

14.0%.[11] These are higher than the average Canadian ROE since the data is for the largest firms in the US economy and includes a large proportion of foreign earnings, whereas that for Canada is for all firms and only for Canada. If I pair the median payout with the median ROE, the "*br*" growth rate for the S&P500 firms is 8.0% much higher than any forecast of US GDP growth including that of J.P Morgan. Combining these with the current dividend yield on the S&P500 index of 1.47% gives a fair return on the S&P500 of 9.6%. Note the higher sustainable growth rate for the S&PS00 is offset by its lower US dividend yield or put another way these US firms are perceived to have better long run growth prospects than Canada as a whole and investors are paying for that growth by driving prices up and dividend yields down. As a result, the combination of yield plus growth estimates for the S&P500 is higher than for Canada. With U.S. long run nominal sales growth similar to Canada as per J.P Morgan's forecast compared to my 5.12% for Canada, the *br* growth rate for the SP500 looks high and significantly higher than J.P Morgan's recent long run total return estimate of 7.0%.

Using the DCF model to estimate the market's required return on equity (equity cost) would indicate a value of 8.10 to 8.75% for Canada and the 6.8-9.6% for the US. These numbers look more accurate than they really are but considering the high-end values and a 2% long run inflation forecast imply long run real equity returns of 6.6-7.4% broadly consistent with long run experience since 1871 in the US.

Individual company estimates.

The DCF estimates for the overall market are more reliable than those for individual companies due to the significant measurement error attached to forecasting future growth rates. For example, the forecast growth rate for the economy is more accurate since the growth rate in profits for the overall market is constrained by the growth rate in the economy. Otherwise, corporate profits will inexorably increase as a share of GDP at the expense of wages and salaried income, However, these growth rates are mechanically estimated and may not reflect market

[11] Data for 2023 is preliminary, a high value was used which won't affect the median.

estimates. Consequently, some use analysts forecast of earnings growth as a proxy for the sustainable growth rates in the former estimates. In my judgment these are no more reliable as can be illustrated by looking at a sample of US gas utilities.

Schedules 15 I extracted data on February 27, 2024, for all thirteen U.S. electric companies for which I also estimated their betas. The Schedule contains the critical values for a mechanical DCF analysis. The average dividend yield based on the trailing dividend per share is 4.38% and the median 4.48% both of which are significantly higher than the yield on the S&PS00 index at the end of 2023 of 1.47% as one would expect for lower-risk utilities. Using the forecast five-year analyst growth rates in a simple constant growth mode gives the K *(Est* g) average (median) of 8.84% (8.90%). The average is affected by both the extremely high forecast growth for Portland of 12.5% and the extremely low forecast for OGE of -12.34%. As a result, the DCF estimates range from -7.9% for OGE to 17.77% for Portland. The wide range reflects the fact that these US. UHCs are not representative of Newfoundland Power. Even though the median value of 8.90% is not affected by these outliers, and these mayappear to be reasonable estimates, there are several problems.

First, if these UHCs reflect the risk of regulated utilities they are clearly lower risk than the overall market, while the median estimate of 8.9% is lower than my *br* estimate for the SPS00 it is much greater than J.P Morgan's value of 7.0% long run for the US market as a whole. This is confirmed by their median five-year growth forecast of 5.90% which is higher than most estimates for U.S. long run GDP growth. Second, the average ROE in 2023 was 8.59% and the median 8.96% are both over 1.0% lower than the requested ROE by Newfoundland Power, so if they are reasonable proxies then NP's current allowed ROE looks reasonable. However, as mentioned previously if the average ROE equals the equity coat or fair ROE then the market to book ratio should be close to 1.0. However, the average (median) market or price to book ratio (PBR) is 1.58 (1.46) indicating that these forecast growth rates include an "optimism bias" by the security analysts. It has to be remembered that these are "sell side" analysts and they tend to be optimistic.

It must be emphasised that the DCF model assumes growth *forever* at this constant forecast growth rate. For these firms to grow at their median growth rate of 4.48% with a 34% retention rate means earning a forecast ROE (4.48/.34) of 13.2% forever and this is significantly higher than their current ROEs. As a reminder the SPS00 has an average retention rate of 57%, compared to the median for these companies of 34%.[12] *It is a Just not consistent to think that by investing 23% less of their earnings these firms can grow at the same rate as the economy similar to SP500 firms.* The market knows this which is why their dividend yields are so much higher than the yield on the SP500 index.

Again, this confirms the optimism bias. In Schedule 16 is an article from the Economist (December 3, 2016) which clearly states:

> ***"Sell side analysts, whose firms make money from trading and investment banking, are notoriously bullish. As one joke goes, stock analysts rated Enron as a "can't miss" until it got into trouble at which point it was lowered to a "sure thing". Only when the company filed for bankruptcy did a few bold analysts dare to downgrade it to a "hot buy".***

"Optimistic" can be substituted for "bullish", but there is little doubt that security analysts are optimistic, which is to say their earnings forecasts are higher than what is expected. The Economist goes on to say that analysts are forecasting S&P500 earnings to be $130.83 in 2017 and $146.33 in 2018, but it is better to discount them to $127.85 and $134.30 respectively. The actual earnings were $109.87 in 2017 and $132.47 in 2018 below even the "discounted" values used by the Economist.

The analyst optimism bias is well known. At Schedule 17 is a Globe and Mail article from May 2010 reporting on an updated McKinsey study which found that analyst forecast accuracy did improve after the disciplinary effects of the global settlement where investment banks were fined for fraudulent reports and some analysts fired. However, as they also point out old habits soon re-emerged. At Schedule 18 is an extract from the Royal Bank of Canada's Investment Strategy

[12] The average retention rate is biased high due to Eversource's negative earnings in 2023.

Playbook (February 2016) reporting the exact same phenomena. This is essentially that analysts start out optimistic in terms of future earnings, which are some distance away, and then get more realistic as that date gets closer, or as a cynic might put it they get better forward guidance from the company itself.

This analyst optimism bias has been in the academic literature for years. Easton and Sommers [13] for example, have documented the optimism bias at 2.84% where they also state (page 986)

> Our estimate of the implied expected rate of return on the market from the value-weighted regression, after removing the effect of bias in analysts' forecasts, is 9.67% with an implied equity risk premium of 4.43%. Of course, this estimate of the equity risk premium is more reasonable than that obtained when all observations have equal weight. [8]

Easton and Summers estimate in 2007 was broadly in line with my own estimate of the expected return on the US market. More impotiantly there is no reason to believe that analyst optimism has suddenly disappeared. In fact, this optimism bias persists in current studies to the extent that authors refer to it as "well documented" that is, researchers are so used to the optimism bias that they automatically take it into account. The Financial Times also noted that analyst optimism exists in Europe, where they quote Goldman Sachs that "going back 25 years analysts have been too optimistic about earnings growth in 20 years out of the 25 and by 8 percentage points on average over the whole period." ***A Google search on analyst optimism on February 27, 2024, produced 6,150,000 hits.***

Mark Grinblatt of UCLA recently looked at the optimism bias and a summary of his research [14] and reported that

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[13] "Effect of analyst's optimism on estimates of the expected rate of return implied by earnings forecasts, Journal of Accounting Research, 45-5, December 2007.

[14] https://www.anderson.ucla.edu/faculty-and-research/anderson-review/analyst-bias. A recent version of this paper is "Analyst Bias and Mispricing" and deals with the prevalence of optimistic analyst earnings estimates.

> ***"When analysts were either most biased or most optimistic, it was by a lot: Among the 20 percent of companies about which analysts most optimistically forecasted earnings — those analysts' estimates were on the high side by about 50 percent. By contrast, among the 20 percent of companies about which analysts were least optimistically biased, earnings forecasts overshot actual results by less than 1.0 percent."***

Of importance is that even amongst the least biased they are still biased, even though by less than 1.0%.

Recent research[15] has indicated that after the global settlement precipitated changes in the regulation of analysts to make them independent of investment banking, the star analysts left. As they state,

> ***"The departed star analysts' earnings revisions and stock recommendations are more informative than those of the remaining analysts who followed the same companies."***

Obviously, this means the remaining analysts are not the stars and their forecast are not as good. This is consistent with the research of Espahbad et al[16] that there was a short run improvement in the forecast accuracy of analysts after new regulations were introduced, but that over the longer period forecast accuracy has declined. I therefore place little reliance on analyst growth estimates since they are inaccurate and known to be biased.

A standard way of alleviating the effects of analyst growth optimism is to use the sustainable growth rate, which indicates that growth in earnings and dividends generally comes from reinvesting earnings at a positive rate of return. This was what I documented theoretically in Schedules 1 and 2. From the data on the electric utilities in Schedule 13 the median retention rate is 34%. As we would expect, these mature utilities normally reinvest less of their earnings than

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[15] Guan, Li, Lu and Wong, "Regulations and brain drain: Evidence from Wall Street Star Analysts' career Choices", Management Science (July 2019.

[16] Espahbad, Espahbad and Espahbad, "Did analyst forecast accuracy and dispersion improve after 2002 following the increase in regulation, Financial Analyst Journal, (Sept/Oct 2015)

do typical SP500 companies so we would expect them to grow at less than their average earnings growth rate which is approximately that of GDP. With the recent ROE for each utility the median sustainable growth rate is just 2.04% or 3.86% lower than the median 5-year earnings forecast. Interestingly this 5-year forecast earnings growth rate is also 2.42% higher than their median growth rate over the prior five-year period. So the median of these US Electric UHCs is a forecast to growth faster than in the past and earn significantly more, which is the defining role of optimism.

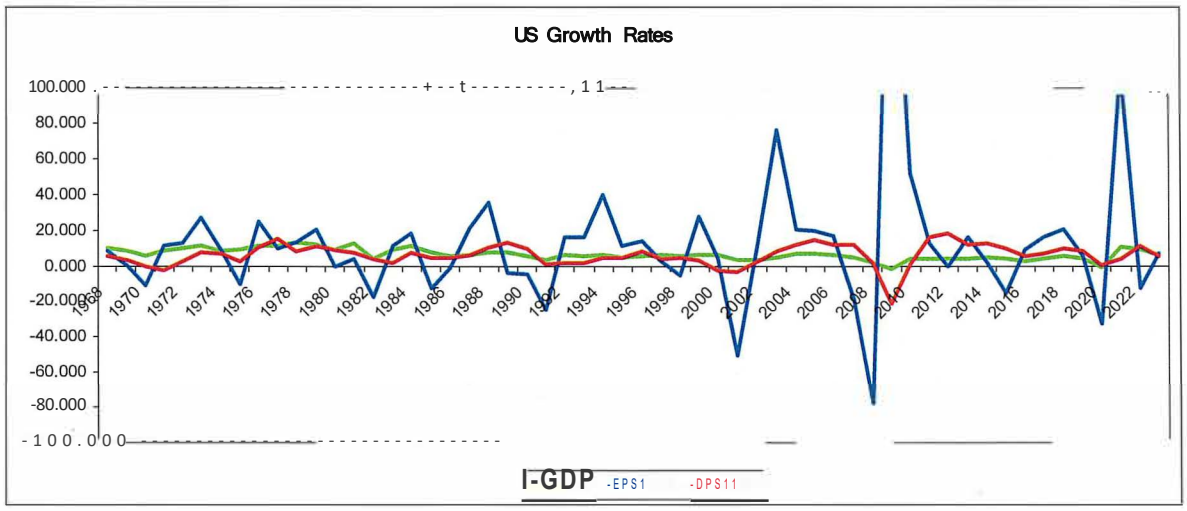
The DCF estimates using sustainable growth rates produce an average (median) equity cost of 6.75% (6.87%) consistent with their average (median) market to book (MB) ratios of 1.68 (1.67), and the fact investors are "happy" with the average (median) earned ROE of 8.59% (8.96%).

Earnings versus dividends

A final problem with the use of analyst forecasts is that they are based on earnings, not dividends, whereas the DCF model values dividends not earnings! Earnings are more volatile than dividends so that short-term earnings growth forecasts are on average higher than for dividends, even if their long run, or compound, growth rates are unbiased and the same! This is due to the common practise of smoothing dividend payments, or put another way, firms only increase their dividend after their fundamental earnings have increased and not as a result of temporary factors.

To illustrate the problem in using earnings rather than dividends I used the S&P Analyst Handbook for the S&P500 index updated to 2023. This index comprises most of the value of US companies and is representative of Corporate USA. It includes EPS and DPS data from which I calculated annual growth rates. I did the same for the nominal GDP series available in the Federal Reserve Bank of St Louis Economic data bank (FRED, GDPA). The following is a graph of the EPS and DPS growth rates starting in 1969 and finishing in 2023 annualised. Similar to Canada, the earnings series is clearly more volatile even for the index of 500 companies, which

diversifies away the unique results of any individual company. We can see for example, the dramatic effect of the financial crisis when 2008 aggregate EPS dropped from $66.17 to $14.88 for a growth rate of -77.5%. The EPS of the S&P500 then recovered to $50.87 with a 242.5% increase, but the average of these two growth rates of 83% still left earnings below their 2007 level. In contrast, DPS slightly increased in 2008 by 1.83% before dropping in 2009 by 21.06% as firms reacted to the lower earnings with a lag.



Over the entire period from 1967, the following is the data on average growth rates:

	GDP	EPS	DPS
Average	6.42%	12.49%	6.03%
Median	5.99%	10.99%	5.86%
Volatility	3.10%	41.11%	6.13%
Compound	6.26%	6.50%	5.74%
OLS	5.85%	5.98%	5.62%

US GDP grew at 6.42% (5.99%) using the simple average (median) of the annual growth rates whereas earnings per share for the S&P500 firms "grew" at almost twice that rate at 12.49% (10.99%). In comparison, annual dividends per share grew at 6.03% (5.86%) only slightly less than GDP. The ordinary least squares estimate of the annual growth rates are 5.85% for GDP, 5.98% for earnings and 5.62% for dividends.

How can earnings grow so much faster than either GDP or dividends'? The answer is that they can't in the very long run, as it is a *statistical oddity* similar to the difference between arithmetic (simple average) and compound growth rates. If a stock drops 50% and then increases by 100% then it is back to where it started, and the compound growth rate is zero even though the arithmetic growth rate or simple average of -50% and+ 100% is +25%. The greater the volatility the bigger the difference between the arithmetic and compound growth rates of any economic series.

The volatility of US GDP growth is only 3.1 % versus almost twice that for the dividends for the SP500 firms and 13 times that for earnings! The result is that the compound growth rate of US GDP was 6.26% over this very long period only slightly less than the simple arithmetic growth rate. In contrast, dividends per share grew at 5.74% or 0.29% below the arithmetic growth rate, but earnings grew at a compound growth rate of 6.41 %, essentially the same as GDP, but 5.99% below or almost half the arithmetic growth rate. ***Generally, this means that the true long run growth rate of earnings is half that of the simply average growth rate due to the volatility in earnings. Similar to the stock market the huge volatility distorts short run growth the same as it does short run expected rates of return.***

Finally, the "best" estimate of the growth rate is normally that obtained by using ordinary least squares (OLS) since this statistical procedure minimises the variability around the estimated annual growth rate. For GDP it lowers the growth rate estimate to 5.85%, which is slightly lower than that for earnings and slightly higher than that for dividends. Given that the DCF model relies on a long run dividend growth rate, relying on short run earnings growth rates as proxies biases any estimate of the fair rate of return.

What this means is that analyst growth expectations are biased inputs into the constant growth model, even if the analysts themselves are neither fraudulent nor suffering from the optimism bias. This is because the limited growth forecasts that are available are all relatively short term and at most for five years. This is very short-term relative to infinity! Long term, the best

estimate for earnings growth for the overall stock market is the growth rate in GDP, since both EPS and DPS growth have broadly tracked GDP growth since 1969.

I would also note that these comments obviously apply to the US utilities as well. Until 2018 S&P produced an Analyst Handbook that had earnings and dividends for the utility sector similar to that for the Index as a whole. Further S&P sub divided utilities into gas, electric and multi-utilities. However, even in the 2018 edition there was no data for gas utilities after 2015 since they had been acquired.[17] However, for the overall utility index the growth rates were as follows:

	EPS	DPS	GDP
Average	4.25%	3.10%	6.49%
Median	3.91%	4.10%	5.99%
Volatility	20.46%	12.81%	3.18%
Compound	2.04%	2.37%	6.45%
OLS	1.34%	1.67%	6.11%

Over the period from 1967-2017 US GDP grew on average (median) 6.49% (5.99%), both slightly above the full period. In contrast, these US utilities had average (median) dividend per share growth of 3.1 % (4.10%) with average (median) earnings growth of only 4.25% and 3.91 %. The compound growth rates are even worse at 2.04% for earnings and 2.37% for dividends, while the least squares regression results are worse still at 1.34% and 1.67%. The reason for the latter two is that they implicitly put more weight on the later performance where the utility EPS was $12.01 in 2017, but was also $12.36 in 2009, and $10.48 as far back as 1993. So, there is little evidence of significant earnings growth even in nominal terms let alone real terms

This evidence from the S&PS00 utility data is for the larger utilities included in the S&PS00 index and this reflects the problems of holding companies like Duke Energy and PG&E.

[17] What is playing out in the utility sector is very similar to what happened prior to the passage of the PUHCA in the U.S in 1935 when the SEC took significant responsibility for supervising U.S utilities because of double leverage at the holding company level.

However, this is also in the minds of investors in utility stocks in the U.S. From this data it is extremely difficult to justify U.S utilities growing at rates higher than the US GDP growth rate as is implied in the use of analyst growth forecasts. It is also difficult to justify including growth at the GDP growth rate when a multi-stage DCF model is used. I would regard long run growth at 65-68% of the GDP growth rate as being reasonable based on actual experienced median growth rates.[18] This would mean 3.3-3.4% long run growth rates based on a 5% GDP growth rate, which with a 3.51 % median yield would mean a DCF equity cost of 6.9-7.0%. This estimate is broadly consistent with the sustainable growth rate estimates and a risk hierarchy when compared with the overall stock market equity cost of 8.75-9.6%.

10 Conclusion

From the forgoing DCF estimates I draw the following conclusions:

- The overall equity market return in Canada is in a range 8.10%-8.75% and that for the U.S SP500 firms slightly higher than the top of the range for Canada at 9.6%. A reasonable range is 8.75-9.6% using the top of the estimates.

- The individual DCF estimates for US gas companies based on analyst growth forecasts would put their equity cost at 8.84-8.90%. However, these forecasts are biased high and inaccurate estimates of their underlying DPS growth rates. Removing this bias by using sustainable growth forecasts lowers this estimate to 6.75-6.87%.

- Analyst earnings growth rate forecasts are optimistic (biased) estimates of dividend growth rates since earnings are much more volatile. Over long periods of time, the growth rate of earnings and dividends for S&P500 firms is approximately that of US GDP. However, simple average growth rates of earnings, which are what analysts forecast, are almost twice as high as for dividends, making them biased when used in the constant growth DCF model.

- SP500 utility earnings and diviqend growth rates since 1967 and up till 2017 confirm that over very long periods neither have grown at close to the US GDP growth rate. This is what logic would dictate since their dividend yields are about twice that of the SP500 index, meaning that with the same forecast growth rate their equity cost is higher. Logic and actual beta estimates confirm that these U.S. UHCs are lower risk due to the impact of regulation.

[18] Actual ratios are EPS (3.91/5.99) or 65% and DPS 4.1/5.99 or 68%.

- My best estimate is that U.S utilities can grow at 65w68% of the growth rate of U.S GDP in the long run, which is the historic experience since 1967. This implies a DCF equity cost less than 7.0%. Adding a 0.50% floatation cost allowance implies a fair rate of return similar to that for Canadian UHCs of 7.5%.

SCHEDULE I

YEAR	BEGINNING BOOK VALLIE PER SHARE	EARNINGS PER SHARE	DIVIDEND PER SHARE	RETENTIONS PER SHARE
1	20.00	2.40	1.20	1.20
2	21.20	2.54	1.27	1.27
3	22.47	2.70	1.35	1.35
4	23.80	2.86	1.43	1.43
5	25.24	3.03	1.52	1.52

ASSUMPTIONS: Return on Equity = 12%
Dividend Payout = 50%
Cost of Equity = 10%

SCHEDULE2

YEAR	BEGINNING BOOK VALUE PER SHARE	EARNINGS PER SHARE	DIVIDENDS PER SHARE	RETENTIONS PER SHARE
1	20.00	2.40	1.20	1.20
2	21.20	2.54	1.32	1.22
3	22.40	2.69	1.45	1.24
4	23.70	2.83	1.59	1.25
5	24.90	2.99	1.73	1.26

ASSUMPTIONS:

Return on Equity	=	12%
Dividend Payout	=	50%+2%p.a.
Required Return	=	10%

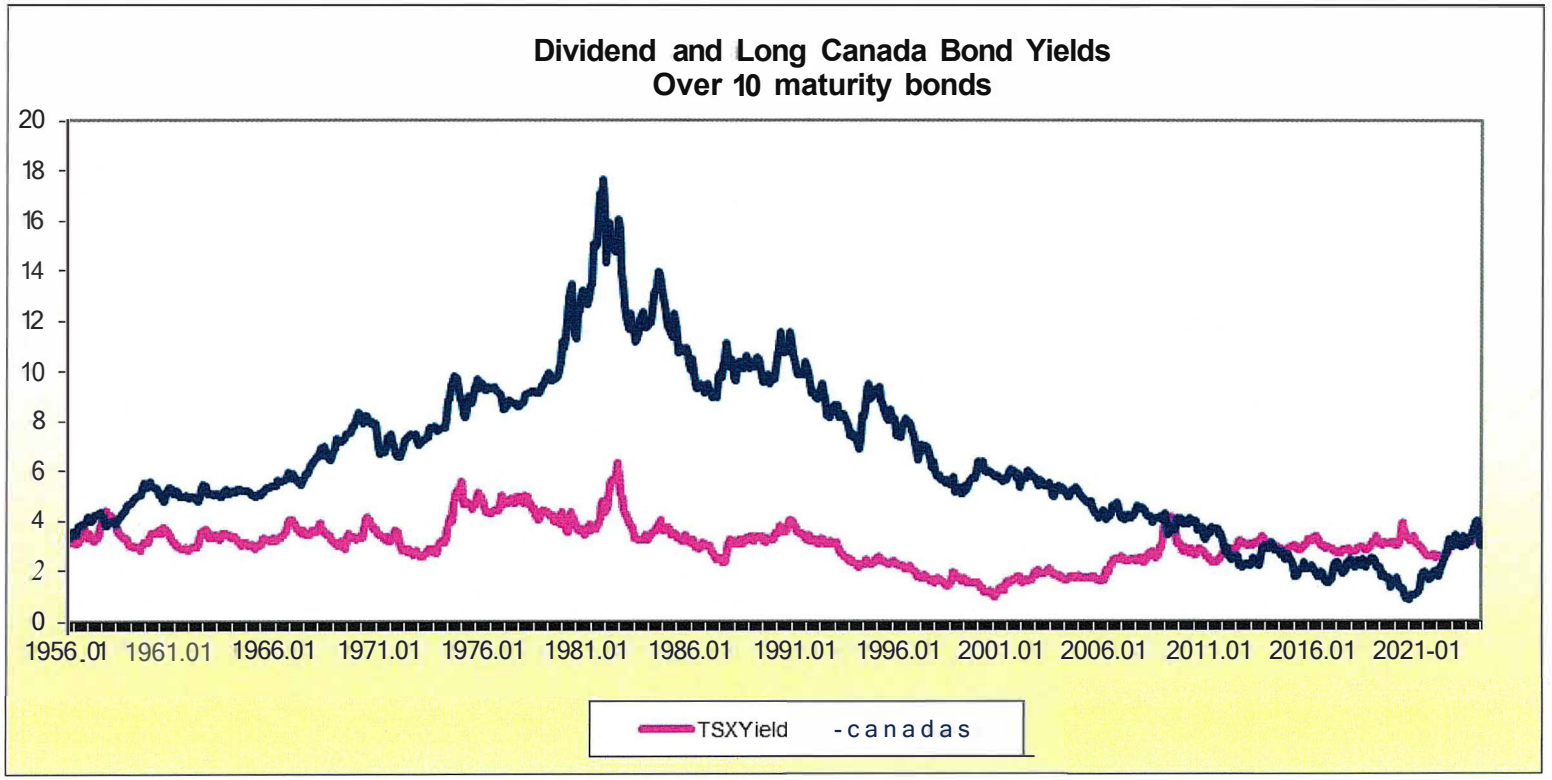
Definition of the Sustainable Growth rate

(From the Financial Post Corporate Analyzer data base)

:oales1.1.,r ~ IJ

X401! - Sus;tainabie Growth {%) - This eafculaian is ttie rare at wtlien comp,my sales can increase wilhom. the company experiencing financial strain or re(jtiiriri9 additiooal fillancin-g ro fund conliruied growth. Many exectitives belreve gm,vth should be maximized. In realirJ, unconkaile<i ,growtti can result in financial strain or worae. tanf;ruptcy, if not properly. Conversely. lack of gro,,;th can make a compan:i,· vumemble to a !akeo11er. To determine the possible ffai:59ies the company may employ in m,maging their gm•,vth. see the Growi:tl Rates s◆tkm which describes i.he ratio combination of Sales Gm,'11:h and the S11stamable Growth rate.

$$ROE \times \left(1 - \left(\frac{\text{Common Dividends}}{\text{Net Income before Discontinued Operations} - \text{Preferred Dividends}}\right)\right)$$

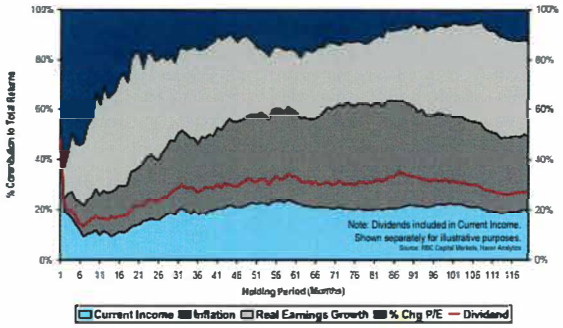

Dividend and Long Canada Bond Yields
Over 10 maturity bonds
20
18
16
14
12
10
8
6
4
2
0
1956.01
1961.01
1966.01
1971.01
1976.01
1981.01
1986.01
1991.01
1996.01
2001.01
2006.01
2011.01
2016.01
2021-01
TSXYield
-canadas

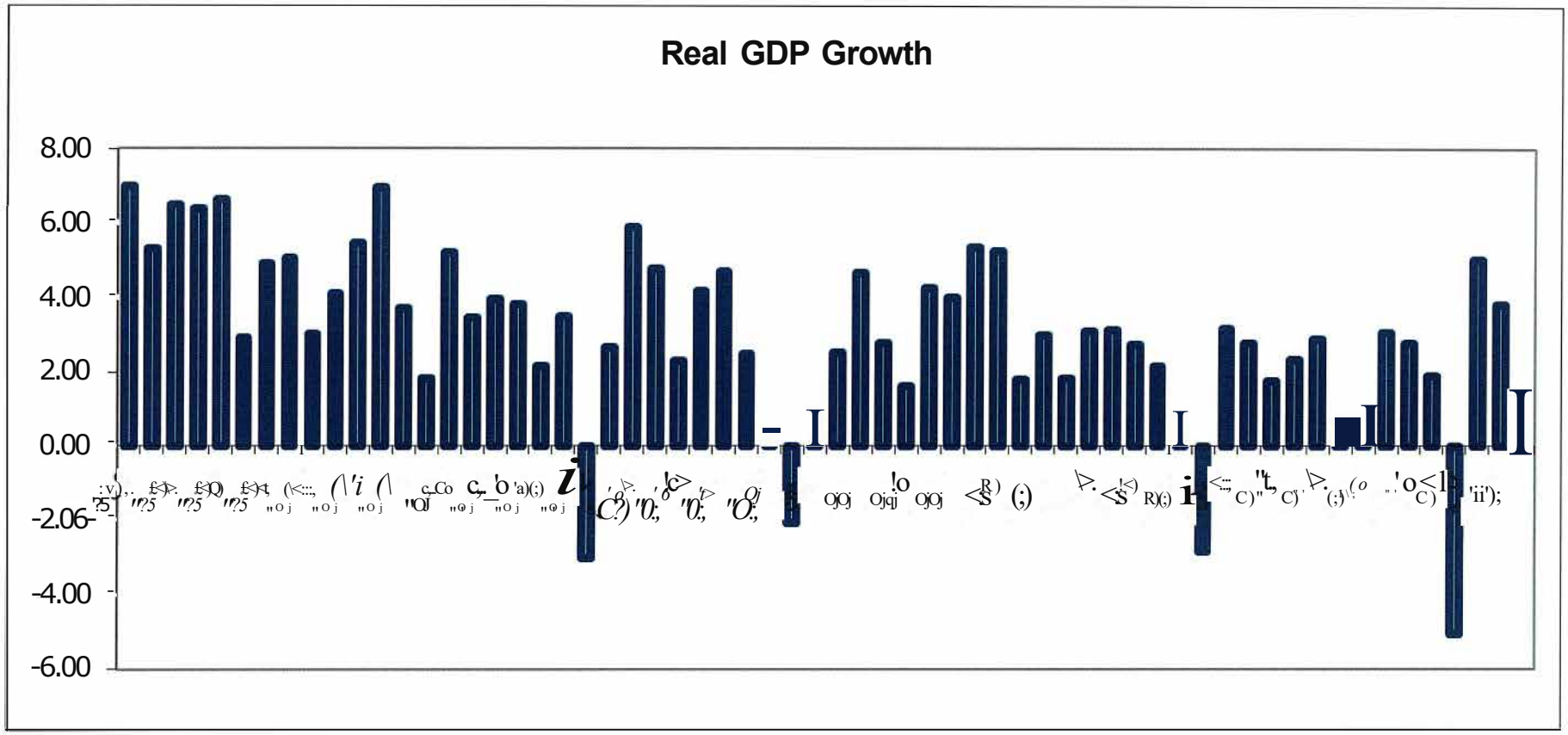
A Supply-Side Framework: The Grinold-Kroner-Siegel Model

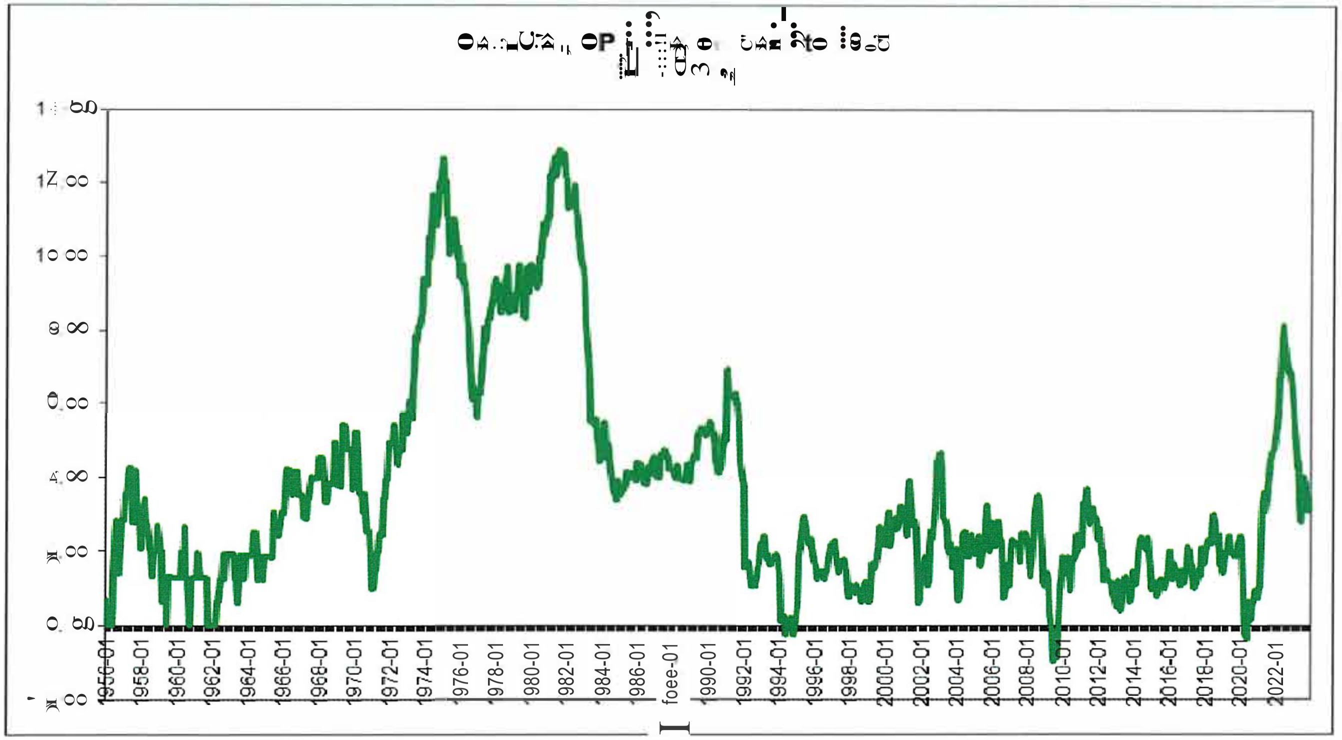
$$R = \underbrace{\frac{D}{P}}_{\text{Income}} \underbrace{- \Delta S + i + g}_{\text{Earnings Growth}} \underbrace{+ \Delta PE}_{\text{Repricing}}$$

- Supply-side models look at what the economy or, more specifically, the group of stocks in question, can supply the market in the way of earnings and ultimately cash flows. The advantage of this framework is that it decomposes market returns into a few easy to think about factors.
- We focus on the intuitive Grinold-Kroner-Siegel model, which consists of 5 factors that approximate total equity returns. These factors can be broadly grouped into the following three components: (1) Income, made up of dividend yield less net share issuance; (2) Earnings Growth, made up of inflation plus real aggregate earnings growth; and (3) Repricing, which is the change in the PE ratio.

- Evaluating this model using historical data shows that ~50% of earnings growth is attributable to inflation and that income, notably dividends, is an important part of returns. And, as we have shown numerous times in the past, psychology (PE change) is a key driver of short-term returns. Over the longer term, however, real EPS growth is the major contributor to equity returns.
- We now need to establish a forward-looking (let's say, a decade long) estimate for each of the three broadly defined components in order to come closer to an equity return estimate. The steps to do this will be provided over the next few pages.




Real GDP Growth
8.00
6.00
4.00
2.00
0.00
-2.06
-4.00
-6.00


1958-01
1960-01
1962-01
1964-01
1966-01
1968-01
1970-01
1972-01
1974-01
1976-01
1978-01
1980-01
1982-01
1984-01
1986-01
1990-01
1992-01
1994-01
1996-01
1998-01
2000-01
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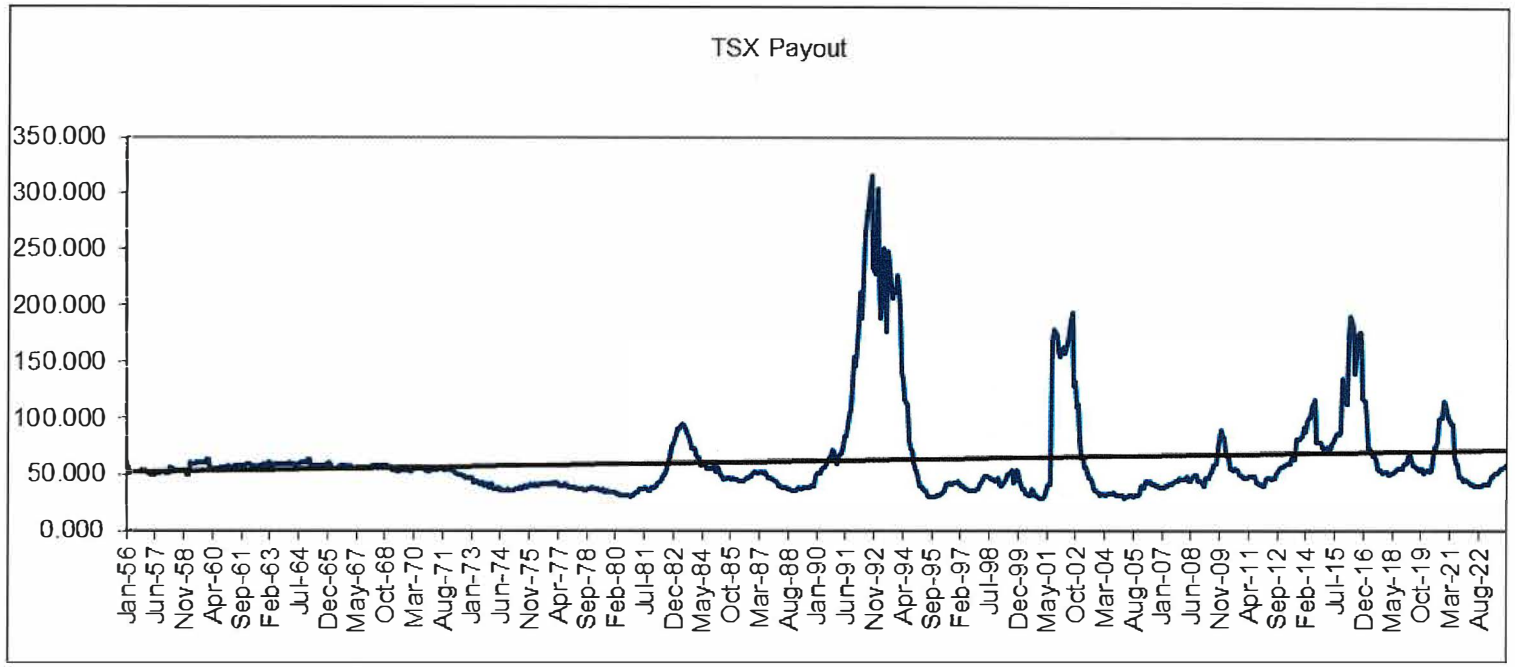
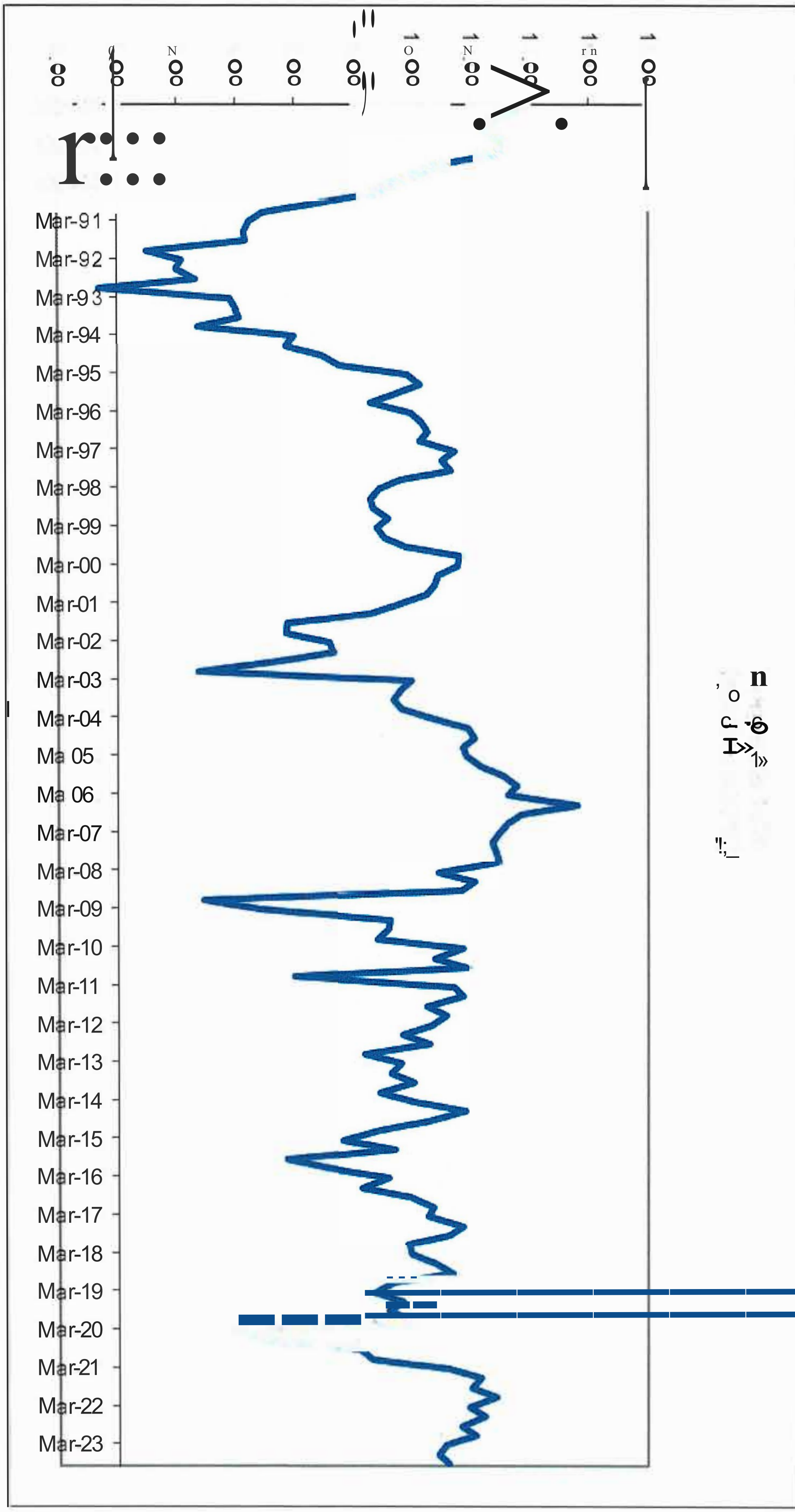
2008-01
2010-01
2012-01
2014-01
2016-01
2018-01
2020-01
2022-01



A number over 100 indicates the dividend exceeded the earnings on the TSX. Note earnings are significantly more volatile than dividends.


Mar-91
Mar-92
Mar-93
Mar-94
Mar-95
Mar-96
Mar-97
Mar-98
Mar-99
Mar-00
Mar-01
Mar-02
Mar-03
Mar-04
Ma 05
Ma 06
Mar-07
Mar-08
Mar-09
Mar-10
Mar-11
Mar-12
Mar-13
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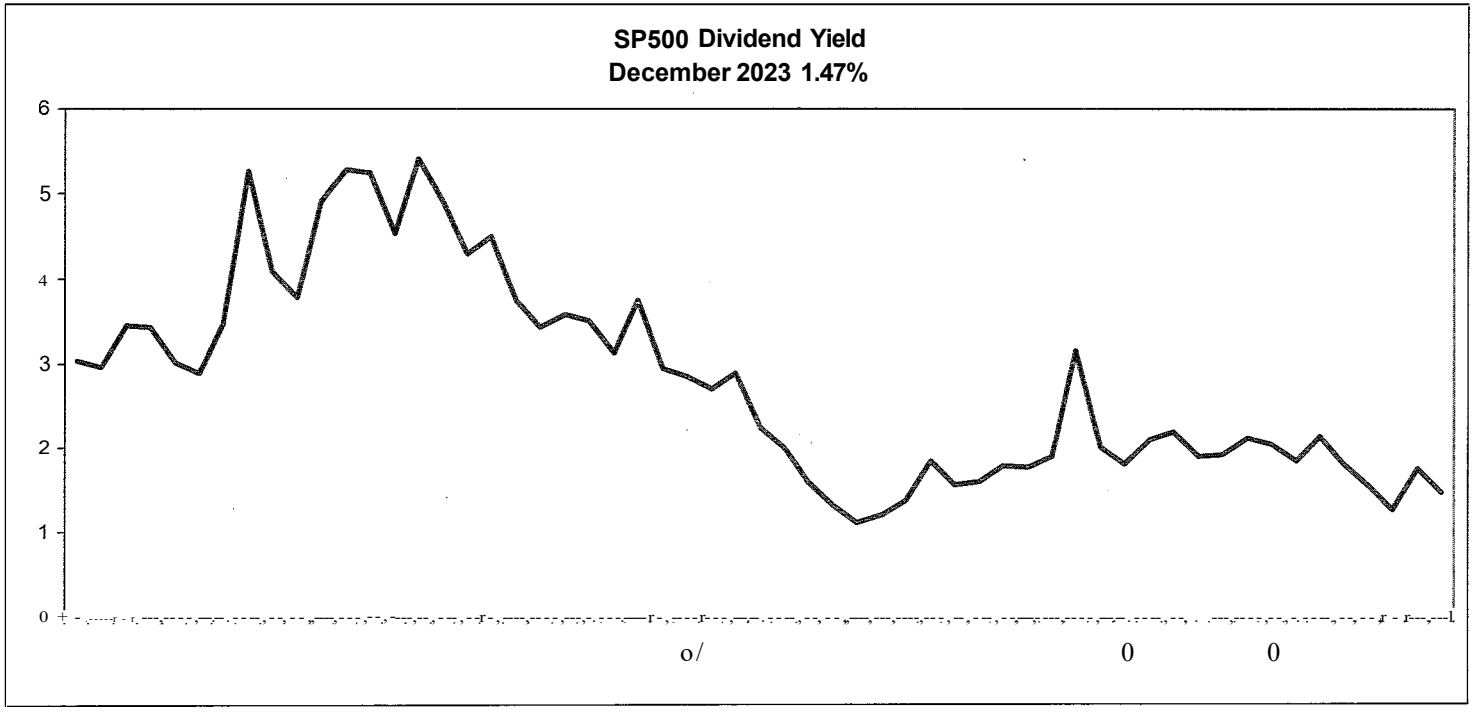
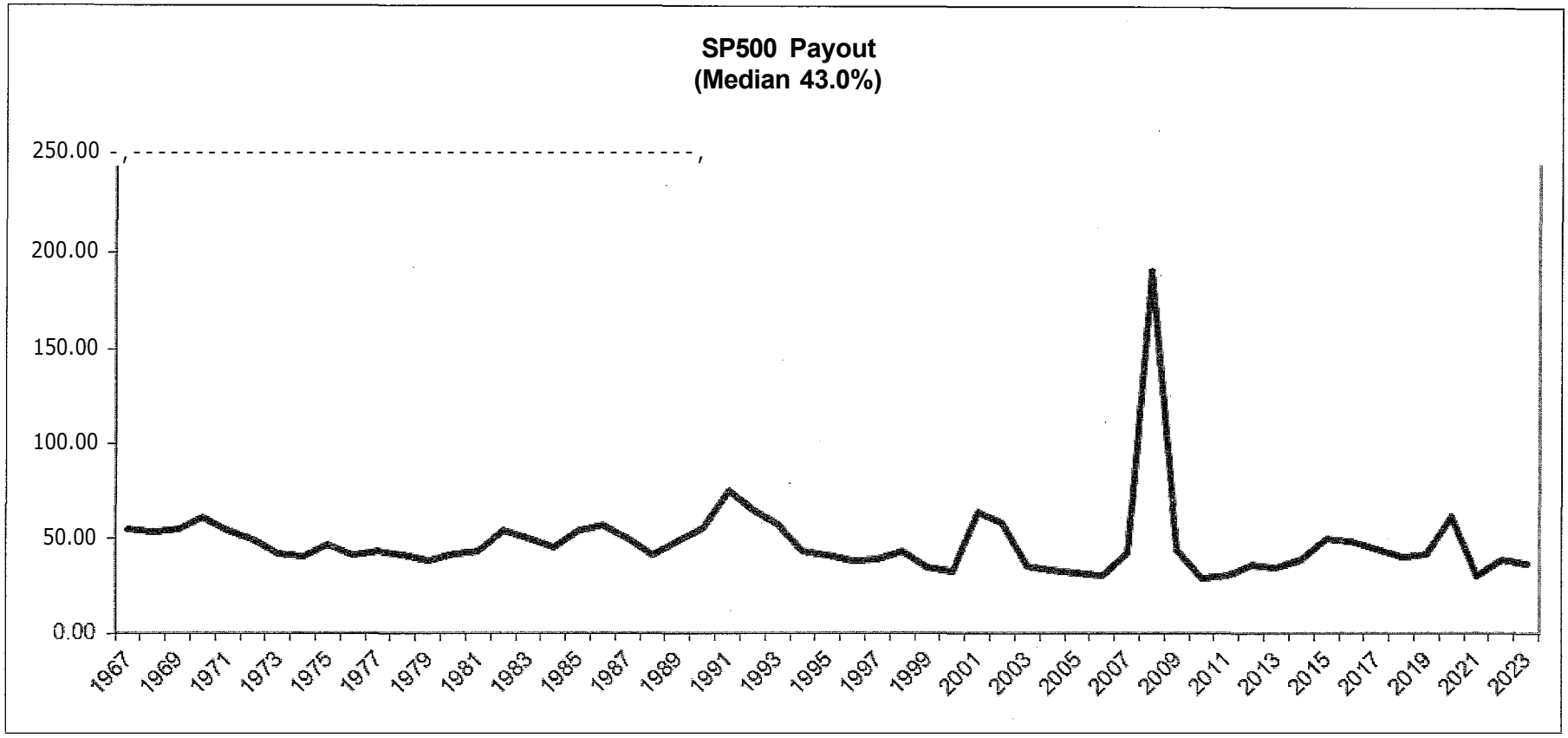
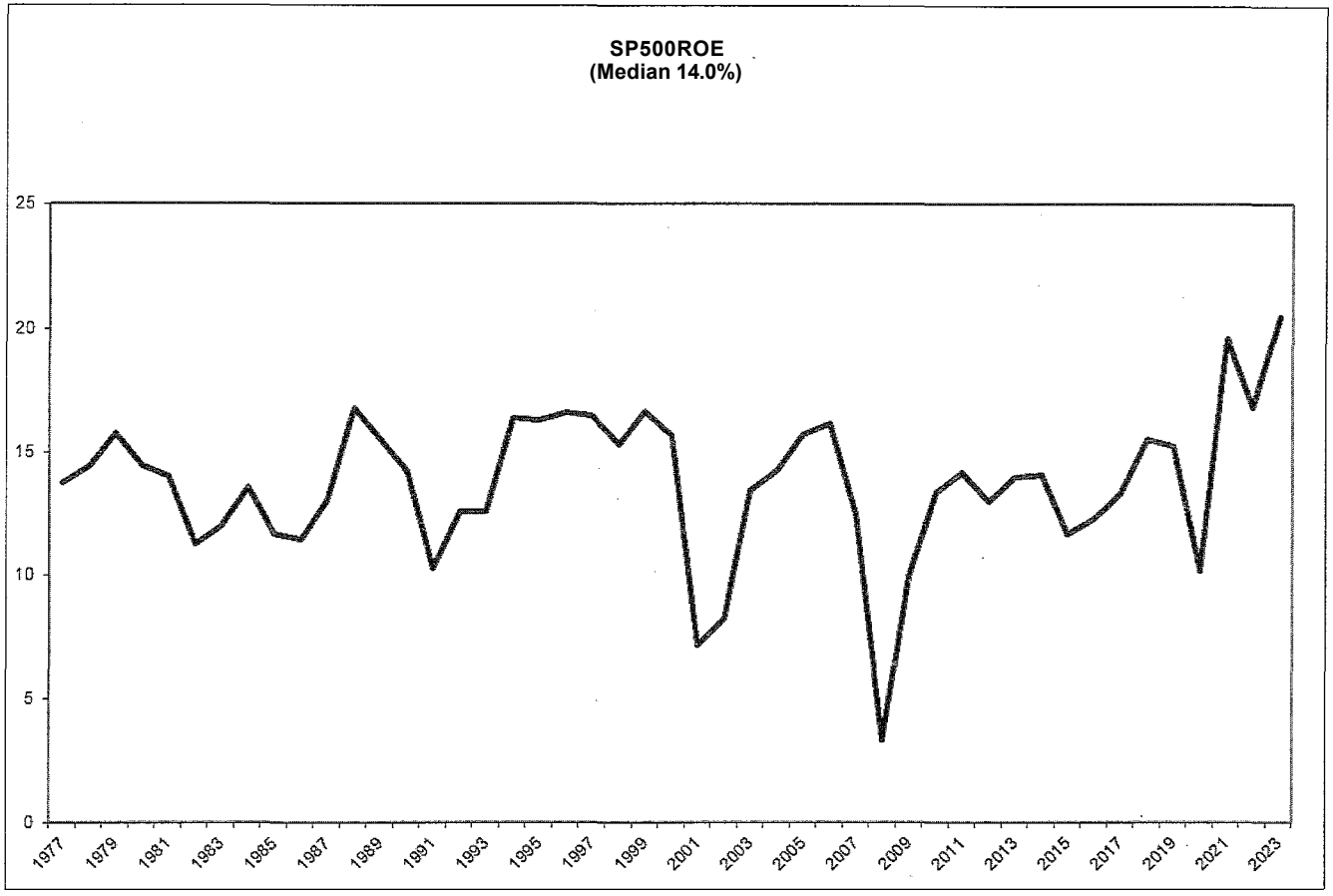
Mar-21
Mar-22
Mar-23


SP500 Dividend Yield
December 2023 1.47%
6
5
4
3
2
1
0
o/
0
0


SP500 Payout
(Median 43.0%)
250.00
200.00
150.00
100.00
50.00
0.00
1967
1969
1971
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
2019
2021
2023


SP500ROE
(Median 14.0%)
25
20
15
10
5
0
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
2019
2021
2023

US Electric Data

	5 year Growth Past	Future	#Analysts	Yield	K (Estg)	ROE	Retention	SUSTG	K	PBR	DPS	EPS	Beta
Duke Energy	2.41	6.81	13	4.48	***11.60***	8.48	0.24	2.04	***6.62***	1.48	4.06	5.35	0.48
Allele Inc.,	2.49	8.1	7	4.82	***13.31***	5.3	0.37	1.96	***6.87***	1.15	2.71	4.3	0.77
Eversource	7.31	3.25	12	4.68	***8.08***	-2.9	3.13	-9.07	***-4.81***	1.42	2.7	-1.27	0.58
OGE Energy	0.14	-12.34	10	5.06	***-7.90***	9.34	0.20	1.85	***7.00***	1.46	1.66	2.07	0.72
Pinnacle West	16.1	5.9	15	4.99	***8.90***	7.7	0.34	2.59	***7.71***	1.23	2.78	4.19	0.48
Evergy	14.68	2.5	8	4.95	***7.57***	7.315	0.17	1.26	***6.27***	1.17	2.45	2.96	0.56
Alliant	6.95	6.55	6	3.82	***10.72***	11 .41	0.35	3.94	***7.91***	1.79	1.82	2.78	0.55
American Electric	6.43	4.2	18	3.52	***7.87***	8.96	0.19	1.73	***5.31***	1.68	3.52	4.36	0.5
Exelon	-6.82	4.2	16	4.04	***8.41***	9.22	0.38	3.55	***7.73***	1.38	1.44	2.34	0.6
Entergy	3.12	6.8	16	4.34	***11.44***	16.69	0.61	10.16	***14.95***	1.85	4.34	11.1	0.71
Southern	3.48	1.39	8	4.2	***5.65***	11.03	0.23	2.56	***6.87***	2.3	2.78	3.62	0.5
POR	1.38	12.5	7	4.68	***17.77***	7.48	0.19	1.44	***6.19***	1.22	1.88	2.33	0.6
Nextera	9.57	7.81	13	3.39	***11.46***	11.58	0.48	5.56	***9.14***	2.38	1.87	3.6	0.52
Average	5.17	4.44	11.46	4.38	8.84	8.59	0.53	2.28	6.75	1.58	2.62	3.67	0.58
Median	3.48	5.90	12.00	4.48	8.90	8.96	0.34	2.04	6.87	1.46	2.70	3.60	0.56

All day based on Yahoo (Feb 27, 2024) which sources its data from S&P
based on Morningstar forecast not S&P

ment of Lloyd's itself on a hypothetical hacker-caused blackout of the entire power grid of the American north-east. It estimated this would cause direct losses to business revenues of $121bn, and a total dent in GDP of over $1trn over five years.

Many insurers are turning to outside expertise. Matt Webb of Hiscox, a specialist insurer, describes an "arms race" between analytics firms such as RMS and Symantec, offering their long-standing modelling prowess (RMS is already well-trusted on hurricane modelling, for example) to help insurers understand their cyber-liabilities.

But even if exposures are better understood, limiting them may prove tricky. Kevin Kaliaich of Aon, an insurance-broker, points to the near-impossibility of drawing a line, for example, between cyber-war or cyberterrorism and "normal" hacking. Cyber-crime knows no geographical bounds, unlike, say, a Florida hurricane. Mr Webb reckons that insurance policies will at a minimum need explicitly to recognise that cyber-risks are covered or to exclude them—just as many policies already include exemptions for terrorism or war.

Although insurers are already helping companies with more mundane data breaches, the industry still lacks a clearly formulated response to a larger-scale cyber-calamity. Inga Beale, CEO of Lloyd's, is optimistic that the market, thanks to its exciting modelling exercises and its unique risk-sharing structure, is better equipped than most. But only a devastating, real-life cyber-attack would test how effective its preparations have been. ■

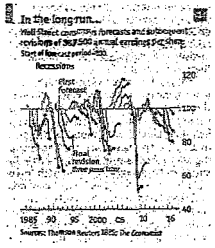
Analyst forecasts

Discounting the bull

Stock analysts' forecasts tend to be wrong in reassuringly predictable ways

"SELL-SIDE" analysts, whose firms make money from trading and investment banking, are notoriously bullish. As one joke goes, stock analysts rated Enron as a "can't miss" until it got into trouble, at which point it was lowered to a "sure thing". Only when the company filed for bankruptcy did a few bold analysts dare to downgrade it to a "hot buy".

Economic research shows that there is some truth to the ribbing. The latest figures from FactSet, a financial-data provider, show that 49% of firms in the S&P 500 index of leading companies are currently rated as "buy", 45% are rated as "hold", and just 6% are rated as "sell". In the past year, 30% of S&P 500 companies yielded negative returns.



Profits forecasts made more than a few months ahead have a dismal record of inaccuracy. According to Morgan Stanley, a bank, forecasts for American firms' total annual earnings per share made in the first half of the year had to be revised down in 35 of the past 40 years. Studying their forecasts over time reveals a predictable pattern (see charts).

In theory, a diligent share analyst should do his own analysis—that is, by projecting a firm's future revenue and expenses, and discounting them to the present. Such models, however, are extremely sensitive to different assumptions of growth rates. Since no one can know the future, analysts cheat.

Three statistical sins are common. Analysts can look at comparable companies to glean reasonable profits estimates, and then work backwards from their conclusions. Or they can simply echo what their peers are saying, and follow the herd. Or, most important, they can simply ask the companies they are following what their actual earnings numbers are.

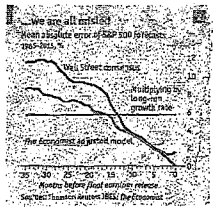
Surveys conducted by Lawrence Brown of Temple University found that two-thirds of sell-side analysts found private calls with company managements to be "very useful" in making their estimates. Analysts' need to maintain relationships with the companies they cover must colour their projections. They are judged primarily on the accuracy of their short-term forecasts, so there is little risk in issuing flattering, if unrealistic, long-term projections. In the short run, however, they have an incentive to issue ever-so-slightly pessimistic forecasts, so companies can "beat" expectations. Since the financial crisis, company profits have exceeded short-term analyst forecasts around 70% of the time.

So are forecasts are useless? Simply taking the market's earnings figures from the previous year and multiplying by 1.07 (corresponding with the stockmarket's long-run growth rate) can be expected to yield a more accurate forecast of profits more than a year in the future.

Yet the very predictability of the errors in analysts' forecasts suggests they could be informative, if they are properly interpreted. Taking forecasts of S&P 500 earnings from 1985-2015, *The Economist* has built a simple statistical model to try to take out the bias that taints Wall Street's prognostications. After controlling for the forecasts' lead time and whether or not they were made during a recession, we find that even our relatively crude model can improve upon the Wall Street consensus for forecasts made more than a quarter in advance (see chart 2).

Adjusting for bias in short-term forecasts is harder. It is tempting simply to accept the errors—after all, they tend to be off by just a little. Data from Bloomberg show that the 320 S&P 500 companies that beat earnings expectations in 2015 did so only by a median of 1.4%. An alternative is to look at crowdsourcing websites such as Estimize. There punters—some amateur, and some professional—are shown Wall Street consensus estimates and asked to make their own forecasts. Estimize users beat Wall Street estimates two-thirds of time.

To some extent, judging Wall Street by its ability to make accurate predictions is silly. Harrison Hong, an economist at Columbia University, reckons that stock analysts should be viewed "more like media". The latest forecasts aggregated by Thomson Reuters suggest that the S&P 500 will yield earnings per share of $130.83 in 2017 and $146.33 in 2018. According to our model, that would imply that they believe the actual numbers will be closer to $122.85 and $134.30. Share analysts want to tell the truth. They just like making it difficult. ■



Wall St.'s woeful forecasting not getting better

David Parkinson The Globe and Mail

PublishedFriday, May. 21 2010, 6:00 PM EDT

http://www.theglobeandmail.com/globe-investor/investment-ideas/wall-sts-woeful-forecasting-not-getting-better/article4353202/

Nearly a decade ago - about the time the bursting tech bubble had raised serious questions about conflicts of interest in Wall Street equity research - consulting firm McKinsey & Co. did a study on the accuracy of analysts' company earnings forecasts. The results were discouraging: Analysts were routinely over-optimistic about earnings growth, too slow to revise forecasts when economic conditions changed, and prone to increasingly inaccurate forecasts when the economy slowed.

Since then, major scandals involving tainted research have come to light, Wall Street's biggest firms have paid $1.4-billion (U.S.) in penalties for those practices, and regulators have put rules in place aimed at creating equity research with more independence and distance from the investment-banking side of the business. Unfortunately, McKinsey reports, the changes have had little effect on the accuracy of analysts' projections.

Downturn reveals same old habits In an update of the 2001 study, McKinsey researchers found that from 2003 to 2006, analysts' earnings projections actually did look less unrealistically rosy. In each of those years, analysts, on average, actually underestimated S&P 500 annual earnings for significant portions of the year - and undershot through the entire year in 2005 and 2006.

But lest we think this was evidence of a new kind of thinking within Wall Street research departments, the Street's wide-eyed optimism came back with a vengeance starting in 2007.

Going back over the past 25 years, McKinsey found that, on average, analysts' earnings-growth forecasts "have been nearly 100-per-cent too high." Annual S&P 500 consensus growth forecasts have typically been in the 10- to 12-per-cent range, while actual earnings growth has averaged 6 per cent.

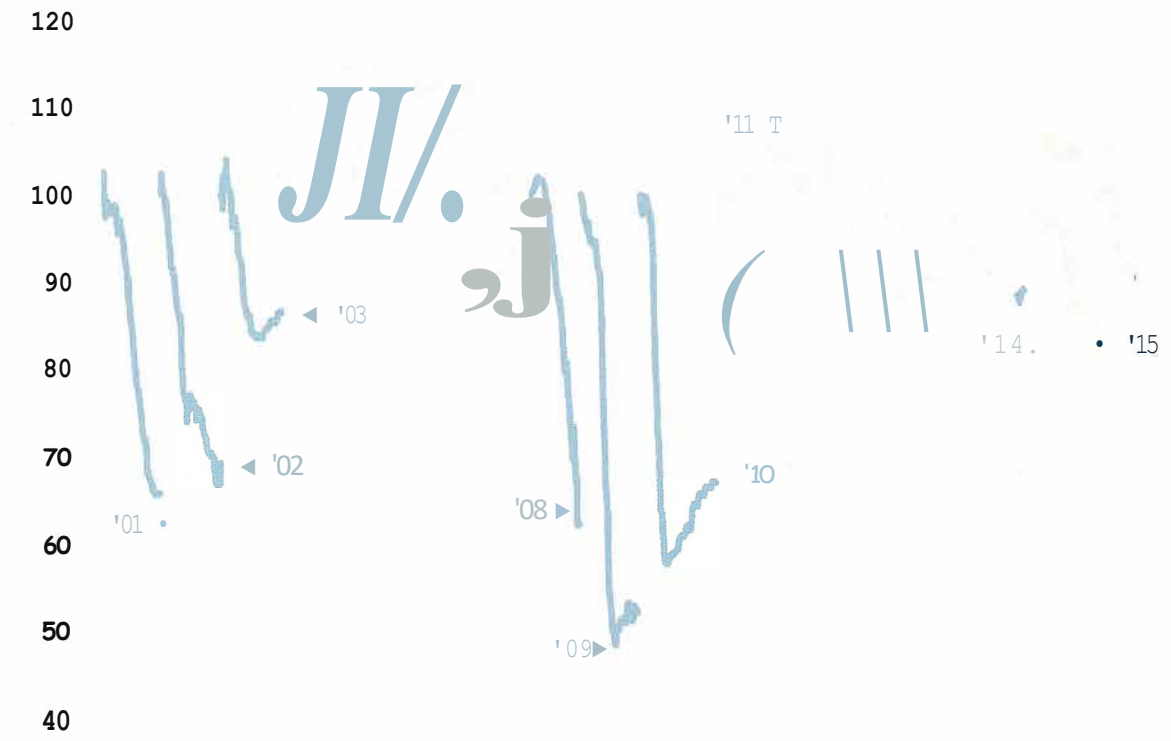
Broken-clock accuracy Looking at five-year rolling average growth estimates, there have only been two periods in the past 25 years when the earnings met or exceeded analysts' forecasts. Both were in recovery periods after the U.S. recessions of the early 1990s and the early 2000s.

"This pattern confirms our earlier findings that analysts typically lag behind events in revising their forecasts to reflect new economic conditions," McKinsey researchers wrote. "When economic growth accelerates, the size of the forecast error declines; when economic growth slows, it increases."

This pattern means that when the analysts are accurate with their forecasts, it's solt of the same way a broken clock is accurate - twice a day.

"As economic growth cycles up and down, the actual earnings S&P 500 companies report occasionally coincide with the analysts' forecasts."

Consensus Bottom-Up S&P 500 EPS Forecasts (Indexed to 100)



Note: Estimates are bottom-up and indexed to 100; shown from initial release through final/most recent results.
Source: S&P, Thomson Financial, Compustat, FactSet and RBC Capital Markets

Source: RBC Investment Strategy Playbook, February 2016

APPENDIXE

AUTOMATIC ROE ADJUSTMENT MODELS

THE NEB FORMULA ROE

Automatic ROE adjustment formulae were introduced in two landmark decisions. The first was by the BCUC in a 1995 Decision and the second was by the National Energy Board (NEB, now Canadian Energy Regulator or CER) also in 1995. Almost all subsequentjurisdictions followed the lead ofthe NEB including the OEB, AUC, and this Board. For this reason, and the fact that the NEB continues to publish annual information on the fair ROE emanating from its formula, this appendix will focus on the NEB's automatic ROE adjustment formula from the RH-2-94 decision.

In considering what has happened to the NEB formula there are three critical dates. The first is the RH-2-94 Decision itself where the NEB described its formula as follows 1:

> *"the RH-2-94 Decision established a mechanism to adjust the allowed ROE annually(RH-2-94 Formula). The RH-2-94 Formula directly links the ROE to aforecast ofa long-term Government ofCanada bondyield and adjusts the ROE/or 75per cent of the change in theforecastedyield. Theforecast ofa long-term Government ofCanada bondyield is determined by averaging the 3-month-out and 12-month-outforecasts of10-yem, Government ofCanada bonds aspublished by Consensus Forecasts in November of each year. To this average is added the average spread between JO-year and 30-year Government ofCanada bondyields aspublished daily in The Financial Post throughout the month ofOctober ofthatyear. "*

In the RH-2-94 Decision the NEB relied on risk premium models and decided (RH-2-94, page 6) that,

> *"Given theproblems associated with the application ofthe comparable earnings and DCF tests at this time, the Board has decided to give primary weight to the results ofthe equity riskpremium test..... The Board is ofthe view that the equity risk premiumfor the market as a whole is 450 to 500 basispoints"*

The NEB then allowed a generic ROE of 12.25% based on a forecast long Canada bond yield of 9.25% for a 300 basis-point risk premium for NEB regulated pipelines. Although the NEB did not

explicitly use the Capital Asset Pricing Model (CAPM) in RH-2-94, it did in a Trans Quebec and Maritimes Pipeline decision (RH-1-2008) where it stated,

> *"The Board is of the view that CAPM is widely accepted as a cost of equity model. This model has been relied upon by the Board in previous proceedings and was not contested in this proceeding as a method to estimate the cost of equity. In the Board's view, CAPM captures the risk equity holders have to bear when holding a common stock. "*

In mathematical terms the CAPM is

$$K_t = R_t + \beta * (KM_t - R_t)$$

Where K_t is the equity cost or fair rate of return at time t, R_t is the risk-free rate at time t, KMt is the market's equity cost or fair (required) rate ofreturn and pis the security's beta coefficient. The risk premium model does not have to be the CAPM beta, as it can be any relative risk coefficient. So, the following is not specific to the CAPM, but is specific to a risk premium model.

In RH-2-94 the market risk premium was set at 450-500 basis points and the pipeline risk premium at 300 basis points. The NEB did not explicitly set an issue cost or financial flexibility premium, but simply stated the 300 basis points includes a "modest allowance for financial flexibility. If this modest amount is the normally used 50 basis points, the NEB implicitly used a CAPM beta in a range from of 0.5 (250/500) to 0.56 (250/450).

The NEB ROE formula is a difference equation since it re-sets the ROE based solely on a 75% change in the forecast long term Canada (LTC) bond yield. Consequently, the NEB formula ROE was determined as follows where the adjustment coefficient (alpha or a) was set at 0.75.

$$K_{t-1} - K_t = \alpha * (R_{t-1} - R_t)$$

With a fixed adjustment coefficient and beta there is an obvious relationship between these two models which I will develop later.

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[1] This is from its 2008 Decision RH-1-2008, page 11.

The second critical date is 2001, where the NEB reviewed and confirmed its ROE formula in a TransCanada Mainline hearing (RH-4-2001). In that decision the NEB concluded that the level of business risk facing the Mainline had increased mainly due to increased pipe on pipe competition and supply issues and increased the Mainline's common equity ratio from 30% to 33% consistent with its view that business risk was best adjusted for in the common equity ratio and not the allowed ROE. It then faced a request by TransCanada to use the After Tax Weighted Average Cost of capital (ATWACC) approach rather than the traditional allowed ROE on allowed common equity.

The NEB rejected the use of ATWACC and confirmed the validity of its ROE formula as it stated (page 54)

> *"Having carefully considered all of the evidence relating to rate of return on common equity, the Board has concluded that the RH-2-94 Formula continues to yield returns that are appropriate for the Mainline. In arriving at this conclusion, the Board gave primary weight to the evidence related to ERP analysis."*

Note in this hearing there was a full range of expert opinion on the fair ROE and the NEB relied on the equity risk premium methodology and rejected the "small amount of evidence relating to DCF methodology that was presented is not sufficiently reliable or meaningful to be given any weight."

Of importance was that in 2001 the NEB used a market risk premium of 550-600 basis points a 100 basis-point increase from the RH-2-94 decision. However, the forecast LTC bond yield had declined from 9.25% to 5.63% for 2002 or by 3.62% causing an increased pipeline risk premium of 0.90% from 3% to 3.90%. This meant the NEB's formula ROE was 9.53%. Again, with a 50 basis-point financial flexibility adjustment the implicit pipeline beta was in a range of 0.57 (3.4/6) to 0.62 (3.4/5.5) or a slight increase over that used in RI-I-2-94. ***What's important is that the NEB ROE formula directly incorporated the proposition that the risk premium is inversely related to the forecast LTC bond yield by only adjusting to 75% of the change in that yield.***

This Decision was appealed by the Mainline in TransCanada vs the NEB, where the Court confirmed the NEB's Decision and that the burden of proof to change anything, such as the NEB formula ROE, rests with the applicant in a hearing. After RH-4-2001 similar ROE adjustment formulae were

introduced or confirmed by several boards:

- The Alberta Energy and Utilities Board (now the Alberta Utilities Commission or AUC) adopted its formula in 2004.
- The Ontario Energy Board (OEB) imposed an ROE formula in 1997, and then reviewed it in an extensive hearing in 2003 and confirmed it in subsequent decisions as late as November 3, 2008.
- The BCUC retooled its formula with minor changes in 2007.
- The Regie de L'Energie rebased and confirmed its ROE formula in a Gaz Metro decision in 2007.

As theAUC noted in its Decision 2009-216, November 12, 2009 page 12.

> 51. Notwithstanding the issues and economic developments discussed above, the Conunission observes that since the issuance ofDecision 2004-052 in July 2004 and before the onset of the economic crisis, there had been few indications that the adjustment formula was not producing an appropriate annual ROE. Decision 2004-052 and the annual formula had resulted in a range ofROEs with a high of9.60 percent and a low of8.51 percent well within the off. ramp triggers set out in the Decision of 7.6 percent and 11.6 percent. Further, until the present Proceeding, no party, other than ATCO Gas with respect to its equity ratio for 2008 and ATCO Pipelines with respect to ROE and capital struohire for 2008, had requested a review of the generic fonm.ila or a change to the allowed capital structure determined in Decision 2004-052.

Similar statements were made by this board in PU43 (2009)) where the decision stated (page 13)

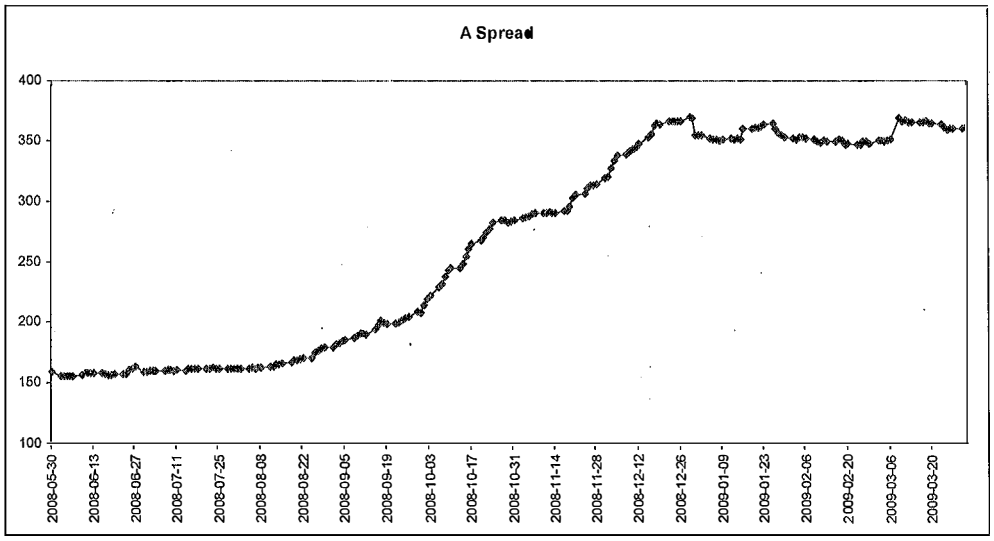
> Nevdcn,mdland Power bet1rs the burden of stuo,iv.:t[tR that it is al)1:1rot!rlate to discoutinue the use of the autou:mlic a<jul1tmen1t fo,nnula, a wel]-es;tablishe.d regulatory tool tbat was expected to be use.d to set rates for Nevvfou,11dlam:t Po;,ver in 2010. The Board is not perr,uaded by the evidence of Ms. McShaue as to tlie historical ,mderperform1am:e of the fon.n'lda, especially given the evidence of both Ms. Petry and Mr. Ludlow that tlte automatic adjustment formula esh1blished appropriate rntes of return on rate base for almost a decade until the extmordirm1y fina11cial market conditions which developed. late in 2008. (Tra1:1script, Oct 19, 2009, pgs. 114/21-25; 11:5/1-25; 116/1-8)

The third date is the Trans Quebec and Maritimes hearing (RH-1-2008) where TransCanada on behalf ofTQM again requested the use ofATWACC and its witnesses recommended changing the

NEB ROE formula. Of importance is that the Decision noted.

> *"The hearing commenced on 23 September 2008 and adjourned on 8 October 2008 in Montréal. The hearing reconvened in Calgary on 20 October 2008 and was completed on 22 October 2008."*

Why the timing is important is that the NEB ROE sets the allowed ROE based on October and November data from the prior year and the 2009 ROE was set at a time when the markets were in turmoil. Intervener evidence was filed at the start of June and the decision published in March 2009. Over that period the following graph shows the change in the credit spread, or difference between the yields on A rated bonds and bonds issued by the Government of Canada.



Before the financial crisis the "normal" A spread was about 100 basis points (1%). The spread had been increasing since 2007, particularly since Bear Stearns was bailed out and markets became aware of problems with US sub-prime debt. On June 1, 2008, the credit spread was an "elevated" 155 basis points (1.55%) and jumped to 198 basis points after Lehmann Brothers filed for bankruptcy, and 310 basis points (3.1%) just before the $400+ billion bailout of Citibank, on its way to a high of 369 basis points (3.69%) at year end as contagion hit the global banking market.

Decisions are rendered based on the information presented to a Board, but it is difficult to believe

that the members of the NEB panel were not aware of the turmoil in the financial markets. This is particularly obvious when the NEB formula ROE for 2009 was based on the November forecast for the LTC bond yield of 4.36% or a decline of 19 basis points from the prior year, so the ROE from the NEB's formula declined from 8.71% to 8.57%.

What happened during the worst days of the financial crisis, when the NEB formula ROE was set, is a "normal" response to a crisis. Investors rush to the safety of government bonds bidding up their prices, causing their yields to go down. Similarly, they sell risk assets, like default risky bonds, causing their prices to go down and their yields to go up. Although this is a normal cyclical behaviour, during the extreme events of 2008/9 some found it difficult to understand why a pipeline's ROE should go down when its borrowing costs had increased from the "A" yield of 5.67% on June 2, 2008, to over 7.0% by year end.

On March 23, 2009, the NEB solicited comments on the applicability of the RH-2-94 Decision and decided in response to "diverging" comments that,

> *"Whatever the reason, given the vast experience the industry has gained in reaching negotiated settlements over the past 15 years, the Board is of the view that it is neither necessary nor appropriate to replace the RH-2-94 Decision with another multi-pipeline cost of capital decision at this time. Accordingly, the RH-2-94 Decision will not continue to be in effect."*

The reaction of the OEB was similar as it announced its concern about the applicability of its own NEB like ROE formula in a June 18, 2009, letter. As it stated in an August 20, 2009 letter,

> The Board's consultation is prompted by the state of the financial markets. As indicated in the Board's June 18, 2009 letter, the Board is satisfied that further examination of its policy regarding the cost of capital is warranted to ensure that, on a going forward basis, changing economic and financial conditions are accommodated if required. [1]

I suspect the OEB was only too aware that its own ROE formula is set based on data in the preceding October. However, unlike the NEB that decided to rely on negotiated settlements this option was not available to the OEB because its cost of capital parameters apply to a very large number of both very

large and very small utilities, including municipally owned electric distribution companies like Toronto Hydro.

In its own hearing into NP in 2009 (PU43, page 29) this Board heard full ROE evidence and set NP's allowed ROE at 9.0% and decided.

> *"The return on rate base which would have been generated by the formula is in the range suggested by the evidence of the cost of capital experts and, while lower than determined by the Board, does not suggest that there is a fundamental issue with the application of the formula."*

However, the Board also highlighted the "unstable" financial markets in 2008 and early 2009 and called for a full review of the formula so that it could be used in future years (2011/2012).

A NEW ROE FORMULA

In testimony before this Board in August 2009 I stated in the Executive summary (page 3)

> - Overall I would estimate a fair ROE for NP to be 7.75% and lower than the 2009 allowed ROE of 8.95%. However, fairness has a variety of connotations, and I would recommend that the Board maintain their ROE formula indefinitely since like most such formulae in Canada it has done a remarkably good job of awarding ROEs that are within a zone of reasonableness, while minimising repetitive testimony. It is also broadly consistent with awarding allowed ROEs consistent with adjustment formulae used elsewhere in Canada.

This was just after (August 3, 2009) Moody's had upgraded NP's bonds two notches from Baal to A2 as it revised its judgment on the value of secured debt like NP's first mortgage bonds.

At that time I was adding a "margin of error" to my estimates due to the impact of the US financial crisis, and was pointing out the impact of higher credit spreads. However, I was reluctant to directly incorporate the impact of credit spreads for methodological reasons. As I stated before this Board (page 57)

> *"However, the key question is whether these A spreads indicate that the ROE formula is "broken" in any way. At first blush it appears counter intuitive that the ROE is going down as borrowing costs are going up, since equities as the residual claimant on the firm are*

clearly riskier than bonds and demand a higher expected rate of return. However there lies the problem; the fair ROE is based on the CAPM and is equal to the investor's required rate of return and is an expected rate of return. In contrast, the yield on a bond is not an expected rate of return; instead it is a promised rate of return. As such promised rates of return can not be compared to expected rates of return unless the bonds are default-fiAee, that is, issued by the Government of Canada. In this case since there is no default possibility the promised rate is also the rate the investor expects to receive. To see just how uninformative these promised yields are, note that on January 6, 2009 the New York Times reported that the promised yield on two year General Motors notes was 97.448%. It is highly unlikely that investors in GM's common shares have an expected return this high and of course GM went into bankruptcy (chapter 11) and never made the interest payments on these notes, let alone repaid them at fitll value. "

The fact is that A bond yields reflect factors other than default risk on the bonds such as their limited liquidity since corporate bonds rarely trade and what trading there is tends to dry up during a flight to quality. In contrast, equity trading tends to increase in similar circumstances. So even changes in the A spread can reflect changes in liquidity, as well as changes in potential default risk.

However, on December 11, 2009, the OEB released its decision after its consultation. Note it did not have a litigated hearing and none of the documents that were submitted were subject to information requests or cross examination. In the OEB decision it adopted the recommendation of the experts on behalf of the utilities that the allowed ROE be changed from its base level by 50% of any change in the forecast LTC bond yield and 50% of the change in the credit spread. This was a reversal of the OEB decision made in a litigated hearing in 2003. The fair ROE was then set by averaging the expert recommendations of multiple utility experts and one slide I presented in the consultation itself.[2]

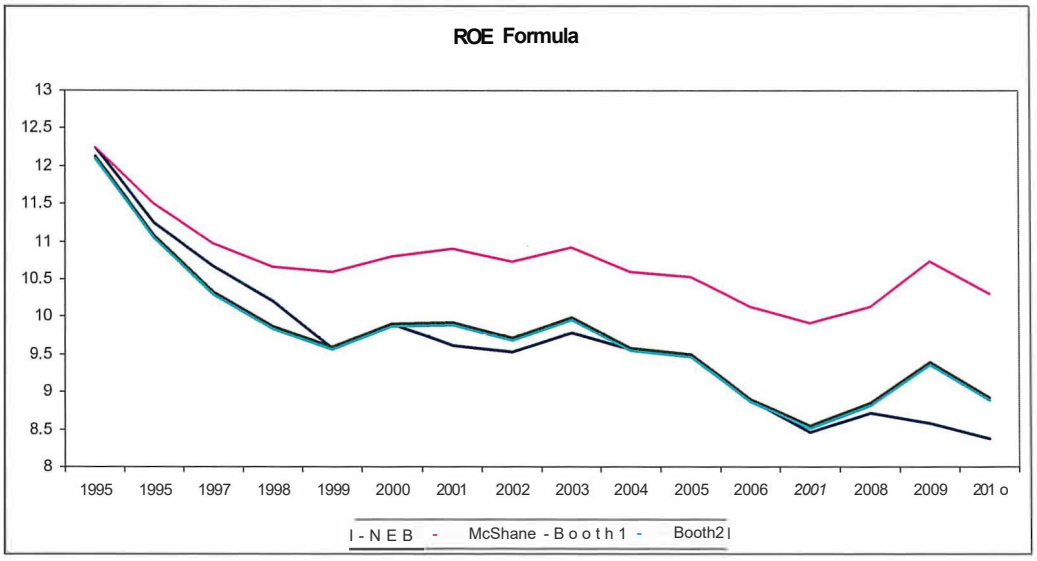
The NEB continues to publish the results of its ROE formula since it is the basis for setting allowed ROEs in some pipeline contracts. In a 2010 hearing before the Regie on Gazifere, after the release of the OEB Decision, Ms. McShane on behalf of Gazifere recommended a similar formula to the OEB's formula ROE. In contrast I recommended to the Regie.

[2] I was asked to provide limited evidence based on answering specific questions not ROE testimony and never made an ROE recommendation. Only later were interveners aware that full ROE evidence had been submitted by the utilities and I was asked to provide a power point presentation with one slide including the most basic calculations with no serious supporting documentation.

"Of the alternatives this is the best for several reasons. First, Bank of Canada researchers have indicated that for investment grade bonds most of the yield change (63%) was due to liquidity changes rather than changes in default risk, which indicates that only 37% of the change in the yield spread may be due to default risk that might be linked to changes in the equity market. Consequently, although I judge 50% to be marginally excessive, I can accept this as it evens out over the business cycle. "

I accepted that the NEB formula was working fine in 2001, as that was the NEB's decision, confirmed by subsequent decisions of other boards up to 2008. I then added the credit risk adjustment of 50% to the change in the credit spread based on the average 0.94% credit spread that was normal before 2008 estimated by Ms. McShane and confirmed by me.

I presented the following graph of the results of Ms. McShane's ROE formula, the NEB formula and my extension of the NEB formula using a 50% credit spread adjustment. ***I pointed out that Ms. McShane's formula if adopted by the NEB instead of the RH-2-94 formula would have over-estimated the allowed ROE decided to be fair and reasonable by every board in Canada in litigated hearings between 1994 and 2008.*** My judgment then and now is that any ROE formula has to be backwardly compatible, in the sense that it does not repudiate prior board decisions.



The two new formulae I provided both used a 50% adjustment to changes in A credit spreads. The

first used the NEB data as of 2001 (Booth 1) and the second used 2005 data when credit spreads were 0.99% or what at the time was regarded as normal (Booth2). The objective was simple to show that the starting date did not have a material impact on the ROE. As expected, there were relatively minor changes in allowed ROEs up to 2008 but these tended to even out over the full business cycle. However, in 2008 the credit risk adjustment added 82 basis points (9.39% vs 8.57%) and in 2009 55 basis points (8.92% vs 8.37%).

I then applied the adjustment formula to Gazifere's last allowed ROE of 10% in 1999 to get an ROE formula allowed ROE of 9.25%. Decision (D2010-147 of the Regie, paragraph 139) then stated

> *"The Regie believes that, in spite of increased volatility of authorized returns, Dr. Booth's alternative formula would make it possible to obtain authorized returns that are better adapted to the financial crisis.* ***The Regie concludes that the current formula should be replaced by Dr. Booth's for the purposes of establishing the rate of return beginning in 2012."***

In the following year in its Decision (D-2011-182) on Gaz Metro (GMI) the Regie adopted the same formula I recommended in the prior Gazifere case, where GMI's allowed ROE would adjust by 75% of the change in the forecast LTC yield from 4.0% and 50% of the change in the A credit spread from 1.5% with a starting ROE of 8.9%.[3]

SUSPENSION OF ROE FORMULAE

In November 2011 NP asked the Board to suspend the application of its ROE formula since it only allowed an ROE of 8.38% in 2011 and 7.85% in 2012 because "these conditions include unusually low and volatile Government Bond yields." I was then asked by the Consumer Advocate if it was reasonable for NP to use the 2011 allowed ROE of 8.38% as a placeholder for 2012 instead of 7.85% and I agreed as I was already aware of the problems with the LTC bond yield.

I then filed testimony in May 2012 which included an assessment of what I thought would have been

[3] In both these cases the spread would be the ***utility*** A yield minus the equivalent LTC yield since utility A yields are not as affected as generic A yields during a financial crisis. The use of the utility spread started with the OEB formula in 2009.

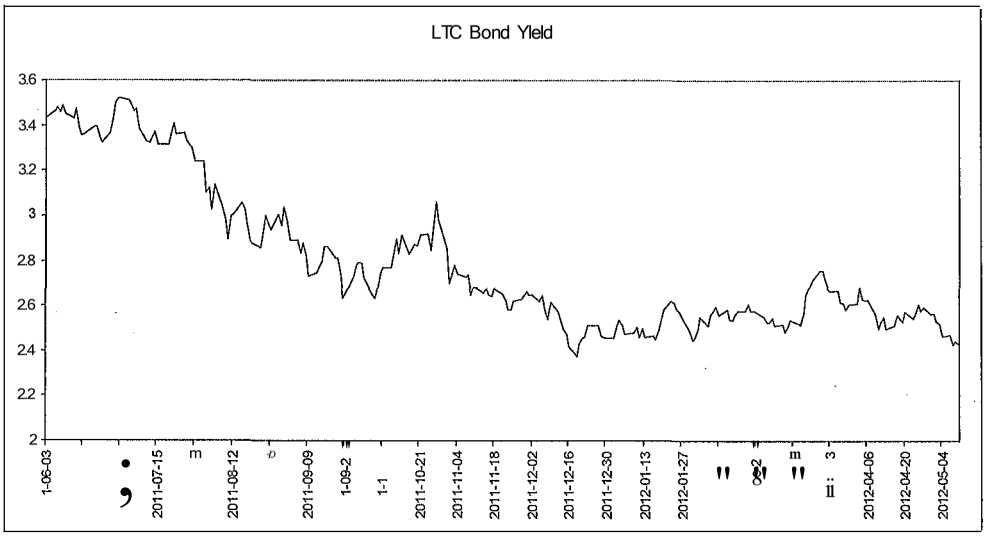
fair and reasonable in 2011. The RBC interest rate forecast in their Financial Markets Monthly (June 3, 2011) is below. Noticeably RBC's forecast LTC bond yields in June 2011 were not unusually low. In fact 4.55% for the forecast LTC bond yields by the end of 2012 looked perfectly normal.

		10Q2	1illll	1QQ1	llill		11Q3	1!..	Qg)_	12Q2	12Q3	llila1
Canada												
	Overnight	0.50	1.00	1.00	1.00	1.00	1.25	1,75	2.25	2.50	2.75	3.00
	Three•month	0,50	0,88	0.97	1.10	1.20	1.70	2.15	2,40	2,65	2,90	3.15
	Two•year	1.39	1.40	1,71	1,85	1,75	2.15	2.40	2.80	3.00	3.35	3.75
	Five,year	**2.32**	2.04	2,46	**2.65**	2.50	3.00	3.30	3.50	3.65	3.85	4.05
	10•year	3.08	2,75	3,16	3.25	3.25	3.50	3.80	3.95	4.05	4,15	4.15
	30-year	3.65	3.34	3.55	3.80	3.75	4,00	4.30	4.45	4.50	4,50	4,55
United States												
	Fed funds	0 to 0.25	Oto 0.25	o to 0,25	Oto 0.25	o to 0.25	0 to 0.25	o to 0.25	o to 0.2s	0.50	1.00	1.50
	Three•month	0.18	0.16	0.12	0.15	0.20	0,20	0.25	0.35	0.65	1.25	1.70
	Two•year	0.61	0.44	0.61	0.70	0.80	0.90	1.10	1.25	1.60	2.00	2.50
	Flve•year	1.79	1.27	2,01	2.10	2.00	2.30	2,60	2,80	3.05	3.40	3.75
	10-year	2.97	2,48	3.30	3.45	3.25	3,65	4,00	4.15	4.25	4.45	4,50
	30•year	3.91	3,67	4.34	4.50	4.55	4.60	4.85	4.90	4.95	5.00	5.05
United Kinudom												

What changed between June and November 2011 was the collapse in interest rates caused by the Euro crisis and the failure of the US to address its huge 2011 fiscal deficit of 9.6% of GDP, both of which were knock-on effects of the US Great Recession. The US, in particular, was downgraded by S&P on August 5, 2011 from AAA to AA+. This was because the super committee set up by Congress could not reach a consensus on budget cuts forcing the US Federal Reserve to massively intervene in the bond market through what I dubbed "Operation Twist" (OT).[4] The objective of OT was simply to lower long term interest rates and "twist" the shape of the yield curve. This would allow people in the US to stay in their houses by renegotiating their mortgages to lower their monthly payments and indirectly help the banks by reducing mortgage defaults.

As Canada was still rated AAA there were increasing capital movesments into Canadian government bonds driving prices up and bond yields down as the following graph shows. On June 3, 2011, the actual LTC bond yield was 3.4% (the over 10-year bond) but had dropped to 2.6% by the middle of November 2011 and by May 2012 it had dropped to 2.5%.

[4] This was the name of a similar intervention in the early 1960's.



At that time, it was my judgment that the bond market prices and yields were not being set by ordinary investors trading off risk versus return, as assumed by standard financial theory, but by global policy makers out to save the Euro currency and the US financial system. Consequently, I agreed that the ROE mechanism should be suspended as it might not produce results that the Board would consider fair and reasonable.

In my May 2012 report on NP, I used two adjustments to the CAPM. The first was the by then standard credit spread adjustment. With spreads at 180 basis points this added 0.40% to make my CAPM estimate into what I started to call a conditional CAPM estimate, since it was a CAPM estimate conditional on the state of the economy as reflected in credit spreads. The second adjustment was to directly incorporate an estimate of how much the level of the LTC bond yield was depressed by the US Fed's bond buying program, also called "quantitative easing." I did this by comparing the LTC bond yield with the yield on conventional preferred shares that did not suffer from the knock-on effects of US quantitative easing. I noted that Canadian preferred share yields had not come down to the extent that bond yields had. Why that is important is that dividends are attractive to Canadians due to the application of the dividend tax credit, whereas they do not appeal to foreign purchases who would also regard them as risky. At that time, the incremental spread on the preferred shares was about 80 basis points indicating that bond yields had been depressed by about

that amount by actions outside of Canada.

Preferred shares are the closest instrument in the capital market to common equities since they are simply a part of shareholder's equity. In testimony with my late colleague Professor Berkowitz, we had provided risk premium estimates as a premium over preferred stock yields. However, this had become difficult due to data limitations where the main supplier, BMO, no longer provided regular reports on their preferred share index.

In its Decision (PU 13) the Board reports (page 23) the discussion amongst the experts on the state of the forecast LTC bond yield. Dr. Vander Weide used 2.73%, Ms. McShane 3.5% but didn't consider the most recent data, while I used a 3.0% forecast, but consistent with the 0.80% OT adjustment recommended using 3.8% to generate a fair ROE, which the Board adopted. Subsequently, I recommended the use of the same model adopted by the Regie and others with the proviso that the ROE does not change until the forecast LTC bond yield is above 3.8%. However, as the Board decision notes in 2012, I was not averse to fixing the allowed ROE for several years given the problems in the bond market.

Subsequent to 2012 the forecast LTC yield has never reached my minimum 3.8% forecast. So, I continued to use 7.5% as my own estimate of the fair ROE for a generic Canadian utility for several years. Before this Board in 2016 I also recommended the suspension of the ROE formula, and the allowed ROE has subsequently been settled in negotiation at 8.5%. My reasoning in 2012 was reinforced by the Covid-19 pandemic when the Bank of Canada drove the LTC bond yield down to a low of less than 1.0% at the end of 2021 by massive bond buying. This time not just the US Fed, but all the major central banks were massively buying government bonds, since the Covid 19 pandemic was a world wide phenomenon.

In Canadian courts fair market value is defined as

> *"The highest price, expressed in terms of money or money's worth, obtainable in an open and unrestricted market between knowledgeable, informed and prudent parties acting at arm's length, neither party being under any compulsion to transact."*

Courts then base values not on actual transaction values, but on fair market value. lt should be obvious that an LTC bond yield of 1.0% is not set by private investors and was the result of central bank intervention under a "compulsion to transact" and violated the very definition of fair market value. With a combined Government of Canada and Bank of Canada commitment to a target rate of inflation of 2.0%, anyone buying bonds with a 1% yield is guaranteed to lose 1% a year in purchasing power without even considering that the 1% is taxable. Instead, of investing they should have borrowed, which retail investors did massively, driving up the prices of assets including houses and shares, both of which peaked in early 2022.

The latest RBC forecast (March 2024) is below.

Interest rate outlook

Policy rates and government bond yields, end of period

	Q1-I3	Q2-2I	QI-23	Q4-23	Q1-I4	Q2-I4	Q1-I4	QH-24	01-25	Q2-25	QI-25	Q4-2S
Canada												
Overnight rate	4.50	4.75	5.00	5.00	5.00	4.75	4.25	4.00	3.75	3.25	3.00	3.00
Three-month	4.34	4.90	5.07	5.04	4.95	4.65	4.10	395	3.60	3.20	3.00	3.00
Two-year	J.74	4.58	4.87	3.88	4.20	3.80	3.50	3.25	2.90	2.75	2.90	3.00
five-year	J.02	3.68	4.25	3.17	3.45	3.30	J.10	3.00	2.85	290	2.90	J.00
10-year	2.90	3.26	4.03	3.10	3.40	3.25	3.10	3.00	2.90	2.95	3.00	3.10
JO-year	3.02	3.09	3.81	3.02	3.35	3.25	3.15	3.05	3.00	1.05	J.10	3.15
United States												
Fed funds midpoint	4.88	5.13	5.38	5.38	5.38	5.U	4,88	4.63	4.63	4.38	4.38	4.13
Three-month	4.85	5.43	5.55	5,40	5.33	5.01	4.78	4.53	4.58	4.33	4.31	4.08
Two-year	4.06	4.87	5.03	4.23	4.60	4.50	4.35	4.30	4.25	4.20	4.20	4.25
fiv year	3.60	4.H	4.60	3.84	4.15	4.05	3.95	3.95	3.95	4.00	4.10	4.20
10-year	3.48	3.81	4.59	3.88	4.15	4.05	3.95	4.00	4.05	4.10	4.20	4.30
30-year	3.67	3.85	4.73	4.03	4,30	4.20	4.15	4.20	4.25	4.30	4.35	4.40

Currently, we have an "inve1ted" yield curve where the 3-month Treasury Bill yield of 4.95% is 1.6% higher than the LTC yield. However, RBC is forecasting that the Bank of Canada will bring inflation back to its 2% target in 2024 allowing monetary policy to ease and T. Bill yields to fall. As they come down the forecast LTC yield will also fall slightly from 3.35% to 3.0% in 2025Q1 before increasing back to 3.35% significantly below what I was using as my minimum forecast LTC yield of

3.8%. So, if RBC is correct it may be some time yet that the fiscal imbalances reverse and forecast LTC bond yields reach my original 3.8% minimum.5

NEWER RISK PREMIUM MODELS

On October 9, 2023, the AUC released its decision from its generic hearing into the cost of capital (27084-D02-2024). The AUC noted (page 13).

> *"Most; if not all parties to this proceeding, were relatively unenthusiastic about, if not rather firmly opposed to, any Commission departure from holding periodic, fully litigated GCOC proceedings and moving instead towards adopting a formulaic approach/or setting the ROE in 2024 and subsequent years ....After considering various perspectives and parties' views, the Commission jinds it will implement the formulaic approach/or determining the ROE, starting in 2024. For the reasons set out below, the Commission is of the view that this approach offers a balanced and pragmatic solution to several pressing concerns. "*

I was not part of the AUC's 2023 hearing but can understand the lack of enthusiasm. In the decision the AUC approved a generic ROE of 9.0% based on the following recommendations with three experts on behalf of the utilities and two interveners. The AUC used a 3.1 % forecast LTC yield.

Table 2. Notional ROE and ERP recommendations by party

Witness (sponsodng parM	Notional ROE (%)	ERP[117] (%)	lEmpirlcal approaches used	Commente
Dr. Villadsen IATCO/Apex/Fortis\[118]	10.0	5.68	CAPM, DCF, M-DCF, Bond Yield Risk Premium Analysis	Recommended range lor notional ROE is 9.2% lo 10.4%
Concentric (ENMAX)	9.50	5.67	CAPM,. DCF, M-DCF, Bond Yield Risk Premium Analysis	Recommendalion refiects M-DCF and CAPM llsinq his!orical MERP.m
D. D'Ascendis {Altalink!EPCOR)	10.30	6.44	CAPM/ECAPM,. DCF, M-DCF, Predictive Risk Premium Model, Adjusted Total Markel Approach	Rewmmended range lor notional ROE is 9.80% lo 10.80%.[120]
D. Madsen {IPCAA)[m]	7.70	4.75	CAPM, DCF an<l M-DCF	Rewmmemlalion is simple average of CAPM and DCF models (7.51% and 7.90%)
D1. Cleary (UCA)	6.75	3.90	CAPM, DCF, M-DCF and Utility Bond Risk Premium Analysis	-

The AUC then decided on an automatic ROE adjustment formula starting at the 9% ROE.

[5] Since 2012 the impact of other factors such as demographics and low real growth have also began to affect the level of the long Canada bond yield.

6.5 Other variables of the formulark approach

183. The approved notional ROE of 9,0 per cent will serve as a ba e ROE to vdlich the approved formulaic approach will be applied eadl year:

$$ROE_t = 9{,}0\% + 0.5 \times (YLDt - 3.10\%) + 0.5 \times (SPRDt - SPRD_{bas;})$$

184. This section explain,;, bow the Commission affived <lt each remaining: variable to be used in the approved fornmlaic approadl. Specifically. Section 6.5.1 deals vvith the adjustment factor,, for clmnges in GoC bond yield and Htility bond yield spread, Section 6,5,2 deals ,vith the ba-,e and test year values for long: GoC' bond! yield,,, Section 6.5.3 deals with the base and te<;t year values for utility bond yield spreado,,

1

2 In a subsequent submission the AUC established the base credit spread of 1.58%.

3 The AUC's use of an automatic ROE formula differs from what I would have proposed, since I
4 don't believe there is any theoretical support for a 50% adjustment of the ROE to the forecast
5 LTC yield. The reason for this is that if the CAPM holds at time tit will also hold for time-period
6 t+ l, so subtracting the equation fort from that fort+ 1 we have the CAPM as a difference
7 equation:

8 $$K_{t+1} - K_t = R_{t+1} - R_t + \beta * (KM_{t+1} - KM_t) - \beta * (R_{t+1} - R_t)$$

9 or

10 $$K_{t+1} - K_t = \beta * (KM_{t+1} - KM_t) + (1 - \beta) * (R_{t+1} - R_t)$$

11 This simply says that if beta is the same between two periods, the equity cost (fair return *with* the
12 floatation cost) changes with the risk-free rate and the market's equity cost or fair return. The
13 relationship between the risk-free rate and the market's equity cost then determines the market
14 risk premium.

15 If we equate this CAPM difference equation to that for the NEB model, and solve for the change
16 in the market's equity cost, we have

$$(KM_{t-1} - KM_t) = \frac{(\alpha + \beta - 1)}{\beta} * (R_{t-1} - R_t)$$

In words the market's equity cost changes by the assumed ROE adjustment coefficient (a) plus the beta coefficient (B) for the utility minus 1, divided by the beta coefficient, all times the change in the interest rate. In the calculations it is necessary to ignore the financial flexibility adjustment since it normally adds 0.50%, and does not depend on the level of interest rat s.

There are two main ROE adjustment coefficients that have been adopted 0.75 as in the NEB formula and 0.5 as in the OEB and now the AUC formula.[6] Different acceptable beta coefficients then provide different plausible changes in the expected return on the equity market and thus the market risk premium. My position is that over the last 30 years beta coefficients have been in a normal estimated range of 0.40-0.6, so I first use 0.50 as the mid-point.

With the NEB's adjustment coefficient of 0.75 this means that the market's equity cost changes by (0.5+0.75-1)/0.5 or 50% of the change in the forecast LTC yield. This means that at the time ofRH-2-94 with a forecast LTC yield of9.25% and a total pipeline risk premium of 3.0% the pipeline fair ROE was 12.25%. The NEB then used a 450-500 basis point market risk premium so using 5% and a 2.5% pipeline premium (minus the floatation cost) means the market' equity cost at that time was 14.25%. The following table then shows what happens with the NEB ROE adjustment formula and a utility beta of0.5 as the forecast LTC yield changes.

alpha	0.75				
beta	0.5				
exposure	0.5				
			Market	Utility	Fair
LTC Yield	URP	MRP	Equity	Equity	ROE

6 The BCUC initially used 1.0 but reverted to 0.75 in a subsequent hearing. Professor Berkowitz and I before the BCUC and NEB originally recommended 0.85 and this Board has used 0.80.

0.0925	0.025	0.05	0.1425	0.1175	0.1225
0.0825	0.0275	0.055	0.1375	0.11	0.115
0.0725	0.03	0.06	0.1325	0.1025	0.1075
0.0625	0.0325	0.065	0.1275	0.095	0.1
0.0525	0.035	0.07	0.1225	0.0875	0.0925
0.0425	0.0375	0.075	0.1175	0.08	0.085
0.0325	0.04	0.08	0.1125	0.0725	0.0775
0.0225	0.0425	0.085	0.1075	0.065	0.07

The table starts with the RH-2-94 decision when the LTC bond yield was forecast to be 9.25% and the pipeline or utility risk premium (URP) was 250 bps or 300 including the floatation cost allowance, so the utility equity cost was 11.75% and adding the 0.50% floatation cost a fair ROE of 12.25%. As the forecast LTC yield drops by 1%, the 0.75 adjustment meant the fair ROE in the last column dropped by 0.0075 to 11.5%. This was the NEB's intention however, it also meant that the utility risk premium, minus the floatation cost, increased to 2.75% and with a beta of 0.50 the market risk premium increased by 0.5% to 5.5%. In this way the equity cost on the market dropped by0.5%to 13.75%.

This result is consistent with two basic ideas often expressed before public utility tribunals:

- there is an inverse relationship between the market risk premium and the level of long-term interest rates as the drop in the forecast LTC yield between 1995 and 2002 caused the market risk premium to increase and
- the market equity cost and utility equity cost both fall as interest rates fall, which is that all non-derivative securities are *substitutes,* that is, they move together, but not necessarily equally.

I judge that these are two important implications that any ROE adjustment model has to satisfy.

In contrast to the 0.75 adjustment coefficient, the use of 0.50 means that with a beta of 0.50 there

is ***no adjustment to the market's equity cost*** and as a result there is no risk premium model for the market as a whole, That is, the markefs equity cost is independent of the interest rate. I find this combination difficult to accept, since it implies that across time changes in risk aversion, that cause the risk premium to exist, varies to exactly offset any change in the LTC yield. Essentially, it voids the use of risk premium models, and has a very strong inverse relationship between the market risk premium and the level of interest rates.

For utilities it means that the 50% adjustment causes the fair ROE to fall even as the market's equity cost is constant which implies that utility shares and the equity market are not good substitutes/ but their equity cost is driven by interest rate risk. The result is in the Table below.

alpha	0.5
beta	0.5
exposure	0

LTC Yield	URP	MRP	Market Equity	Utility Equity	Fair ROE
0.0925	0.0250	0.0500	0.1425	0.1175	0.1225
0.0825	0.0300	0.0600	0.1425	0.1125	0.1175
0.0725	0.0350	0.0700	0.1425	0.1075	0.1125
0.0625	0.0400	0.0800	0.1425	0.1025	0.1075
0.0525	0.0450	0.0900	0.1425	0.0975	0.1025
0.0425	0.0500	0.1000	0.1425	0.0925	0.0975
0.0325	0.0550	0.1100	0.1425	0.0875	0.0925

7 Plausibly it could be because utilities have more interest rate risk, but interest rate risk premiums are tiny compared to the market risk premium.

I have trouble with these results since they are at the very limit of plausibility in only marginally satisfying the two basic ideas of what an ROE adjustment model should include.

If the beta coefficient is higher at 0.75 and the ROE adjustment coefficient is 0.5, close to what experts on behalf of utilities often recommend, the market's equity cost adjustment to interest rates is (0.75+0.5-1)/0.75 or 0.33. The following illustrates the implications.

alpha	0.5
beta	0.75
exposure	0.33

LTC Yield	URP	MRP	Market Equity	Utility Equity	Fair ROE
0.0925	0.0250	0.0500	0.1425	0.1175	0.1225
0.0825	0.0283	0.0567	0.1392	0.1108	0.1158
0.0725	0.0317	0.0633	0.1358	0.1042	0.1092
0,0625	0.0350	0.0700	0.1325	0.0975	0.1025
0.0525	0.0383	0.0767	0.1292	0.0908	0.0958
0.0425	0.0417	0.0833	0.1258	0.0842	0.0892
0.0325	0.0450	0.0900	0.1225	0.0775	0.0825

When interest rates drop by 1% the market's equity cost only drops by 0.33% from 14.25% to 13.92%, so the market risk premium increases by 0.67% to 5.67%. In this case, the utility equity cost is 11.08% for a fair ROE of 11.58%. At the NEB's forecast LTC yield for 2002 of 5.63% the 3.62% drop in the forecast LTC bond yield means that the market's equity cost only drops by 1.20% (3.62*.333) to 13.0% for a very high market risk premium of 7.4% well outside the

NEB's range of 5.5-6.0% implying a fair utility ROE of 9.84% or 0.40% higher than what the NEB felt was fair, even with a 0.60 implied beta. Consequently, the use of a 0.50 ROE adjustment factor and a beta of around 0.75 violates the backward compatibility of the ROE formula and implies that the NEB's decision in 2001 was to award an unfair ROE to the major pipelines.

These values are in between the two previous possibilities so there is an inverse relationship between interest rates and the market risk premium and the utility and overall equity market are both substitutes in the sense they move together. However, these values only satisfy the two assumptions due to the beta value of 0.75 which is implausible based on historic estimates. So, accepting an ROE adjustment factor of 0.50 only makes sense if the Board also accepts much higher beta values than have historically been observed.

My recommendation is that a beta value of 0.50 and an adjustment coefficient of 0.75 are empirically consistent with ROE awards until the massive bond buying by central banks starting in August 2011 set forecast LTC yields into a tailspin. At a 1.0% forecast LTC bond yield, similar to that of December 2021, the fair ROE would have been 6.25%. I did not and still do not think that is a fair ROE since the fair ROE has to satisfy the criteria of the fair return standard and be based on LTC bond yields that are also fair market value. Consequently, there needed to be off ramps to the application of the formula for extreme levels of the forecast LTC bond yield when they are not consistent with fair market value.

NEB AND AUGMENTED NEB ROE FORMULA

In Schedule 1 are the NEB forecast LTC bond yields since 1994 and their formula ROE as well as my Boothl adjustment I used in 2011 by adding a 50% adjustment to the A credit default spread. The actual formula would use Bloomberg's utility A yield rather than the generic ones originally produced by Scotia McLeod and now updated by Thomson Reuters.

It is easy to see why I agreed not to use the ROE formula in 2011 for the 2012 test year as the

forecast LTC bond yield was only 3.06% producing an NEB formula ROE of7.58%. While the ROE result was not itself that unreasonable the LTC yield producing it was. Unfortunately, the forecast LTC yield has not met my trigger of a forecast LTC yield of 3.8%, since, and after the Covid-19 pandemic, the massive bond buying by the Bank of Canada produced NEB formula ROEs well below 7.0%, which I regarded as unreasonably low.

The current NEB ROE of 7.88% for 2024 is based on the November forecast for the LTC bond yield of 3.45%, which has since decreased. However, I continue to judge that a minimum forecast yield of 3.8% is needed to justify relying on it as a fair market value yield rather than a yield created as the result of central bank intervention. Using a 3.8% LTC bond yield the NEB formula and my Booth 1 formula ROE are 8.15% and 8.44%. **The latter value is almost exactly NP's current allowed ROE.**

My recommendation would be that if the Board wants to use an automatic ROE mechanism to first set the starting value at 8.5% and only increase the allowed ROE should the forecast LTC bond yield exceed 3.8% and then increase it by 75% of the increase. I would no longer include the credit spread adjustment since it is already included in the 8.5% fair ROE at what has become a new normal level. Further except in extreme crises it has made little difference across the business cycle and NP can always solicit opinion on not changing the allowed ROE as it did in 2011. Consequently, I do not regard changes from the 1.50% level I used or the 1.58% used by the AUC for 2024 as being material.

One final comment is always that the key question is how long the automatic ROE is used for and whether off ramps are needed. If the formula is to be used within say a three-year period, then it differs little from a fixed ROE during that period. If it is expected to last longer than three years, then the question of the relationship between the adjustment coefficient and utility beta becomes more important. The NEB formula lasted 14 years and was only thrown into disarray by the worst financial crisis since 1937 so it has to be regarded as a success. However, it was reviewed in 2001 and then again in 2008, so there were substantive reviews during its 14-year

history. In practise, it did not last indefinitely but was reviewed periodically at the request of the utility (pipeline).

SCHEDULE 1

		NEB	Booth1
1995	9.25	12.25	12.13
1996	8.03	11.25	11.07
1997	7.14	10.67	10.33
1998	6.53	10.21	9.88
1999	5.69	9.58	9.60
2000	6.12	9.9	9.90
2001	5.73	9.61	9.92
2002	5.63	9.53	9.71
2003	5.98	9.79	10.03
2004	5.68	9.56	9.63
2005	5.55	9.46	9.51
2006	4.78	8.88	8.90
2007	4.22	8.46	8.53
2008	4.55	8.71	8.83
2009	4.36	8.57	9.41
2010	4.3	8.52	8.95
2011	3.72	8.08	8.51
2012	3.06	7.58	8.07
2013	2.59	7.23	7.65
2014	3.52	7.93	8.31
2015	3.14	7.64	7.97
2016	2.75	7.38	7.83
2017	2.1	6.86	7.30
2018	2.76	7.36	7.59
2019	2.87	7.44	7.67
2020	1.79	6.63	6.94
2021	1.49	6.4	6.74
2022	2.26	6.98	7.19
2023	3.45	7.88	8.24
2024	3.45	7.88	8.18