FAIR RETURN FOR NEWFOUNDLAND POWER (NP)

EVIDENCE OF

Laurence D. Booth

BEFORE THE

Board of Commissioners of Newfoundland and Labrador.

September 25, 2018

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EXECUTIVE SUMMARY

1) This report comes 2 ½ years after my last report and events have progressed largely as I anticipated at that time in that Canada has used up its remaining spare capacity. On most objective criteria Canada is reaching the peak of the business cycle. This is largely the result of a booming US economy with an unemployment rate 0.7% below the natural or normal rate and an economic growth rate significantly exceeding its trend line.

2) The problems that were evident in 2016, a technical recession, weak commodity prices, widening credit spreads, tightening loan standards and a stock market 14% off its highs, have all dissipated. Instead, credit spreads have tightened from 1.90% down to 1.35%, the stock market has boomed, the KCFSI and the Bank of Canada's loan survey both indicate easier credit, and commodity prices have strengthened.

3) By all objective criteria the financial system has returned to health in the US and now both the US and Canada have fully recovered from the financial crisis. The most obvious indicator is the persistent increases in the policy rates targeted by both the US Federal Reserve and the Bank of Canada. In fact, the US Fed anticipates increasing the Federal Funds rate to slow down the US economy in 2020.

4) The conundrum is that although the headline CPI inflation rate is above 2.0% in both the US and Canada, the core rates are not, while wage growth is anaemic. This seems to be leading President Trump to push the envelope with both trade and tax policy designed to increase demand and boost production in the US and not China. Canada again seems to be suffering potential collateral damage in terms of the renegotiation of NAFTA.

5) The absence of the expected inflation for this stage in the business cycle coupled with the huge amount of bonds taken off the market through quantitative easing in the US, Europe, the UK and Japan means that long term bond yields are yet to be determined by private purchasers and are instead still largely determined by central banks. Paradoxically, the expected long Canada bond yield is lower today at 3.0% than it was in 2016 at 3.65% which in turn is lower than it was in my 2012 report at 4.55%.

6) If NP were still on a formula ROE the decline in A credit spreads of 0.45% since 2016 coupled with the drop in forecast long Canada bond yields of 0.65% would together indicate a significant drop in the allowed ROE. However, I do not judge the resulting ROE to be fair since I do not believe that equity markets are keying off these very low government bond yields. In particular, I continue to believe, though with some misgivings, that the allowed ROE should not be changed from 7.5% until the forecast long Canada bond yield exceeds 3.8%. Consequently, I continue to recommend a 7.5% allowed ROE, but would point out that there is increasing evidence that the current 8.50% allowed ROE is generous.

7) In terms of business risk I judge NP to be a typical Canadian utility. The addition of three more years of data has not changed that assessment, since NP over-earned in each of those years. Risk is the probability of incurring a loss and in the last 25 years it is difficult to see any material losses. Consequently, I tend to believe that NP is being allowed a risk premium for risks that it is not bearing

8) In 2016 I entered extensive business risk and capital structure evidence recommending a gradual reduction in NP's common equity ratio. The Board rejected that recommendation and awarded NP a 45% common equity ratio, which exceeds that of its Canadian peers. The main justification seemed to be the possibility of increasing electricity prices from the pass through of Muskrat Falls costs. NP is now justifying its increased revenue requirement on an increased ROE and higher risk due to those *same* increased costs.

9) The only way that higher electricity prices can increase NP's risk is if they increase the likelihood of NP failing to earn its allowed ROE as customers shift to alternative fuels. I do not think this risk is significant for two reasons. First, the province will in all likelihood reallocate some of those costs to other entities to reduce rate shock as I am sure it knows of the experience of the Liberal government in Ontario. Second, electricity costs in the province can absorb higher costs without becoming so large as to encourage people to drop off the system. So in my judgement the death spiral risk is non-existent.

10) I regard a 7.5% ROE for NP on 40% common equity as satisfying the fair return standard. However, since the Board heard full business risk and capital structure evidence in 2016 and fixed NP's common equity ratio at 45% I have not entered full evidence on the common equity ratio again. For this reason, I strongly recommend that the Board reduce the allowed ROE, since all the normal indicators point to a lower ROE than the 8.50% set by the Board in 2016.[1]

[1] My understanding is that if the ROE is maintained at 8.50% there is no material increase in NP's revenue requirement. A reduction to a fair rate of return will then decrease rates and somewhat cushion rates from potential increases in electricity costs.

11) I INTRODUCTION AND OVERVIEW

Q. PLEASE DESCRIBE YOUR NAME, QUALIFICATIONS AND EXPERIENCE.

A. Laurence Booth is a professor of finance in the Rotman School of Management at the University of Toronto, where he holds the CIT Chair in Structured Finance. Dr. Booth appeared before the Board of Commissioners most recently in a 2016 hearing, as well he has appeared before most of the major utility regulatory boards in Canada including the CRTC, the National Energy Board, the Ontario Energy Board (OEB), the BCUC, the Alberta Utility Commission (AUC), the Nova Scotia Utilities and Review Board, the New Brunswick Public Utilities Board, the Manitoba Public Utilities Board, the Regie de l'Energie du Quebec and the Prince Edward Island Regulatory and Appeals Commission. He has also filed testimony before the Ontario Securities Commission and in a variety of civil suits pertaining to financial matters. A detailed resume is filed as Appendix A. Further information and copies of working papers by Dr. Booth can be can be downloaded from his web site at the University of Toronto at http://www.rotman.utoronto.ca/~booth.

Q. PLEASE DESCRIBE THE PURPOSE OF YOUR TESTIMONY

A. The Consumer Advocate of the Province of Newfoundland and Labrador has asked me to offer an opinion on the fair rate of return on common equity (ROE), and to recommend an appropriate common equity ratio for Newfoundland Power.

Q. DO YOU HAVE SOME OVERALL REMARKS?

A. Yes. It is just over two and a half years since I last filed a report with the Board and quite generally economic events have progressed much as I anticipated. At that time I pointed out that it was three years since the Board last reviewed NP's ROE and capital structure and we were in a "long drawn out recovery." I also felt that I was surprised at how slowly the global economy had taken to recover from the financial crisis and that we were very much in a "holding pattern" waiting for the US and Europe to work their way through the after effects of their Great Recessions. Consequently, I continued to recommend a 7.5% ROE since forecast long Canada (LTC) bond yields were still slightly below my 3.8% trigger point for changes in the ROE.

Now the situation is at last changing. The US and Canada economies are both getting close to the top of the economic cycle and on conventional statistics have little excess capacity left, whereas Europe and Japan still have a way to go. However, the after effects of massive monetary easing and fundamental demographic changes have left long term interest rates at extremely low levels. By now we should be seeing inflationary pressures building and higher interest rates, but we are not. We have seen the Bank of Canada increase its target overnight rate to 1.50% with expectations of further increases with similar forecasts for the US Federal Reserve. However, despite increasing short term interest rates, forecast LTC yields are actually *lower* now than in 2016. In its January 8, 2016 forecast, for example, the Royal Bank of Canada was forecasting an LTC yield for the end of 2018 of 3.65%. In contrast, its current forecast (September 12, 2018) for the end of 2019 is only 3.0%. The result is that my 3.8% trigger for the LTC yield to indicate changes in the allowed ROE has still to be met.

In terms of business risk, I accept that the implication of Muskrat Falls for electricity prices in Newfoundland may appear to increase risk, however I judge there to be two offsetting factors. First, I see little chance of a significant change in electricity prices during the test period as Muskrat Falls will only be fully online in 2021, beyond the end of the test period. Second, the provincial government has options in how to deal with the escalating costs of Muskrat Falls. In Ontario we have seen the defeat of a Liberal government partly due to its mishandling of the energy file.[2] I suspect that the Newfoundland and Labrador government is well aware of this and will use similar techniques to avoid the worst of the forecast for future electricity prices. Regardless, I do not see NP's shareholders as bearing any increased risk resulting from higher electricity prices. Ultimately the core risk borne by utility shareholders is that of the death spiral where its distribution network is by-passed due to the emergence of other supply sources or alternative distribution mechanisms. Neither of these risks seems to be significant for NP even should the provincial government allow it.

In my judgment, NP's case for an increase in its allowed ROE is non-existent since there is no significant increase in LTC yields and capital market conditions remain benign with enormous

[2] See Gordon Kaiser, "Ontario cancels wind and solar contracts," Energy Regulation Quarterly 6-3, 2018.

liquidity. Further, I continue to judge NP as warranting the same 40% common equity ratio as other Canadian electric distribution utilities with similar low business risk. However, I generally recommend that common equity ratios only be changed in the face of significant changes in business risk or when they are clearly out of line. Since the Board heard full evidence on NP's common equity ratio in 2016 and decided to maintain it at 45% I have not revisited this topic in detail. However, since the "electricity price risk" has already been taken into account by the Board the case for decreasing the allowed ROE is stronger.

II FINANCIAL AND ECONOMIC OULOOK

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 "altered conditions in the money market" where we would now understand the money market to mean the capital market. The Supreme Court of Canada determined a fair rate of return in *BC Electric Railway Co Ltd., vs. the Public Utilities Commission of BC et al* ([1960] S.C.R. 837), where the Supreme Court 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 or not 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 by definition do not include unreasonable and unfair cost allocations. The statute also articulated the "prudently and reasonably acquired" test in terms of the assets included in the rate base.

Most statutes also allow the regulatory authority to examine all factors that enter into the rates to ensure that the rates are "fair and reasonable." This includes the firm's capital structure decision, 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, otherwise the management of the regulated firm is not fulfilling its fiduciary duties to act in the best interests of its stockholders.

In terms of financial charges, in Northwestern Utilities vs. City of Edmonton (1929), it was stated that a utility's rates should be set to take into account 'altered conditions in the money market.' A fair rate of return was further confirmed in the BC Electric decision when Mr. Justice Lamont's definition of a fair rate of return, put forward in Northwestern utilities, was adopted:"

> "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 an 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 earn their opportunity cost will the returns accruing to them be fair, i.e., they will neither reward the owners with excessive profits, nor ratepayers by charging prices below cost.

To any modern financial economist Mr. Justice Lamont's definition of a fair rate of return as an opportunity cost means a risk adjusted discount rate or expected rate of return. This is the rate that is determined in the capital market as conditions constantly change.

Q. HOW HAVE MONEY MARKET CONDITIONS CHANGED?

A. The Bank of Canada's responsibilities are to "promote the economic and financial welfare of Canada." To do this it conducts monetary policy to "foster confidence in the value of money" and promote the safety and efficiency of Canada's financial system. In practise, the Bank of Canada operates in a manner consistent with what is termed the Taylor rule, after Professor John B. Taylor of Stanford University, as does the US Federal Reserve.

The Taylor rule is as follows:

$$r = i + r^* + a * (i - i^*) + b * (GDP - GDP^*)$$

where r is the Bank's actual policy rate (overnight rate), i the inflation rate and GDP the gross domestic product. The superscript stars indicate the Bank's target rates, where r^* is the target rale rate and a and b are coefficients, which Taylor originally set at 0.50. The Bank of Canada's target rate of inflation has been 2% in a band of 1.0-3.0% for almost two decades and was renewed with the Government of Canada in the Fall of 2016 as part of a new five year pact. For illustrative purposes assume for the moment that the target GDP growth rate and overnight rate are both set at 3% so the "normal" overnight rate would be 5%, or the sum of the real target rate and inflation.

Now suppose currently inflation is 1% and GDP growth is 0%. This would be a weak economy with below target economic growth and inflation. Substituting these values into the Taylor rule we get

$$r = 1\% + 3\% + 0.5 * (1\% - 2\%) + 0.5 * (0 - 3\%) = 2\%$$

So the policy prescription would be to lower the overnight rate from the "normal" target to 2% to stimulate demand.

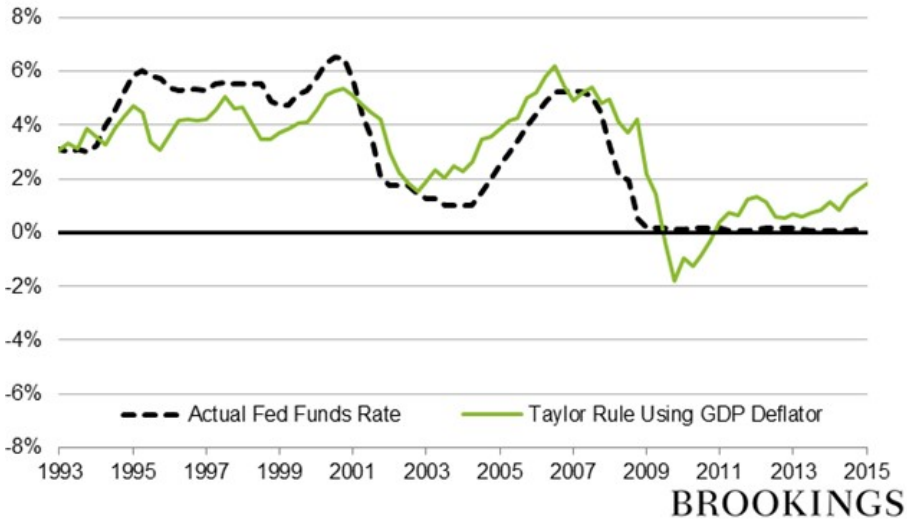
In contrast, suppose the economy was growing at above trend at 4% and inflation was at the top of the Bank's range at 3%. In this case substituting into the Taylor rule we get

$$r = 3\% + 3\% + 0.5 * (3\% - 2\%) + 0.5 * (4 - 3\%) = 7.0\%$$

In this case with a strong economy and rising inflation the Bank would set the overnight rate at 7.0% or above target

These two examples show how the Taylor rule works in "mimicking" the decision process of a central bank trying to maintain an inflation target. In a presentation at the Brookings Institute in April 2015 Ben Bernanke, the former chair of the US Federal Reserve, produced the following graph that clearly shows how the actual US target rate (Federal Funds rate) matched the rate produced by the Tayler rule.

Figure 1: The Original Taylor Rule, 1993-Present

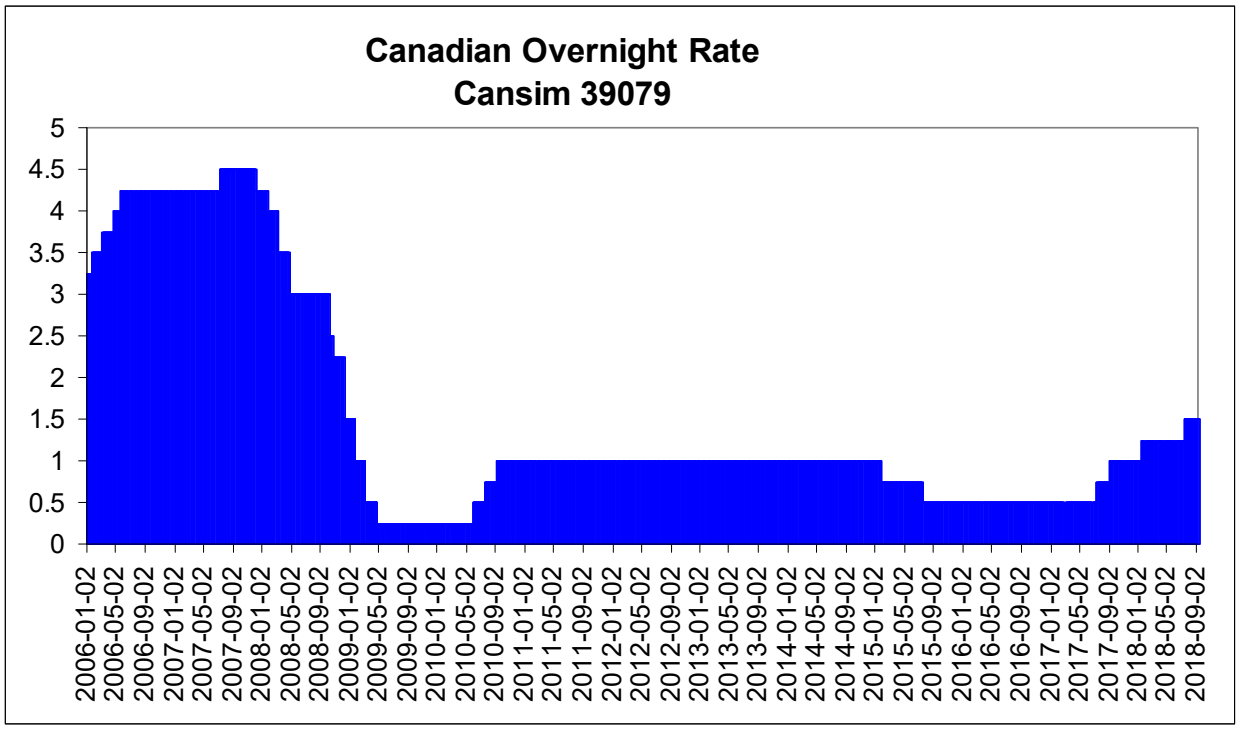


Although simplistic the Taylor rule points to the two key values that are critical for setting the policy rate: the difference between current and target inflation rate and the output gap, that is, how much spare capacity there is in the economy.

In Schedule 1 is basic macroeconomic data since 1987, where we can clearly see the effect of the Bank of Canada's agreement with the Government of Canada to bring down the rate of inflation as it has not exceeded 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 unemployment rate was actually below what is commonly regarded as the natural or non-accelerating inflation rate of unemployment (NAIRU) of 6.0%. Consumer spending was strong as low interest rates supported the purchase of consumer durables and new housing, while the strong investment position in Canada was partly due to a dramatic improvement in Canada's terms of trade as commodity prices increased. This created a perception that Canada was a "petro," or at least a "raw materials" based, economy which allied to the continuing strength of the current account surplus resulted in a strengthening Canadian dollar and incipient inflationary pressures. The result was that starting in September 2005 the Bank of Canada increased its overnight rate from 2.5% to reduce the stimulus being injected into the economy.

The following graph shows the impact of this tighter monetary policy from January 2006 until December 2007, the Bank of Canada set the target rate to try and slow down the economy and reduce inflationary pressures. Of importance is that consistent with the Bank of Canada's 2%

inflation target the overnight rate should be *at least* 3.0%; so 4.5% up until December 2007 was regarded as restrictive in increasing borrowing costs to slow interest sensitive demand. This policy stance was reversed due to the impact of the sub-prime mortgage crisis coming out of the United States.



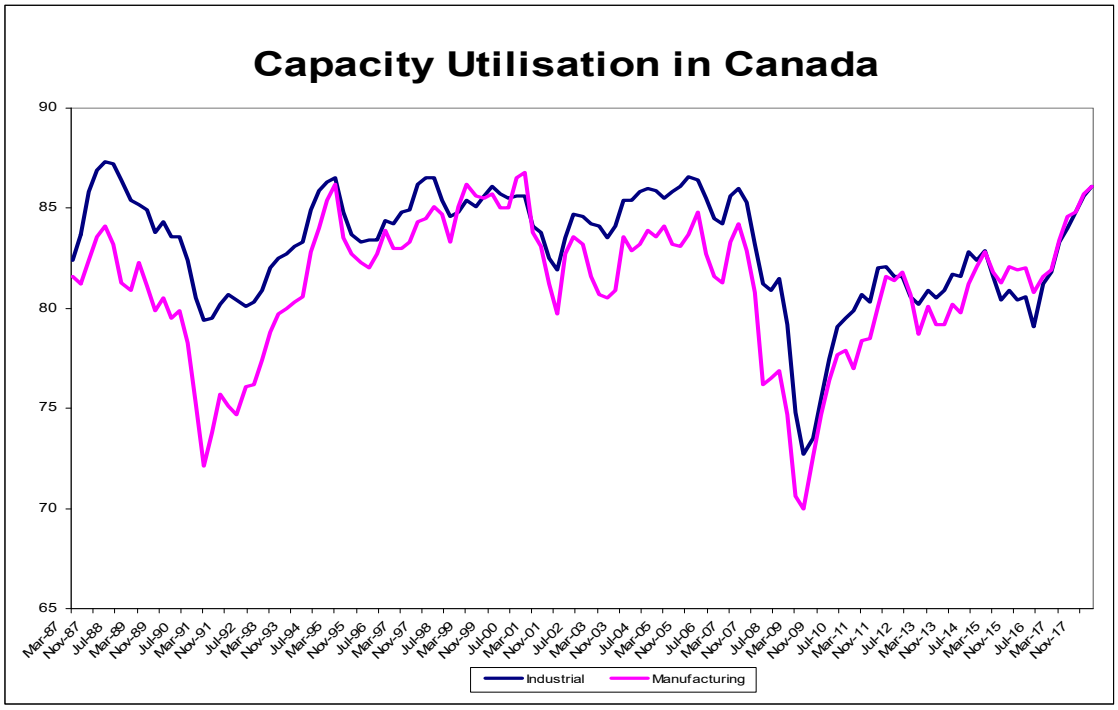
The above graph shows that the Bank conservatively lowered the overnight rate to 3.0% in May 2008 and it kept it there throughout the summer. It was then forced to dramatically and rapidly cut the overnight rate to 0.25% in response to the financial crisis triggered by the failure of Lehman Brothers. A 0.25% overnight rate has traditionally been thought of as the lowest rate the Bank can set, otherwise it means negative deposit rates for the settlement balances at the Bank.

Unlike the US, Canada recovered quickly from the "Great Recession" and the Bank of Canada started "normalising" by increasing the overnight rate in June 2010 as there were obvious signs of recovery in the Canadian economy. The Bank of Canada increased the overnight rate on three separate occasions each time by 0.25% to bring it to 1.0% and with it Prime increased to 3.0%. Expectations in 2011 were that the Bank would resume increasing the overnight rate as the economy continued to strengthen as it was still regarded as below the "equilibrium" or "normal" rate. Further, the Bank of Canada and the Federal Government started to worry that at 1.0% the

overnight rate would encourage too much personal borrowing and lead to levels of indebtedness that would have negative implications as interest rates returned to normal levels.[3],[4]

The conundrum faced by the Bank of Canada was that while it wanted to stimulate the economy by maintaining low interest rates, it did not want a US style debt-fuelled housing bubble. The additional problem was that the Canadian economy is not an island and increasingly the Bank of Canada was concerned about the transfer of events from the Eurozone, the UK, Japan, the US and China into Canada as the US Federal Reserve (Fed), the Bank of Japan, the Bank of England and the European Central Bank (ECB) all followed expansionary monetary policies.

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

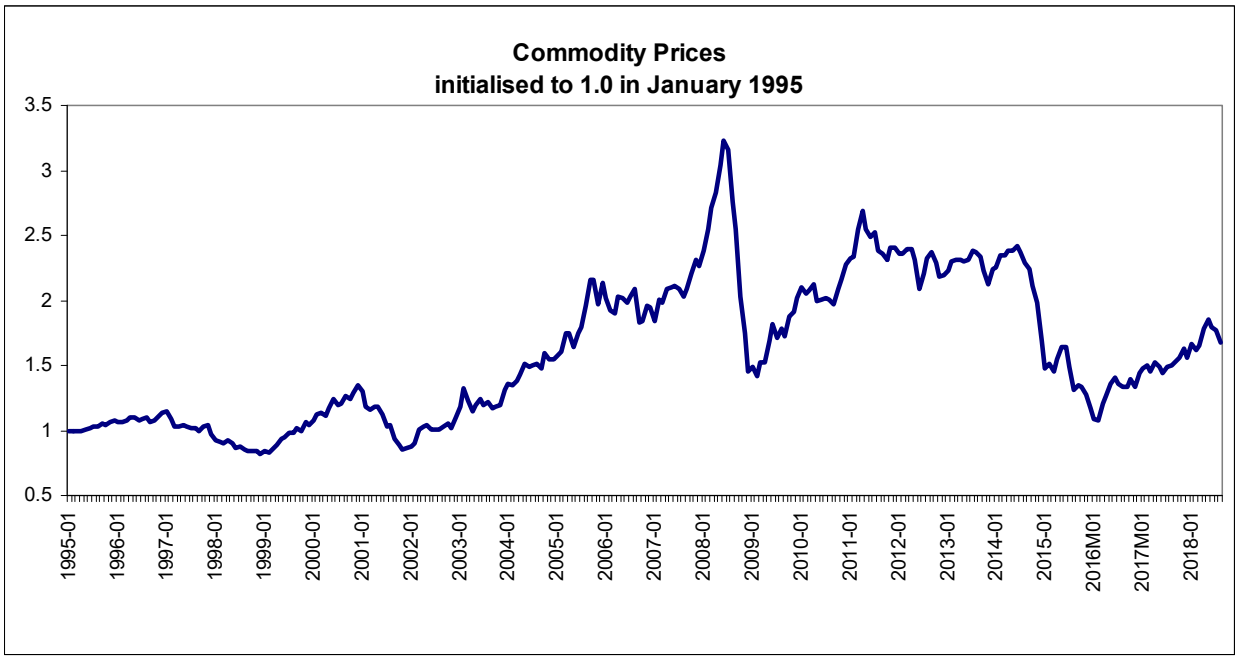


[3] The Bank and Federal Government were both particularly concerned about potential housing bubbles in Vancouver and Toronto.

[4] See the Canadian Bankers Association web site http://www.cba.ca/en/media-room/50-backgrounders-on-banking-issues/657-changes-to-canadas-mortgage-market

The sharp drop in capacity utilisation during the recession in the early 1990's is evident as well as 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 2012-2014 at a "low" level as the recovery did not continue apace. Instead, we were hit with the after effects of the Euro crisis and particularly the slow recovery of our major trading partner, the United States. Then just as the US recovery started to gather speed we were hit with the slowdown in China during 2015 and the dramatic drop in commodity prices.

The following graph shows the Bank of Canada's commodity price index. We can see the strong increase in commodity prices that started in 2002 as China started to seriously industrialise. The Great Recession in the United States in 2009 caused these prices to collapse, but they quickly recovered until the sharp sell-off in Summer 2015 on growing fears of a China slowdown.



It was this drop in commodity prices that severely affected Canada's resource sector, particularly in Western Canada and triggered a technical recession in 2015Q2 and weakened capacity utilisation at the start of 2015. In reaction to this the Bank of Canada surprised markets by cutting the overnight rate twice in early 2015 to 0.50%.

This was the situation at the time of my report in 2016: commodity prices had weakened; there was a drop in capacity utilization; and the Bank had reversed course and lowered the overnight rate.

Q. WHAT HAS HAPPENED SINCE 2016?

A. Mainly two events have occurred, the first is the recovery has continued and the second is the election of President Trump in the United States. In terms of the continued recovery, the fears of a slowdown in China proved overblown and commodity prices have partly recovered. The Table below is from the Bank of Canada's Monetary Policy Report (MPR, July 11, 2018) and shows that even Europe grew at 2.6% in 2017, with China still at 6.9%. The United States would undoubtedly have continued to grow in 2017, but President Trump has increased business confidence with a promise of reduced regulation and tax reform that was actually implemented in 2018.

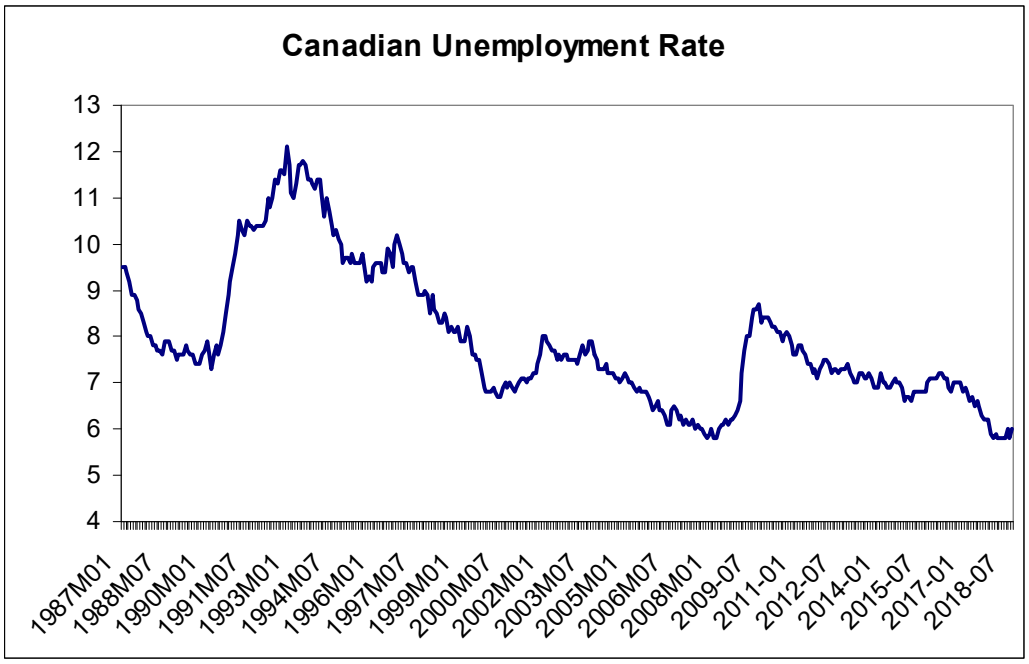
Table 1: Projection for global economic growth

	Share of real global GDP* (per cent)	Projected growth† (per cent)			
		2017	2018	2019	2020
United States	15	2.3 (2.3)	3.1 (2.7)	2.5 (2.7)	1.8 (2.0)
Euro area	12	2.6 (2.5)	2.2 (2.3)	1.6 (1.7)	1.4 (1.5)
Japan	4	1.7 (1.7)	0.9 (1.5)	0.9 (1.0)	0.2 (0.2)
China	18	6.9 (6.9)	6.5 (6.6)	6.2 (6.3)	6.0 (6.1)
Oil-importing EMEs‡	33	4.4 (4.4)	4.5 (4.5)	4.2 (4.4)	4.2 (4.2)
Rest of the world§	18	1.3 (1.4)	2.0 (2.0)	2.6 (2.4)	2.7 (2.7)
World	100	3.6 (3.6)	3.8 (3.8)	3.5 (3.6)	3.4 (3.4)

As the US is our main trading partner this increased growth has spilled over into Canada. As the capacity utilization graph shows, Corporate Canada is currently running at close to maximum capacity.

Further evidence is in the following graph of the unemployment rate. At the time of my 2016 report the unemployment rate was 6.8%. It dropped to 5.8% at the start of 2018 and has been hovering there throughout the year. In response to the stronger economic performance the Bank

of Canada has started to increase its target rate with four consecutive 0.25% increases to bring it to its current level of 1.50%. This is the highest it has been since the financial crisis.



Q. HOW DOES THIS RELATE TO GDP?

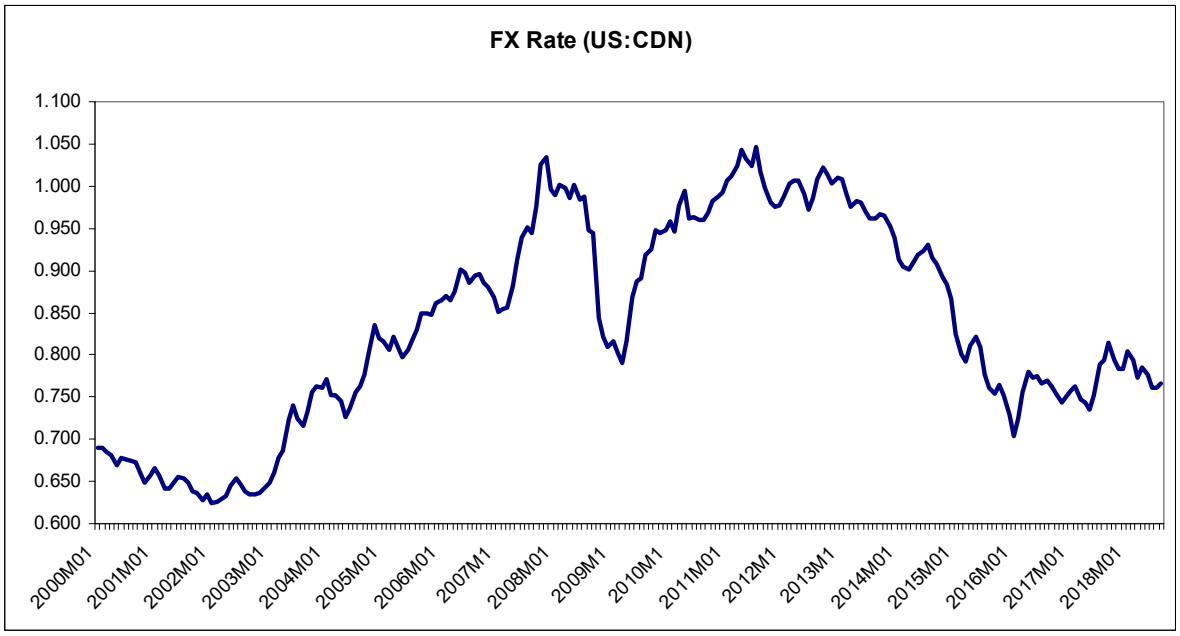
A. In 2016 the Bank was still very concerned about housing prices and household indebtedness, which to some extent it still. However, Household indebtedness has stabalised as interest rates have increased and economic growth has broadened with increased exports and business investment picking up as firms bump up against capacity constraints. The following table from the July MPR shows the Bank's 2% economic growth forecast has only 1.2-1.3% coming from consumer spending, while housing has a negative impact. From the Bank's point of view, this is a better scenario than in 2016 as the "heavy lifting" is no longer coming solely from the consumer and the housing market. Moreover, there is no longer the "two speed" scenario of 2016 with a strong Central Canada and a weak Western Canada.

Table 2: Contributions to average annual real GDP growth

Percentage points*†

	2017	2018	2019	2020
Consumption	1.9 (2.0)	1.3 (1.5)	1.3 (1.2)	1.2 (1.0)
Housing	0.2 (0.2)	0.1 (0.0)	0.0 (0.0)	-0.1 (-0.1)
Government	0.6 (0.6)	0.7 (0.6)	0.3 (0.3)	0.4 (0.4)
Business fixed investment	0.3 (0.3)	0.7 (0.4)	0.2 (0.3)	0.2 (0.3)
Subtotal: final domestic demand	3.1 (3.1)	2.8 (2.5)	1.8 (1.8)	1.7 (1.6)
Exports	0.3 (0.3)	0.5 (0.0)	0.8 (0.9)	0.8 (0.8)
Imports	-1.2 (-1.2)	-1.2 (-0.5)	-0.4 (-0.4)	-0.6 (-0.6)
Subtotal: net exports	-0.9 (-0.9)	-0.7 (-0.5)	0.4 (0.5)	0.2 (0.2)
Inventories	0.8 (0.8)	-0.1 (0.0)	0.0 (-0.2)	0.0 (0.0)
GDP	3.0 (3.0)	2.0 (2.0)	2.2 (2.1)	1.9 (1.8)

The major concern for the Bank is the impact of potential tariffs from the United States and the fact that commodity prices are still somewhat weak. We can see this in the value of the Canadian dollar graphed below.



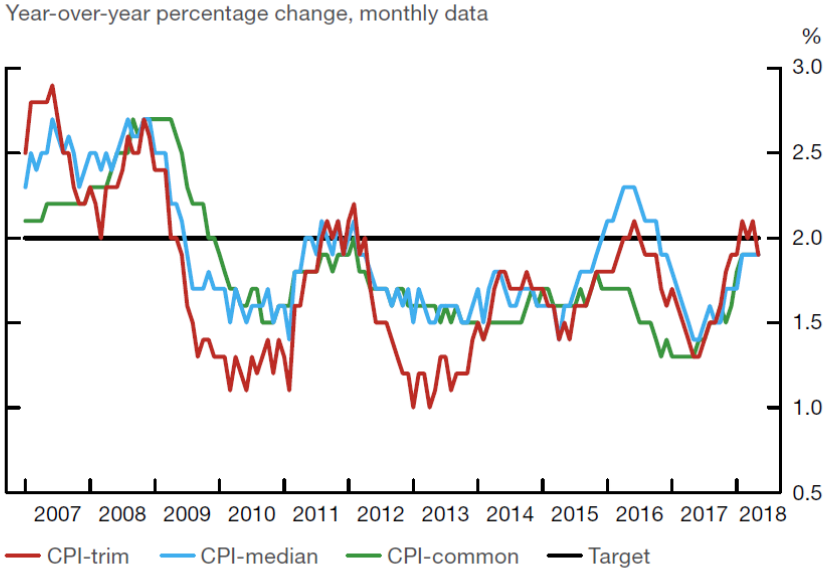
In January 2016 the Canadian dollar briefly touched US$0.703 due to the weak commodity prices. However, it subsequently increased to the US0.80 level before concerns about President Trump's potential tariffs knocked it back to the US$0.76 level.

Q. WHAT IS YOUR OUTLOOK FOR INFLATION?

A. The Bank of Canada's 2.0% target rate of inflation within a 1.0%-3.0% band was renewed with the Government of Canada in the Fall of 2016. However, currently Canada is operating at close to capacity with very low unemployment, so there are some inflationary pressures that were non-existent in 2016. However, although in July 2018 the headline CPI inflation rate hit 3.0% the Bank of Canada prefers to focus on core inflation which takes out the impact of volatile items. It does this by using three measures, CPI trim which removes outliers, CPI median which looks at the middle number and CPI common which is a statistical model that looks at the underlying factor driving prices. The following chart from the MPR shows that core inflation is at the centre of the Bank's inflation range at close to 2.0%.

Chart 9: Core inflation measures remain close to 2 per cent

Year-over-year percentage change, monthly data



Sources: Statistics Canada and Bank of Canada

Last observation: May 2018

So short run we can expect headline inflation to go beyond the Bank's 2% target, but core inflation to stay within the Bank's range.[5]

[5] Consensus CPI inflation for 2018 and 2019 are both marginally above 2.0%.

For longer run inflation we can look at the market's pricing of the nominal bond, where the interest rate is fixed and 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 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.

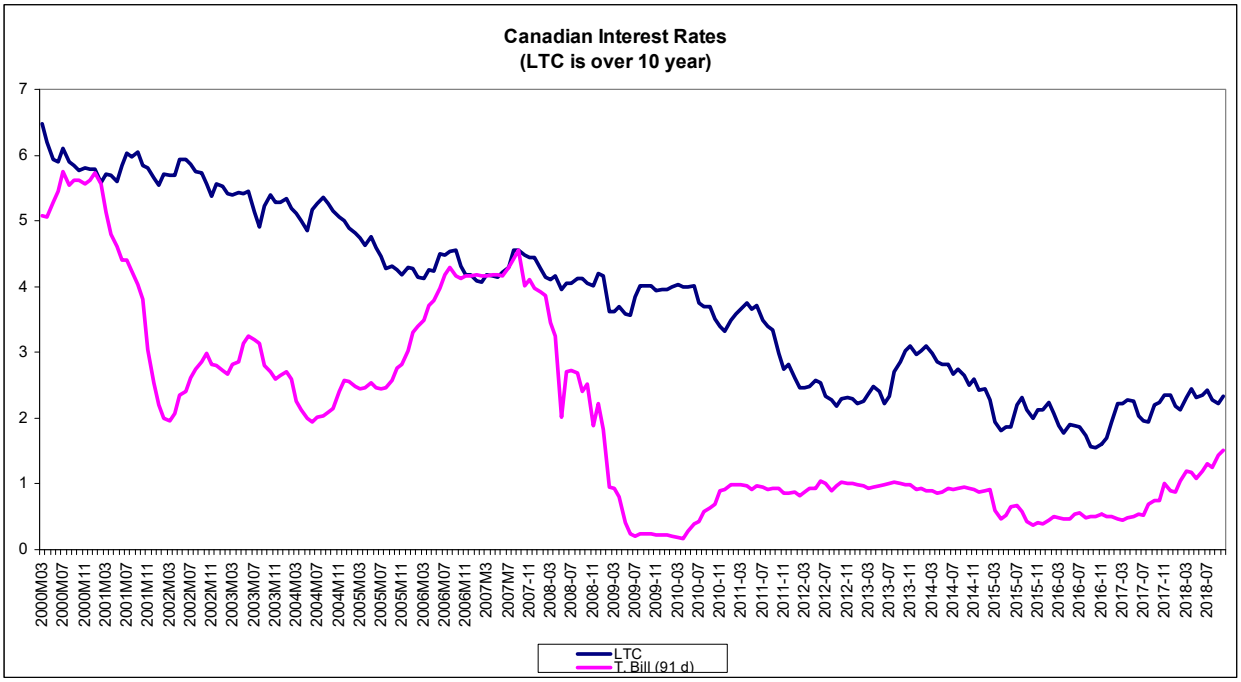
We can clearly see the collapse in inflationary expectations in the late 1990's as the market finally believed the Federal Government's intentions not to inflate its way out of its deficit problems. Since then the BEIR has generally been slightly above the Bank of Canada's 2.0% inflation target, but never above the 3.0% upper limit. However, at the time of my 2016 report the BEIR was only 1.37%, due to the weaker economic conditions; since then it has increased, but remains below 2.0%. Currently it is 1.72%.

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

Schedule 2 provides data on the full range of interest rates across the broad maturity spectrum as of September 11/12 2018. The interest rate on the 30 year Government of Canada bond at 2.34% is 0.82% higher than the 1.52% yield on 91 day Treasury Bills. This is referred to as a normal

yield curve as typically LTC yields are higher than short term T Bill yields. However, this yield spread of 0.82% is significantly smaller than in 2016, when it was 1.57% and slightly higher than the typical spread of 1.25%. The narrowing spread reflects the Bank of Canada's recent increases in the overnight rate and the reduction in the monetary stimulus the Bank is providing to the economy. This narrower spread also confirms the recovery since 2016.

Normally yields on LTC bonds are not as affected by current monetary policy as short term interest rates, since monetary policy works at the short end of the yield curve via the overnight rate; its influence then weakens as the maturity of the bond increases. The following graph shows that the LTC yield has been on a long run decline since 2000 when it was 6.48%.



However, it was still 4.0% until 2011 when the markets realised that although Canada was recovering neither the US nor Europe was in good shape, particularly the weaker Euro area members (Portugal, Ireland. Greece and Spain, the PIGS). The result was that what started as conventional monetary policy in the US, UK, Japan and Europe morphed into large bond buying programs known as quantitative easing. For example, in 2011 economists (RBC June 3, 2011) were still forecasting that LTC yields would increase to 4.55%. However, in 2011Q4 the US Federal Reserve embarked on the most dramatic third round of "quantitative easing" (QE3). With an open ended commitment to buy $85 billion of US 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.

The result was that in January 2016 the over ten year LTC bond yield was only 1.89% and actually bottomed out at 1.55% in August 2016. Since that time the US has stopped its bond buying program, and other countries have scaled back in the face of stronger economies. This combined with rising short term interest rates has caused LTC yields to increase to 2.33%. However, they are still not at the level they reached before the onslaught of these bond buying programs and much still depends on how quickly the central banks decide to sell off their huge excess bond holdings; the US Fed alone has purchased $3.7 trillion in bonds. If the US and the other central banks had not done this, bond yields would undoubtedly be much higher.

In 2016 I compared the situation to a bath, where although the baths had stopped filling or at least slowed down,[6] they were still incredibly full. The result is twofold: the supply of liquidity (money) used to buy securities has enormously increased, while the supply of bonds has decreased, since trillions have been taken off the market by central banks. The result has been a dramatic increase in bond prices and drop in market yields. Canada has been a by-stander in this as the Bank of Canada has never had to initiate a bond buying program, since it recovered from its own 2008/9 recession and started to increase the overnight rate in 2010. Essentially Canada has been waiting for the rest of the world to sort out its problems. It was for this reason that I put a floor under the forecast LTC yield in prior testimony of 3.80% when used in my risk premium estimates. In a nutshell, LTC bond yields were not being in a private sector "equilibrium" trading off risk versus return. Instead, they were being set by "global policy makers" which were the central banks.

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

A. Currently, the Royal Bank of Canada's September 9, 2018 forecast is as below. RBC is forecasting that the current overnight rate of 1.50% will increase to 2.25% by the end of 2019.

[6] The UK restarted its own program after a referendum in favour of Brexit in 2016.

The US, in contrast, has a current Federal Funds rate of 2.25% which is expected to increase to 3.50% over the same time period. Similarly, RBC is forecasting the 30 year LTC bond yield will increase from 2.45% to 3.0% rather than the US increase from 3.35% to 3.85%.

Interest rates—North America
%, end of period

	Actual						Forecast						Actual		Forecast	
	17Q1	17Q2	17Q3	17Q4	18Q1	18Q2	18Q3	18Q4	19Q1	19Q2	19Q3	19Q4	2016	2017	2018	2019
Canada																
Overnight	0.50	0.50	1.00	1.00	1.25	1.25	1.50	1.75	2.00	2.25	2.25	2.25	0.50	1.00	1.75	2.25
Three-month	0.52	0.71	1.00	1.06	1.10	1.26	1.40	1.65	1.90	2.15	2.15	2.15	0.46	1.06	1.65	2.15
Two-year	0.75	1.10	1.52	1.69	1.78	1.91	2.10	2.30	2.45	2.45	2.40	2.35	0.75	1.69	2.30	2.35
Five-year	1.12	1.40	1.75	1.87	1.97	2.07	2.25	2.45	2.55	2.65	2.70	2.70	1.12	1.87	2.45	2.70
10-year	1.62	1.76	2.10	2.04	2.09	2.17	2.35	2.60	2.70	2.80	2.90	2.95	1.71	2.04	2.60	2.95
30-year	2.30	2.14	2.47	2.27	2.23	2.20	2.45	2.70	2.80	2.90	3.00	3.00	2.31	2.27	2.70	3.00
Yield curve (10s-2s)	87	66	58	35	31	26	25	30	25	35	50	60	96	35	30	60
United States																
Fed funds*	1.00	1.25	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	0.75	1.50	2.50	3.50
Three-month	0.76	1.03	1.06	1.39	1.73	1.93	2.15	2.35	2.65	2.90	3.15	3.35	0.51	1.39	2.35	3.35
Two-year	1.27	1.38	1.47	1.89	2.27	2.52	2.65	2.80	3.00	3.25	3.40	3.55	1.20	1.89	2.80	3.55
Five-year	1.93	1.89	1.92	2.20	2.56	2.73	2.95	3.10	3.25	3.45	3.55	3.65	1.93	2.20	3.10	3.65
10-year	2.40	2.31	2.33	2.40	2.74	2.85	3.15	3.30	3.45	3.60	3.70	3.75	2.45	2.40	3.30	3.75
30-year	3.02	2.84	2.86	2.74	2.97	2.98	3.35	3.50	3.65	3.75	3.80	3.85	3.06	2.74	3.50	3.85
Yield curve (10s-2s)	113	93	86	51	47	33	50	50	45	35	30	20	125	51	50	20
Yield spreads																
Three-month T-bills	-0.24	-0.32	-0.06	-0.33	-0.63	-0.67	-0.75	-0.70	-0.75	-0.75	-1.00	-1.20	-0.05	-0.33	-0.70	-1.20
Two-year	-0.52	-0.28	0.05	-0.20	-0.49	-0.61	-0.55	-0.50	-0.55	-0.80	-1.00	-1.20	-0.45	-0.20	-0.50	-1.20
Five-year	-0.81	-0.49	-0.17	-0.33	-0.59	-0.66	-0.70	-0.65	-0.70	-0.80	-0.85	-0.95	-0.81	-0.33	-0.65	-0.95
10-year	-0.78	-0.55	-0.23	-0.36	-0.65	-0.68	-0.80	-0.70	-0.75	-0.80	-0.80	-0.80	-0.74	-0.36	-0.70	-0.80
30-year	-0.72	-0.70	-0.39	-0.47	-0.74	-0.78	-0.90	-0.80	-0.85	-0.85	-0.80	-0.85	-0.75	-0.47	-0.80	-0.85

Note: Interest Rates are end of period rates. * Top of 25 basis point range

What is clear is that there has been movement since 2016 toward "normality" at the short end of the yield curve. However, the enormous amount of excess global liquidity is still affecting LTC yields. Whereas in June 2011 RBC was forecasting a quick rebound to the 4.55-5.05% level for LTC and US Treasury yields, this was scaled back to 3.65%-4.25% in 2016 and is now even lower at only 3.00-3.85%.

The RBC forecast is usually aggressive compared to the general consensus. However, it currently is not as aggressive as it has been. Currently, the Consensus Economics forecast for the three month Treasury Bill yield in a year's time is 2.20%, which is a bit higher than RBC whereas its 10 year bond yield is at 2.875% which is essentially the same as RBC. The range for the 10 year bond yield is 2.63-3.2% and even adding the current spread to the 30 year bond yield which is a miniscule 0.02% no-one is forecasting that my 3.8% trigger for the LTC bond yield will be reached by the end of next year.

Moreover, at one point this Board used the current LTC yield not the forecast LTC yield to set the fair ROE. Logically this is the correct approach, since bond yields are set on the basis of market participants expectations for future interest rates. For example if the current two year yield is 5% and the one year yield 1%, next year's one year yield should be 9% so that the rate earned over two years is similar. This "unbiased expectations theorem" is particularly relevant at the moment since the current 30 year bond yield is 2.34%, whereas the ten year bond yield is only 2.32%. To a close approximation this means that in ten year's time, the market is expecting that the 20 year bond yield will still be similar to today. In other words, the market does not believe the interest rate forecasts from the economists included in the Consensus. Instead the market believes that interest rates will be lower for longer! The fact that forecasters have been consistently wrong since the financial crisis would reinforce this view.

In my judgement interest rates are not, and probably will not for the foreseeable future, be set by private investors. Instead, they are mainly being set by the "global policy makers." As a result, forecasting interest rates for a small country like Canada in a global financial system depends critically on central bank decisions elsewhere.

Q. AS THE MAJOR "POLICY MAKER" WHAT IS HAPPENING IN THE US?

A. The US Federal Reserve has been increasing its policy rate, the Federal Funds rate, since 2016 and has stopped its bond buying program and is now winding down its bond holdings in an orderly manner. At the time of my report in 2016 the Federal Funds rate was 0.75%, whereas at its August 1, 2018 meeting it kept the rate at 2.0%. This is a slightly higher rate of increase than for the overnight rate. After the Federal Reserve's March 2018 meeting RBC produced the following chart. Why this chart is important is that the Federal Reserve's policy making committee regards the "longer run" Federal Funds rate to be 2.9%. In 2016 I referred to Bank of Canada research[7] that this "longer run" or neutral rate in the US was felt to be a real rate of 1.75%, which with 2% inflation means about 3.75%. Consequently, the Fed seems to be explicitly ratcheting down the long run "neutral" policy rate. More importantly the Fed saw the

[7] Reza and Sarker, "Is slower growth the new normal in advanced economies," Bank of Canada Review, Autumn 2015.

US economy as "over-heating" with unemployment dropping to 3.6% or below its neutral rate of 4.5% and short term economic growth well above its longer run rate of 1.8%. As a result, the Fed sees its policy rate rising to average 3.4% by 2020 as its tries to slow down the US economy and incipient inflation. In this, RBC is right on Consensus with a current forecast for the Federal Funds rate of 3.5% by the end of 2019.

FOMC Median Economic Projections, March 2018

	2018	2019	2020	Longer run	
Change in real GDP	2.7	2.4	2.0	1.8	Growth revised
December projection	*2.5*	*2.1*	*2.0*	*1.8*	higher
Unemployment rate	3.8	3.6	3.6	4.5	Unemployment
December projection	*3.9*	*3.9*	*4.0*	*4.6*	below LR level
PCE inflation	1.9	2.0	2.1	2.0	
December projection	*1.9*	*2.0*	*2.0*	*2.0*	
Core PCE inflation	1.9	2.1	2.1		
December projection	*1.9*	*2.0*	*2.0*		
Federal funds rate	2.1	2.9	3.4	2.9	Fed funds
December projection	*2.1*	*2.7*	*3.1*	*2.8*	above LR level

Note: GDP and inflation projections are Q4/Q4
Source: Federal Reserve Board

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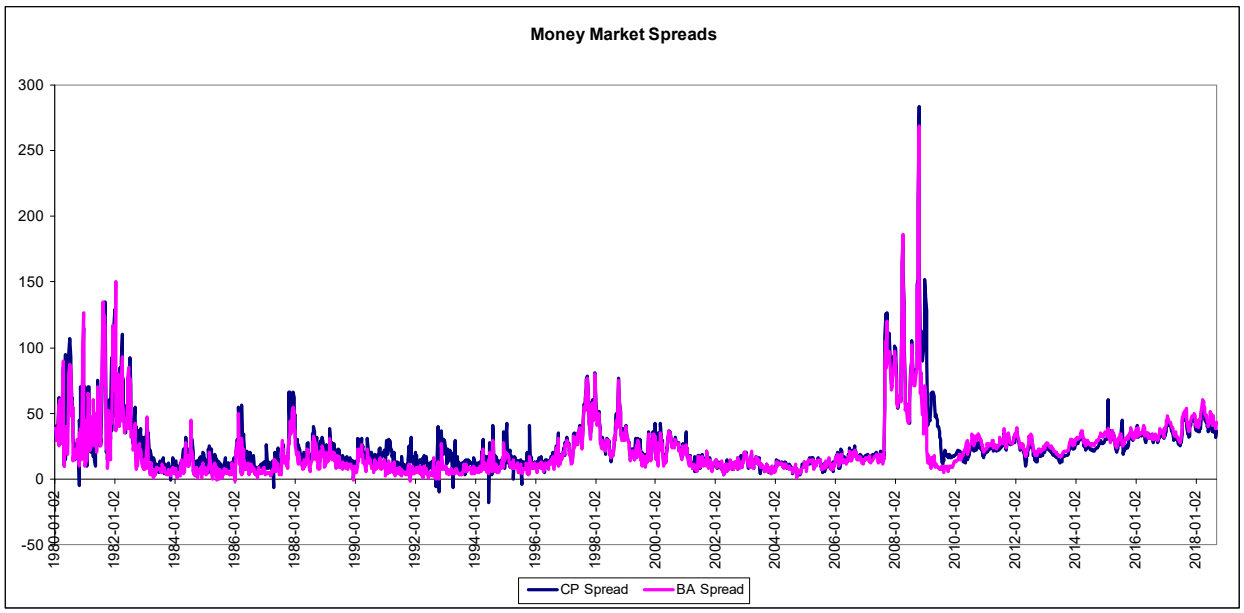
The fear is that if the Federal Reserve gets this wrong, its actions may trigger a US recession in 2021. Regardless, the Fed forecasts above trend US economic growth through 2020 which will support Canadian exports provided a new NAFTA is negotiated.

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

A. The following graphs the spread between the yield on 91 day Treasury Bills (TB) and those on three month Bankers Acceptances (BA) and Commercial paper (CP). Treasury Bill yields are close to the rate that the chartered banks get from their deposits at the Bank of Canada when they have excess cash and are effectively default free, since they are obligations of the Treasury of the Government of Canada. In contrast, the Bankers' Acceptance rate is the rate the market requires on short term investments in the main chartered banks, whereas the Commercial Paper rate is the rate that large Canadian companies with the best credit rating can get by issuing notes in the money market. As a result, the spreads between these two private rates and that on Treasury Bills

is indicative of the state of the short term lending market[8] and the willingness of large investors to lend to the banks and very low risk, stable, Canadian companies

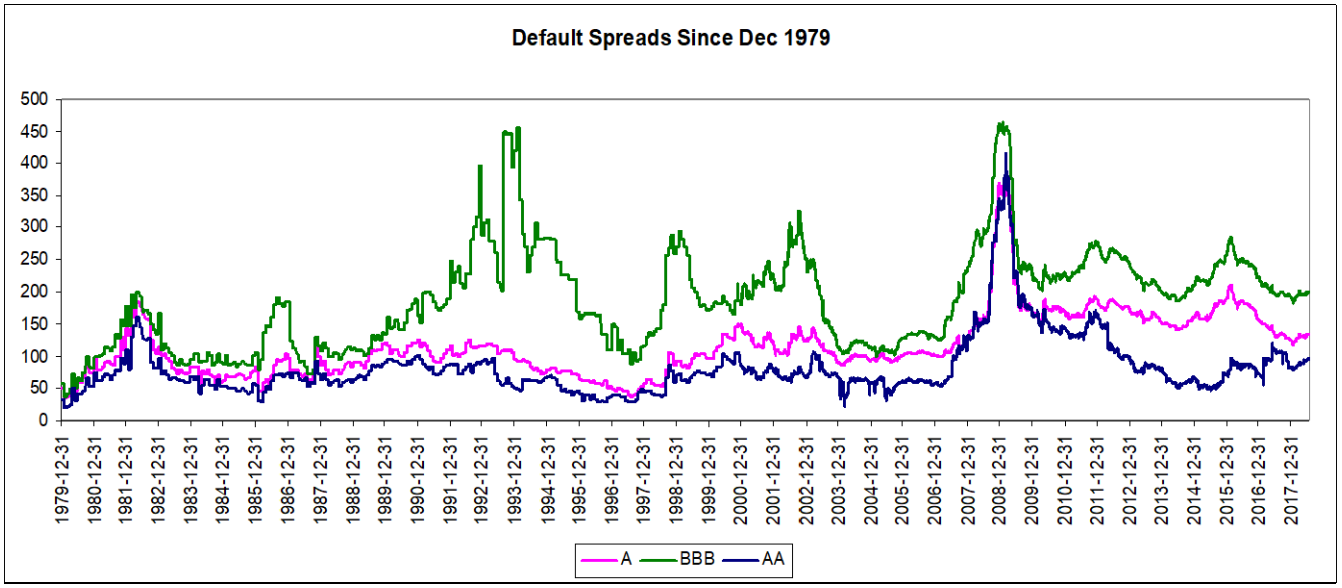


Before discussing these spreads, it is important to note that investors in the money market are mainly "parking" their money, rather than investing, since their main concern is security of principal, that is, getting their money back. Consequently, with any hint of default the market seizes up. This happens periodically in the CP market as seemingly low risk institutions default and investors panic and refuse to roll over or reinvest the money invested in CP. Their fear is of further losses due to an inability to distinguish between good and bad risks. For example, we can clearly see the impact of the financial crisis in 2008/9 when investors did not know how healthy the Canadian banks were or how deep the recession would be.

At the time of my report in 2016 CP spreads were at 0.37% and BA spreads 0.38% over T Bill yields of 0.45%. Currently (5/9/2018), T Bill yields have increased to 1.49% with the 1% increase in the overnight rate, but the CP spread is still 0.37% while the BA spread is slightly wider at 0.43%. There is no question that top quality credits can access funds in the money market on similar spreads to 2016 with no hint of any access problems.

[8] The main banks are generally rated R-1 (Mid) equivalent to an AA bond rating while CP is a mixture of R-1 (Mid) and R-1 (low), so generally these spreads are very similar.

The following graphs the generic credit or default spreads between corporate and government long term bonds using the AA, A, and BBB indexes maintained originally by Scotia Capital markets.[9]



Corporate bonds have default risk, since companies can run into financial difficulty, whereas governments borrowing in their own currency like Canada cannot.[10] 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. We can see this clearly in the high spreads during the long recession of the early 1990s, the panic of the Asian crisis and the bursting of the Internet Bubble and in particular the financial crisis of 2008-9. Note also that usually the spread increases most for BBB bonds, which are the riskiest of investment grade bonds.

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

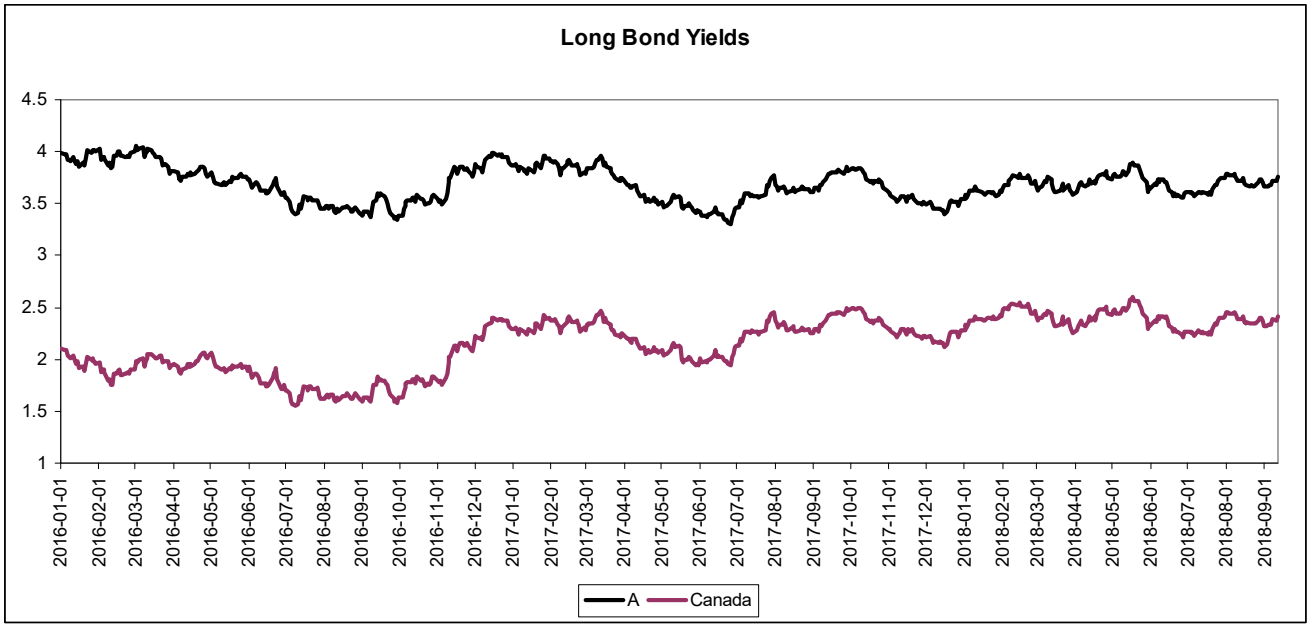
[10] This assumes they simply print more money to pay off their debts. The US can do this, but it has been the behaviour of Tea Party Republicans in Congress arguing that the US should default that has frightened global investors since 2011 and caused S&P to downgrade US $ debt to AA+.

In 2016 at the time of my report, A spreads were about 1.90% and had increased since the summer of 2015, when they were just under 1.60%.[11] Currently, A spreads have dropped to 1.35% and are at their lowest level since the financial crisis. It is important at this point to emphasise that a spread is simply the difference between two numbers and can obviously change if either of those two numbers changes. The following is the actual data:

	A Yield	LTC	A Spread
2016-01-06	3.9265	2.0356	189.09
2018-09-11	3.7653	2.417	134.83

On January 6, 2016 the LTC yield was 2.0356% and the generic A yield 3.9265% for a spread of 1.891%. On September 11, 2018 the LTC yield had increased to 2.417% while the generic A bond yield had dropped to 3.765%, so the drop in the spread of 0.54% is comprised of two components: an increase in the LTC yield of 0.38% and a drop in the A yield of 0.16%.

The following chart has the actual yields since January 2016, not the spreads.



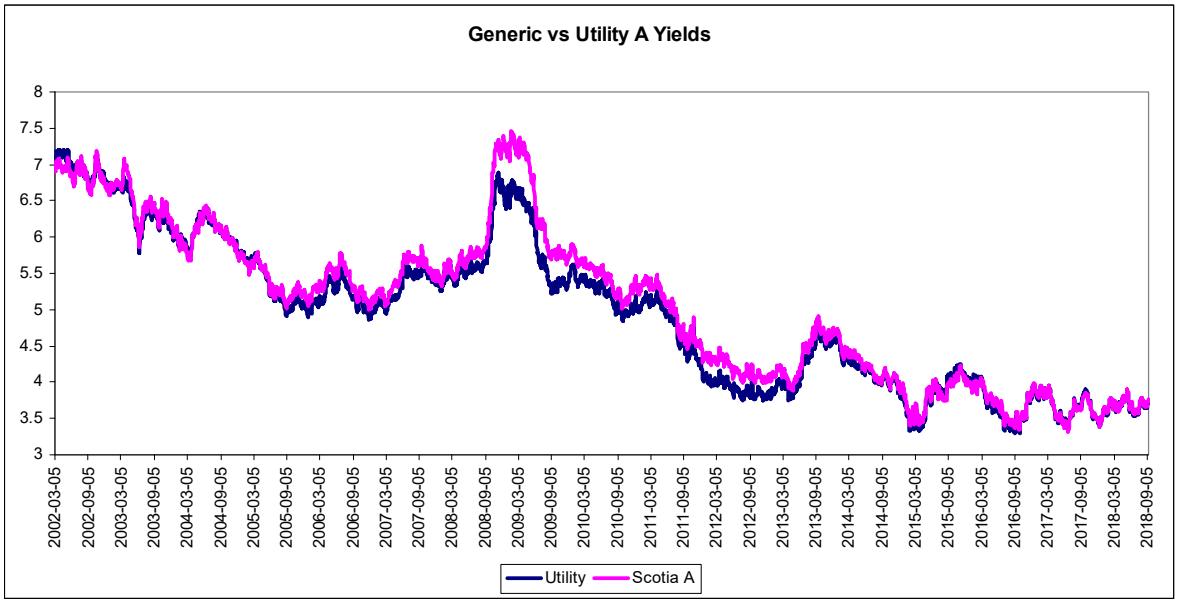
There is no reason why all interest rates should increase or decrease in the same manner, since they represent different markets. I judge that the increase in LTC yields is due in part to the

[11] This was a minor increase over the 1.80% of my 2012 report.

retreat from quantitative easing as well as being a shift into slightly riskier A rated bonds in search of a higher yield. It is notable that LTC yields have been more volatile over this period than have A bond yields, which have been remarkably stable.[12] However, the fact is that spreads have not been consistently below recent levels since the end of 2007. Both of these facts indicate that the state of the corporate debt market in Canada is even more accessible than in 2016.

Q. DO THESE GENERAL COMMENTS APPLY TO UTILITIES?

A. Yes. In testimony just after the financial crisis I provided information about utility "A" yields as distinct from Scotia's generic "A" yields. This is because during financial crises when investors "rush for safety" they value the regulatory protection afforded utilities. As a result, there is a positive spread between generic and utility yields and utilities can still finance on reasonable terms whereas some non-utilities may have problems. The graph below shows the yields from Scotia's generic A rated bond series and a synthetic series created by Bloomberg from A rated bonds issued by utilities. The latter series has been used by other regulators, in particular, the Ontario Energy Board in their generic formula based ROE.

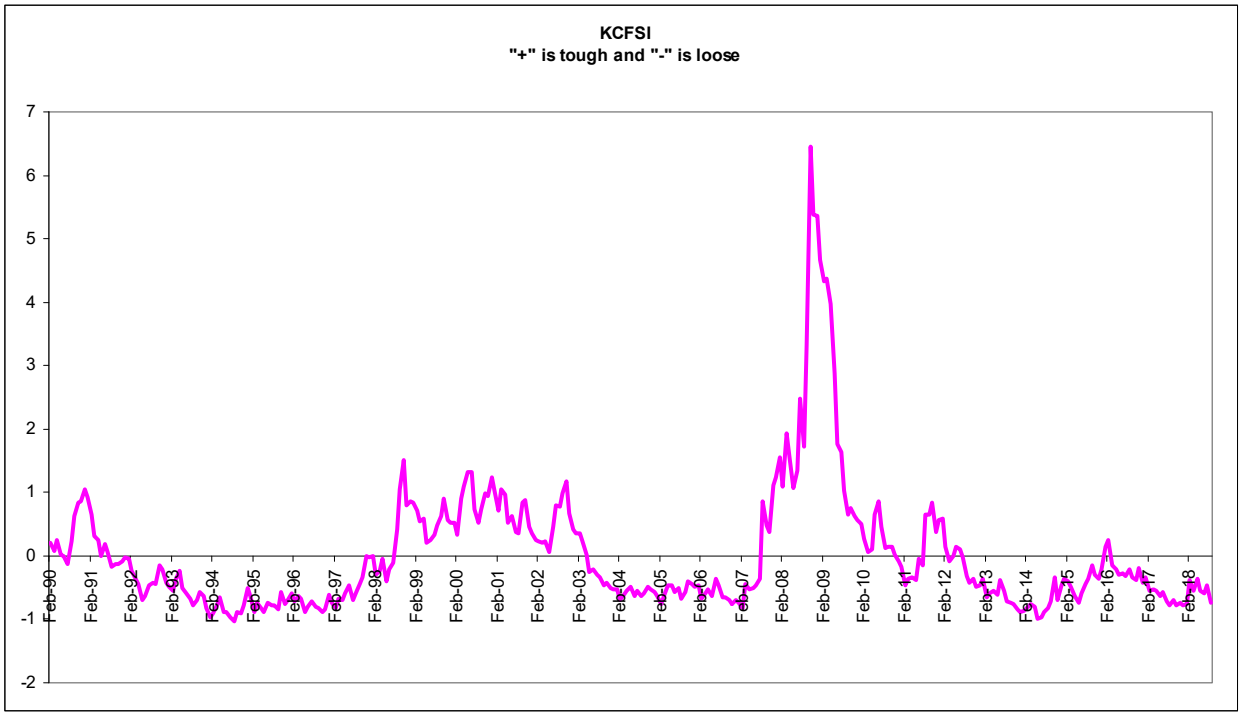


[12] The standard deviation of the LTC yields has been 26.0%, whereas that for the A yields 16.5%.

Note that during the financial crisis the generic A spreads were consistently higher than the utility A spreads. However, by 2013 and the recovery of the Canadian market this difference had just about disappeared. So far in 2018 the difference is an insignificant 0.0157% (1.57 basis points). This is another indicator of the current lack of stress in financial markets.

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 bankers. It is useful therefore to look at broader measures of the state of the financial system. In the US the Federal Reserve Bank of Kansas City has developed the Kansas City "Financial Stress" Index (KCFSI) which is graphed below.

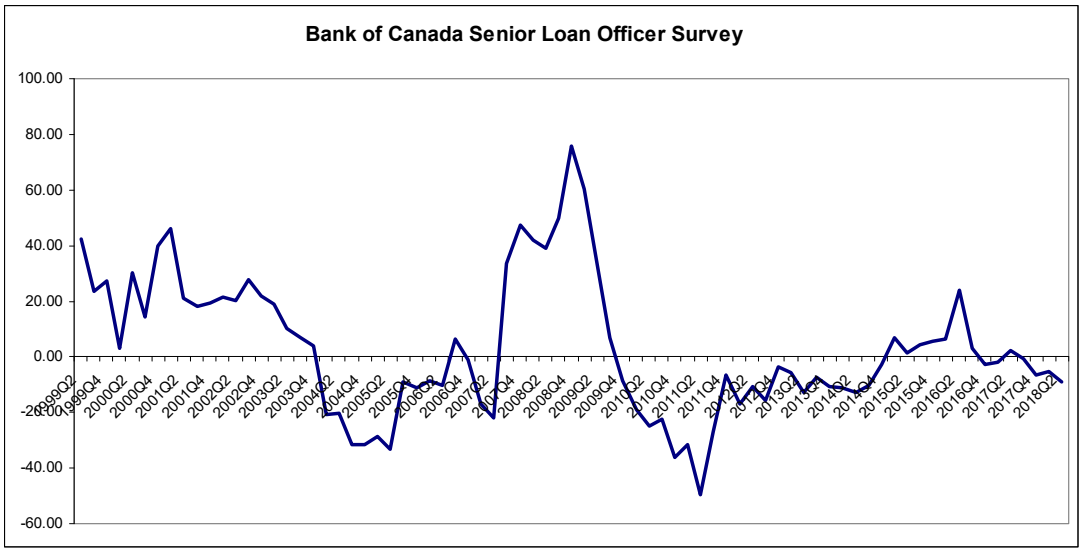


This index is designed to capture a variety of financial indicators in addition to the two which I have traditionally focussed on, which are the spreads in the money and bond markets. The additional indicators include the stock market volatility index, the state of bank share prices, and the behaviour of stock and bond returns. When the KCFSI is above 0 it indicates that capital markets are under stress or that access to markets is "tough" 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.[13] The major insight of the KCFSI is that it emphasises the enormous pressure in the US financial system during the financial crisis. Unlike the internet bubble crash in 2001 the crisis in 2008/9 struck at the very core of the US financial system, which is the banking system, where liquidity, that is, the ability to trade securities at close to their true market value, dried up in many parts of the capital markets while the US government had to intervene on a massive scale. Since the financial crisis financial market conditions have been easy, except that in 2012 and again in 2016 they briefly tightened. At the time of my report in 2016 the KCFSI was above 0 (end of January 2016, 0.25) indicating a slightly stressed system, whereas today it is -0.73, indicating significantly less stress.

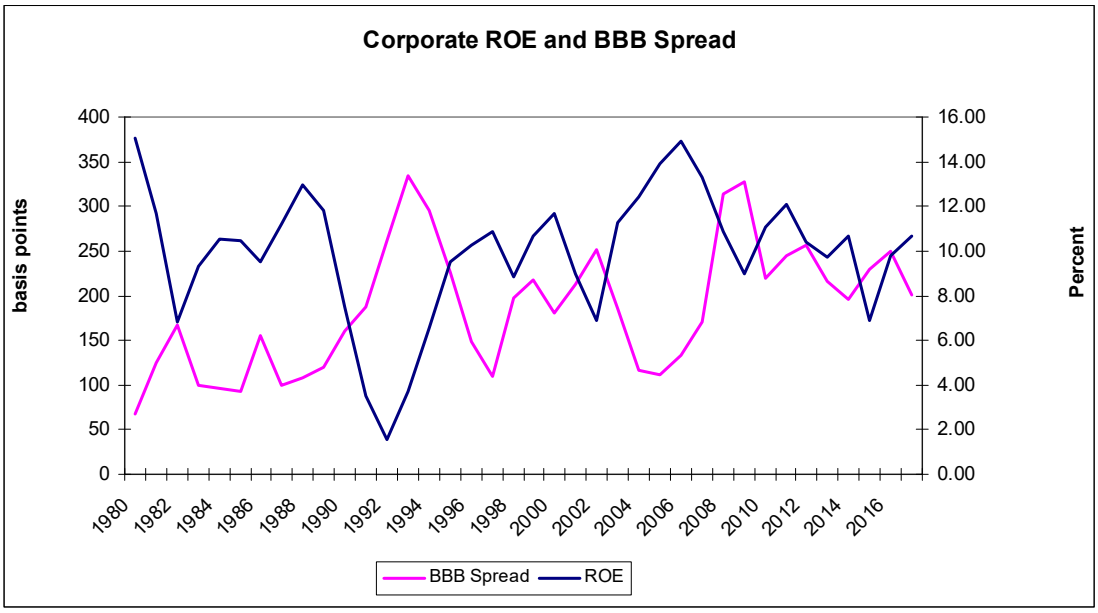
The work by the Kansas City Fed follows pioneering work done by researchers at the Bank of Canada who developed a simpler financial conditions stress index. However, the Bank of Canada has downplayed its own financial stress indicator and preferred to rely on alternative measures. One of the most important indicators is the Bank's survey results from senior lending officers, which reflects their assessment of the lending conditions to Canadian non-financial firms. The following graph provides the survey results from the Bank and similarly we see the tightening credit market conditions during the financial crisis and the loose conditions thereafter with a gradual return to normal pricing and credit conditions, However, similar to the KCFSI it also shows the deterioration in credit markets at the time of my 2016 report, where the survey respondents reported tighter credit market conditions that had not been seen since the financial crisis. However, this soon passed and currently we are back to easier credit markets.

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



Q. HOW DOES THE STATE OF THE ECONOMY AFFECT PROFITS AND THE CAPITAL MARKET?

A. The following graph shows the average annual ROE earned by all firms in Canada and the spread between the yield on BBB debt and long Canada bonds since 1980. The graph illustrates the basic inverse relationship that spreads normally increase during recessions when corporate profitability drops and then reduce when the economy recovers and corporate profits increase. This pattern is most evident in BBB spreads since they are usually more credit sensitive. For example, we can clearly see the recession of the early 1990s and again to a lesser degree during the financial crisis. However, even during the financial crisis basic corporate profitability in Canada remained healthy due to strong commodity prices, indicating that much of the pressure was coming from events in the US and elsewhere. In 2015 and 2016 the average BBB spread was 2.29% and 2.50% while the average ROE was 6.9% and 9.8% respectively. In contrast in 2017 corporate profitability increased to an ROE of 10.68% while BBB spreads averaged 2.02%.



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

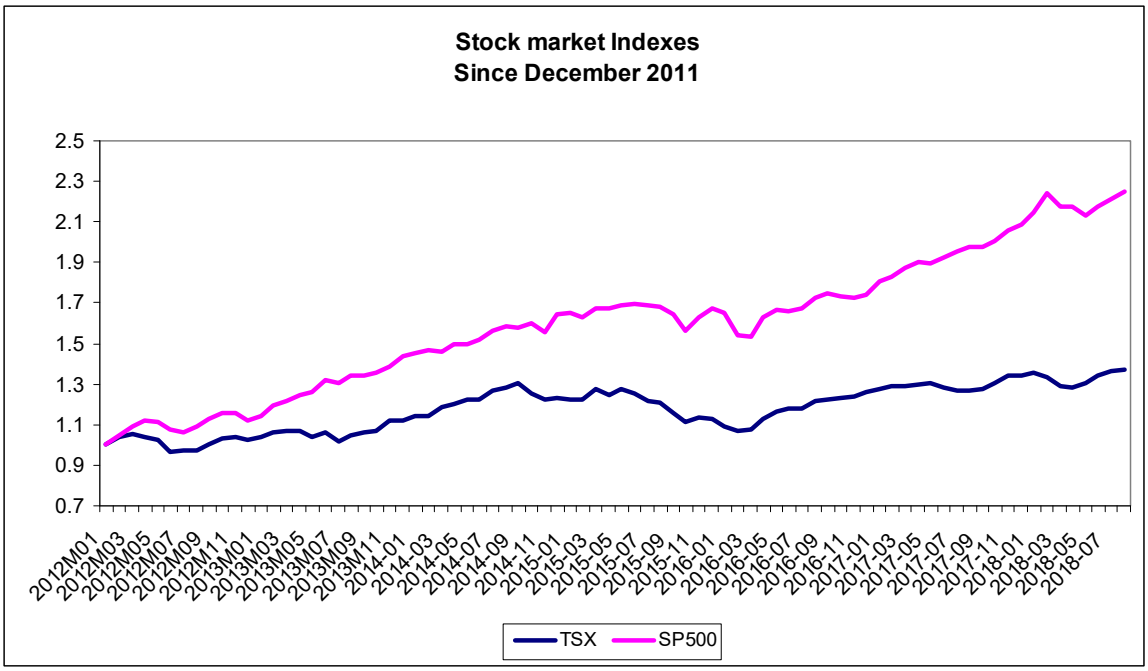
A. In 2016 the Canadian economy was suffering from two effects: a drop in commodity prices hurting the materials and energy sector and a strengthening U.S economy. In response the Bank of Canada cut the overnight rate, spreads widened and LTC bond yields dropped to record lows. In a nutshell, there was some stress in the capital markets. This was in contrast to the situation in 2012 where the Bank of Canada had anticipated that the remaining spare capacity in the economy would be used up by mid-2015, while the financial system was "firing on all cylinders" according to the then Governor of the Bank of Canada, Mark Carney. In 2016 I concluded that

> "we are still a couple of years away from the peak of the business cycle with plenty of growth to come. Whether we can use up these resources depends on continued growth in the U.S and whether the slowdown in China causes more problems."

This forecast has proven accurate. The US has been and is forecast to grow above trend, the fears over China have dissipated and the combined effect has been that Canada has used up most of its spare capacity leading to a shift in the composition away from consumer (housing) lead growth to export and investment lead growth. .

These underlying real effects have caused capital markets conditions to change. Rather than the incipient stress that was evident in 2016, financial conditions are now easier. The enormous stimulus injected into the economy by central banks is gradually being withdrawn and the overnight rate has increased by 1.0%, while in the US the Federal Funds rate is getting close to its "neutral" rate in neither stimulating nor slowing down the US economy. Consequently, government long term bond yields have increased, while those on A rated bonds have decreased leading to spread decreases. At the same time the easier conditions in the bond market are also reflected in easier conditions in corporate lending and less financial stress.

These conditions have not gone unnoticed in the equity market as shown in the following graph. In 2016 the value (January 29, 2016) for the TSX was 12,720 which was 18.5% below its high as the impact of low commodity prices hurt the market contributing to financial stress. Currently the TSX is at 16,434 (July 2018) or almost 30% higher. The US S&P500 index has performed even better, increasing from 1982 (Jan 2016) to 2,794 (July 2018) or 41%. The following graph tracks this performance since 2012 where both are initialised to 1 on that date.



Overall, the stock market mirrors the reduction in financial stress, easy credit market conditions, and good economic growth.

In fact, financial market conditions are so good it is worrying! Part of the Bank of Canada's responsibilities is to promote the safety and efficiency of Canada's financial system. In doing this it publishes its Financial System Review, where it gauges the severity of risks posed to the financial system. In this activity it is the job of the Bank to find risks and highlight them so that policy makers can take action. So the fact the Bank finds risks should not be a surprise. In its latest review (June 2018) it reported the following:

Table 3: Key risks to the stability of the Canadian financial system

Risk scenarios	Ratings and developments since the November 2017 *Financial System Review*
Risk 1: A severe nationwide recession leading to a rise in financial stress ▪ A large, persistent negative foreign demand shock affects Canada. One possibility is a severe recession in China or a sharp rise in global protectionism, which triggers weaker global growth. ▪ A foreign demand shock could lead to a severe recession in Canada, with a sharp rise in unemployment nationwide and a correction in house prices. ▪ Household and housing market vulnerabilities interact to create stress on lenders and the broader financial system.	**Elevated but decreasing** ▪ Economic performance in Canada and abroad has been strong. ▪ Solid job growth and higher wages have enhanced the resilience of Canadian households. ▪ Stronger mortgage underwriting standards and higher interest rates have slowed household credit growth. The updates to Guideline B-20 will also help reduce the creation of highly indebted households. ▪ The stock of household debt remains high and is expected to be elevated for some time.
Risk 2: A house price correction in overheated markets ▪ Significant house price corrections occur in Toronto and Vancouver and their surrounding areas, with modest direct spillovers to other housing markets. ▪ Residential investment and related consumption fall dramatically in affected regions. ▪ Lender balance sheets deteriorate and credit conditions tighten.	**Moderate** ▪ Growth in home prices has slowed markedly over the past year. Resales are also down, but activity is expected to pick up. ▪ Price declines for single-family homes in Toronto have unwound increases from early 2017. In contrast, the growth in condominium prices in Toronto and Vancouver has been strong, and there is evidence of speculative activity.
Risk 3: A sharp increase in long-term interest rates driven by higher global risk premiums ▪ Higher global risk premiums are triggered by abrupt market reactions to (i) an unanticipated change in economic policies or (ii) an unexpected increase in inflation prospects. Financial contagion affects a wide range of asset classes. ▪ The resulting collapse in valuations puts many financial institutions under stress, amplified by past risk-taking in the non-bank financial sector.	**Moderate but increasing** ▪ Major global central banks are gradually withdrawing monetary stimulus, or plan to do so. ▪ Despite gradual increases in global policy rates, risk premiums remain low. ▪ Financial stress is developing in some emerging-market economies, but contagion has so far been limited. ▪ Liquidity mismatch by investment funds could amplify shocks.

Risk ratings: Low | Moderate | Elevated | High | Very high

Of note is that only one risk is elevated, (but decreasing), while none are high or very high. This is the possibility of external threats such as trade wars and protectionism affecting Canada. The Bank's perennial concern about household indebtedness has been reduced, while it remains concerned about the knock on effect of rising interest rates. It no longer puts probabilities assigned to these risks or weights their severity. I would judge this assessment as remarkably benign.

Q. THESE COMMENTS ARE FOR CANADA IS THERE ANYTHING DIFFERENT ABOUT NEWFOUNDLAND AND LABRADOR?

A. While almost all the capital market data is relevant for Canada as a whole there are important differences in regional economic performance. This is particularly true for Newfoundland and Labrador simply because it is the second smallest province in Canada and does not have the diversified economy of larger provinces. Consequently, its economy is buffeted by large projects such as Hebron and Muskrat Falls that would not have the same impact on, for example, Ontario.

The table below comes from the Royal Bank of Canada's provincial forecast (September 12, 2018). The volatility of real GDP growth is clearly evident where the province had suffered negative growth for both 2014 and 2015 leading up to the 2016 GRA. At the time RBC indicated that the province was suffering the crest of a wave in terms of the impact of these major projects and 2016 and 2017 were both good years.

Newfoundland and Labrador

	2011	2012	2013	2014	2015	2016	2017F	2018F	2019F
Real GDP	2.7	-4.4	5.2	-0.9	-1.7	1.9	2.1	0.2	2.6
Nominal GDP	15.3	-4.5	7.6	-0.5	-11.5	2.6	7.7	5.0	6.7
Employment	4.1	3.8	0.8	-1.7	-1.0	-1.5	-3.7	-0.7	-0.8
Unemployment Rate (%)	12.6	12.3	11.6	11.9	12.8	13.4	14.8	14.9	14.8
Retail Sales	5.1	4.3	5.2	3.7	0.7	0.4	2.4	-2.0	1.8
Housing Starts (Thousands of Units)	3.5	3.9	2.9	2.1	1.7	1.4	1.4	1.5	1.0
Consumer Price Index	3.4	2.1	1.7	1.9	0.4	2.7	2.4	1.9	2.5

Currently RBC expects that while 2018 will show very little growth, 2019 will see 2.6% real growth. However, the provincial unemployment rate will return to its traditionally high levels. I will discuss the impact of Muskrat Falls under NP's business risk, but RBC simply notes that "with major investment projects winding down, employment will continue to fall." Unfortunately, this is not an unusual situation for the province. However, what should not be ignored is that Newfoundland and Labrador is not a poor province. The following table from RBC simply confirms that 2016 personal disposable income per capita at $32,561 is above the Canadian average and is exceeded only by the western provinces.

Key provincial comparisons

(2016 unless otherwise stated)

	Canada	NL	PE	NS	NB	QC	ON	MB	SK	AB	BC
Population (000s, 2017)	**36,708**	529	152	954	760	8,394	14,193	1,338	1,164	4,286	4,817
Gross domestic product ($ billions)	**2,035.5**	31.1	6.3	41.7	34.2	394.8	794.8	67.9	75.3	314.9	263.7
Real GDP ($2007 billions)	**1,801.4**	27.9	5.2	36.7	29.4	343.3	685.0	60.4	62.5	302.8	240.8
Share of provincial GDP of Canadian GDP (%)	**100.0**	1.5	0.3	2.0	1.7	19.4	39.0	3.3	3.7	15.5	13.0
Real GDP growth (CAGR, 2011-16, %)	**1.9**	0.0	1.4	0.4	0.4	1.3	2.2	2.3	1.7	1.6	3.1
Real GDP per capita ($ 2007)	**49,673**	52,519	35,037	38,639	38,786	41,248	49,012	45,857	54,442	71,469	50,618
Real GDP growth rate per capita (CAGR, 2011-16, %)	**1.1**	-0.2	0.6	0.3	0.4	0.5	1.1	0.9	0.2	-0.7	2.0
Personal disposable income per capita ($)	**31,781**	32,561	28,112	28,519	29,168	27,723	32,093	29,076	32,717	37,298	34,395
Employment growth (CAGR, 2012-17, %)	**-1.1**	1.4	-0.2	0.4	0.0	-1.1	-1.2	-0.7	-0.7	-1.0	-1.7
Employment rate (Jul. 2018, %)	**61.6**	50.8	60.9	56.8	56.4	60.9	61.3	63.0	64.1	66.9	61.3
Discomfort index (inflation + unemp. rate, Jul. 2018)	**8.8**	18.1	12.9	10.7	10.2	8.0	8.5	9.3	9.7	10.2	8.3
Manufacturing industry output (% of GDP, 2017)	**10.3**	4.1	10.4	7.9	11.7	13.5	11.7	9.6	7.3	6.4	7.1
Personal expenditures on goods & services (% of GDP)	**56.7**	53.5	68.8	70.7	65.8	59.2	56.8	57.6	48.6	46.9	64.1
International exports (% of GDP)	**31.0**	31.8	22.5	16.9	37.7	28.0	35.6	24.1	38.7	31.0	22.8

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III RISK PREMIUM ESTIMATES OF THE FAIR ROE

Q. WHAT IS THE MOST COMMON WAY OF ESTIMATING THE FAIR ROE?

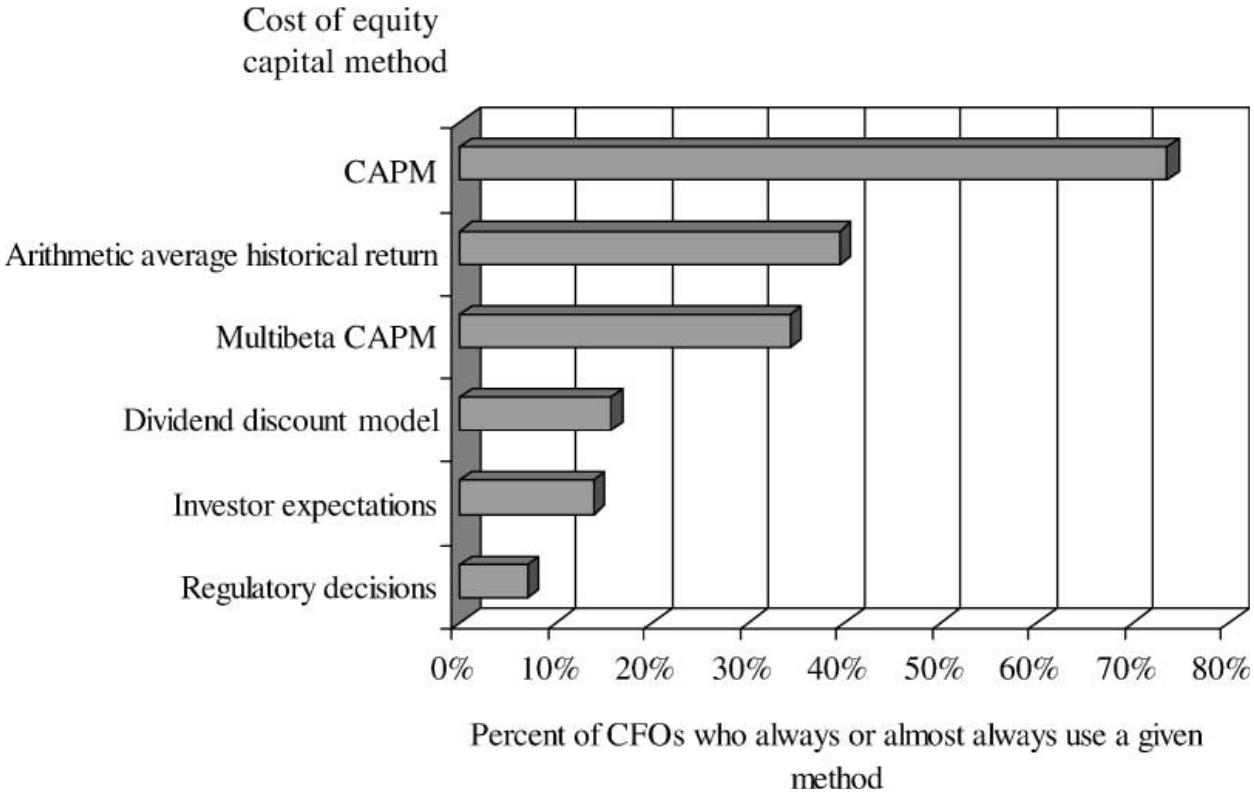
A. The capital asset pricing model or CAPM remains the most common way of estimating the fair rate of return. It is a special form of risk premium model which simply says,

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

In words the investor's required or fair rate of return (K) is equal to the risk free rate (R_F) plus a risk premium. Where the CAPM differs from other risk premium models is that it specifies that the risk premium is comprised of the market risk premium (MRP) times the security's relative risk or beta coefficient (β). ***In this regard any fair ROE can always be decomposed into a risk free rate and a risk premium***, so the CAPM is perfectly general: its contribution is simply to relate an individual risk premium to the overall market risk premium and its relative risk coefficient.

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 "ball-park." Where the CAPM normally gets controversial is in the beta coefficient; since risk is constantly changing so too 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. It also reflects the fact that modern capital markets are dominated by large institutions that hold diversified portfolios.

Currently, the CAPM remains the most important model used by a company in estimating their cost of equity capital. The following table comes from a survey of 392 US Chief Financial officers by Graham and Harvey in the Journal of Financial Economics 2001:



70% of US CFOs explicitly use the CAPM, while 35% or use average historic returns, which as I discuss in Appendix B is a key input to estimating the market risk premium and a further 30% use a multi-beta approach similar to the two factor model I have used in the past. The dividend discount model is known as the DCF model in regulatory hearings comes a poor 4th similar to investor expectations, which are largely from survey results similar to those I discuss in Appendix B.

The US survey results are for large US companies, Baker et al[14] performed a similar survey of large and small firms in Canada with the results in the following table. The most important "factor" was judgement, which is obviously required in any analysis. After judgement the main two objective models were the cost of debt plus an equity risk premium and the CAPM, which is simply a specific way of setting the risk premium. As might be expected the CAPM is most popular among larger firms, where the Chief Executive officer has an MBA. In this way the main

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

results are the same as in the US. Unlike the US survey results the DCF and multi-beta models rank behind investor expectations, average risk adjusted returns and accounting ROE. Even for large firms and those managed by a CEO with an MBA, the DCF model and multi-beta models are simply not as important as the CAPM.

Table 6. How Canadian Firms Estimate Their Cost of Equity Capital

This table presents the responses by Canadian managers 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, 1 = rarely, 2 = sometimes, 3 = often, and 4 = always. The table partitions the sample by firm size (large and small) and by whether or not the firm's CEO holds an MBA. *, ** indicate significance at the 0.05 and 0.01 levels, respectively.

			Response Mean				
				Firm Size		CEO with an MBA	
S#	Statement	% of Often or Always	Full Sample	Large	Small	Yes	No
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	Earnings/price (E/P) ratio	21.8	1.02	0.53	1.20**	0.83	1.09
9	Based on what our investors tell us they require	20.0	1.00	0.85	1.07	1.56	0.76**
8	Average historical returns 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

Note in this respect that multi-beta models, while slightly more general, don't alter the average rate of return which is anchored by the risk free rate and market risk premium: all they do is generate slightly different estimates for individual firms.

In response to persistent criticisms by some witnesses on behalf of utilities I have started to look at alternatives to the CAPM, which are generally described as multi-factor models. Although they are not generally used by professionals, as the survey results confirm, they are popular amongst academics. Essentially these models extend the one factor CAPM to include additional factors. The current 'standard is to include a size premium (the return difference between small firms minus big or SMB) and a value premium (the return difference between value versus growth stocks). This is the Fama-French three factor model, which states,

$$E(R_j) = R_F + \beta_{1,j} MKT + \beta_{2,j} SMB + \beta_{3,j} HML$$

In this case as well as the market risk premium (MKT) an investor requires a premium for small firms and value stocks. Why the FF3 factor model is controversial is that some believe that small

value stocks are riskier and thus deserve a premium, whereas others believe that the market consistently miss-prices large growth stocks, since they are faddish and sexier for financial advisors to sell (think Apple, Facebook etc) and are thus over-valued and consistently earn lower rates of return.

I tend to believe the faddish argument, but regardless for individual stocks using the FF3 factor model versus the CAPM rarely makes much of a difference. For example, Estrada (2011)[15] estimated the equity cost for the Dow 30 firms using both 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 components, so that the sum of the parts should always (approximately) add up to the same number. The Dow 30 stocks have a beta close to 1.0 since they are a portfolio of stocks and this should be close to average; as we would expect they have negative exposure to the size premium, since they are all large stocks and positive exposure to the value premium, since they are generally value stocks. In this respect they are similar to utilities that tend to be relatively large value stocks.

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.[16] 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 these factors, which is greater than the lower beta estimate. 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

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

[16] 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.

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.

Q. HOW DO YOU DERIVE A CAPM ESTIMATE FOR A UTILITY?

A. In Appendix B I estimate the market risk premium of common equities over long term Canada bonds at 5.0-6.0%. This estimate is drawn from the Canadian capital market history going back to 1924 so encompasses various economic periods such as the bleak 1930s of slow growth and falling prices, as well as booms and serious inflation such as the 1970's. While the Canadian data points to a market risk premium of under 5.0%, I give weight to the US evidence for three main reasons. First, most of the restrictions on keeping Canadian 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. Third, the Canadian bond market has received significant foreign capital inflows depressing yields below where they would have been historically with a segmented or closed capital market. The result has been lower interest rates in Canada than the United States for most of the last 12 years, which has removed the historic bias of a smaller Canadian market risk premium over a higher and riskier Canadian government bond yield.

My Appendix B is a free standing analysis of the market risk premium, but I consider the survey results of Professor Fernandez[17] particularly relevant as confirmatory evidence. In particular the following extract from his 2018 survey has the following estimates for the US and Canada. With 1,348 responses the average (median) estimate of the market risk premium in the US was 5.4% (5.2%) whereas with 77 responses it was 5.8% (6.0%) in Canada. In other words the average and median estimates were both within my 5.0-6.0% range. With so many responses in the US there is bound to be a wide range, but in Canada the range for the market risk premium was relatively narrow at 4.1%-7.20%, that is, the extreme high value for the market risk premium from 77 responses from finance professionals in Canada was 7.20%.

[17] "Market risk Premium and Risk-Free Rate Used for 59 countries in 2018: a survey," IESE Business School, 2018. Pablo Fernandez IESE, 2018

Table 2. Market Risk Premium (MRP) used for 59 countries in 2018

MRP	Number of Answers	Average	St. Dev.	Median	MAX	min	St.Dev. / Average
USA	1348	5,4%	1,7%	5,2%	17,8%	1,3%	32,1%
Spain	675	6,7%	2,4%	6,2%	20,0%	0,8%	36,2%
Germany	528	5,3%	1,7%	5,2%	15,2%	1,0%	32,5%
Argentina	73	13,9%	4,7%	16,3%	20,2%	1,9%	34,3%
Australia	74	6,6%	1,4%	7,1%	10,2%	3,3%	20,8%
Austria	56	6,2%	0,7%	6,4%	7,2%	4,2%	10,5%
Belgium	53	6,2%	0,8%	6,4%	7,2%	3,3%	12,5%
Bolivia	6	6,6%	2,9%	6,6%	9,4%	3,8%	43,3%
Brazil	100	8,4%	2,3%	8,6%	15,2%	2,3%	26,9%
Bulgaria	8	7,5%	1,3%	7,7%	9,5%	5,0%	16,8%
Canada	77	5,8%	0,7%	6,0%	7,2%	4,1%	12,7%
Chile	72	6,1%	1,1%	6,2%	8,2%	3,1%	17,7%
China	95	6,3%	2,8%	7,0%	13,2%	0,6%	43,4%
Colombia	72	8,7%	3,7%	7,9%	25,2%	3,8%	42,6%
Czech Republic	63	5,9%	0,7%	6,0%	8,2%	4,8%	12,3%
Denmark	53	6,0%	0,8%	6,2%	7,2%	3,8%	12,9%
Ecuador	7	9,0%	3,5%	8,0%	12,8%	5,5%	38,7%
Egypt	9	10,9%	4,5%	12,6%	15,2%	4,8%	41,6%
Estonia	7	5,1%	1,0%	5,2%	6,1%	3,0%	20,4%
Finland	53	5,9%	0,8%	6,0%	7,2%	3,8%	13,0%
France	83	5,9%	1,6%	6,4%	8,8%	1,3%	27,3%

The other interesting feature is that Fernandez now also asks for the risk free rate to match with the market risk premium to get the required return for investing in the equity market. For the US this was an average (median) risk free rate of 2.8% and for Canada 2.9%. Of significance is that at the time of his survey the 30 year US government bond yield was about 2.9%, whereas that in Canada about 2.2% (previous RBC forecast). I would infer from this that Canadian finance professionals were adjusting for the extremely low LTC yields by adding 0.70% to the actual LTC yield. When the market risk premium is added to the risk free rate the average (median) required return on the US market was 8.20% (8.30%) and in Canada 8.70% (9.00%).

My Appendix C discusses relative risk adjustments or betas. The recent history of Canadian utilities in general is of beta coefficients in an approximate range of 0.30-0.40. However, in my judgement Canadian utility betas are currently "contaminated" by the fact they are seen as yield substitutes for long Canada bonds. As Schedule 1 in my Appendix C shows the returns on Canadian utility shares are interest sensitive and have about 60% of the interest exposure of the long Canada bond. This is why they are seen as low risk defensive stocks. However, the temporal decline in interest rates from 6.48% in 2000 to the current level of about 2.3%, while supporting their stock prices, has weakened their relationship with the general market.

Consequently, their stock market risk (betas) has declined from the 0.55 level in 2000. The extent of merger and acquisition (M&A) activity has also reduced the sample and caused me to break my old sample into a pipeline sample (Enbridge, TransCanada and Pembina) and a utility sample (Canadian Utilities, Emera, Fortis and GMI). This has posed additional problem since smaller samples can make the estimates less reliable, while both Emera and Fortis have both made extensive acquisitions. For this and other reasons discussed in Appendix C I continue to use a beta range of 0.45-0.55.

As a check on my Canadian beta estimates I also use estimates for US gas and a US electric utility holding company samples. Although I regard these companies as riskier than their Canadian counterparts the most recent estimates for the US gas and electric samples are both within my 0.45-0.55 range. As a final check I also provide beta estimates from respected sources; these are Yahoo finance that uses S&P data, the Royal Bank of Canada, Thomson-Reuters and three new investment advisory services that have sprung up in the US as a result of the global Settlement that dealt with fraudulent and biased security analyst reports. These services do not all cover the Canadian firms, but I take comfort in the fact that the average sample beta values from these services are generally lower than my own estimates.[18]

Q. DO YOU ADJUST YOUR BETAS?

A. To the extent that I do not mechanically use my beta estimates, I adjust them. As indicated above in the survey of Canadian professionals by Baker et al the most important factor in estimating the required and fair rate of return is judgement. However, I do not use the Blume adjustment which Mr. Coyne relies on. This was a general adjustment for a sample of all stocks developed by Professor Marshall Blume and published 43 years ago. As far as I am aware this study has never been replicated and no-one has ever applied it with any success to utility stocks. As I discuss in Appendix C the only studies I am aware of on utility stocks show that any adjustment of utility stocks is toward their own average value not the average value of the market

[18] Note Mr. Coyne's betas (CA-NP-133) from Value Line average 0.54 which is also within my range of 0.45-0.55, but even these unadjusted betas are clearly much higher than any of these 6 independent services.

as a whole. Gombola and Kahl clearly showed this in their seminal article in 1990 and most recently Michelfielder and Theodossiou in 2013 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 insignificant….None of the 51 beta distributions display any tendency for the betas to drift toward one"

There is simply no justification for mechanically adjusting utility betas toward the market mean of 1.0.

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

A. With a market risk premium estimate of 5.0-6.0% and a beta range of 0.45-0.55 the range for the utility risk premium is 2.25%-3.30%. This is the same range I used in 2016 as the utility shares have not become riskier and survey evidence indicates no material increase in the market risk premium. If this utility risk premium is added to the 3.00% consensus (and RBC forecast) LTC yield for 2019 and a 0.50% flotation cost allowance added, the range of the CAPM estimate is as follows:

Simple CAPM Estimates	2019
Low end	**5.75%**
High end	**6.80%**

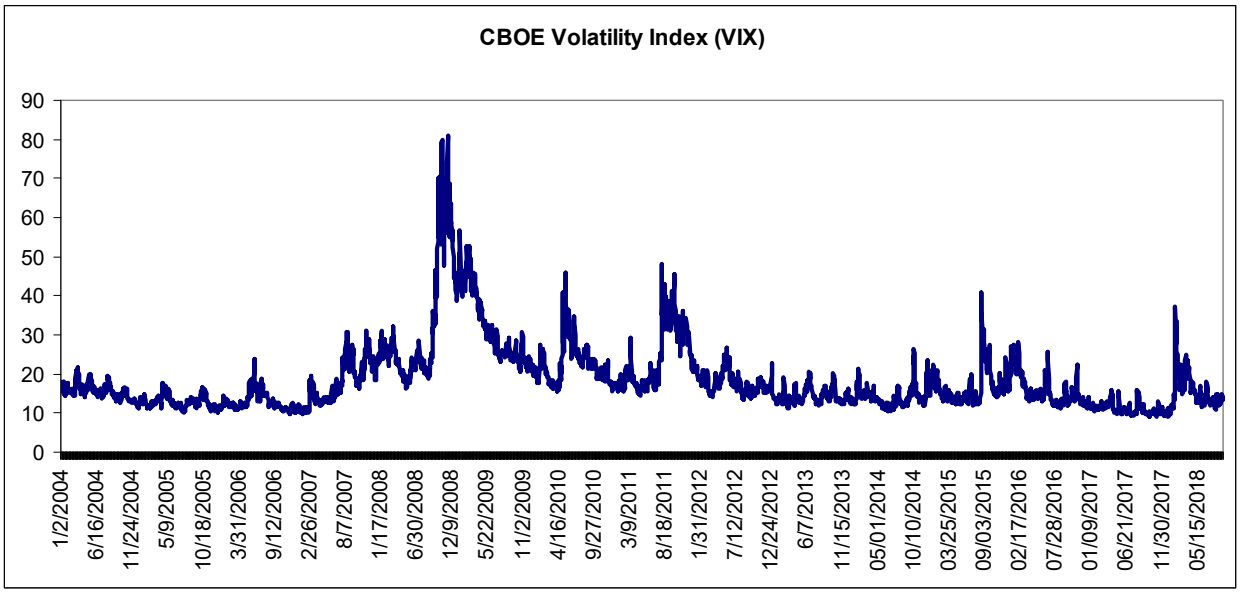
The average estimate of 6.28% is higher than my 2016 report because the forecast long Canada bond yield has increased slightly.

Q. DO YOU USE THIS SIMPLE CAPM ESTIMATE?

A. No. As in 2016 I judge that the simple CAPM estimate is not a reflection of current market conditions. The CAPM estimate is appropriate under "normal" or average markets, since it uses a normal or average market risk premium estimated over long periods of time and assumes that conditions in the bond market affecting the long Canada bond yield are also driving conditions in the equity market. What this means is that the correct "opportunity cost" for an equity investor is the bond market plus a normal risk premium. However, at the current point in time conditions in the Canadian bond market are largely being driven by external factors and are

still not "average" market conditions even though they are now normalising. To adjust for this in 2016 I made two adjustments: the first was simply to make the CAPM estimate conditional on the state of the markets thereby converting it into a conditional CAPM or CCAPM; the second was to adjust for the abnormally low LTC bond yields resulting from rampant bond buying programs by central banks.

In terms of the CCAPM there are a variety of financial variables to use to condition on the state of the markets. For example, I have previously discussed the Kansas City financial stress index which attempts to do this by looking at a composite stress index, which should be correlated with investor risk aversion. Another popular index is the Chicago Board of Exchange's (CBOE) volatility index (VIX). This calculates the expected standard deviation of the overall stock market return from at the money call options.[19] The standard deviation, as explained in my Appendix B, is a measure of the overall risk or volatility of the stock market and has averaged 18-20% since 1926. Below is a graph of the VIX since 2004.



[19] Call options pay off only if a certain event (usually the stock price) reaches a specific value and the only "unknown" to price them is the variability or standard deviation of the price. As a result, we can work back from the market price to estimate the implied standard deviation or volatility.

The average value for the VIX over the period 2004-2018 was 18.4%, close to the average from stock market data going back to 1926.[20] However, consistent with the KCFSI we can see the huge increase in uncertainty during the financial crisis as the VIX hit a peak value of 80% or 4X its average value. The VIX reflected the huge panic during the financial crisis, but as always the panic subsides and over the last five years volatility has been below average at 14.7%.

The level of the VIX would indicate that investors are optimistic and currently require lower than normal rates of return.[21] The problem with the VIX and the KCSFI is they are not direct estimates of a rate of return and cannot be used to reliably alter a CAPM expected return estimate. An alternative is to use the default or credit spread between risky corporate debt and default free Government of Canada bonds. This is the corporate spread discussed earlier and similar to the VIX and KCSFI shows the huge impact of the financial crisis when corporate A rated spreads peaked at 3.70% versus a pre-crisis average of 0.94% (1979-2007).

It is very difficult to disentangle liquidity spreads in bonds from the pure credit spread. However, since 2010 as Canadian capital market conditions were returning to normal, I have been recommending a 50% adjustment to changes in credit spreads. Over a normal business cycle this adjustment should average out to zero as capital market conditions fluctuate around average levels. This adjustment has been incorporated into ROE adjustment models adopted by the OEB, Regie and the BCUC.

In 2016 A spreads were at 1.90% or 90bps more than the typical average for the business cycle, which I take to be 1.0%. Consequently, I added 0.45% for this credit market effect. However, as capital markets have normalised this credit spread has shrunk to its current level of 1.35%. As a result, I would add 0.18% to the simple CAPM estimate to reflect the higher credit spread. I regard this sort of adjustment as converting the CAPM into a conditional CAPM, where the CAPM holds conditional on the state of the financial markets.

My estimate for the CCAPM is as follows:

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[20] It may surprise some but there is no evidence of any structural increase in uncertainty in the stock market: it has always been highly volatile!

[21] The VIX is often referred to as a fear index.

CCAPM Estimates	2019
Low end	**5.93%**
High end	**6.98%**

The average of these two is 6.46% and would be appropriate as an estimate for a fair ROE at this stage of the business cycle in a capital market that is ***also*** typical for this stage in the business cycle. However, I still regard the resulting ROE as an under estimate at the current point in time.

Q. WHY IS THIS CCAPM AN UNDER-ESTIMATE AT THE MOMENT?

A. In Appendix B Schedule 6, I develop a model to explain the behaviour of the real yield on long Canada bonds, defined as the nominal yield minus the average of past, current and future CPI inflation. Ignoring the indicator or dummy variables for WW2 and the 1970s, when there was huge liquidity during the petro dollar recycling period, the model essentially says that the real LTC bond yield is 1.34% plus a premium based on bond market uncertainty and a premium based on the size of the government deficit. The model does well in explaining the very high yields when there was huge volatility in the bond market and Canada was running deficits approaching 10% of GDP.

However, since the financial crisis while we have seen bond market uncertainty go down, the aggregate deficit in Canada has gone from a surplus to about 1% of GDP. Normally this would cause an increase in government debt pushing down prices and pushing up yields. Plugging numbers into the regression model would predict a real long Canada yield of about 3.71% for 2017, rather than the actual 0.39% (2.18% average 2017 Canada yield minus 1.79% inflation). However, the flood of government debt is being bought in part by non-residents due to the impact of loose monetary policy elsewhere in the world. Once an indicator (dummy) variable is added for the years since 2010, the 2017 real yield estimate is reduced by 2.65%. What this indicates is that during 2017 the long Canada bond yield was severely depressed below where it would have been had Canada remained partially segmented from external events. The model also indicates that current bond yields are not being determined by ordinary investors trading off risk versus return as assumed in standard risk premium models.

For 2017 the model forecasts a real Canada yield of 3.71%, which with average CPI inflation of 1.87% means an LTC yield of 5.58%. If that seems high, the last time government in Canada ran a deficit similar to 2017 was in 2004 when the LTC yield was 5.08%.[22] The fact that LTC yields are not at that level I put down partly to the flood of liquidity generated by central banks and the fact that the size of the Canada bond market has not been swollen by deficit financing similar to the US, the UK, Japan and many Euro area members. With a AAA bond rating this has made Canada attractive to foreign investors.

In 2016 I used an "Operation Twist" adjustment to Canadian LTC yields to reflect these unique circumstances, similar to my evidence in 2013. This was partly based on a comparison with preferred share yields which while being LTC substitutes for many investors are uniquely Canadian for tax reasons.[23] However, such data is no longer available. In contrast the Fernandez survey data indicates quite strongly that the 77 Canadian professionals responding used a Canadian risk free rate of 2.9% rather than the US rate of 2.8% even when Canadian interest rates were significantly lower. Further forecast LTC yields for 2019 provided by Consensus Economics as well as RBC indicate that forecast Canadian rates remain 0.85% below those in the US. I therefore use a 0.80% adjustment to the forecast LTC yield.

My adjusted CAPM fair return estimate is therefore as follows:

Low end	**6.73%**
High end	**7.78%**

The average estimate is 7.26%. Taking into account the 0.50% flotation cost to get a fair ROE I would regard the underlying estimate of the required rate of return of 6.76% to be consistent with the survey results on the market required rate of return of 8.3-8.7%.

[22] J. P Morgan, "How demographic change will affect savings growth and interest rates," set the real interest rate without quantitative easing at 3.0-3.5%, which would similarly translate into a nominal rate bond rate of at least 5.0%.

[23] Relative to interest income, dividend income in Canada at the personal level is preferentially taxed.

IV DCF ESTIMATES OF THE FAIR ROE

Q. WHAT ARE YOUR DCF ESTIMATES?

A. In appendix D I review the DCF model and apply it to the market as a whole and highlight the problems in applying it to individual stocks. For the market as a whole it is difficult to envisage a situation where dividends and earnings can consistently increase substantially as a share of GDP. This constrains the value of the DCF estimate to consider short run growth and departures from the economy's long run growth potential. As I have already discussed, currently there is very little spare capacity in Canada and the unemployment rate is very close to or at the minimum rate consistent with non-accelerating inflation. Consequently, I see no reason to add a short run growth potential to the long run GDP nominal growth rate. On this basis I estimate the DCF required return on the equity market at 8.37-8.86% for Canada and 0.50% higher for the US. These estimates are broadly consistent with those provided by the respondents to Fernandez's survey and those in my 2016 report.

In Appendix D I also analyse Standard and Poors data for the electric utility sub index where they provide earnings, dividends, book value per share and yield data back to 1993. This provides a long series of consistent data to use the DCF model to extract an electric utility risk premium. I estimate this utility risk premium as 3.00-3.70% over 10 year US Treasury Yields. Given the normal use of a 30 year bond yield in Canada to estimate the fair ROE I would regard this as broadly consist with my CAPM utility risk premium of 2.25-3.30%.

Consistent with survey results in both the US and Canada the DCF estimate of the fair rate of return is not placed in as high regard as the CAPM estimate. 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 "ball-park." However, the recent very low long Canada bond yields have 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 (R_F) plus the risk premium comprised of the market risk premium (MRP) times the beta coefficient (β). For the market as a whole we can simply set the beta to one since this is definitional, so the required return is the risk free rate plus the market risk premium.

The constant growth version of the DCF model is most appropriate for the market as whole for the reasons I give in Appendix D and states:

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

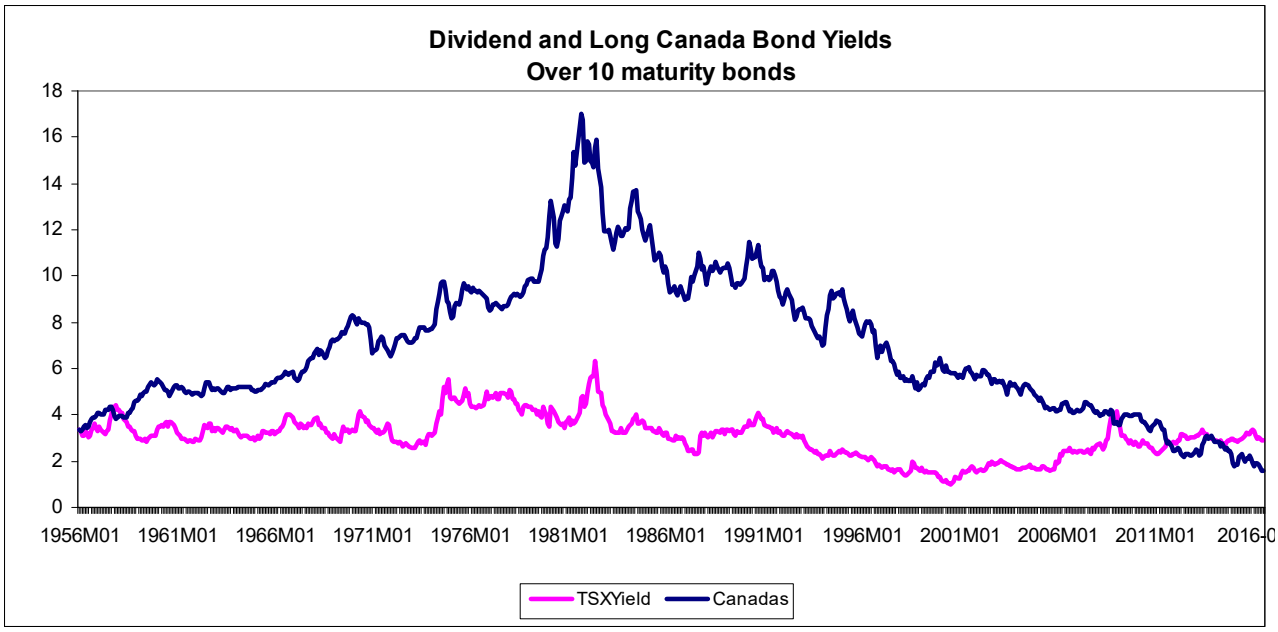
In words, the required rate of return is the forecast dividend yield plus the long run growth rate. Conceptually the DCF model and CAPM should give exactly the same values but, of course, since they approach it from a different perspective there is always estimation error. For the market as a whole the 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.[24]

We can assess the relative value of the DCF and CAPM by graphing the "known" parts of both models for the overall market, which are the long Canada bond yield and the TSX dividend yield. Note that in the following graph lately the dividend yield on the TSX is *higher* than the LTC bond yield, which is unusual. However, this has been a persistent phenomenon due to the very low LTC bond yields. 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

$$DCF - CAPM = {}^{d_1}\!/_{P} - R_F = MRP - g$$

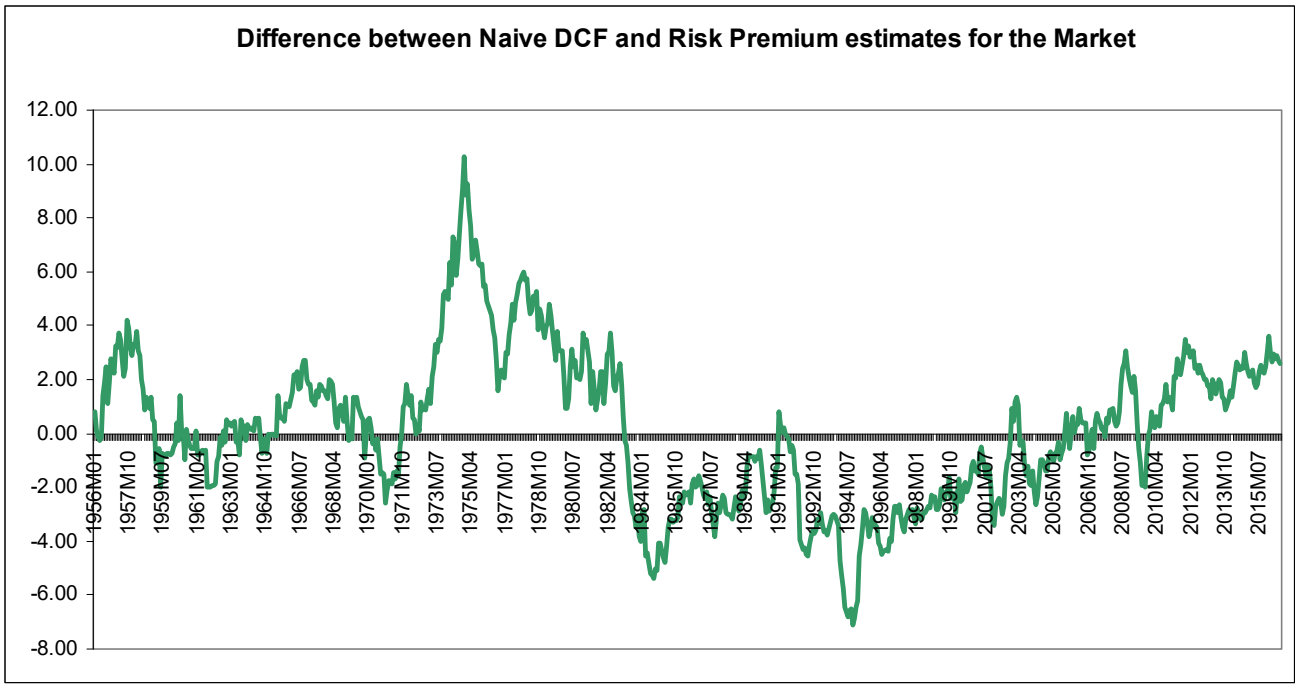
This simply indicates that the gap between the dividend yield and LTC yield reflects the difference between the market risk premium and the growth rate.

[24] Note since for the CAPM we are dealing with the market return the following analysis is general for ***any*** risk premium model



As is immediately obvious the difference was greatest in the 1970s and 1980s when from Schedule 1 inflation was greatest. This also means it is possible to come up with a simple or "naïve" estimate of the market return by adjusting for this bias. For example, I 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 3.50% real growth rate. This gives a simple growth rate forecast to add to the dividend yield and thus a simple or naïve DCF estimate for the market as whole. Similarly, we can add a long run market risk premium of 3.5% to the long Canada yield for a simple CAPM estimate. For the entire period the average naïve DCF estimate is 10.55%, while the average naïve CAPM estimate is 10.44%, or a difference of only 0.11% between the two, so "on average" these assumptions seem to make sense.

To see how robust this simple procedure is, the following graphs the difference between the two estimates for every month since 1956. The graph indicates that the difference was very large from the mid 1970's until the early 2000's, but not consistent. The reason was twofold. First, in the 1970s inflation was increasing and was captured in the DCF estimate whereas bond investors did not believe that the Bank of Canada would allow these high levels of inflation to continue. This resulted in very low real yields on LTC bonds and a positive difference between the DCF and CAPM estimates. In other words, during this period the naïve DCF estimate was higher.



Once investors caught up to the impact of high inflation the reverse set in, as the budget deficits at the Federal level convinced the market that the government would inflate its way out of its deficit problems, rather than bring down inflation. As a result, while the year over year inflation rate dropped dramatically, LTC bond yields did not at first similarly drop, leading to very high real yields and simple CAPM estimates that exceeded the DCF estimate. It is this phenomenon of low real bond yields in the 1970 into the 1980s and high real bond yields in the 1990s that is a major reason for these significant differences.

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 and have recently used 5.0-6.0%, rather than 3.5% as my market risk premium estimate. Similarly, the long run real growth rate may have dropped and could be lower than the 3.5% used in the naive model as most forecasts are now for 2.0-3.0% growth.

However, the point is that we can "ballpark" the broad range for the DCF estimate for the market just as we can for risk premium models like the CAPM. The most recent naïve estimates are 7.63% for the DCF estimate and 5.05% for the risk premium model. I regard both of these as

abnormally low and naïve, but the 2.58% difference supports an adjustment from the 3.5% market risk premium I used to use, as well as from the historic Canadian estimate in Appendix B, Schedule 9 of 4.67%. It also supports the value of currently looking at DCF estimates despite the fact they are downplayed by both professionals and academics.

Q. WOULD YOU USE THESE ESTIMATES?

A. No. These are very simple or naive estimates that use average numbers for a very long period of time. They are presented simply to show that while the DCF and CAPM estimates are consistent over long periods of time, they both have problems when used *mechanically* during periods of very high or low real Canada bond yields. The analysis also helps explain why DCF estimates fell out of favour in the 1990s while the validity of CAPM estimates has recently been questioned due to the low level of bond yields.

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 part of the investor (cost of equity capital) is also the expected rate of return. Defined benefit pension funds need this expected rate of return to determine whether a fund is in deficit or surplus. On October 19, 2012 TD Economics produced its own analysis of the long run returns of the type needed in defined benefit pension plans.[25] The important point about the TD Economics forecast is that the going forward risk premium for equities minus bonds is 4.00%. This is not the market risk premium, since adjustments need to be made but it is certainly in the right ballpark.

[25] TD Economics, An Economic Perspective on Long-term Financial Returns.

FINANCIAL PROJECTIONS OVER THE NEXT DECADE	
Financial Instrument	Average Annual % Return
Cash (3-Month T-bills)	2.00%
Bonds (DEX Universe Bond Index)	3.00%
Equities	
Canada (S&P/TSX Composite)	7.00%
U.S. (S&P 500)	7.00%
International (MSCI EAFE)	7.00%
Source: TD Economics	

Q. WHAT ADJUSTMENTS NEED TO BE MADE?

A. As TD Economics notes its return forecast is for ten year geometric returns so they have to be converted to arithmetic 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 8. Historically the standard deviation of equity returns has been about 20% (0.20) so the variance is 0.04 and half this is 0.02 or 2.0%. Similarly, the volatility of the long Canada bond return has been about 9% (0.09). I would suspect that this overstates the future volatility, since it is unlikely we will see LTC yields at almost 20% again, but this means a variance of 0.0081 and half this is 0.4%. So converting these long run returns to short run arithmetic returns means market risk premium of 5.60% as follows:

	Long run	1/2 the variance	Arithmetic
Equities	7.0%	2.0%	9.0%
Bonds:	3.00%	0.40%	3.40%

However, the TD Economics forecast is over the yield on the DEX universe bond index and not over long Canada bonds. The universe of bonds would have lower duration or maturity than the 30 year long Canada bond, but can be expected to earn more since they have default risk. But I would take these estimates as broadly consistent with my own.

Q. IS THERE ANY EVIDENCE FROM NP THAT SUPPORTS THIS?

A. Yes. NP still has a defined benefit pension plan and each year it has to work out how much it must contribute based on whether the fund is in surplus or deficit. To do this it has to estimate how much the plan is likely to earn and whether that is sufficient to cover its forecast liabilities. In answer to CA-NP-081 NP indicated that it currently uses a forecast rate of return on plan assets as follows:

		Expected return	
	Mix	2016	2018
Equities	40%	8.1%	7.7%
Bonds:	60%	3.5%	3.0%

What is clear is that NP on the advice of its financial advisor (Mercer (Canada) Ltd) is forecasting a drop in the equity market return from 8.1% to 7.7% and the bond market return from 3.50% to 3.0%. This implies a marginal increase in the risk premium of equities over bonds of 0.1%, but the fact is NP judges that forecast equity returns have gone down.[26]

I assume to hedge future questions NP asked Mercer to convert these returns to an arithmetic return similar to my adjustment to the TD Economics returns. In doing this, Mercer converted the 7.7% by adding 1.5% to get 9.2%, which is a slightly smaller adjustment than I made to the 2012 TD Report. NP asked Mercer the same question in 2016 when they indicated the same adjustment meant an equity market return of 9.6%. So it is clear that the professionals hired by NP judge that the overall market expected return has dropped by about 0.40%.

In 2016 in answer to CA-NP-269 NP provided the latest AON Hewitt assumptions and forecast of capital market conditions.[27] I have reproduced the critical equity market forecast from 2016 in

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[26] Note NP claim that these expected returns justify the 5.25% expected return in its DB plan. However, in 2016 it also used 5.25% when both the bond and equity returns were higher. The expected return on plan assets above is 4.88%, not 5.25% and in 2016 was 5.34%.

[27] AON Hewitt, "Capital Market Assumptions & Methodology" (Canadian Version) December 31, 2015.

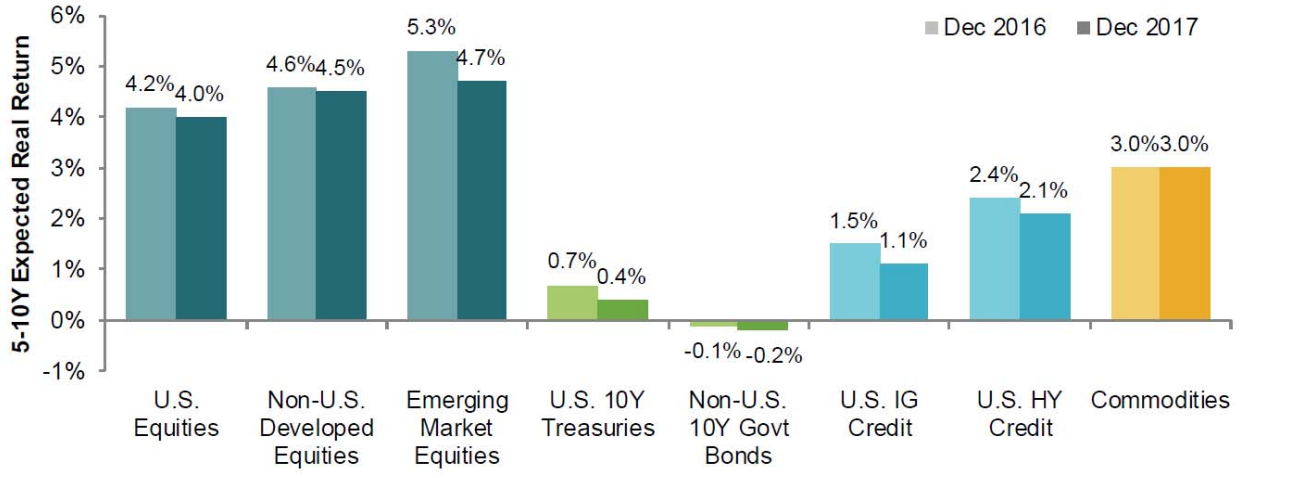
Schedule 4. Note that AON Hewitt forecast ten year expected rates of return, which is what they record as "compound" returns, and also converts them to simple arithmetic returns, which is their "average annual return." In this way they make the same calculation as I made for TD Economics returns and Mercer made at the request of NP. At that time AON Hewitt forecast an average annual return on the Canadian market of 8.3%, which was almost the same as my own at the time.

Q. WHY HAVE YOU NOT INCLUDED THE LATEST AON HEWITT DOCUMENT?

A. I asked NP for it in CA-NP-081 but they indicated it was publicly available information and did not provide it. Unfortunately, I could not obtain a current version. However, there are lots of similar forecasts available and the following ones are not from pension consulting firms. The first is from AQR[28] which is a value investing shop,

Exhibit 1

Summary of Expected Medium-Term Real Return Estimates for Major Asset Classe



For US equities they are forecasting returns of 4.0%, which looks low and could be due to the fact they are "medium" term. What is important is that like Mercer they are down from 2016, in this case from 4.2%

[28] Capital market assumptions for major asset classes, 1Q18.

The following is from the Quantitative Research Group[29]

Table 2: Capital Markets Assumptions by Asset Class

	2018 Estimates		2017 Estimates		Year 2018 vs 2017	
	expected return	standard deviation	expected return	standard deviation	expected return	standard deviation
All Cap	6.11%	15.29%	6.19%	15.45%	-0.08%	-0.15%
Global Equity	6.50%	14.67%	6.57%	14.83%	-0.07%	-0.16%
Large-Cap Core	6.06%	15.12%	6.15%	15.28%	-0.09%	-0.16%
Large-Cap Growth	5.90%	16.80%	6.01%	16.92%	-0.11%	-0.12%
Large-Cap Value	6.23%	14.71%	6.28%	14.91%	-0.06%	-0.20%
Mid-Cap Core	6.55%	16.86%	6.83%	17.01%	-0.28%	-0.15%
Mid-Cap Growth	6.45%	20.51%	6.83%	20.63%	-0.38%	-0.11%
Mid-Cap Value	6.62%	15.79%	6.83%	15.99%	-0.21%	-0.20%
Small-Cap Core	6.74%	19.66%	6.69%	19.76%	0.05%	-0.10%
Small-Cap Growth	6.72%	22.89%	6.66%	22.97%	0.06%	-0.07%
Small-Cap Value	6.76%	17.41%	6.71%	17.56%	0.04%	-0.15%
Int'l Developed Mkts	7.19%	16.70%	7.30%	16.88%	-0.11%	-0.18%
Foreign Large Cap Core	7.19%	16.84%	7.31%	17.03%	-0.13%	-0.19%
Foreign Large Cap Growth	6.93%	17.01%	6.84%	17.17%	0.10%	-0.15%
Foreign Large Cap Value	7.42%	17.42%	7.72%	17.64%	-0.30%	-0.23%
Foreign Small Mid Cap Core	7.21%	16.95%	7.25%	17.22%	-0.04%	-0.26%
Foreign Small Mid Cap Growth	7.14%	18.02%	6.93%	18.26%	0.20%	-0.24%
Foreign Small Mid Cap Value	7.33%	16.92%	7.66%	17.23%	-0.33%	-0.30%

Their equity market forecast is 6.11% and unlike Mercer and AQR it is a small increase from 2017 when it was 6.19%. The following is from the Bank of New York Mellon[30]

Exhibit 18: 10-Year Equity Market Expected Returns From 2018 to 2027 (in USD)

U.S. Equity	6.2%
U.S. Large Cap Equity	6.1%
U.S. Mid Cap Equity	6.5%
U.S. Small Cap Equity	7.0%
International Developed Equity	5.8%
International Small Cap Equity	5.9%
Emerging Equity	8.3%

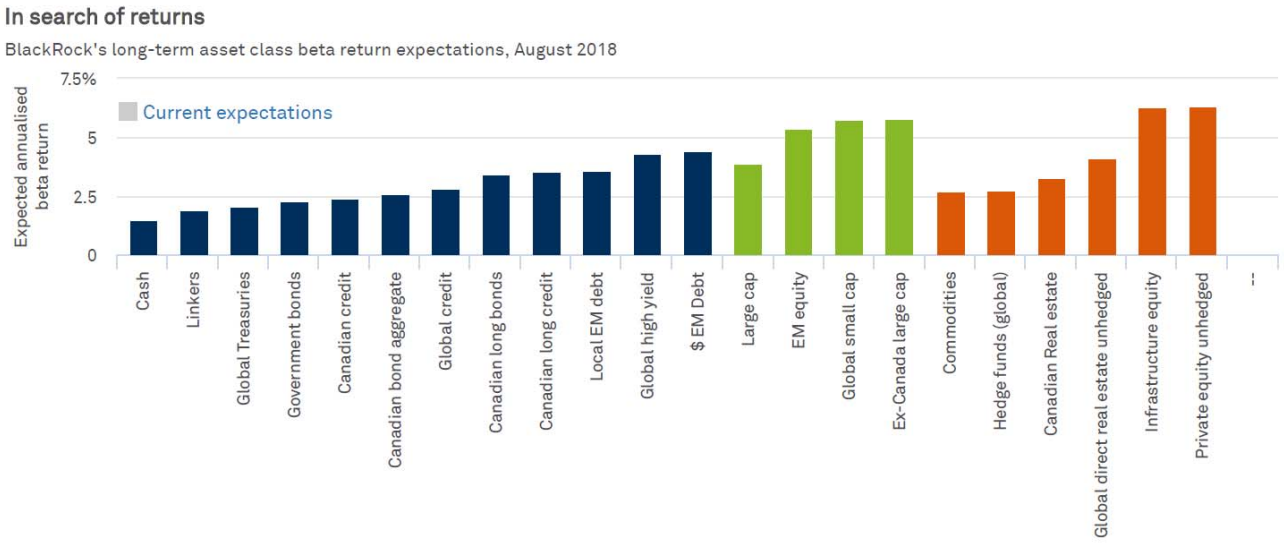
Source: BNY Mellon Wealth Management. Data as of October 31, 2017.
Please see page 9 for a list of representative indices.

[29] Capital markets assumptions 2018.

[30] Calendar year 2018 10-year capital market return assumptions.

Similar to QRG, BNY is forecasting long run 10 year equity market returns of 6.2% and a bit more for small capitalisation (value) stocks.

Blackrock is the largest asset manager in the world with $6.2 trillion under management. The following is their forecast of long run returns.



They are more pessimistic than BNY-Mellon and QRG and closer to AQR.

All of these forecasts need an adjustment to arithmetic returns, which would mean adding 1.5-2.0% to them, but they all imply an overall equity market return below what I am assuming. However, they indicate that Mercer may be a tad on the high side.

Finally, the largest bank in North Ameica, J. P Morgan, has the following forecast for long run returns. Unlike the other forecasts, J. P Morgan also shows how their forecast has evolved over time. This is shown by the blue line. For example, in 2009 the forecast for large cap (market value) US equities was about 9%, in 2016 about 7% and now 5.5%. J. P Morgan has clearly become more pessimistic about future equity returns as the stock market has recovered and reached new highs.

EXHIBIT 7: 10-YEAR RETURN ESTIMATES FOR S&P 500, IG, HY; AVERAGE SPREAD BETWEEN THEM SHOWN IN RETURN TERMS

Source: J.P. Morgan Asset Management; estimates as of September 30, 2017. IG: investment grade; HY: high yield

A breakdown of J. P Morgan's equity market forecast for the US and other major markets is below.

EXHIBIT 5: SELECTED DEVELOPED MARKET EQUITY RETURN ASSUMPTIONS AND BUILDING BLOCKS

Equity assumptions	U.S. large cap	Euro area	UK	Japan
Revenue growth	5.3	4.6	4.5	3.0
+ Margins impact	-0.7	-0.3	0.8	-0.7
Earnings growth	4.5	4.3	5.4	2.3
+ Gross dilution	-2.0	-2.0	-2.0	-2.0
+ Buybacks	2.3	1.6	0.7	2.1
EPS growth	4.8	3.8	4.1	2.3
+ Valuation impact	-1.4	-1.1	-2.1	-0.2
Price return	3.3	2.7	1.9	2.1
+ Dividend yield (DY)	2.0	3.0	3.5	2.5
Total return, local currency	5.50%	5.75%	5.50%	4.75%
Change vs. 2017	-75bps	-25bps	-75bps	-

Source: J.P. Morgan Asset Management; estimates are as of September 30, 2017.

J. P Morgan start with revenue growth at 5.3% keyed off nominal GDP growth and then take into account other factors to create a shorter run forecast than mine. Unlike my analysis in Appendix D, they see some profit margin compression from competitive pressures at the top of the business cycle, which will reduce earnings growth to 4.5%. They then see the change in the number of shares (buybacks plus issues) increasing earnings per share growth to 4.8%. J. P Morgan then subtract a "valuation impact" of -1.4%. What this means is that J.P Morgan sees the equity market as currently over-valued and that equities will sell on lower PE multiples in the future.

The key feature of J. P Morgan's analysis is that they are taking into account short term growth prospects in the US, which in their case they view as negative in two ways. First, they see margin

compression and second the stock market as over-valued. Without these two adjustments their US equity market forecast is 5.5% + 1.4% for the valuation impact and 0.7% for margin compression or 7.6% in total. Like all these equity market forecasts, J. P Morgan's forecast needs an adjustment from long run compound returns to arithmetic returns of between 1.5-2.0%. In the case of J. P Morgan this raises their estimate without the adjustments to 9.1%-9.6%, which is slightly higher than my own estimate for the S&P500 in Appendix D of 8.77%-9.73%.

Q. NP DOES NOT BELIEVE IT IS APPROPRIATE TO USE PENSION ASSUMPTIONS AS A BASIS FOR NP'S ALLOWED ROE. IS THIS CORRECT?

A. No. First of all I have posted these other forecasts since they are from asset managers and not consulting actuaries. However, more importantly, the actuary is faced with the exact same problem the Board is faced with, which is determining the opportunity cost or expected rate of return. This then has to be adjusted to meet the specific needs of the actuary versus the Board. In the Board's case it has to adjust the overall expected market return to get the expected return for NP, which is done by making a risk adjustment. It then adds a flotation cost allowance to convert the expected return to the allowed ROE. But the base expected rate of return has to be consistent with investor expectations in the capital market. This is the very basis of the fair return standard and why in Appendix D I estimate the overall equity market return as a benchmark. In contrast, the actuary has to estimate the expected rate of return and then make allowances to get the discount rate, which is then used to assess whether there are enough assets to meet the plan's expected liabilities.

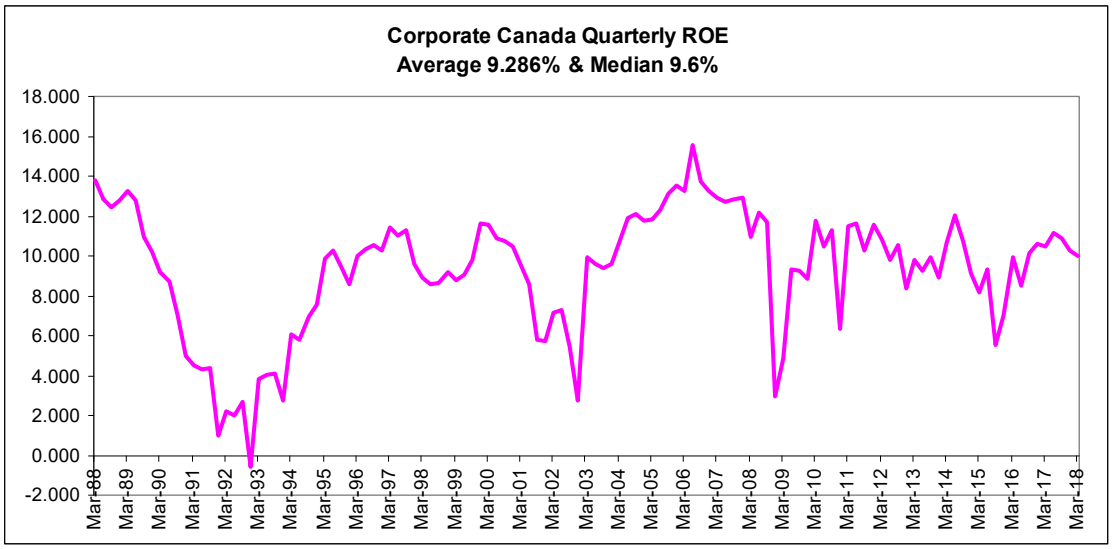
The point of this discussion is that Mercer has to make the exact same forecasts of the economy and future rates of return as I make.[31] Further NP has to make the same assumptions for its funding plan for its pension. In this respect, it is assuming an arithmetic expected rate of return on the combined US and Canadian equity market of 9.20% while it is requesting a 9.5% allowed ROE. Even after adjusting for the flotation cost allowance, in my judgment the requested ROE is excessive relative to NP's own assumptions about its pension plan. Further even though it has

[31] Note the data in my Appendix B comes from the Canadian Institute of Actuaries.

reduced its own assumptions about the expected rate of return from 9.6% to 9.2% it has not reduced its requested ROE, which is the same 9.5% as in 2016.

Q. IS THERE ANY OTHER EVIDENCE SUPPORTING 7.50%?

A. Yes. Ultimately stock market returns are driven by the returns earned by companies. 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 2018-Q1 the average ROE has been 9.286% and the median 9.60%. I regard these as representative of the typical ROEs earned by Canadian firms. These corporate ROEs are obviously tied in to the market rates of return earned by investors. For example, in 1925 John Maynard Keynes pointed out[32] 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."[33] In modern terminology this would be the internal rate of return on the firm's cash flows, or an approximate ROE. The second component he called the ***speculative*** return, which involved forecasting the psychology of the market and

[32] 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

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

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.[34]

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 cannot continue to have a state of high confidence any more than interest rates can continue to increase or decrease: both of them will tend to revert back 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 months out. In contrast, buy and hold or fundamental investors are mainly concerned with the investment return: finding good companies and holding them regardless of the speculation in the stock market.

Warren Buffet is probably the most successful fundamental investor of the last fifty years. He repeated Keynes' argument by stating:[35]

> "*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 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 as a whole, 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!

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[34] Page 149 of the General Theory

[35] Berkshire Hathaway's 2006 Annual Report, reported in Fortune (March 20, 2006).

This discussion of what generates stock market returns is provided since in the long run the average stock market return should approximate the average investment return or ROE,[36] 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 to look at a DCF model for the economy as a whole.

In Schedule 5 is the average annual ROE for Corporate Canada since 1980 as reported by Statistics Canada (Table # 1800003). Over this period the average ROE has been 9.92%. The third column reports the annual return on the TSX Composite which over the same period has been 10.14% or 0.22% more. However, the rough equality over this period hides the significant year to year variation where speculative returns have been significantly high or low. For example, in 1980 Corporate Canada earned 15.05%, but the TSX Composite earned 30.13% as the basis of valuation (PE ratio) increased for a short term speculative gain of 15.09%. Then in 1981 Corporate Canada earned an ROE of 11.70% while the TSX lost 10.25%! In each year we can see that the speculative return is highly volatile and on average 5-6 times more volatile than the investment return.

The second way of looking at the investment return is that used by 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 in Schedule 6. This marginally understates the investment return since he 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 US stock market return of 9.1%. However, since he underestimated the investment return the difference in reality is *de minimis*. Just 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)

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

"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."

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.

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

A. I would judge a fair ROE based on my adjusted CCAPM to be in a range 6.73%-7.78% with a mid-point of 7.26%. This is developed below:

Risk Premium

Base LTC forecast:	3.00%
Normal utility risk premium:	2.25%-3.30%
Issue costs:	0.50%
Normal Fair ROE	6.28%
Credit Spread Adjustment	0.18%
Operation Twist Adjustment	0.80%
Fair ROE:	**7.26%**

My DCF analysis I use to support my overall expected market return and to directly estimate DCF risk premiums for both the S&P500 electric utility index and my sample of US electric utilities.

DCF:

Overall equity market return:	8.00-9.00%
US SP500 Electric risk premium:	3.00-3.70%
US Electric UHCs:	5.63-5.90%

Finally, I take into account broader measures such as:

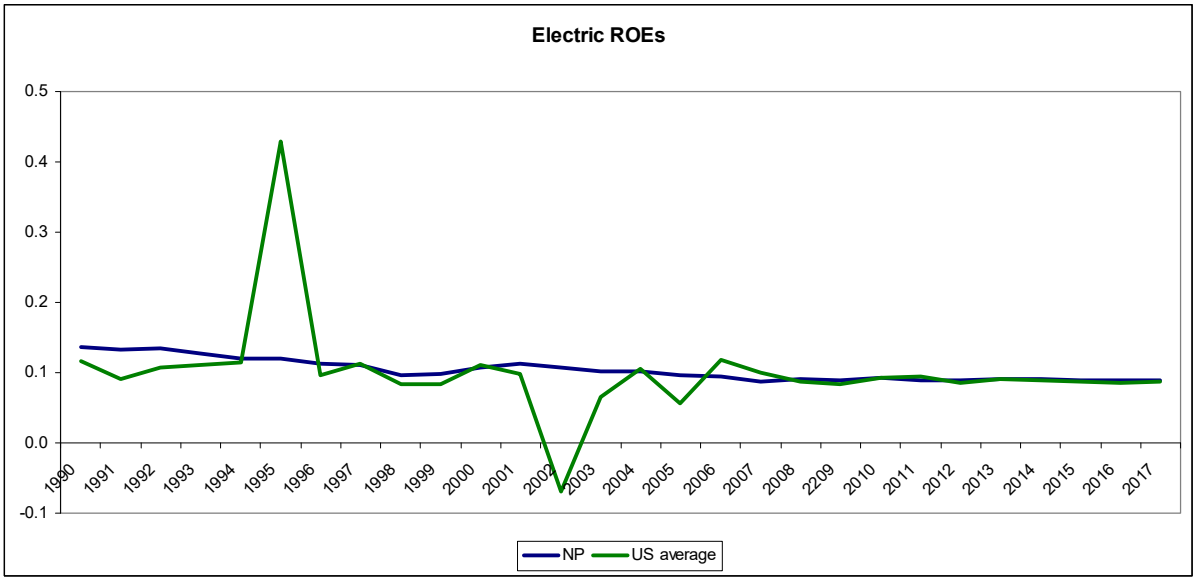
Average Canada ROE since 1980:	9.92%
Asset Manager long run equity returns:	7.00-9.20%

Balancing these values, I continue to judge a fair ROE for NP to be 7.50%, despite the fact that capital market conditions are unambiguously better than in 2016. Further, since the LTC yield has yet to hit the 3.80% trigger I regard as a minimum "normal" LTC yield, I would keep my recommended ROE at 7.50%, which is the same recommendation I made in both 2012 and 2016. However, all the market indicators are that the fair ROE has declined from 2016 when the Board set NP's fair ROE at 8.50%.

Q. WHAT IS YOUR VIEW ON THE USEFULNESS OF ESTIMATES FROM THE US?

A. I continue to be concerned, since the US is a separate country as is most obvious from the fact that current US Treasury yields are still 0.78% higher than LTC yields and that this has actually increased from the 0.55% that existed in 2016. This is a reversal of the long history of Canada having higher rates than the US to attract capital. With objectively lower long term Canada yields it seems contradictory to say that market opportunity costs are the same in both countries. Consequently, estimates down from the US need to be analysed and adjusted should the "comparable firms" not in fact be ***identical***, but just broadly similar.

In Schedule 7 are the earned ROEs for the 6 US electric companies, NP and its ultimate parent Fortis since 1990. Below is a graph of the ROE for NP and the average for the US electric companies.



Averages inevitably produce more stable results than the underlying data, but it is clear that NP's ROE is more stable than these US electric companies. The data for 1995, for example, is the result of Allete's extreme ROE, whereas that for 2002 results from Westar losses. If I graphed he individual results their volatility would be evident. As it is, the standard deviation of the ROEs, which is often used as a measure of risk, is 1.6% for NP and ranges from a low of 1.9% for OGE to a high of 36% for Allete.[37] Of all these US "comparables" none has the low volatility of NP's ROE. What this means is that even if the US operating companies are identical to NP, their holding companies are not. This is because holding companies are normally riskier than the operating companies, since they are one level removed from the underlying cash flow and are often actively involved in mergers and acquisitions (M&A) activity.

Over this 28 year period, NP's average ROE was 10.4%, and the average for the US companies 10.00%. The latter is affected by the huge loss suffered by Westar in 2002 and the huge ROE earned by Allete in 1995,[38] but then this is what happens in the US! Low earned ROEs have also been earned by Duke (-9.5% in 2003), Allete (2.2% in 2005), Eversource (-9.5% in 2005), Great Plains (-3.0% in 2001), Westar (-81.1% in 2002) and PNW (-29.1% in 1989).[39] The only US electric utility not to suffer significantly was OGE, where the lowest ROE was 7.6% in 1979. In contrast, since 1990 the lowest ROE earned by NP has been 8.7% in 2007, which looks good in comparison with these US utilities.

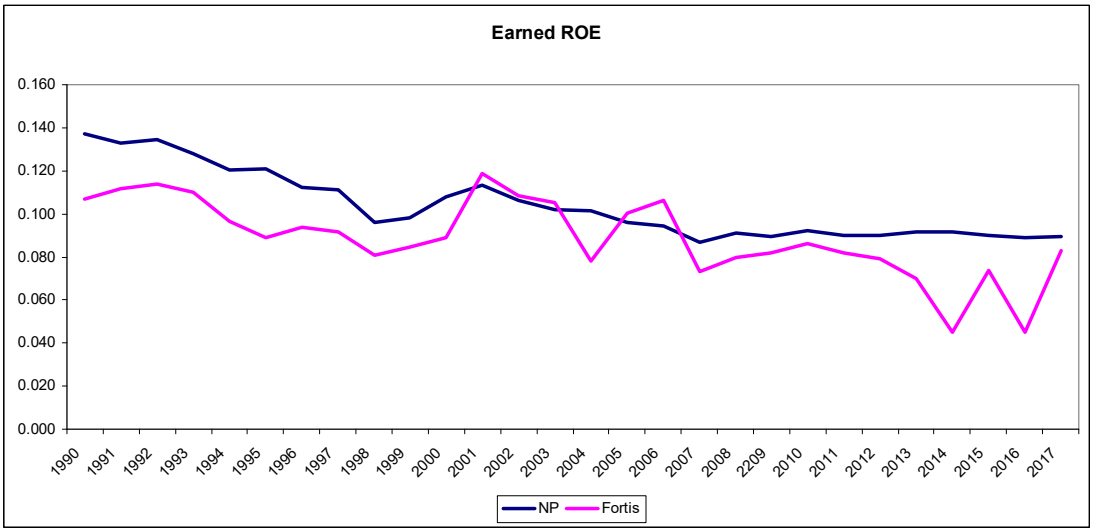
NP's ultimate parent is Fortis and the following graph shows the ROE for Fortis and NP. Fortis predominantly owns regulated assets, but it is a holding company with additional debt at that level plus the added risks that arise from M&A activity. The average ROE for Fortis since 1990 was 8.9% or 1.5% less than for NP and its worst year was an ROE of 4.5% in both 2014 and 2016. Over the last 5 years Fortis' ROE has averaged only 6.3% as it has engaged in a major acquisition program of US utilities. What this indicates is the major difference between the regulated utility operations, like NP, and the utility holding company like Fortis. There is no

[37] Note risk for a utility is the ability to earn its allowed ROE not the volatility of the ROE.

[38] High ROEs are often caused by prior year losses reducing the book value of common equity.

[39] Not in the explicitly in the current sample but merged with Westar to form EVRGY

question that the utility holding company is riskier than the operating company, which is why many regulators "ring fence" their operating company from the activities of the parent. It is also why the holding company debt sells on higher yields.[40]



At this point I should also reiterate my concerns about the practice of relying on "comparable" US samples for comparison with Canadian *operating* utilities. None of the samples used by Mr. Coyne and I are of operating companies since there are none: most operating companies have long since been acquired since they are valuable as the base for a holding company.[41] Moreover, while the screens to create the samples removes some firms it does not remove the underlying risk!

For example, Allete, Eversource, Evrgy (Westar), Duke and PNW have all suffered serious losses at some point in the past, which would have knocked them out of a "comparable" sample at some point. However, this does not mean to say that investors have forgotten or that similar events can't happen in the future. As I pointed out in 2016 Ms. McShane in previous testimony before this Board has included Southern, Scana, Dominion Resources and Consolidated Edison among her group of "comparable" US utilities, whereas Dr. Vander Weide included American

[40] The holding company is reliant on dividend flows from the operating subsidiary that may be restricted.

[41] Note (Ontario) Hydro ONE was privatised and one of the first acts of the newly private company was to consider making acquisitions. The new government in Ontario seems to have stopped this.

Electric Power. Similarly, Mr. Coyne now includes Alliant, American Electric Power, Edison Electric and PNM Resources, which were not in his 2016 sample. All of these companies at some point were regarded as "comparable" to NP but not at other times. But the fact that they have been in and out means that they have never really been comparable to an operating company like NP.

For reference purposes the following recent data (September 21, 2018) for these other "comparable" US firms is below.

				Betas				
		M/B	ROE	Yahoo	RBC	Thomson	Value	Research	Sabrient
SO	Southern	1.89	9.15	-0.015	-0.03	0.1	-0.05	-0.03	-0.1
D	Dominion	2.57	16.29	0.23	0.21	0.3	0.24	0.21	0.34
ED	Consolidated Edison	1.55	10.47	-0.17	0	0.1	-0.02	0	-0.05
AEP	American Electric Power	1.88	10.64	-0.14	0.08	0.2	0.08	0.08	-0.04
LNT	Alliant	2.33	11	-0.07	0.22	0.7	0.22	0.22	0.03
EIX	Edison Electric	1.9	2.68	-0.25	0.11	0.3	0.11	0.11	-0.07
PNM	PNM Resources	1.83	4.91	-0.17	0.15	0.3	0.17	0.15	-0.04
	Average	1.99	9.31	-0.08	0.11	0.29	0.11	0.11	0.01

Their average market risk (beta) was in a range –0.08 to 0.29 indicating yet again how low risk even some US electric utility holding companies are or how important M&A risk and how much their recent stock market performance has been affected by a rising interest rate environment. Their average ROE was 9.31% almost exactly the same as the sample of US firms that I used and their market to book ratio was 1.99 indicating how satisfied US investors are with their recent performance.

Q. DO YOU THINK NOW IS THE TIME TO RETURN TO AN AUTOMATIC ROE ADJUSTMENT MODEL?

A. There is no question that markets have normalized and that NP should by now be back on an AAM. Recently, for example, the Alberta Utilities Commission in its generic decision concluded,

> 505. Based on the evidence regarding market conditions in this proceeding, as summarized in Section 6, the Commission considers that returning to an annual adjustment/generic formula approach to ROE may be reasonable. Specifically, it would appear, based on the evidence in this proceeding, that the reasons justifying a departure from the annual adjustment formula in 2009 may no longer be a concern.

I did not provide a report in that proceeding, but can fully understand the AUC's decision. However, in my judgement there is still significant uncertainty on a number of factors that may affect long term bond yields.

The first is that the US Federal Reserve is no longer buying bonds and is not even reinvesting the proceeds from maturing bonds and interest. As the Fed switches from buying bonds to gradually running down its stock of bonds, demand is taken off the market and we can expect prices to drop and interest rates to increase.

The second is the wild card of China. Currently, China has a $375 billion trade surplus with the US and the bulk of that cash is simply invested in US government securities, since China is reluctant to convert the cash into renminbi as this will cause exchange rate problems. Currently, this may add over $30 billion a month to the demand for US Treasury securities. If Mr. Trump is successful in reducing the US trade deficit with China, by definition, this also reduces the demand for US Treasury securities causing prices to drop and interest rates to increase.

The third is that President Trump may actually end up lowering the current very large US deficit with revenues from tariffs and increasing income taxes as the US participation rate increases. As a result, there is a possibility that the supply of US Treasury securities could decrease causing interest rates to increase.

Finally, there has been considerable discussion of the impact of demographic changes. Some argue that current very low interest rates have been caused by "baby boomers" entering their peak saving years. As they enter their retirement years this will reverse and generate selling pressure, again forcing lower bond prices and higher interest rates.

Whether any of these factors causes US long term yields to increase depends on the Federal Reserve, which can always simply stop selling Treasury securities to ensure an orderly change does not disrupt markets.

However, whatever happens in the US may affect Canada, where for the last several years I have not used the forecast LTC yield in my recommended ROE. If I had used the actual forecast LTC yield my recommended ROE would have been up to 1.00% lower than it has been. Instead, I set

a trigger for the forecast LTC yield of 3.8%. If the Board simply sets the allowed ROE through an AAM based on changes in the forecast LTC yield from current levels without recognizing the anomalous LTC yields that current ROEs are based on, the result could be an unfair ROE. That is, my recommendation is implicitly based on a 3.8% LTC yield and not the actual forecast yield of 3.0% so that increasing the allowed ROE for LTC yields changes from 3.0% to 3.8% I would regard as unfair unless the Board acts similar to the BCUC at one time and uses an AAM with a floor forecast LTC yield..

Finally, much depends on the future relationship between the US and Canada, which at the moment seems highly uncertain. If trade negotiations fail and NAFTA is rescinded, Canada may revert to the policies that existed prior to the Conservative government enacting free trade with the Americans.[42] These concerns should be clarified by the time there is a hearing for the test years 2021 and beyond and I would recommend that the Board defer considering a new AAM until the GRA for years 2021 and beyond.

[42] Such policies included minority floats of US companies in Canada on the TSX, as well as capital barriers to insulate Canada from the US. The Americans seem to have forgotten what we gave up to get the original FTA,

V: BUSINESS RISK, FINANCING AND CONCLUSIONS

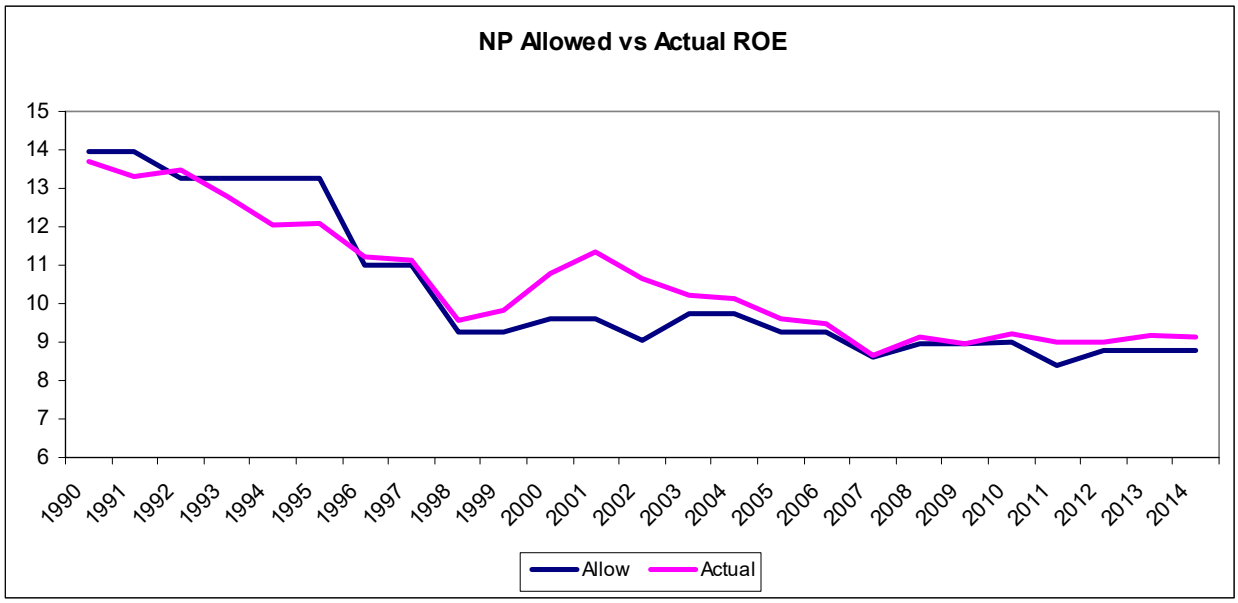
Q. WHAT IS YOUR JUDGMENT ON NP's CAPITAL STRUCTURE?

A. I see nothing in the evidence filed by NP to cause me to change my judgement that NP is a low risk Canadian utility and should have the same common equity ratio as other low risk Canadian utilities. This is why I have recommended a 40% common equity ratio in the last several GRAs. However, in the 2016 decision the Board reaffirmed its 45% common equity ratio for NP after both I, Professor Sean Cleary, and the company entered full business risk and capital structure evidence. Since I judge there to be no material change in NP's business risk since 2016 and Professor Cleary I understand will file business risk and capital structure evidence, I have limited my report in this area.

Q. WHAT IS YOUR HIGH LEVEL BUSINESS RISK ANALYSIS OF NP?

A. As I discussed in 2016 business risk has a short and long run dimension. Short run essentially means does the regulator allow the utility the tools to earn its allowed ROE. In 2016 I listed the deferral accounts available to NP. Deferral accounts are a valuable regulatory tool as they allow the utility to go back and charge a customer for services already delivered and paid for. It can do this due to its market power and the fact that its customer clientele is stable. I could go through all these accounts again or like Mr. Coyne assess the regulator on a variety of factors, but there is an immediate and obvious scientific way of doing. This is to look at the allowed ROE and whether or not NP has been given the tools to earn it.

In answer to CA-NP-093 NP provided its allowed and actual ROE back to 1990. For convenience the following graph shows this data. What is clear is that apart from the early 1990s NP has had no problem earning its allowed ROE. In fact over the last 20 years it has earned on average 0.49% more than allowed. To all intents and purposes when the Board sets the allowed ROE at 8.50% it is really allowing NP to earn almost 9.0%. In 2017, for example, with an 8.50% allowed ROE, NP earned 8.93%. One has to ask if 8.50% is fair, what is 8.93%?



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 over the forecast long Canada rate. Most recently this has been of the order of 5.0% yet its very worst experience was 24 years ago in 1994 when it under earned by 1.22%, that is, it under earned by a quarter of its compensation for risk. This is like a home owner looking at their insurance bill and saying I am paying $1,000 a year with a $500 deductible yet have never had a claim in 28 years. This is because the 5% risk premium (insurance cost) exceeds by an order of magnitude any actual loss (1.22%).

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

A. Yes. This seems to be a consistent theme to expert evidence put forward by most companies and through their expert witnesses. This is that bad things could happen to the utility even though they never have so far. More often than not the conclusion is that the utility is riskier than its last rate hearing. In 2016 in CA-NP-044 NP was asked to provide extracts from its business risk evidence in the 1990s when it was suffering the most from inter-fuel competition. It was asked to do the same in this hearing with the same results, so I repeat the conclusions from 2016.

- 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."

- 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 from NP's demonstrated ability to earn its allowed ROE these risks have so far never materialised. 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 the company is on top of its forecasting and risk assessment the impact of some customer losses is not material as its ROE history demonstrates.

My conclusion is that NP, like most Canadian T&D operating companies, has no short term risk: frequent rate hearings forward tests years, deferral accounts and reasonable skill at forecasting has removed any material risk.

Q. WHAT ABOUT LONG RUN RISKS?

A. The basic long run risk is that the commodity being distributed becomes uneconomic causing significant numbers of customers to drop off its system. As the utility tries to reallocate costs to other customers rates have to rise and so even more customers drop off and they reach a level that many would regard as unjust or unfair and unreasonable. This is the "death spiral" and is real.

TransCanada had a hearing before the National Energy Board in 2012 to consider changing its rate design due to a reduction in load on its Mainline. Due to the emergence of different supply

basins closer to its Central Canadian markets the concern was that its bullet pipeline could not support the tolls required for it to earn its allowed ROE. In this case there was a concern that ***bypass*** of the Mainline would strand some of its assets.

Another example is local Telco service; the final loop. In the early 1990s the development of telecommunications technology allowed the local cable companies to compete with the incumbent copper wire providers. Further as the technology developed even the long distance market became threatened with competition which limited the cross subsidisation of local service with "excess" long distance revenues. Now we take it for granted that competition allows a variety of services to provide both short and long distance telco service, but this was not the case 25 years ago. The CRTC decided to refrain from direct rate of return regulation of the cable and telephone companies as their markets became competitive.

I provide these two examples to indicate that the death spiral is a real long run risk to some distribution utilities either as a result of ***technological change*** or the development of ***alternative supplies*** closer to market. The question is whether either of these have any relevance to NP with the potential for significant increases in the price of electricity as a result of cost over runs at Muskrat Falls. If NP can simply reallocate costs and continue to earn its allowed ROE regardless of the cost of power, then there is no increase in risk.

So the first question is how high can power costs go before the demand for electricity drops enough to lead to a death spiral and is it even possible? In its application NP claims that electricity prices could "more than double" in the absence of rate mitigation. NP (Evidence pages 1-6, 1-7) concludes

> "In Newfoundland Power's view, the continuation of a struggling provincial economy and the commissioning of Nalcor Energy's Muskrat Falls project contribute to an above average business risk for the company."

I have already disputed the observation of a "struggling" provincial economy being a new risk factor, since unfortunately this has been a persistent feature of the provincial economy. Regardless of that fact, RBC is forecasting a weak 2018 will be followed by a healthy 2019. This leaves high electricity prices.

In its MD&A in its 2017 results (page 8), NP states

Future changes in supply costs, including costs associated with Nalcor Energy's Muskrat Falls hydroelectric generation development and associated transmission assets, may affect electricity prices in a manner that affects the Company's sales. During 2017, Nalcor Energy indicated that the cost of the project is now projected to reach $12.7 billion and that it was investigating the options available to moderate the impact of higher project costs on electricity prices.

There is no mention of electricity prices ***doubling***. In CA-NP-089 NP was asked why there was no mention of doubling in the MD&A and NP answered

> "The general provisions of NI-51-102F1 requires that a company's management discussion and analysis ("MD&A") discuss risk and uncertainties that might reasonably affect the future performance of the company."

The answer goes on to point out that the MD&A did disclose the risk of higher electricity prices. However, the important point is there is no mention of electricity prices ***doubling***, presumably because it is not reasonable that this level of electricity prices will actually be reached.

On July 28, 2018 Premier Dwight Ball indicated that without mitigation power prices would go to 22c a kWh when Muskrat Falls is fully online in 2021, but that the government was committed (their "mission") to making sure that prices don't go "much above 17 c kWh." He indicated this would cost $400 million a year and as a start he would draw on Nalcor and for the balance the government would set up a committee to avoid selling power on the spot market, but instead get long term, more valuable, contracts. The point is that politicians are searching for ways to avoid a doubling of electricity prices and the higher costs of Muskrat Falls may be met through other means.

Q. WHAT IS IMPORTANT ABOUT 17c kWH?

A. In answer to CA-NP-072 NP was asked about the provincial election cycle and the recent experience from Ontario. The reason is that the current government has to face the electorate in 2019 just before Muskrat Falls is fully online and the effect of higher prices is passed through in rates. As a result, it will certainly be an issue in the election if electricity prices are seen to double. Here the experience in Ontario is relevant.

As NP explains in CA-NP-072, in 2016 electricity prices in Ontario rose to 18c kWh on peak. This was largely a self-imposed wound, since it was the result of massive subsidies to alternative energy providers that created excess supply when it wasn't needed, forcing the sale of energy to the US at negative prices! Fearing that it would be defeated in an upcoming election, which it

was, the Liberals passed the "Fair Hydro Plan," that essentially took costs out of the system to be paid back after 2021. As NP explains the 25% reduction in consumer electricity costs were paid for by:

a) An 8% rebate on the HST portion on electricity bills,
b) A 16% reduction from electricity cost refinancing and
c) A 1% reduction as a result of regulatory program adjustments

Provincially owned Ontario Power Generation (OPG) bore the brunt of the cost due to an approximate 25% reduction in energy charges to consumers. As NP emphasies (!) the T&D companies in Ontario were not affected and the same would seem to apply in Newfoundland and Labrador.

I think that the Ontario FHP indicates that when issues become capable of defeating the government in an election, it spurs action! This is what happened in Ontario and I would expect similar action in Newfoundland and Labrador, particularly since Muskrat Falls is a very long term project and costs tend to be front loaded so that prices decline in real terms over time. This offers the ability to smooth real prices by transferring some costs to a future time period as was done in Ontario. Spreading costs over various payers and across time while minimising rate shock is a win for politicians even if it comes at a financial cost.[43]

Q. IS A POLITICAL RESPONSE INDICATIVE OF A SERIOUS PROBLEM FOR NP?

A. I don't think so, just because something causes problems for a political party does not mean it is indicative of a death spiral. For example, in Manitoba the Affordable Utility Rate Accountability Act of 2012 requires the following:

> **Report on comparison of utility costs**
>
> 1 For each fiscal year ending after 2012, the Minister of Finance must engage an independent accounting firm to prepare a report that, for each province of Canada, lists a comparable cost, determined in accordance with the regulations, of a utility bundle consisting of
>
> (a) electricity for home use;

[43] The cost in Ontario is huge see CA-NP-072.

(b) natural gas for home heating; and

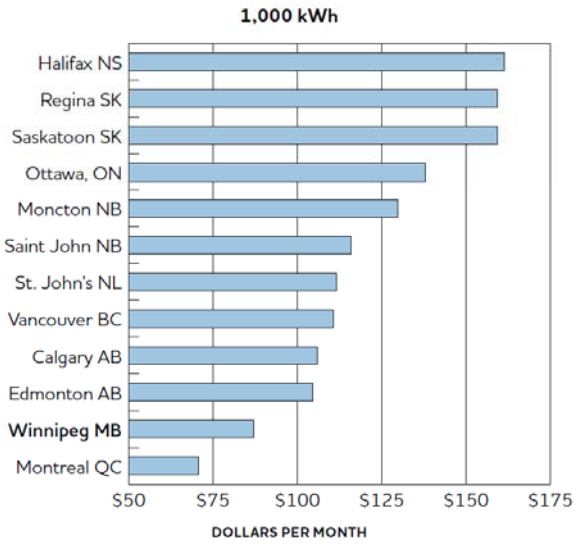
(c) automobile insurance.

Personally, I applaud the thinking behind this Act, since it directly addresses the fairness of utility costs across Canada. The latest review (May 1, 2017) has the costs in the following table.[44] According to Manitoba Hydro the cost for a 1000 KWh residential customer in St John's is $111.52 a month, which is less than the $125.58 a month in 2016. This charge puts St John's in the middle of the pack with an overall cost of 11.59c kWh, compared to 16.146c kWh in Halifax. The cities where power is significantly cheaper are those with abundant cheap hydro, namely Quebec, Manitoba and BC. Otherwise the cost of electricity in St John's is relatively cheap compared to non-advantaged Canadian cities.

Residential

One Month Bill For:

	1,000 kWh	¢/kWh
Halifax NS	$ 161.46	16.146
Regina SK	$ 159.41	15.941
Saskatoon SK	$ 159.37	15.937
Ottawa, ON	$ 137.90	13.790
Moncton NB	$ 129.70	12.970
Saint John NB	$ 115.91	11.591
St. John's NL	$ 111.52	11.152
Vancouver BC	$ 110.79	11.079
Calgary AB	$ 106.02	10.602
Edmonton AB	$ 104.50	10.450
Winnipeg MB	**$ 87.12**	**8.712**
Montreal QC	$ 70.70	7.070



The Manitoba comparisons are for the total cost not the power cost itself, since this is what people pay. However for NP electricity costs are approximately 65% of total revenues, so if power costs increase from the 0.12c kWh that Premier Ball indicates is involved in the current application to his mission to keep them at about 0.17c kWh, it amounts to a 42% increase in

44 https://www.hydro.mb.ca/accounts_and_services/rates/pdf/survey-of-canadian-electricity-bills.pdf

power costs. Ceteris paribus, this results in an overall increase of about 28% in NP's revenue requirement. If passed through equally to all rate groups, this would increase the St John's residential bill to in between that for Ottawa and Saskatoon. This is a broad assessment based on a number of assumptions. However, if approximately correct, while it might cause the Premier to lose the next election, I find it difficult to see how it would endanger the financial viability of NP. In fact even if power costs jump to 0.17c kWh, this would seem to put St John's electricity bills below those in Halifax, where Nova Scotia Power is financed with 37.5% common equity and the cornerstone of Emera.

Even if electricity costs do double this would "only" increase NP's revenue requirement by 65% since the non-power costs do not change. A 65% increase would put the 1,000 kWh residential bill at $184 a month and top of the league, and 14% higher than Halifax. However, it is important to consider what alternatives consumers have since switching from one fuel source to another is not costless. In 2016 NP estimated that oil had a 40% cost advantage in the 1990s (2016 CA-NP-042) and yet only 6,000 customers or 3.7% of the total switched from electric space heating. Moreover, NP only suffered serious under earning in 1994 and 1995 and then for factors unrelated to inter fuel competition.

I suspect that the government's attempt to mitigate rate shock will be successful. Further given the competitiveness of electricity in Newfoundland and Labrador it will not undermine its position relative to fuel oil and propane for space and water heating. Further, even if some do switch, the process would be gradual while other users, like street lighting in practise cannot switch from electricity.

In my judgement there is no material increase in NP's business risk since 2016 should power costs jump to Premier Ball's "limit" of 0.17c kWh and that any rate shock from higher electricity costs can be dealt with should they materialise. Finally none of this is material for the two future test years 2019 and 2020, since Muskrat Falls will only be fully online in 2021. It is a basic regulatory principle that users only pay the cost of assets that are used and useful in providing service. At hand is an application by NP to earn a risk premium for the two test years 2019 and 2020 for risks that it will ***not*** face in those two test years. I judge that the Ontario Energy Board got it right when it decided to ignore risks beyond the test year since they can be dealt with when

they become material. At the current point in time it is speculative to consider the implication of rising electricity prices, particularly since there is ***no*** evidence before the Board that higher electricity prices will impair NP's ability to earn its allowed ROE.

Q. DO OTHERS SHARE YOUR OPINION?

A. Yes. Both DBRS and Moody's have expressed caution about the impact of electricity prices, but have not changed their ratings on NP's debt. For example, DBRS (September 5, 2017) report on NP states[45]

> *"DBRS remains concerned about the potential rate shock once the Muskrat Falls project, which is currently under construction by Nalcor Energy (Nalcor), comes on line in mid-2020. Nalcor expects that by 2022, rates in the Province of Newfoundland and Labrador (the Province) will increase to 23.3 cents per kilowatt hour (kWh), which is a substantial increase from current rates of around 11.7 cents/kWh. Should the upward pressure on rates affect Newfoundland Power's ability to fully pass on costs, or affect ratepayers' ability to pay their electricity bills, this could result in a negative rating action.*
>
> *It is currently uncertain how costs for the project will be recovered from Newfoundland Power's customers; however, should upward pressure on rates affect the Company's ability to pass on costs, this would negatively affect its credit profile."*

The DBRS report clearly states that what is important is the ability to recover these power costs, that is, NP's ability to earn its allowed ROE. However, currently this is uncertain and there is no evidence of inability in this filing. If Moody's and DBRS judge it to be premature for them to change their rating of NP after extensive consultation with management, I would also judge it premature to warrant an increase in NP's ROE.

Q. HAVE YOU ANY COMMENTS ON NP'S FINANCIAL INTEGRITY?

A. Yes. NP's application seems to refer to its Moody's bond rating as BAA1. It is not, NP regards itself as a Moody's A2 as is clear from page 6 of the MD&A to its 2017 results reproduced below.

---

[45] CA-NP-087

Credit Ratings and Capital Structure: To ensure continued access to capital at reasonable cost, the Company endeavours to maintain investment grade credit ratings. Details of the Company's investment grade bond ratings as at December 31, 2017 and 2016 follow.

	2017		2016	
Rating Agency	**Rating**	**Outlook**	**Rating**	**Outlook**
Moody's Investors Service ("Moody's")	A2	Stable	A2	Stable
DBRS	A	Stable	A	Stable

Both Moody's and DBRS issued updated credit rating reports in 2017 confirming the Company's existing investment grade bond rating and rating outlook.

Newfoundland Power maintains an average annual capital structure composed of approximately 55% debt and preference equity and 45% common equity. This capital structure is reflected in customer rates and is consistent with the Company's current investment grade credit ratings.

Some rating agencies distinguish between an issue rating and an issuer rating. An issuer rating is a rating of the company without considering its actual security issues. It is useful, for example, in contracting even when a company does not issue any securities that need to be rated. An issue rating, on the other hand, is the rating on a particular issue of securities.

A company may be rated BBB, for example, but have different securities rated A-, BBB and BB where the different ratings reflect the priority of the claims in the event that the firm runs into financial difficulty. For example, the senior mortgage debt may be rated A-, the senior unsecured debt BBB and the subordinated unsecured debt BB.

Moody's gives NP a BAA1 issuer rating, but its first mortgage bonds have an issue rating of A2. It is the A2 rating that matters, since NP only issues first mortgage sinking fund bonds. Moreover, when there is only one class of debt outstanding, as there is for NP, such a distinction is quaint and a peculiarity of Moody's. DBRS, for example, gives NP an A for both NP's issuer and issue rating

What is important is that an A rating is a very strong bond rating indicative of very high financial integrity. Indicative of this is that On June 2, 2017, NP issued $75 million 40-year, 3.815% first mortgage sinking fund bonds. A company has to be very strong to issue 40 year debt at a fixed rate. Under the circumstances it is misleading to characterise NP as a Moody's BAA1 credit, which it is not.

Q. DO YOU HAVE ANY COMPARATORS FOR THIS COMMENT?

A. Yes, the obvious one is Fortis, NP's parent company. At Schedule 8 is a slide from a Fortis presentation where it describes itself as "one of the lowest risk utility businesses in North America." I wonder from this comparison whether Fortis is saying in fact that its businesses are lower risk than Duke, Enrgy, Eversource, Allete, PNW and OGE?

Further in Schedule 9 is another slide where Fortis describes itself as having "investment grade credit ratings and ample liquidity." Of note is that Fortis is rated BBB(High) from DBRS versus A for NP and BAA3 from Moody's versus A2 for NP. Fortis is rated A-/BBB+ by S&P, which is a strong rating. Schedule 10 has recent S&P bond ratings for Canadian and US electric utilities followed by TD Securities. Of importance is that 9 of the 17 US utilities have BBB type S&P bond ratings and only 8 have the same ratings as Fortis. For the Canadian utilities 4 have lower ratings than Fortis and 3 the same, while Valener is unrated. Out of 24 utilities only one has a better S&P rating than Fortis which is Hydro One, which is controlled by the Province of Ontario. So effectively no privately controlled, public utility has a better S&P bond rating than Fortis and yet NP unambiguously has a better bond rating than Fortis.

I regard NP as being a low risk utility with an excessively conservative common equity ratio. It is significantly lower risk than the comparable companies used by either myself or Mr. Coyne. My 7.5% recommended ROE satisfies the fair return standard.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

Schedule 1

Macro data

	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	-2.11	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	10.70
2000	6.85	5.21	2.69	5.48	5.92	0.67	11.70
2001	7.23	1.78	2.52	3.85	5.79	0.67	9.00
2002	7.66	2.97	2.25	2.57	5.67	0.65	6.90
2003	7.61	1.84	2.80	2.87	5.29	0.72	11.30
2004	7.18	3.10	1.85	2.27	5.08	0.77	12.40
2005	6.77	3.11	2.21	2.71	4.41	0.83	13.90
2006	6.32	2.72	2.00	4.02	4.29	0.88	14.90
2007	6.03	2.13	2.14	4.17	4.32	0.94	13.30
2008	6.15	0.84	2.37	2.62	4.06	0.94	10.90
2009	8.23	-2.86	0.30	0.40	3.85	0.88	9.00
2010	7.99	3.15	1.78	0.50	3.71	0.97	11.10
2011	7.46	2.77	2.39	0.94	3.22	1.01	12.10
2012	7.29	1.75	2.03	0.96	2.35	1.00	10.40
2013	7.07	2.48	0.94	0.98	2.71	0.97	9.70
2014	6.90	2.86	1.91	0.91	2.65	0.91	10.70
2015	6.90	1.00	1.13	0.50	2.06	0.78	6.90
2016	7.00	1.41	1.43	0.50	1.80	0.75	9.80
2017	6.36	3.05	1.60	0.71	2.18	0.77	10.68
Cansim	V13682111	v62305752	v41690973	V122484	V122501	V37426	V634672/V634628

Schedule 2

CANADA BOND YIELDS

Overnight money market rates		1.50
Benchmark bonds		
Canada	Three month Treasury Bill yield	1.52
Canada	Six month Treasury Bills	1.96
Canada	One year Treasury Bills	1.94
Canada	Two year	2.13
Canada	Three year	2.15
Canada	Five year	2.24
Canada	Seven year	2.26
Canada	Ten year	2.32
Canada	Long term (30 year)	2.34
Canada	Real return bonds	0.64
Marketable Bond Average yields		
Canada	1-3 year	2.11
Canada	3-5 year	2.21
Canada	5-10	2.30
Canada	Over tens	2.35

Source: Bank of Canada's web site at http://bankofcanada.ca/en/securities.htm, for September 11/12, 2018.

Schedule 3

Fama-French Application

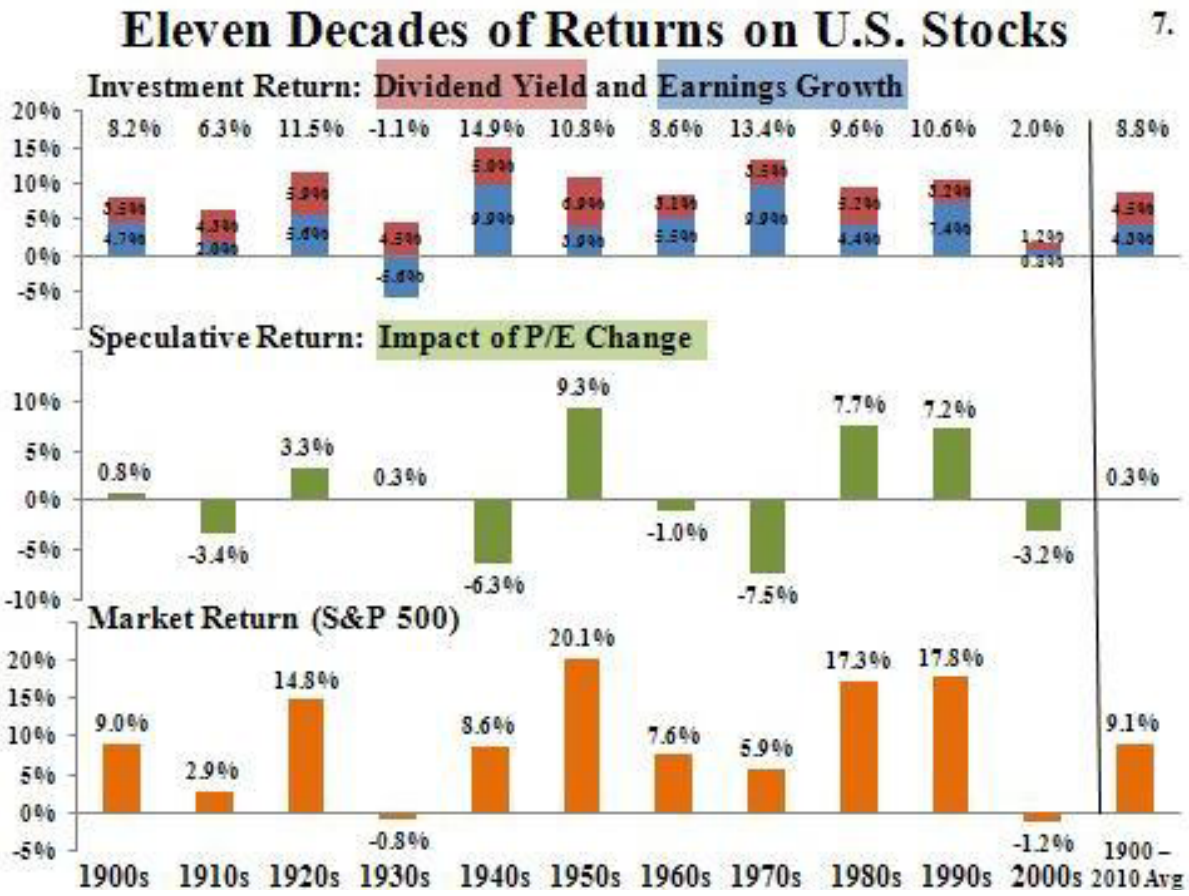
Company	β_i	β_i^S	β_i^V	3FM	β_i	CAPM	Diff
3M	0.66	0.05	0.18	8.5%	0.76	8.4%	0.2%
Alcoa	2.11	0.69	-0.38	17.1%	2.10	16.3%	0.8%
American Express	1.15	0.38	1.79	17.7%	2.08	16.2%	1.5%
AT&T	0.82	-0.23	-0.23	7.3%	0.66	7.8%	-0.5%
Bank of America	1.55	-1.15	2.20	17.1%	2.30	17.5%	-0.4%
Boeing	1.21	-0.64	0.44	10.7%	1.26	11.3%	-0.7%
Caterpillar	1.67	0.00	0.25	14.6%	1.78	14.4%	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	11.8%	1.22	11.1%	0.8%
Coca-Cola	0.75	-0.72	-0.01	6.2%	0.56	7.2%	-1.0%
DuPont	1.10	-0.18	0.67	12.1%	1.37	12.0%	0.1%
Exxon Mobil	0.72	-0.70	-0.30	5.2%	0.41	6.3%	-1.2%
General Electric	1.21	-0.36	0.79	12.6%	1.49	12.7%	-0.1%
Hewlett-Packard	1.03	0.48	-0.26	10.5%	1.02	9.9%	0.5%
Home Depot	0.38	0.55	0.41	9.1%	0.71	8.1%	1.0%
Intel	1.45	-0.09	-0.58	10.3%	1.16	10.7%	-0.5%
IBM	0.81	0.36	-0.18	9.1%	0.81	8.7%	0.4%
Johnson & Johnson	0.60	-0.51	0.09	6.3%	0.52	7.0%	-0.7%
JPMorgan Chase	0.45	-0.60	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	0.86	-0.58	-0.25	6.5%	0.60	7.4%	-1.0%
Merck	1.36	-0.89	-0.55	7.5%	0.88	9.1%	-1.6%
Microsoft	1.09	-0.04	-0.30	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	-0.30	-0.43	6.8%	0.60	7.4%	-0.7%
Wal-Mart	0.30	-0.41	0.09	4.8%	0.24	5.3%	-0.5%
Walt Disney	0.89	0.12	0.35	10.7%	1.08	10.3%	0.4%
Min	**0.30**	**-1.15**	**-0.58**	**4.8%**	**0.24**	**5.3%**	**-1.6%**
Max	**2.11**	**0.69**	**2.20**	**17.7%**	**2.30**	**17.5%**	**1.5%**
Avg	**0.95**	**-0.22**	**0.19**	**9.5%**	**0.99**	**9.7%**	**-0.2%**

Asset Class	10-yr Average Annual Return	10-yr Compound Return	Average Annual Standard Deviation	Average Annual CTE 95%
Canadian Equities	8.3%	7.1%	17.0%	-26.4%
Canadian Equities, Small Cap	9.3%	7.6%	20.3%	-32.3%
Canadian Equities, Low Vol	7.1%	6.3%	14.0%	-20.1%
U.S. Equities	7.6%	6.5%	15.9%	-24.0%
U.S. Equities, hedged	8.0%	6.6%	18.0%	-28.0%
U.S. Equities, Small/Mid Cap	8.4%	6.8%	20.1%	-29.0%
U.S. Equities, Small Cap	8.9%	7.0%	21.6%	-31.1%
U.S. Equities, Low Vol	6.7%	5.9%	13.4%	-18.8%
Int'l Equities	7.9%	6.9%	15.8%	-25.9%
Int'l Equities, hedged	8.0%	6.6%	18.0%	-31.0%
Int'l Equities, Small Cap	8.8%	7.4%	18.6%	-28.4%
Int'l Equities, Low Vol	5.9%	5.4%	10.4%	-16.5%
Global Equities	7.8%	6.9%	14.7%	-23.1%
Global Equities, hedged	8.0%	6.7%	17.3%	-28.3%
Global Equities, Small Cap	8.9%	7.6%	17.7%	-26.2%
Global Equities, Small Cap, hedged	9.2%	7.4%	20.9%	-31.9%
Global Equities, Low Vol	6.3%	5.8%	10.5%	-15.0%
All Country Index (ACWI)	8.2%	7.2%	15.0%	-23.2%
All Country Index (ACWI), partially hedged	8.3%	7.0%	17.5%	-28.2%
Emerging Markets	11.0%	8.3%	25.9%	-35.1%
Emerging Markets, Low Vol	7.9%	6.9%	15.7%	-22.9%

Investment and Speculative TSX Returns back to 1987

	ROE	TSX	Spec
1980	15.05	30.13	15.09
1981	11.70	-10.25	-21.95
1982	6.80	5.54	-1.26
1983	9.34	35.49	26.15
1984	10.53	-2.39	-12.92
1985	10.47	25.07	14.60
1986	9.49	8.95	-0.54
1987	11.19	5.88	-5.31
1988	12.97	11.08	-1.89
1989	11.79	21.37	9.58
1990	7.48	-14.80	-22.28
1991	3.53	12.02	8.48
1992	1.56	-1.43	-2.99
1993	3.69	32.55	28.86
1994	6.57	-0.18	-6.75
1995	9.55	14.53	4.98
1996	10.29	28.35	18.06
1997	10.86	14.98	4.12
1998	8.83	-1.58	-10.42
1999	10.70	31.71	21.01
2000	11.70	7.41	-4.29
2001	9.00	-12.57	-21.57
2002	6.90	-12.44	-19.34
2003	11.30	26.72	15.42
2004	12.40	14.48	2.08
2005	13.90	24.13	10.23
2006	14.90	17.26	2.36
2007	13.30	9.83	-3.47
2008	10.90	-33.00	-43.90
2009	9.00	35.05	26.05
2010	11.10	17.61	6.51
2011	12.10	-8.71	-20.81
2012	10.40	7.19	-3.21
2013	9.70	13.00	3.30
2014	10.70	10.55	-0.15
2015	6.90	-8.32	-15.22
2016	9.80	21.08	11.28
2017	10.68	9.10	-1.58
Average	9.92	10.14	0.22
Volatility	2.92	15.85	15.56

Jack Bogle's Investment and Speculative Returns in the US back to 1900

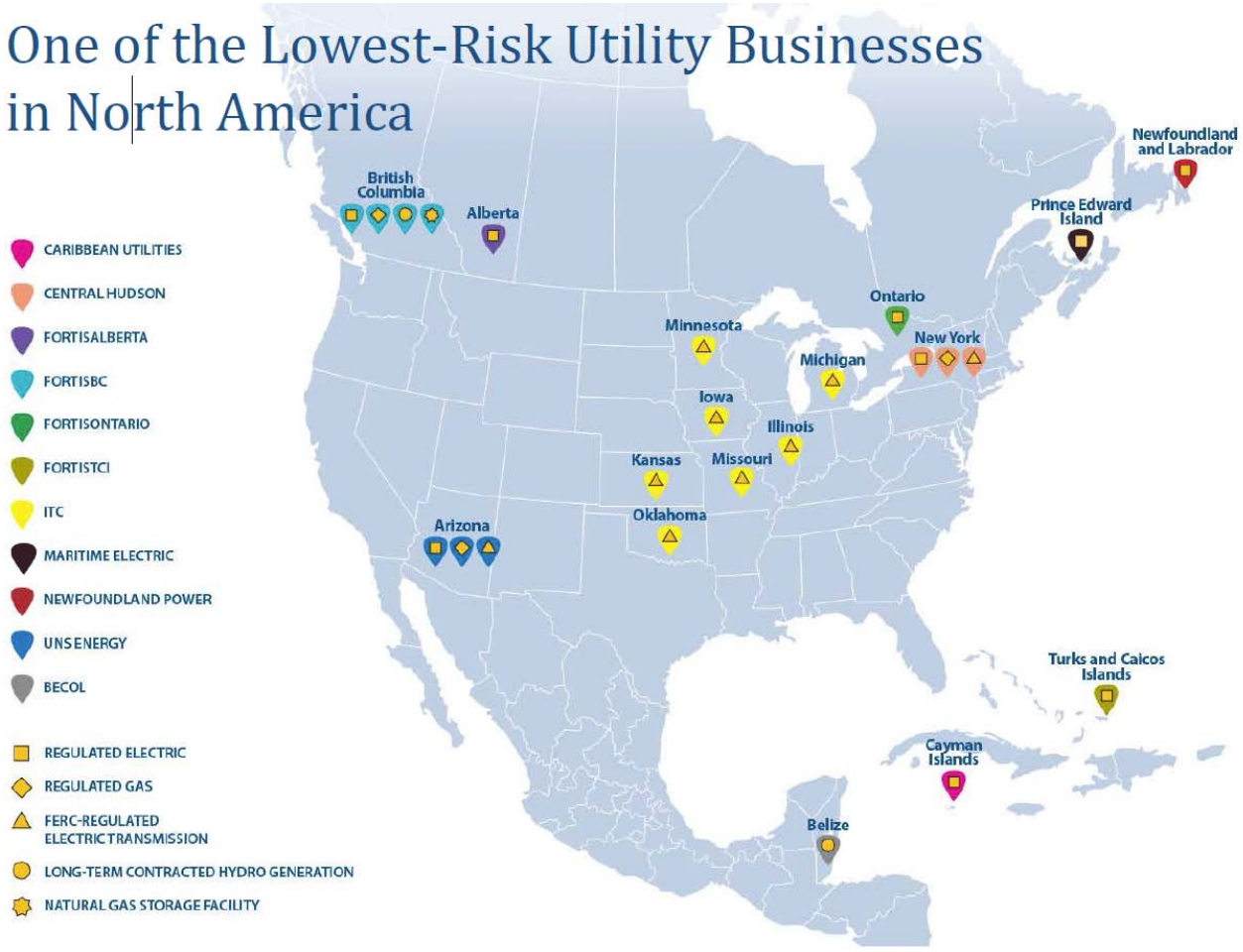


Schedule 7

Utility ROEs

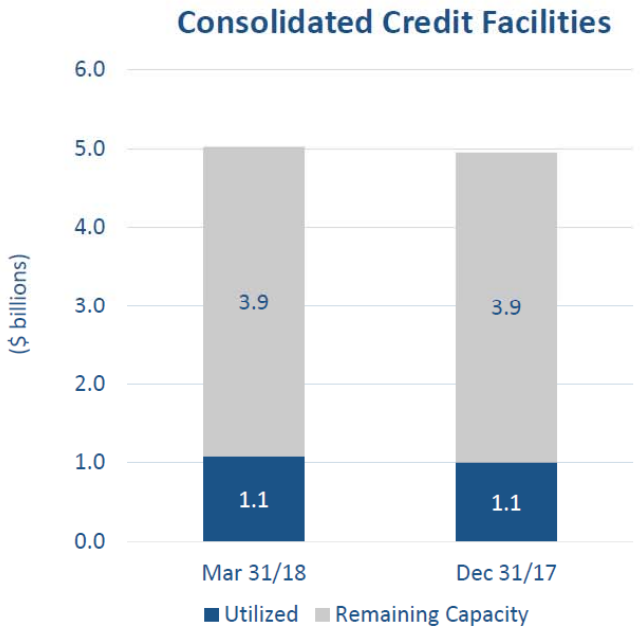
	NP	Fortis	Duke	Allete	Eversource	OGE	PNW	Westar	US average
1990	0.137	0.107	0.118	0.129	0.108	0.149	0.069	0.120	0.116
1991	0.133	0.112	0.122	0.144	0.115	0.139	-0.089	0.116	0.091
1992	0.135	0.114	0.103	0.136	0.107	0.105	0.101	0.090	0.107
1993	0.128	0.110	0.122	0.102	0.105	0.119	0.108	0.111	0.111
1994	0.120	0.096	0.120	0.101	0.113	0.127	0.110	0.114	0.114
1995	0.121	0.089	0.131	2.000	0.111	0.127	0.096	0.105	0.428
1996	0.112	0.094	0.131	0.108	0.013	0.132	0.091	0.099	0.096
1997	0.111	0.092	0.121	0.114	-0.040	0.128	0.113	0.237	0.112
1998	0.096	0.081	0.148	0.108	-0.051	0.159	0.112	0.024	0.083
1999	0.098	0.085	0.162	0.081	0.024	0.148	0.077	0.007	0.083
2000	0.108	0.089	0.172	0.165	-0.006	0.138	0.127	0.071	0.111
2001	0.114	0.119	0.147	0.121	0.112	0.097	0.125	-0.011	0.098
2002	0.107	0.108	0.068	0.111	0.068	0.092	0.056	-0.811	-0.069
2003	0.102	0.105	-0.095	0.162	0.051	0.108	0.085	0.082	0.065
2004	0.101	0.078	0.090	0.166	0.051	0.119	0.082	0.127	0.106
2005	0.096	0.100	0.111	0.022	-0.097	0.153	0.051	0.094	0.056
2006	0.095	0.106	0.071	0.115	0.163	0.163	0.095	0.106	0.119
2007	0.087	0.073	0.071	0.118	0.083	0.145	0.087	0.091	0.099
2008	0.091	0.080	0.061	0.100	0.096	0.122	0.062	0.081	0.087
2209	0.090	0.082	0.067	0.066	0.092	0.127	0.069	0.077	0.083
2010	0.092	0.086	0.078	0.077	0.098	0.129	0.090	0.085	0.093
2011	0.090	0.082	0.081	0.087	0.098	0.134	0.086	0.083	0.095
2012	0.090	0.079	0.052	0.081	0.057	0.128	0.098	0.095	0.085
2013	0.092	0.070	0.068	0.078	0.082	0.128	0.097	0.096	0.091
2014	0.092	0.045	0.072	0.078	0.082	0.122	0.091	0.095	0.090
2015	0.090	0.074	0.072	0.09	0.085	0.102	0.095	0.080	0.087
2016	0.089	0.045	0.062	0.082	0.088	0.098	0.092	0.091	0.085
2017	0.089	0.083	0.071	0.077	0.089	0.1	0.099	0.083	0.086
Volatility	0.016	0.018	0.050	0.360	0.058	0.019	0.039	0.176	

Westar updated with EVRGY
Data from 2008 Valueline


One of the Lowest-Risk Utility Businesses in North America
CARIBBEAN UTILITIES
CENTRAL HUDSON
FORTISALBERTA
FORTISBC
FORTISONTARIO
FORTISTCI
ITC
MARITIME ELECTRIC
NEWFOUNDLAND POWER
UNS ENERGY
BECOL
REGULATED ELECTRIC
REGULATED GAS
FERC-REGULATED ELECTRIC TRANSMISSION
LONG-TERM CONTRACTED HYDRO GENERATION
NATURAL GAS STORAGE FACILITY
British Columbia
Alberta
Newfoundland and Labrador
Prince Edward Island
Ontario
Minnesota
New York
Michigan
Iowa
Illinois
Kansas
Missouri
Oklahoma
Arizona
Turks and Caicos Islands
Cayman Islands
Belize

Investment-Grade Credit Ratings and Ample Liquidity

Credit Ratings	
S&P Global (1)	A- / BBB+
DBRS	BBB (high)
Moody's (2)	Baa3



(1) In March 2018, S&P affirmed the Corporation's credit ratings. The outlook was revised to negative from stable, due to modest temporary weakening of financial measures as a result of U.S. Tax Reform, which reduces cash flow at the Corporation's U.S. utilities.
(2) In April 2018, Moody's issued a credit opinion with no change to the Corporation's credit ratings or outlook.

Schedule 10

Electric companies S&P Bond ratings

August 27, 2018	Ticker (Exch.)	Recent Price	Market Cap.	EV	EV/EBITDA 2016A	2017A	2018E	2019E	For.	vs. Peers	Debt-to-Cap.	S&P Debt Rating
Canadian Power & Utility												
AltaGas Ltd.	ALA-T	24.96	6,621	16,478	23.4	20.6	16.1	11.1	12.8	109%	44.2	BBB
ATCO Ltd.	ACO.X-T	39.80	4,569	17,502	9.0	8.0	9.0	8.1	8.5	n.a.	58.0	A-
Canadian Utilities Ltd.	CU-T	32.60	8,867	19,911	11.4	11.0	10.6	9.7	10.0	96%	60.6	A-
Capital Power Corp.	CPX-T	27.47	2,820	4,913	9.8	8.5	7.0	6.9	7.0	67%	41.4	BBB-
Caribbean Utilities Ltd.	CUP.U-T	13.13	435	710	11.6	10.6	12.2	11.4	11.7	112%	54.8	A-
Emera Inc.	EMA-T	40.58	9,357	25,731	16.1	11.0	10.5	9.8	10.0	96%	67.8	BBB+
Fortis Inc.	FTS-T	42.47	18,042	44,658	17.8	11.9	11.9	11.1	11.4	109%	56.8	A-
Hydro One Ltd.	H-T	19.33	11,518	23,756	11.5	11.7	10.5	8.3	9.1	87%	52.8	A *-
TransAlta Corp.	TA-T	7.60	2,187	7,278	7.0	7.0	7.4	7.5	7.5	72%	45.8	BBB-
Valener Inc.	VNR-T	20.13	787	979	7.5	3.2	14.7	14.1	14.3	137%	12.1	NR
Average					**12.9**	**10.6**	**11.2**	**10.0**	**10.4**		**48.5**	
U.S. Electric Utilities												
Ameren Corp.	AEE -N	63.99	15,616	24,695	11.0	10.4	10.5	10.1	10.2	106%	53.5	BBB+
American Electric Power	AEP-N	71.55	35,269	59,440	10.8	11.3	11.1	10.4	10.6	110%	55.5	A-
Centerpoint Energy Inc.	CNP-N	27.88	12,032	19,986	9.8	9.4	9.3	8.7	8.9	92%	65.3	A- *-
CMS Energy Corp.	CMS-N	49.36	13,982	24,094	11.7	11.0	11.0	10.4	10.6	110%	70.1	BBB+
Consolidated Edison Inc.	ED-N	79.45	24,717	41,712	11.4	10.4	10.8	10.3	10.5	108%	51.8	A-
Dominion Resources Inc.	D-N	71.64	46,836	86,428	14.9	13.5	12.7	11.8	12.1	126%	65.8	BBB+
DTE Energy Co.	DTE-N	111.90	20,308	33,880	13.3	12.8	12.4	11.4	11.7	122%	56.4	BBB+
Duke Energy Corp.	DUK-N	81.41	57,993	113,741	12.1	11.7	12.0	11.4	11.6	120%	56.6	A-
Edison International	EIX-N	67.44	21,973	38,691	8.9	8.7	8.6	7.9	8.1	84%	51.1	BBB+
Entergy Corp.	ETR-N	85.09	15,389	32,655	9.6	9.3	9.9	9.1	9.4	97%	67.1	BBB+
FirstEnergy Corp.	FE-N	37.05	18,007	37,102	8.4	8.3	9.7	9.4	9.5	98%	85.1	BBB-
NextEra Energy Inc.	NEE-N	172.70	81,446	116,685	14.2	12.6	12.4	11.8	12.0	125%	54.3	A-
PG&E Corp.	PCG-N	42.81	22,139	41,129	6.6	6.6	8.2	6.3	7.0	72%	49.6	BBB *-
Pinnacle West Capital	PNW-N	81.23	9,096	14,627	10.8	10.1	10.5	9.9	10.1	104%	49.2	A-
PPL Corp.	PPL-N	29.70	20,777	42,209	10.3	10.8	10.3	9.6	9.8	102%	66.4	A-
Public Service Enterprise	PEG-N	52.75	26,656	40,891	11.3	11.1	11.2	10.4	10.7	111%	49.6	BBB+
Southern Co./The	SO-N	45.03	45,667	96,768	13.5	11.4	11.8	10.9	11.2	116%	66.3	A- *-
Average					**11.0**	**10.5**	**10.6**	**9.9**	**9.6**		**59.2**	

Source: TD Securities, Pipelines, Power and Utilities Weekly Update August 27, 2018.

Appendix A

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

ACADEMIC BACKGROUND:

D.B.A.,	Indiana University, (Finance).
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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
Best paper in corporate finance, 1999 SFA meetings
ASAC Distinguished Professor Address 1990,
Director Financial Management Association 1988-90,
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Elected to Beta Gamma Sigma,
First class honours B.Sc.(Econ)
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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, the Economic Environment of Business, Business Finance, Corporate Financing, International Financial Management, Mergers & Acquisitions, Financial Management, Capital Markets & Corporate

Financing (EMBA), Applied Asset Management, Financial Theory of the Firm (Ph.D), Capital Markets Workshop (Ph.D). Undergraduate courses (B.Comm) in International Business, Business Finance and Introduction to Financial Markets. Executive courses (2-5 days) on Money and Foreign Exchange Markets, Business Valuation, Financial Strategy, Equity Markets, Capital Market Innovations, Mergers & Acquisitions and Finance for Non-Financial Managers.

JOURNAL ARTICLES

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"Additional Sources of Equity Risk premium Data-Canada" Appendix 3C in Valuation Handbook, 2017, Duff and Phelps, John Wiley Inc.

TESTIMONY Expert financial witness in a variety of civil cases plus (some with the late Professor M.K. Berkowitz) rate hearings for Altalink partners, ATCO Gas (South), ATCO Pipelines (South), ATCO Electric, Bell Canada, Consumers Gas, Teleglobe, Maritime T&T, Island Tel, BC Tel, AGT, Newfoundland Tel, Union Gas, Intragaz, Gazifere, Gaz Metropolitain, Ontario Hydro, Centra Gas Ontario, NB Tel, Northwestel, Pacific Northern Gas, BC Gas, West Kootenay Power, TransCanada Pipelines, TransEnergie, Trans Mountain Pipelines, IPL, Westcoast Energy, Nova Gas Transmission, Foothills Pipeline, TQ&M, ANG, Centra Gas Manitoba, Maritime Link, Newfoundland Power, AOSPL, Alberta Bottlers Depot Association.

Ph.D SUPERVISOR:

George Pink, A Dominance Analysis of Canadian Mutual Funds, 1988,

Greg Lypny, An Experimental Study of Managerial Pay and Firm Hedging Decisions, 1989,

Frank Skinner, Credit Quality Adjustments and Corporate Bond Yields, 1990,

Rui Pan, Probability Analysis of Option Strategies, 1994,

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Kevin Lam, The Pricing of Audit Services, 1997,

Sean Cleary, The Relation Between Firm Investment and Financial Slack, 1998,

Xinlei Zhao, Three Essays on Financial Markets, 2002,

Lynnette Purda, Elements of Corporate Debt Policy, 2003,

Themis Pantos, Investment Distortions in the Presence of a Sovereign Debt Overhang, 2003.

Zhao Sun, PEG ratios and Stock Returns, 2004.

Zhaoxia Xu, Dynamic Adjustment of Financial Policy, 2007.

Bin Chang, Information in Financial Markets, 2008.

Ambrus Kesckes, Three Essays on IPOs, 2008 (Co-chair with Jan Mahrt-Smith)

Jun Zhou, Industry Influences on Corporate Financial Policy, 2010.

CASE WRITING:

A fair rate of return for Bell Canada, 1986.
Canvend 1984, A & B, 1988.
Peoples Jewellers, 1988.
Great Lakes Forest Products A, 1989.
Inco, 1989.
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American Can Canada, 1990.
Great Lakes Forest Products A, 1993 (with W. Rotenberg)
BC Telephone, 1993
103 Kirsten Avenue, 1994
Great Lakes Forest Products B, 1994 (with W. Rotenberg)
Mill Creek Jewellery, 1995 (With E. Kirzner)
Chapters, draft 2002.
Second Cup Valuation, draft 2002.

SERVICE:

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
- Managerial Finance 2016-
- Global Finance Journal 2016-
- Investment Management and Financial Innovation 2012-2017

Director at large Multinational Finance Society 1998-2012
Co-Chair 1991 Northern Finance Association meetings.
Chair 1998 Northern Finance Association meetings
Chair 2008 MFS annual meetings.
President Multinational Finance Society, 2010-11
Programme Committee member FMA meetings, October 1993.
Programme Committee member SFA meetings November 2002.
Programme Committee member, MFS meetings 2002-
Programme Committee Member, Global Finance Conference, 2006, 2015.

Programme Committee Member, European Financial Management 2006-
Programme Committee member, NFA meetings 2008-
Investment Committee, Trinity College, U of T, 2010-2015
Pension Committee, Governing Council University of Toronto, 2011-14
Special committee on the Supplementary Retirement Arrangement (SRA) University of Toronto, 2011
Frequent media commentator.
Vice-President Mid-West Finance Association 2012-14.
President Elect Mid-West Finance Association 2014-2015
President Mid-West Finance Association 2015-2016.

July 2018.

APPENDIX B
ESTIMATION OF THE MARKET RISK PREMIUM

Introduction

In this Appendix, I estimate the market risk premium.[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 in current market conditions and requires an explanation of why "this time it is different,"

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 that fact that every statistic is actually 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 as 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 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

[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 "Equity Risk Premiums in the US and Canada," *Canadian Investment Review* (Spring 2001). The latter paper is available for download from Professor Booth's web site http://www.rotman.utoronto.ca/~booth

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).

Both the arithmetic and compound rates of return are normally calculated. 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 long time this is the GM return. Moreover, if we ignore intervening periods, then the AM return is the same as the GM return, that is, 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 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 or a high variance (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:

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

In estimating the market risk premium, I believe that the correct time-period for calculating rates of return is a **one-**year holding period. The reason for this is primarily because most regulated firms are regulated on the basis of annual rates of return where rates are almost always expressed as annual percentages.

In addition to the AM and GM rates of return I also estimate the rate of return by means of an ***ordinary least squares*** regression model. This is a statistical technique that estimates the annual

rate of return by minimising the deviations around the estimate. Ordinary least squares (OLS) is the standard technique for estimating economic models and is commonly used for estimating other annual growth rates, such as the growth rate in dividend growth 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 in 1924-1928 the average market risk premium is estimated for each of the AM, GM and OLS and is then updated each year with the addition of a new year of data, so the second observation is for the period 1924-1929. In this way the graph captures the "learning" that goes on from 1924. The instability in the 1920s into the 1930's is evident: as the averages all start out very high, due to the strong equity markets in the 1920's, and then in the 1930s they decline precipitously after the great stock market crash of 1929. However, the market risk premium stabilises by the late 1950s, before beginning a long gradual decrease. Note that with over ninety years of data, the impact of any one-year is now very small and the market risk premium is "stuck" around 5.0%. However, it is apparent that the realised market risk premium has been **declining** almost continuously since the mid 1960's as the importance of the prewar period gets smaller and smaller and the impact of the post war period increases.

An alternative to the above procedure is to work backwards, that is, start in the five-year period 2014-2018 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, this graph always includes the most recent five-year period. In this case the last five years includes more favourable equity markets similar to the 1920's. However, as we work back through time we include the impact of the 2008/9 stock market crash and need to get back to the 1950's before the market risk premium gets above 4.0%. However, the graph illustrates why current market participants generally assess the risk premium of equities over bonds as much

2 The graphs use data from the Canadian Institute of Actuaries, "Report on Canadian Economic Statistics" May 2018.

lower than 5.0%, since this is what they have experienced over the last 30 years or so.

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 2017, this is essentially a subset of the data graphed in Schedule 1. Note for example, that the most recent 20-year period has an earned risk premium of 1.86%, as we go back successively by adding an extra ten years of data each time the earned risk premium drops to 0.59%, increases to about 2.0% until it finally reaches 3.18% for the last 60 years of market history. It then requires over 70 years of data to get to just below 5.0%. ***For the whole period, 1924-2017, the AM market risk premium is 4.86%.***

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 ending the time period in the 1980s or 1990's by using stale data from old textbooks. Equivalently a low market risk premium can be estimated by emphasizing the most recent period since the late 1980's, as most comparable to today. In both cases, the choice is the result of a long cycle on Canadian interest rates.

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 but starting in the 1950's interest rates started to increase with inflation, thereby causing losses to anyone holding long-term bonds, since as interest rates go up the return to holding bonds goes down. This process ended in the period 1981-1989, after which it has gone into reverse until we reach the current period of very low interest rates when over 10 year maturity long Canada bonds ended 2017 at just 2.15% (V122487).

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 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 since monetary policy was subordinate to fiscal policy.4 As a result, the standard deviation of annual bond market returns was only 5.20%. In contrast, from 1956-2018, 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 substantially. Effectively bond market risk dramatically increased, while equity market risk was much the same, if not less.

This changing bond market risk is illustrated in Schedule 4, which graphs the equity market risk divided by the bond market risk. For each the risk is estimated as the standard deviation of returns over the prior ten-year period, so the series start 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, where equities dropped from being six times riskier than long-term Government of Canada (GOC) bonds to their low point, prior to the Internet Bubble, of similar risk. Since then the traditionally higher equity market risk as again asserted itself.

However, what is crucial for the investor is whether this risk is diversifiable, that is, is the bond market beta or risk positive? In Schedule 5, I show that the Canadian bond market beta was very large during the period from the mid-1980s until the early 2000's. This was the period 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 portfolio risk to the extent that it did in the 1950's and more recently. However since the Canadian government solved its structural budget problems in the 1990's we have seen the bond market beta revert to its more typical negative or insignificant relationship.[5]

---

[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.

4 For part of this period, the world was on the gold standard so interest rates were not as affected by national inflation rates etc as they are now.

5 During this period, the Government of Canada long-term bond had as much market risk as low risk Canadian utilities.

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.[6] The regression model explains a large amount of the variation in real Canada yields, and five 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 periods 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 them was very low. The coefficient on the risk variable indicates that for every 1% increase in bond market volatility, real Canada yields increased by about 24 basis points. That is, a 5% increase in the standard deviation of bond market returns before and after 1956 was associated with about a 1.25% increase in real Canada yields between these two periods.

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 increasingly ran deficits, this figure became a very large negative number. For 1992, the deficit was about 9.0% of GDP, a record peacetime high, indicating that government net borrowing was flooding the markets with government bonds. For 1997, this deficit turned into a surplus, which increased every year until 2000 when the surplus almost hit 3.0% of GDP. The coefficient in the model indicates that for every 1% increase in government borrowing real Canada yields increased by about 25 basis points. That is, increased government borrowing by competing for funds with other borrowers has driven up real interest rates. At the peak of the government's financing problems in 1992 a 9% 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 yields in the early 1990s. In 1994, for

[6] Before 1991 there was no real return bond

example, when real yields were over 7%, the deficit added about 1.75% and the bond market uncertainty about another 2.65% or in total close to 4.5 % to the real yield. It is easy to see that with this dramatic increase in real yields there was very little "extra" risk for low risk equities over bonds at this time.

The three “dummy” or indicator variables represent unique periods of intervention in the financial markets. An indicator variable simply inserts a “1” for the years when this special phenomenon was in effect. Dum1 is for the years from 1940-1951, which were the "war" years, when interest rates were effectively controlled to finance the war and recovery. The coefficient indicates that government controls reduced real Canada yields 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. The sign on Dum2 indicates that, but for this recycling and the oil crisis, real yields would have been about 3.6% higher.

Dum3 is for the recent period of quantitative easing or central bank bond buying since 2010, which indicates that the real yield has recently been about 2.6% below where it would have been without the recent extreme measures taken in the US, UK, Europe and Japan. These dummy variables are included due to known periods of intervention that have prevented the “normal” application of financial principles in the bond market. Essentially, at these times interest rates were determined largely by political, rather than underlying economic factors.

In Schedule 7 is a graph of the error from two models. The first (M1) is the error from a real yield model that excludes the financial crisis indicator variable. 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 a financial crisis indicator variable is included (M2) this error disappears. The model indicates that but for the financial crisis the real yield with current Canadian government deficits and bond market uncertainty would be about 3.70%. This would be similar to the situation in the early 2000s.

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 directly 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% and is currently at 0.54%.

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. Checking on 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 1926-2017.

Regardless of whether we estimate the AM, GM or OLS average, the historic record is that the US average estimate 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 of 1.41% (6.08%-4.67%) is split between a difference in the average equity return of 0.98% and a difference in the average government bond return of 0.42%, that is approximately a 2:1 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] as well as by the historically slightly lower risk of the Canadian market.

[7] Note, however, that the standard deviation or variability of the S&P500 equity returns was 19.79% or 1.30% 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; 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.

Further, we have to bear in mind that Canada is in a favourable position as a AAA rated borrower that has 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 bonds. However, this started to change as the Government of Canada move into a surplus position and since the mid 2000's long Canada bonds have usually had lower yields than US Treasuries.

For example between 1994 and February 2005 the average yield on long Canada bonds was 0.33% higher than that on US bonds, which is roughly consistent with the data in Schedule 9. In contrast, since March 2005 the yields on long Canada bonds have been 0.66% less than those on US Treasuries. All else constant this swing of 1.0% in the Canadian bond yield against that in the US would raise the estimate of the Canadian equity market risk premium. Currently (June 2018) Canadian long-term bond yields continue to be 0.70% lower than equivalent US Treasuries, consistent with lower required rates of return in Canada. As a result, although my direct estimate of the Canadian market risk premium is well under 5.0% I judge a reasonable range to be 5.0-6.0%, since this reflects the recent behaviour of interest rates in Canada and the removal of regulatory protection in the Canadian equity market.

Reasonableness of the Estimates

The prior statistical work indicates that the Canadian market risk premium has been under 5.0% while that for the US has been about 1.4% higher, but the Canadian market risk premium has almost certainly increased. These estimates are consistent with the judgment of professionals in the area of capital markets. Professor Fernandez[9] and his co-authors survey finance professionals around the world to find out what they actually use for the market risk premium. A key result

9 Market risk Premium and Risk-Free Rate Used for 59 countries in 2018: a survey," IESE Business School, 2018.

from his 2018 survey is reproduced bas follows:

Table 2. Market Risk Premium (MRP) used for 59 countries in 2018

MRP	Number of Answers	Average	St. Dev.	Median	MAX	min	St.Dev. / Average
USA	1348	5,4%	1,7%	5,2%	17,8%	1,3%	32,1%
Spain	675	6,7%	2,4%	6,2%	20,0%	0,8%	36,2%
Germany	528	5,3%	1,7%	5,2%	15,2%	1,0%	32,5%
Argentina	73	13,9%	4,7%	16,3%	20,2%	1,9%	34,3%
Australia	74	6,6%	1,4%	7,1%	10,2%	3,3%	20,8%
Austria	56	6,2%	0,7%	6,4%	7,2%	4,2%	10,5%
Belgium	53	6,2%	0,8%	6,4%	7,2%	3,3%	12,5%
Bolivia	6	6,6%	2,9%	6,6%	9,4%	3,8%	43,3%
Brazil	100	8,4%	2,3%	8,6%	15,2%	2,3%	26,9%
Bulgaria	8	7,5%	1,3%	7,7%	9,5%	5,0%	16,8%
Canada	77	5,8%	0,7%	6,0%	7,2%	4,1%	12,7%
Chile	72	6,1%	1,1%	6,2%	8,2%	3,1%	17,7%
China	95	6,3%	2,8%	7,0%	13,2%	0,6%	43,4%
Colombia	72	8,7%	3,7%	7,9%	25,2%	3,8%	42,6%
Czech Republic	63	5,9%	0,7%	6,0%	8,2%	4,8%	12,3%
Denmark	53	6,0%	0,8%	6,2%	7,2%	3,8%	12,9%
Ecuador	7	9,0%	3,5%	8,0%	12,8%	5,5%	38,7%
Egypt	9	10,9%	4,5%	12,6%	15,2%	4,8%	41,6%
Estonia	7	5,1%	1,0%	5,2%	6,1%	3,0%	20,4%
Finland	53	5,9%	0,8%	6,0%	7,2%	3,8%	13,0%
France	83	5,9%	1,6%	6,4%	8,8%	1,3%	27,3%

This table indicates that with 1,348 responses the average US market risk premium was estimated to be 5.4% with the typical (median) slightly lower at 5.2%. In contrast, the average market risk premium from the 77 responses in Canada was reported at a slightly higher 5.8% with a median of 6.0%. The median Canadian response of 6.0% was amongst the highest of the developed countries, but across these countries there is an obvious 5.0-6.0% grouping.

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. Textbooks normally use a Treasury Bill yield, rather than the long term bond yield used before regulatory boards. However, as reported below in the US the average risk free rate was given as 2.8% in the US and in Canada 2.9%. In both cases these look more like long term bond yields than Treasury Bill yields. Further Fernandez remarks that "most respondents use for European counties a R_F (risk free rate) higher than the yield of the 10-year Government bonds."

Table 3. Risk Free Rate (RF) used for 59 countries in 2018

RF	Number of Answers	Average	St. Dev.	Median	MAX	min	St.Dev. / Average
USA	1348	2,8%	0,8%	2,8%	7,0%	-0,3%	30,0%
Spain	675	2,1%	1,1%	1,8%	6,2%	-0,1%	52,3%
Germany	528	1,4%	1,0%	1,2%	5,2%	-0,7%	67,6%
Argentina	73	9,3%	4,9%	10,4%	25,9%	2,0%	52,8%
Australia	74	3,1%	0,5%	3,0%	5,0%	2,4%	14,7%
Austria	56	2,0%	1,1%	1,8%	6,2%	0,7%	54,1%
Belgium	53	1,6%	0,4%	1,7%	2,4%	0,8%	26,6%
Bolivia	6	3,0%	1,1%	3,0%	4,2%	1,8%	37,0%
Brazil	100	7,3%	2,3%	7,2%	10,7%	2,0%	31,9%
Bulgaria	8	2,8%	1,2%	2,9%	5,0%	1,3%	44,9%
Canada	77	2,9%	0,5%	2,9%	4,2%	1,8%	17,7%
Chile	72	4,1%	0,7%	4,3%	5,0%	1,8%	15,9%
China	95	3,8%	0,4%	3,8%	4,7%	2,3%	11,7%
Colombia	72	6,7%	1,4%	6,7%	10,2%	3,9%	20,6%
Czech Republic	63	2,6%	0,6%	2,8%	3,3%	0,8%	21,4%
Denmark	53	1,6%	0,5%	1,7%	2,7%	0,5%	30,4%
Ecuador	7	3,6%	1,4%	3,8%	6,0%	2,1%	38,8%
Egypt	9	10,0%	3,5%	10,0%	14,2%	5,8%	34,7%
Estonia	7	2,1%	0,9%	1,8%	4,0%	1,3%	43,5%
Finland	53	1,7%	0,6%	1,8%	2,7%	0,6%	33,4%
France	83	1,6%	0,7%	1,6%	3,2%	0,3%	41,7%

Finally, with both the market risk premium and the risk-free rate, the survey reports the overall return on the market as shown below where again there is a remarkable commonality: the overall average market return is 8.2% in the US and 8.7% in Canada.

Table 4. Km [Required return to equity (market): RF + MRP)] used for 59 countries in 2018

Km	Number of Answers	Average	St. Dev.	Median	MAX	min	St.Dev. / Average
USA	1348	8,2%	2,0%	8,3%	19,8%	2,4%	23,9%
Spain	675	8,8%	2,5%	8,5%	21,2%	1,9%	27,8%
Germany	528	6,7%	1,9%	6,8%	16,2%	1,0%	28,3%
Argentina	73	23,1%	6,8%	26,2%	43,5%	8,6%	29,4%
Australia	74	9,7%	1,5%	10,0%	14,4%	7,1%	15,2%
Austria	56	8,2%	1,3%	8,2%	12,4%	4,9%	15,6%
Belgium	53	7,8%	1,1%	8,1%	9,2%	4,1%	14,2%
Bolivia	6	9,6%	1,8%	9,6%	11,6%	7,6%	18,7%
Brazil	100	15,7%	3,0%	15,2%	21,4%	10,5%	19,2%
Bulgaria	8	10,3%	1,2%	10,0%	13,0%	9,1%	11,6%
Canada	77	8,7%	1,1%	9,0%	10,4%	6,1%	12,4%
Chile	72	10,2%	1,2%	10,5%	12,4%	7,1%	12,0%
China	95	10,1%	2,7%	10,6%	17,4%	4,3%	27,2%
Colombia	72	15,4%	4,4%	14,6%	35,4%	10,1%	28,7%
Czech Republic	63	8,5%	1,0%	8,5%	11,4%	6,1%	11,9%
Denmark	53	7,6%	1,0%	7,8%	9,0%	4,9%	13,3%
Ecuador	7	12,5%	4,4%	14,0%	17,0%	7,6%	34,7%
Egypt	9	20,9%	3,1%	19,0%	25,4%	18,2%	15,0%
Estonia	7	7,2%	0,8%	7,0%	8,3%	6,1%	10,8%
Finland	53	7,6%	1,0%	7,8%	9,0%	4,5%	12,9%

Estimating the cost of capital has become a business line for some organisations. In the United States Duff and Phelps purchased the Ibbotson and Associates business and now offer a variety of cost of capital services to aid corporate decision making. In Schedule 11 is their summary of their equity market risk premium and their overal equity market return estimate. From January 31, 2016 until November 14, 2016, which approximates the hearing time for the last GRA, Duff and Phelp's estimate of the equity market risk premium was 5.50% over a 4.0% "normalized" 20 year US Treasury yield for an equity market return of 9.50%. Since then they dropped their normalized Treasury yield to 3.50% in November 2016 and then their equity market risk premium to 5.0% in September 2017. Currrently, their overall equity market return is 8.50% for the US in between the Fernandez survey result of 8.20% for the US and 8.7% for Canada.

Similarly, Credit Suisse now produce an annual "Global Investment Returns Yearbook." This used to be freely available, but now only a summary extract is available. However, the critical equity risk premium data is summarized in their Figure 5 reproduced in my Schedule 12. Between 1900-2017 the equity risk premium over Treasury Bills was highest at barely over 6.0% in Japan, but in not one country was the equity risk premium over long term bonds above 5.50% and only in a few was it even over 5.0%.. In the US the equity risk premium over bonds was just over 4.0% and for Canada under 4.0%.

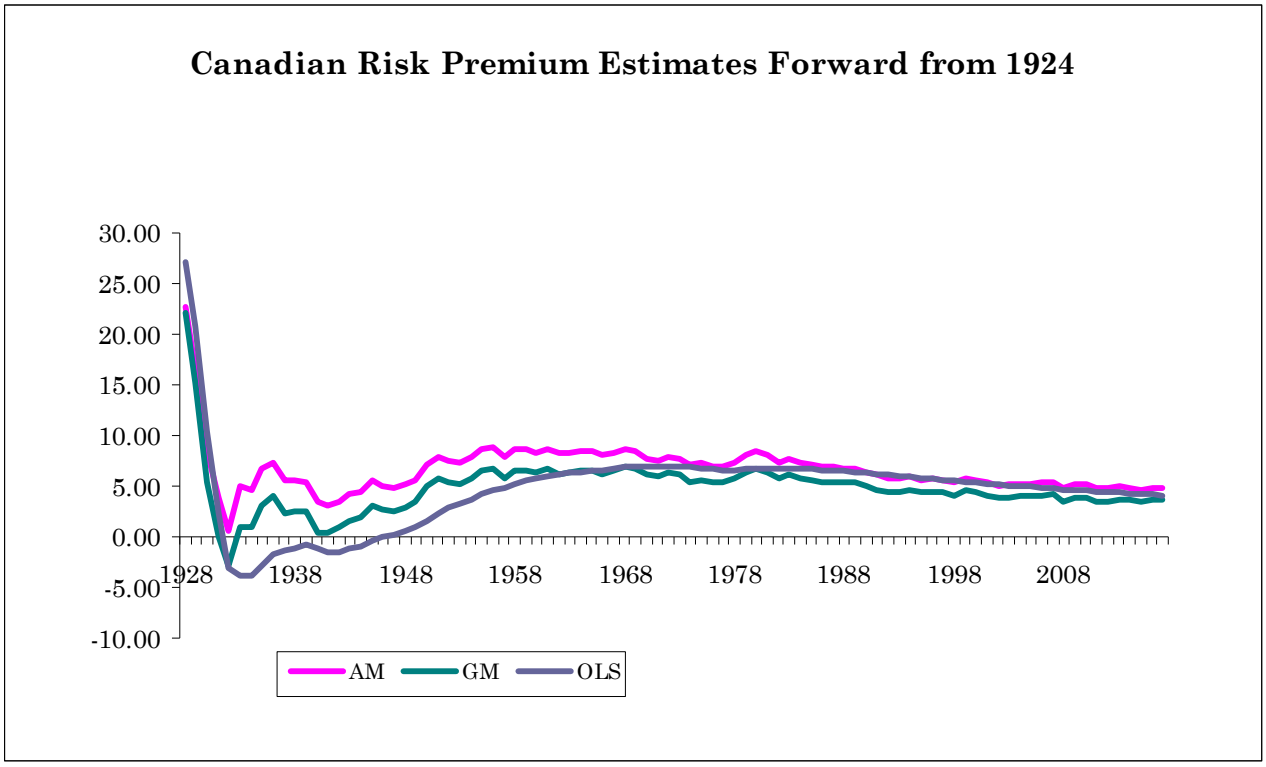
Conclusions

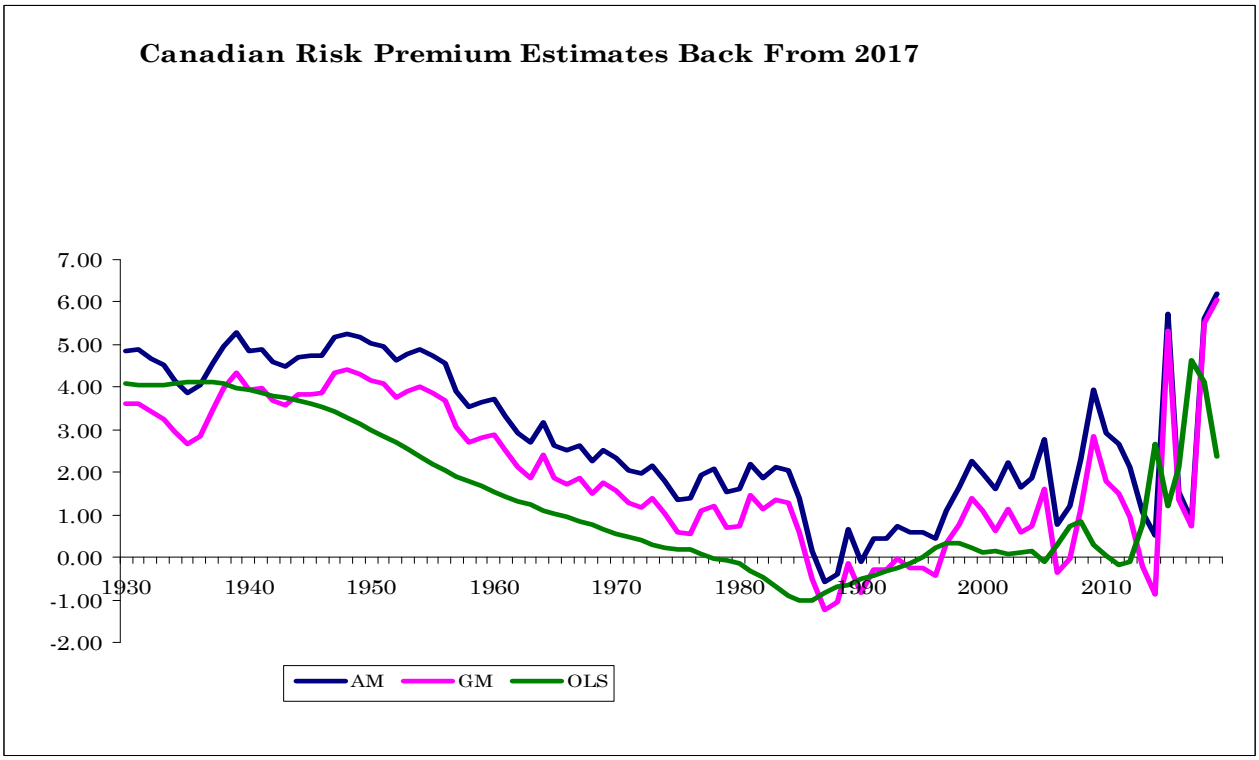
Fernandez's survey work and the professional work by Duff and Phelps and Credit Suisse all support my own empirical work and judgment that the Canadian market risk premium is currently between 5.0-6.0%. This value is at the *upper* limit of historic equity market performance. These estimates also support an overall equity market return of 8.0%- 9.0%.

To summarise:

- My own direct estimate of the experienced Canadian equity risk premium since 1926 is 4.67% and for the US 6.08%.
- This historic equity risk premium in Canada is probably low given the removal of barriers to capital flows and the current very low level of Canadian bond yields.
- I would judge the equity risk premium to currently be in a range of 5.00-6.00**%.** This estimate is supported by the survey results of Fernandez and the opinion of Duff and Phelps, but is significantly higher than the widely distributed Credit Suisse report.
- The overall market return from the Fernandez survey and Duff and Phelps is 8.2% - 8.7%, which benchmarks the return for low risk Canadian utilities.

SCHEDULE 1


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
AM
GM
OLS


Canadian Risk Premium Estimates Back From 2017
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
-1.00
-2.00
1930
1940
1950
1960
1970
1980
1990
2000
2010
AM
GM
OLS

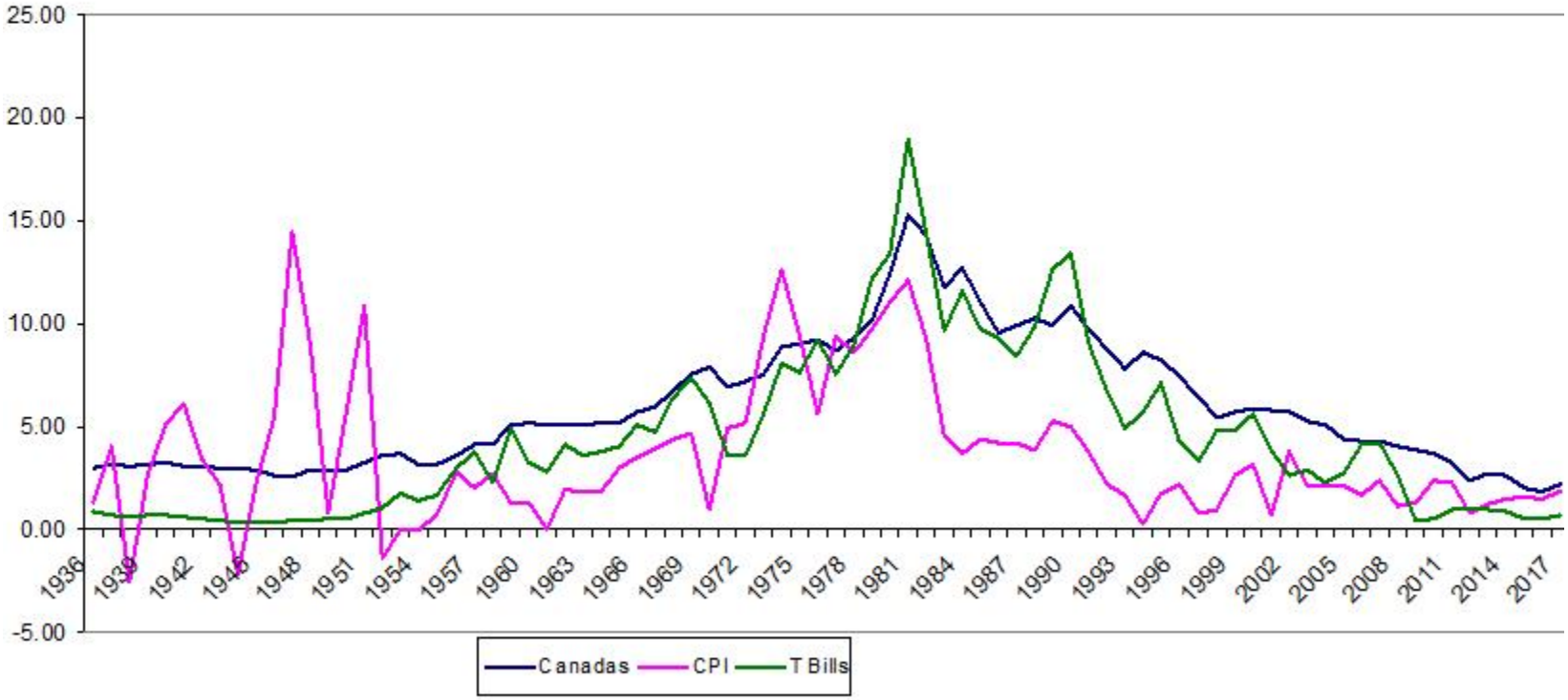
SCHEDULE 2

Arithmetic Earned Risk Premiums for Different Holding Periods

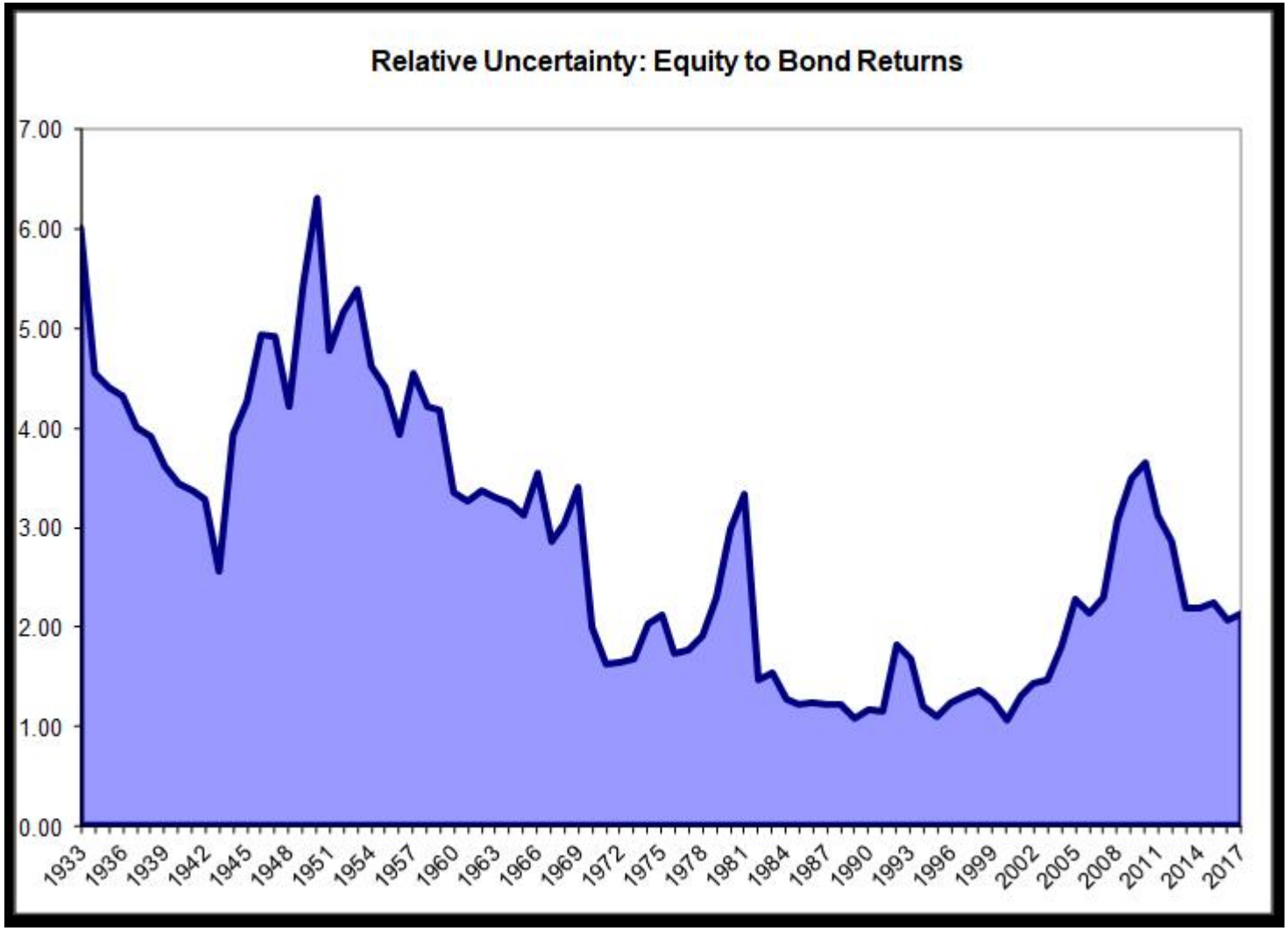
Start dates on the horizontal and ending dates on the vertical. For example, an investor would have earned a 5.78% arithmetic risk premium investing from 1958-1987.

	1924	1938	1948	1958	1968	1978	1988	19998	2008
1937	5.67								
1947	4.74	3.45							
1957	7.81	9.31	15.17						
1967	8.32	9.56	12.62	10.07					
1977	6.94	7.38	8.36	5.45	0.84				
1987	6.86	7.19	8.12	5.78	3.63	6.43			
1997	5.67	5.66	6.11	3.84	1.77	2.24	-1.96		
2007	4.74	5.32	5.63	2.84	2.13	2.56	0.63	3.22	
2017	4.86	4.71	4.90	3.18	1.81	2.05	0.59	1.86	0.51

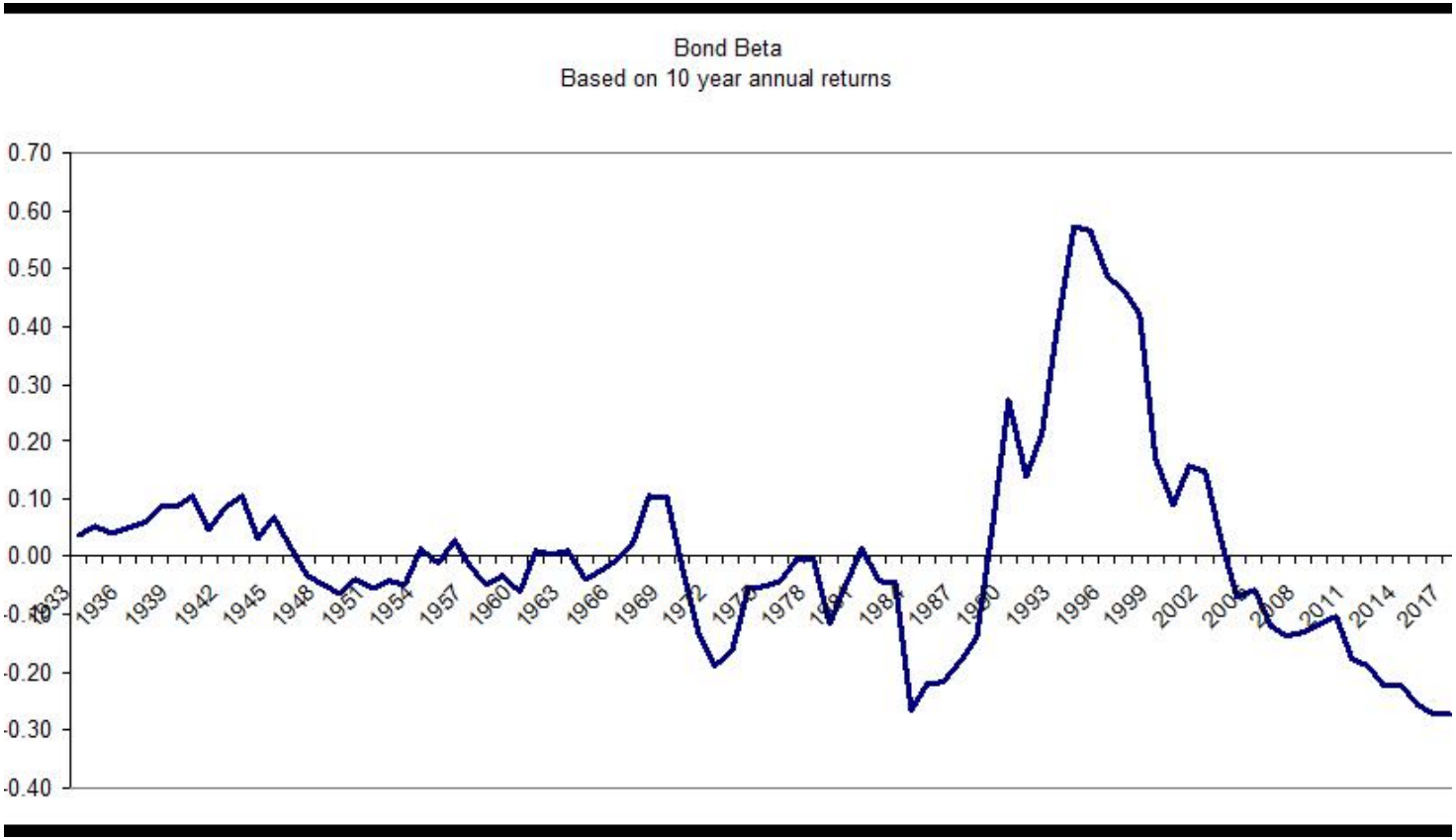
Interest Rates and Inflation
1936-2017



SCHEDULE 4


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

SCHEDULE 5


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

SCHEDULE 6

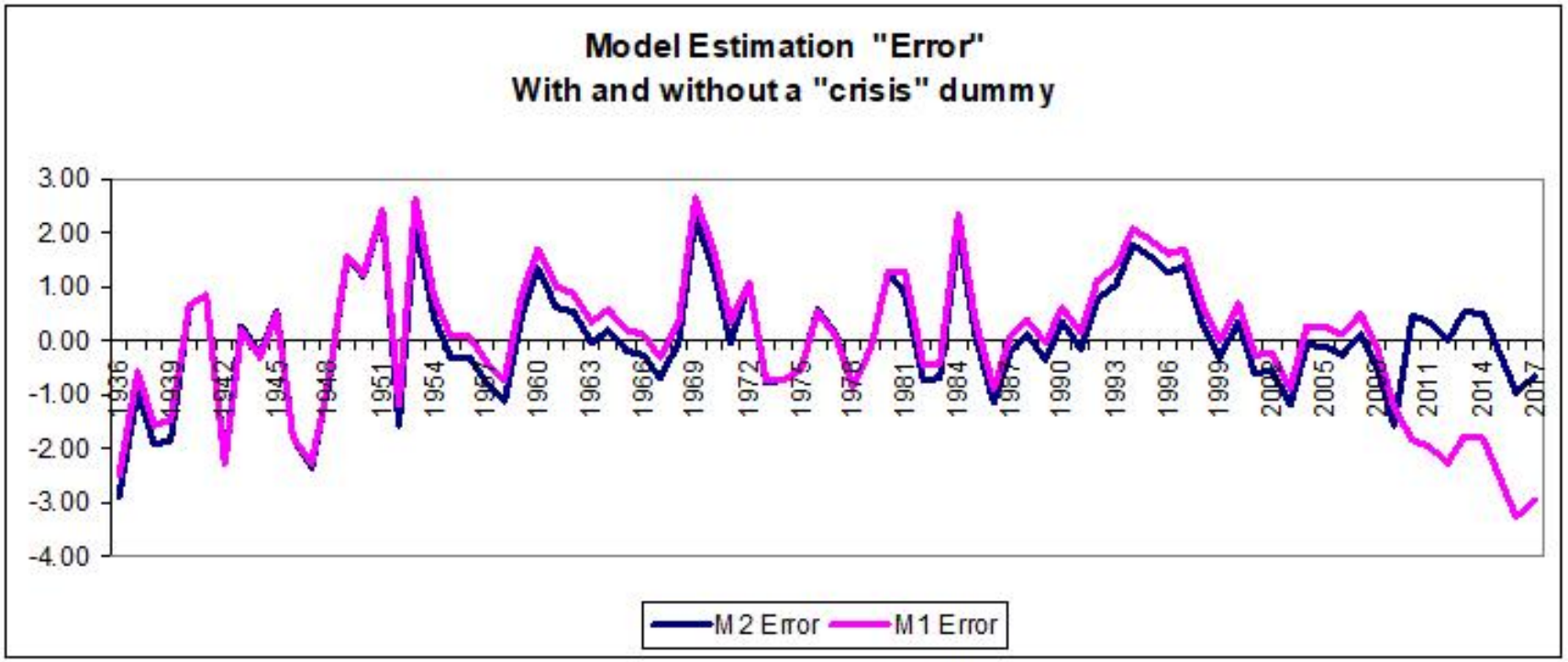
FACTORS INFLUENCING THE REAL CANADA YIELD

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

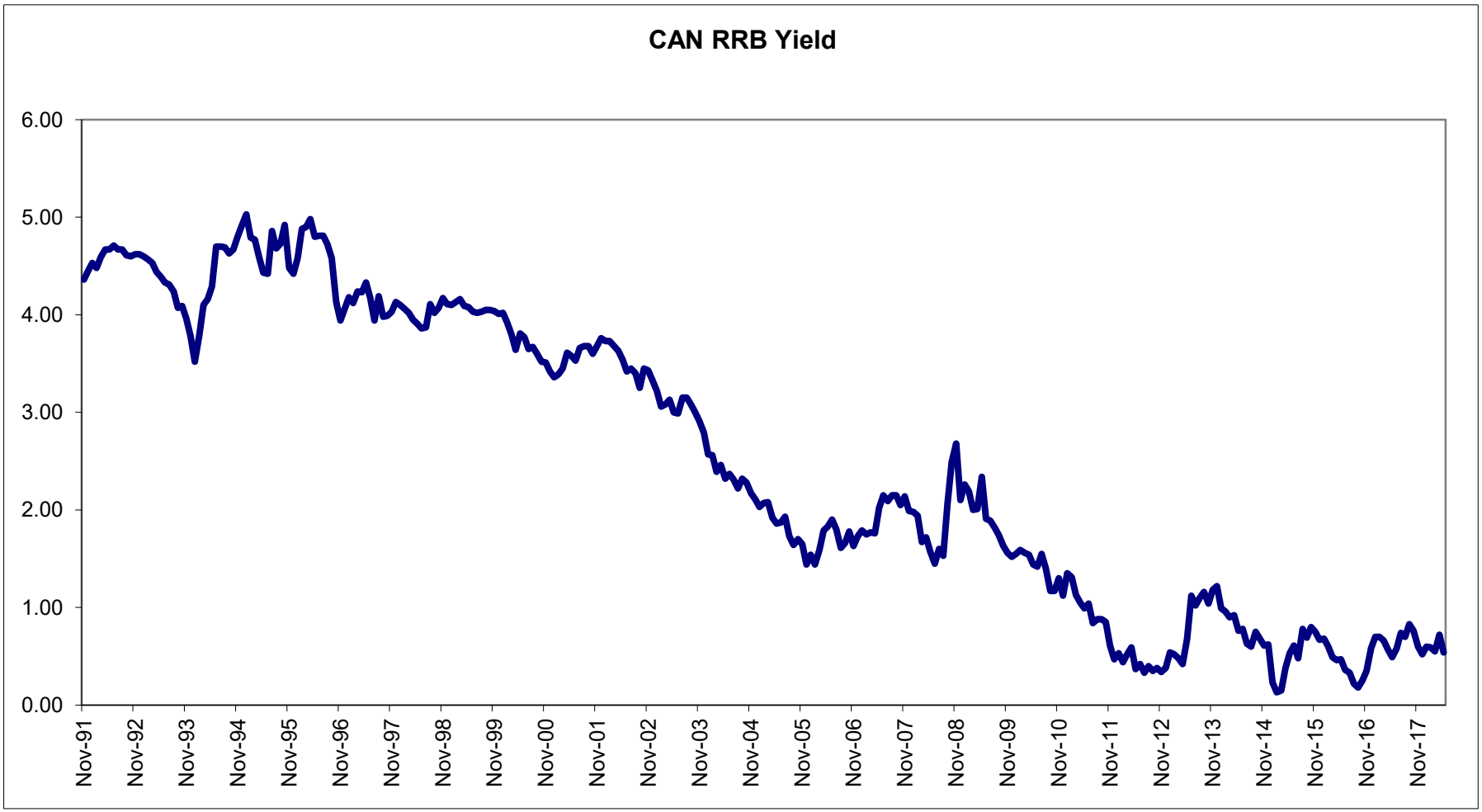
Independent variables:

	Coefficient	T-Statistic
Constant:	1.351	3.560
Risk: standard deviation of return on long bond index for prior ten years.	0.235	5.212
Deficit: aggregate government lending as a % of GDP.	-0.260	-8.853
Dum1: dummy variable for years 1940-51	-5.319	-13.151
Dum2: dummy variable for years 1972-80	-3.628	- 9.093
Dum3: dummy variable for years 2010-2017	-2.647	- 6.315

Adjusted R^2 of the regression 85.34%
Data 1936-2017


Model Estimation "Error"
With and without a "crisis" dummy
3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
-4.00
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
2017
M2 Error
M1 Error

SCHEDULE 8


CAN RRB Yield
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Nov-91
Nov-92
Nov-93
Nov-94
Nov-95
Nov-96
Nov-97
Nov-98
Nov-99
Nov-00
Nov-01
Nov-02
Nov-03
Nov-04
Nov-05
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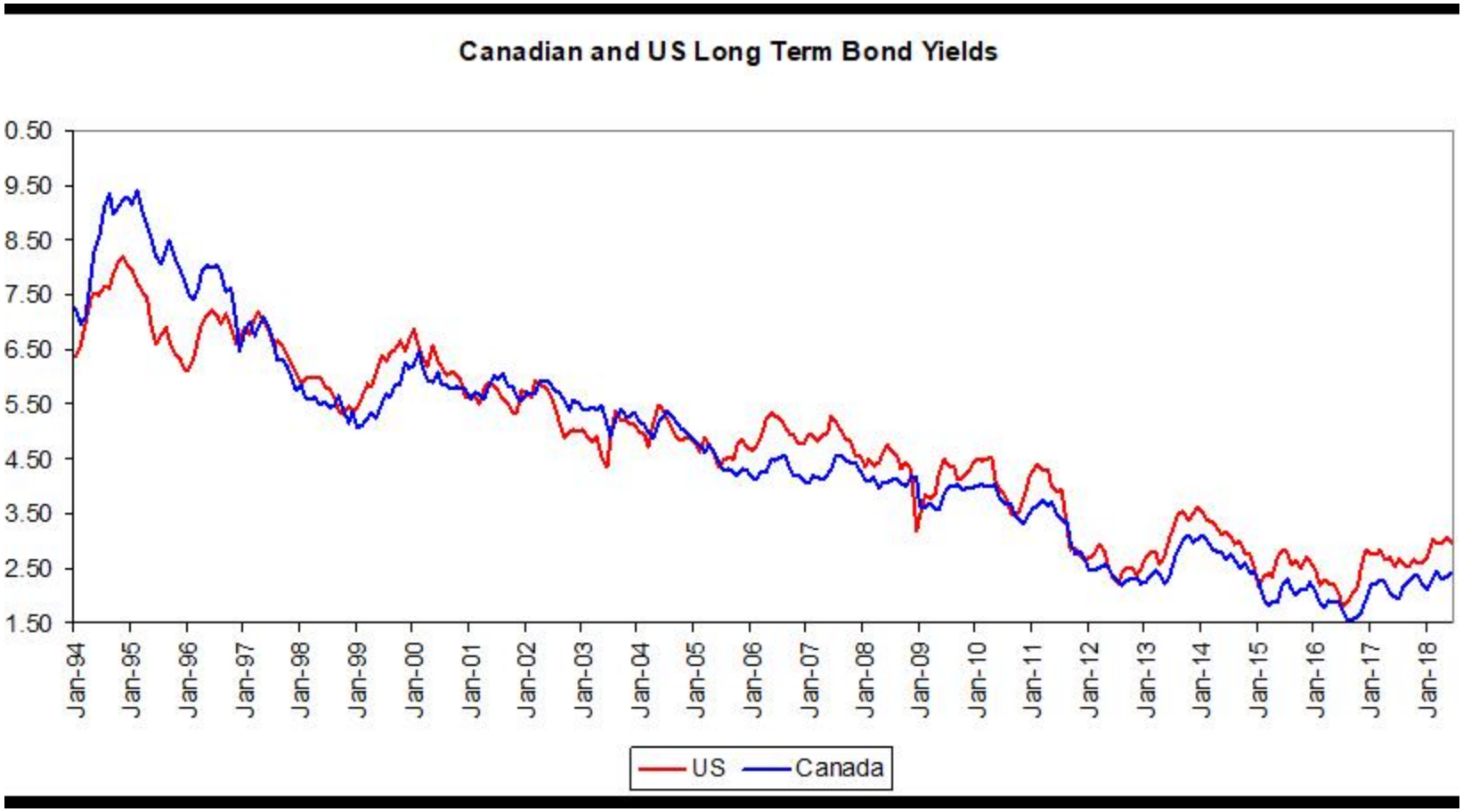
Nov-14
Nov-15
Nov-16
Nov-17

Annual Rate of Return Estimates 1926-2017

	U.S.			CANADA		
	S&P Equities	Long US Treasury	Excess Return	TSE Equities	Long Canadas	Excess Return
AM	12.05	5.98	6.08	11.07	6.40	4.67
GM	10.27	5.60	4.67	9.58	6.13	3.45
OLS	10.91	5.52	5.39	10.21	6.16	4.05
Volatility[1]	19.79	9.86		18.49	8.86	


Canadian and US Long Term Bond Yields
0.50
9.50
8.50
7.50
6.50
5.50
4.50
3.50
2.50
1.50
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
US
Canada

DUFF&PHELPS

Table: Equity Risk Premium & Risk-free Rates

September 5, 2017

For additional information, please visit
www.duffandphelps.com/CostofCapital

Duff & Phelps Recommended U.S. Equity Risk Premium (ERP) and Corresponding Risk-free Rates (R_f): January 2008–Present

Date	Risk-free Rate (R_f)	R_f (%)	Duff & Phelps Recommended ERP (%)	What Changed
Current Guidance: September 5, 2017 – UNTIL FURTHER NOTICE	**Normalized 20-year U.S. Treasury yield**	**3.50**	**5.00**	**ERP**
November 15, 2016 – September 4, 2017	Normalized 20-year U.S. Treasury yield	3.50	5.50	R_f
January 31, 2016 – November 14, 2016	Normalized 20-year U.S. Treasury yield	4.00	5.50	ERP
December 31, 2015	Normalized 20-year U.S. Treasury yield	4.00	5.00	
December 31, 2014	Normalized 20-year U.S. Treasury yield	4.00	5.00	
December 31, 2013	Normalized 20-year U.S. Treasury yield	4.00	5.00	
February 28, 2013 – January 30, 2016	Normalized 20-year U.S. Treasury yield	4.00	5.00	ERP
December 31, 2012	Normalized 20-year U.S. Treasury yield	4.00	5.50	
January 15, 2012 – February 27, 2013	Normalized 20-year U.S. Treasury yield	4.00	5.50	ERP
December 31, 2011	Normalized 20-year U.S. Treasury yield	4.00	6.00	
September 30, 2011 – January 14, 2012	Normalized 20-year U.S. Treasury yield	4.00	6.00	ERP
July 1 2011 – September 29, 2011	Normalized 20-year U.S. Treasury yield	4.00	5.50	R_f
June 1, 2011 – June 30, 2011	Spot 20-year U.S. Treasury yield	Spot	5.50	R_f
May 1, 2011 – May 31, 2011	Normalized 20-year U.S. Treasury yield	4.00	5.50	R_f
December 31, 2010	Spot 20-year U.S. Treasury yield	Spot	5.50	
December 1, 2010 – April 30, 2011	Spot 20-year U.S. Treasury yield	Spot	5.50	R_f
June 1, 2010 – November 30, 2010	Normalized 20-year U.S. Treasury yield	4.00	5.50	R_f
December 31, 2009	Spot 20-year U.S. Treasury yield	Spot	5.50	
December 1, 2009 – May 31, 2010	Spot 20-year U.S. Treasury yield	Spot	5.50	ERP
June 1, 2009 – November 30, 2009	Spot 20-year U.S. Treasury yield	Spot	6.00	R_f
December 31, 2008	Normalized 20-year U.S. Treasury yield	4.50	6.00	
November 1, 2008 – May 31, 2009	Normalized 20-year U.S. Treasury yield	4.50	6.00	R_f
October 27, 2008 – October 31, 2008	Spot 20-year U.S. Treasury yield	Spot	6.00	ERP
January 1, 2008 – October 26, 2008	Spot 20-year U.S. Treasury yield	Spot	5.00	Initialized

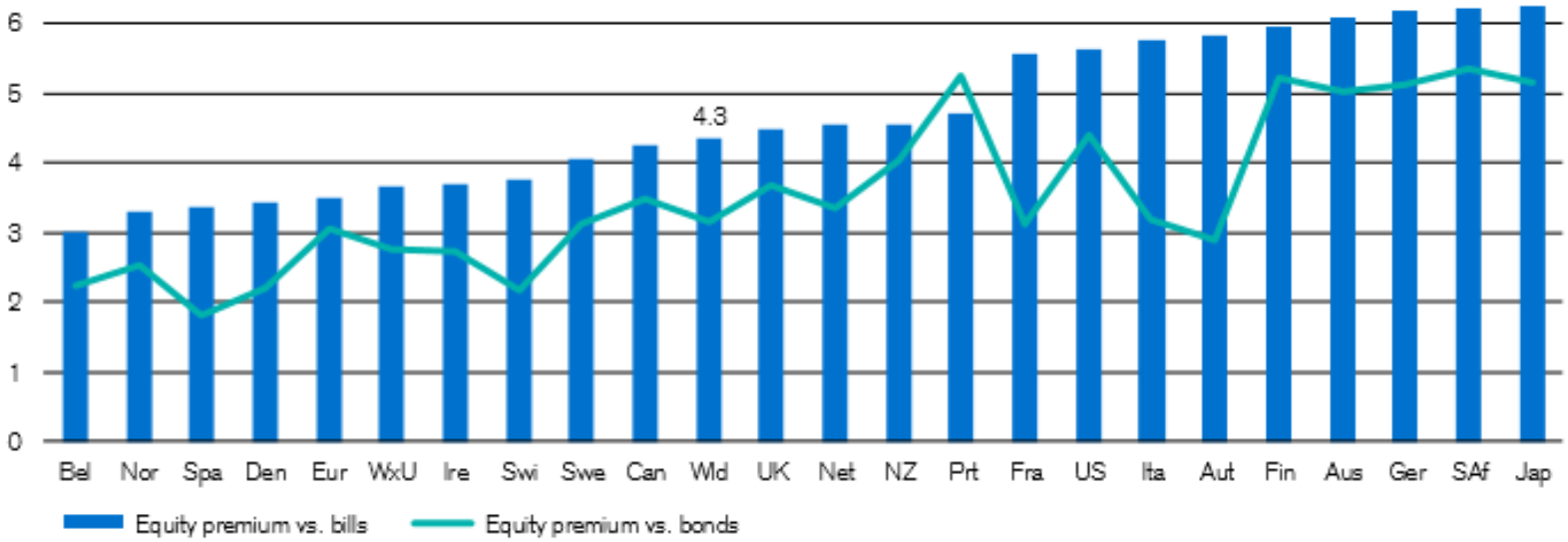
"Normalized" in this context means that in months where the risk-free rate is deemed to be abnormally low, a proxy for a longer-term sustainable risk-free rate is used.

To learn more about cost of capital issues, and to ensure that you are using the most recent Duff & Phelps Recommended ERP, visit www.duffandphelps.com/CostofCapital.

To learn more about/purchase Duff & Phelps valuation data resources published by John Wiley & Sons, visit: www.wiley.com/go/ValuationHandbooks.

Figure 8

Worldwide annualized equity risk premium (%) relative to bills and bonds, 1900–2017



Source: Elroy Dimson, Paul Marsh, and Mike Staunton, Triumph of the Optimists, Princeton University Press, 2002, and subsequent research. Premiums for Austria and Germany are based on 116 years, excluding 1921–22 for Austria and 1922–23 for Germany.

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 market as a whole. 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 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 9.70% is only 0.20% more than the estimate from the three factor Fama-French Model and that the market risk premium is much 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 security to the risk of a diversified portfolio. We normally estimate actual historic beta estimates

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.

by a simple ordinary least squares (OLS) regression of the security's return on 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. This 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.

To overcome this problem in estimating the market risk premium we go back over very long periods of time. This is because the basic risk return trade-off in the capital market is regarded as relatively constant. However, for estimating beta coefficients this is more doubtful, 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 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 Exchange outsourced its market indexes to Standard and Poors (S&P) and changed the composition of our sub-indexes. These changes roughly coincided with the loss of many traditional Canadian utilities. It was also controversial in transferring Enbridge and TransCanada from pipelines, where they were regarded as similar to utilities, into energy services.

Regardless of these changes the great advantage of the sub-indexes is that they include more companies than possible with individual company estimates since companies are constantly being reorganised as business strategy changes. This is particularly important due to the fact that a large number of Canadian regulated firms, like Consumers Gas, Maritime Electric, Bell Canada, Union Gas, Pacific Northern Gas, Fort Chicago Energy Partners (Veresen), BC Gas, Maritime T&T etc., have 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, 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.

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 of data 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 1 is the simple beta against the Canadian market index, whereas the second Beta 2 also includes the impact of interest rate changes by adding the monthly return on the long Canada bond as a second risk factor. However, to all intents and purposes the beta estimates are 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 over 30 years of data (1988-2017) 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 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 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.

6 In Canada this is the TSX/Western data base and in the US 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 Fitel in 1999.

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 as Nortel and the tech boom affected the Canadian market while utility shares were not. As the effect of the internet bubble and crash passed through the 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. The message was that during this period utility shares added very little risk to a diversified portfolio, since that portfolio was dominated by the effect of Nortel and JDS Uniphase. However, as this bubble and crash period receded utility shares added their normal amount of risk to a diversified portfolio, not because their risk had changed but their risk *relative* to the overall market 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 vice versa. 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 P/E."

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 has lead utility shares to trade on the basis of their interest sensitivity or income support.

In Schedule 2 are the results of two multiple regression estimates of utility risk. The first panel has the estimates for the entire period from 1988 where the utility beta is 0.26 and the gamma

8 October, 3, 2001 RBC Morning Comment.

0.43. This means that over the whole period utilities had 26% of the exposure of an average stock to the market and 43% of the exposure of the long Canada bond to interest rates. However as noted previously this period reflects the Internet bubble and crash. In the second panel are the estimates for the last five year period ending in 2017. For this period the beta estimate is 0.401 closer to traditional levels and the gamma 0.776. Note that in all cases both the beta and gamma coefficients are highly significant.

If the Nortel/JDS Uniphase effect distorts Canadian beta estimates we can look at the returns against the US market index. This might reduce the impact due to the greater diversity of the US market. To examine this, the graph in Schedule 2 uses the hedged US S&P500 index as the market instead of the TSX composite. However, it is clear that the Nortel/JDS Uniphase effect is just as dramatic since the internet bubble if anything was more dramatic in the US. Moreover, the most recent beta estimates, whether single measured against the US market alone or two factor with the effect of interest rates, are lower than with the Canadian market index. This is possibly due to the current FAANG dominated US market that has no counterpart in Canada.[9]

We can see the same effects in the average beta estimates in Schedule 3, where I have split the few remaining Canadian utility-like stocks into pipeline and utility holding company (UHC) samples. The individual values estimated, since the 1996-2000 period, are in Schedule 4.The low risk UHC sample consists of Canadian Utilities (CU), Fortis (FTS), Emera (EMA) and Gaz Metro (GMI) through Valener (VNR).[10] The Pipeline sample consists of TransCanada Corporation (TRP), Enbridge Inc. (ENB), and Pembina (PPL), which almost doubled its size by purchasing Fort Chicago Energy Partners (Veresen).[11] 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 UHCs recent average betas have been around 0.20, whereas the betas of the pipeline sample have recently been much higher reflecting all the uncertainties surrounding pipeline expansions in both the US and Canada.

9 FAANG stands for Facebook, Amazon, Apple, Netflix and Google.

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

11 Pembina purchased Veresen October 2, 2017.

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 this recent period of very low interest rates. This is evident from the fact that their betas vary inversely with their interest sensitivity. 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. I would therefore expect some tendency for their betas to revert back to their long run average level: for the market as a whole this is 1.0, but for regulated firms I have normally judged this to be about 0.45-0.55.

US utility stocks as a comparison

Given the diminishing number of Canadian utility stocks I have been forced to look at samples of US utility holding companies. In my 2016 report I explained how I started by using the intersection of two samples used previously by Ms. McShane, who has testified before this board in the past and Dr. Vilbert who has appeared before many Canadian boards. In both cases they have testified on behalf of utilities. This intersection of their two "samples" might then be regarded as a smaller and unambiguously purer set of low risk US utilities. However, the US has not been immune from the M&A activity that has reduced the number of Canadian UHCs. My 2016 sample of US gas UHCs has been further reduced by the purchase by AltaGas of WGL on July 6, 2018 and the purchase of Piedmont Natural Gas by Duke Energy October 31, 2016.

In 2016 for US electric companies I used the sample of 7 companies used by Mr. Coyne in his report to avoid any arguments of who should be in or out of the sample. These companies were: Duke Energy (DUK), Allete Inc.,(ALE) Eversource (ES), Great Plains Energy Inc., (GXP) OGE Energy Corp (OGE), Pinnacle West Capital (PWN) and Westar Energy Inc.(WR), However, Westar and Great Plains merged to create Evergy (EVRG) on May 24, 2018 which reduces the sample to 6. In this hearing Mr. Coyne added Alliant Energy Corp, American Electric Power, PNM Resources and Southern Company. However, for consistency with my 2016 report I will continue with Mr. Coyne's 2016 sample of firms.

Schedule 6 provides a graph of the average beta estimates for the gas companies back to 1990 with the most recent betas in Schedule 7. 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 US 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 utility holding companies. However, the most recent average level of the betas from these companies is significantly higher than for the Canadian companies at 0.53, although, the median value is less at 0.43.

Schedule 8 provides a graph of the average beta estimates for the US electric companies with the individual values in Schedule 9. Again we see the Internet bubble effect, where prior to 1998 average betas were about 0.55 and after 2005 they increased to about 0.80 before trending down to end 2017 at an average of 0.47, although the median beta is slightly less at 0.43. Again, it is clear from the graph that US electric company betas are higher than for the regulated UHCs in Canada.

Since the December 2007 estimates (post internet bubble, 2003-2007) the average beta for the sample of lower risk Canadian UHCs has been 0.20. In contrast, the average for the US gas companies has been us 0.42 and that for the US electric companies 0.53. These differences imply an average beta difference of 0.22 between Canadian UHCs and US gas companies and 0.33 between Canadian UHCs and US electric companies. The data indicate clear differences in the risk perception of Canadian UHCs relative to both US electric and gas holding companies.

Adjusted betas

It is always necessary to adjust betas since they are only estimates of what actually happened over a particular time period, whereas what is needed is an estimate of what is likely to happen in the future. Utility witnesses frequently adjust utility betas toward the overall market average beta of 1.0. As low risk businesses this *inevitably* increases utility betas to what are called "adjusted beta." Such a process 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 that the "true" beta is underestimated and vice versa. For the whole *universe* of stocks he recommended that we

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

adjust betas by taking 2/3 of the estimated beta and adding 0.33, which essentially means weighting them 1/3 with the market mean of 1.0 and 2/3 with the actual beta. This procedure means that low betas are increased and high betas are reduced.

However, low estimates for utilities do not mean they are under-estimated and need adjusting, since utility betas are perennially low due to their low risk. 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 a long run beta of 0.50, I would get an adjusted beta as follows:

Adjusted beta = 0.67 * 0.40 +0.33 * 0.5 = 0.43 for the utility sub index

Adjusted beta = 0.67 * 0.2 + 0.33 * 0.5 = 0.30 for the individual large companies

This type of adjustment is consistent with the 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 insignificant….None of the 51 beta distributions display any tendency for the betas to drift toward one"

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 Gombola and Kahl and Michelfielder and Theodossiou is the only research that I am aware of that specifically looks at the adjustment tendency of utility betas. It is almost a

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, pp60-68.

truism that across all stocks they should have a tendency to revert to 1.0, since that 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.

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 Theodossio, 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 RBC, Yahoo, Value Engine, RT (the Research Team), Thomson, and Sabrient as well as my own estimates up until December 2017. This is a wider range of beta sources than I used in 2016 reflecting the growth of independent research services like Sabrient, Value Engine and the Research Team. However, not all of these services provide beta estimates for the Canadian companies, since they are US services and follow shares of interest to US investors. For example, neither Sabrient nor Thomson Reuters[15] currently provide beta estimates for the Canadian utility holding companies.

The following represents recent estimates for the Canadian firms.

15 The Thomson Reuters estimates come from their IBES estimates; earnings valuation report, which indicates their US analyst coverage.

Canadian Betas								
	Thomson	Value Engine	RT	Sabrient	RBC	Yahoo	Average	Booth
TransCanada	1	0.26	0.7	0.31	0.7	0.7	0.61	0.57
Enbridge	N/A	0.24	0.87	0.17	0.87	1.3	0.69	0.62
Pembina	1.4	0.3	1.07	N/A	1.07	1.16	1.00	0.79
Average							0.77	0.66
Canadan Utilities	N/A	0.11	0.55	N/A	0.55	0.41	0.41	0.49
Fortis	N/A	-0.05	0.08	N/A	0.08	-0.03	0.02	0.01
Emera	N/A	0.11	0.1	N/A	0.1	0.25	0.14	0.00
GMI (VNR)	N/A	0.17	0.34	N/A	0.34	0.52	0.34	0.15
Average							0.23	0.16

For the pipeline sample my average beta estimate is 0.66 whereas the average for these six independent services is 0.77. However, there is a much wider range across these services with TransCanada's beta, for example, ranging from 0.26 from Value Engine to 1.0 from Thomson Reuters. Similarly, Enbridge's beta ranges from 0.3 from Value Engine to 1.4 from Thomson Reuters. In both cases, I suspect these wide differences are largely due to the time period over which the betas are estimated and whether or not they capture good or bad news on approvals for pipeline expansions. For the four Canadian UHCs my average is 0.16 whereas the average from the four services that provide estimates is 0.23. What this indicates is the continued low risk nature of the Canadian UHCs, since the highest beta provided is the 0.55 for CU.[16] It also indicates that these services do not adjust their beta estimates using the Blume methodology since with an actual beta of 0 the Blume adjustment would give a beta of 0.33 and the average beta is less than this for the UHCs.

For the US gas companies their beta estimates are as follows

US Gas Companies								
	Thomson	Value Engine	RT	Sabrient	RBC	Yahoo	Average	Booth
Spire	0.30	0.40	0.07	-0.06	0.07	-0.12	0.11	0.31
Vectren	0.30	0.58	0.51	0.57	0.51	0.36	0.47	0.84
NorthWest	0.30	0.35	0.33	0.25	0.33	0.14	0.28	0.40
New Jersey	0.50	0.31	0.27	0.16	0.27	0.04	0.26	0.40
Atmos	0.40	0.23	0.18	0.35	0.18	0.09	0.24	0.41
SouthWest	0.50	0.53	0.51	0.52	0.51	0.34	0.49	0.62
WGL						0.42		
Average							0.31	0.50

16 The Yahoo beta estimates with pertinent financial data for the four Canadian UHCs are in Appendix A.

The average from the six services is 0.31 whereas my own estimate is higher at 0.50. Interestingly, the highest beta estimate is from Value Engine for Vectren at 0.58 only marginally higher than the 0.55 from RBC for CU in Canada. However, just as my average beta estimate for these gas companies is 0.50 versus 0.16 for the Canadian UHCs, these services also have higher average betas for the US gas companies (0.31) versus the Canadian UHCs (0.23), although not quite as pronounced.

Finally the following table gives the beta estimates for the US Electric companies.

US Electrics

	Thomson	Value Eng	RT	Sabrient	RBC	Yahoo	Average	Booth
Duke	0.20	0.09	0.03	0.16	0.03	0.03	0.09	0.27
Allette	0.30	0.31	0.19	0.18	0.19	-0.04	0.19	0.48
Eversource	0.40	0.31	0.23	0.28	0.23	0.19	0.27	0.32
Great Plains		0.35		0.37			0.36	0.48
OGE	0.50	0.64	0.63	0.70	0.63	0.76	0.64	0.92
Pinnacle West	0.30	0.20	0.13	0.24	0.13	0.03	0.17	0.39
Westar/Evergy	0.30	0.32	0.26	0.35	0.26	0.26	0.29	0.43
Average							0.29	0.47

Again my own average beta estimate at 0.47 is higher than the average of these sources of 0.29 largely due to my estimate for OGE. However, again if the actual beta were zero a Blume adjustment would mean an adjusted beta of 0.33 whereas the average from these sources is less than that at 0.29.

Of importance is that the way these estimates are derived appears to be consistent with conventional practise. 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 FP does note that different time horizons can be used other than my conventional use of five years of data.

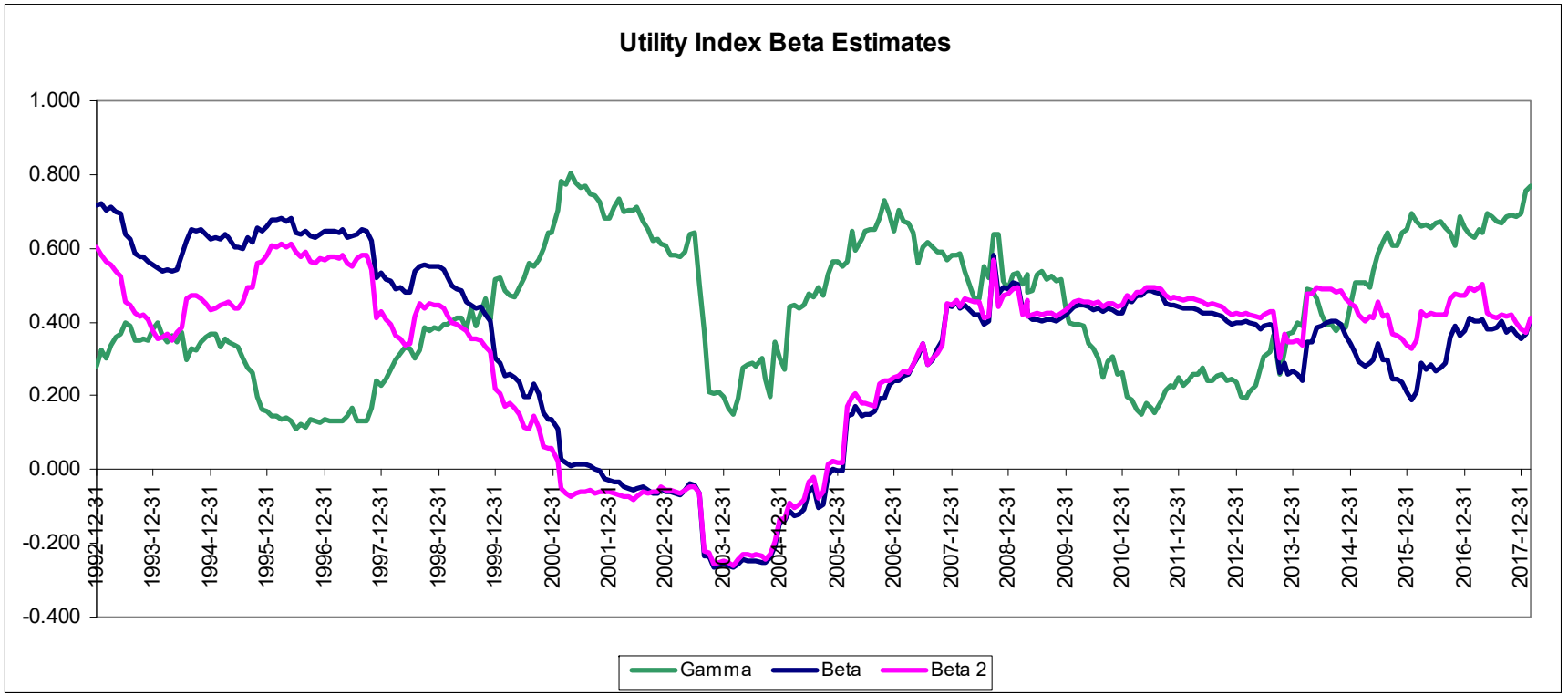
Conclusion

What is clear from the above analysis is that the market recognises that Canadian utilities are 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 the Canadian estimates against those from two US samples of gas and electric companies
- I check the estimates against those that are publicly available from Yahoo Finance as well as those from Canada's largest bank and several financial research services

I would also note that the betas from both US gas and electric utilities are higher than for the Canadian UHCs. From this analysis I can see no reason that would cause me to deviate from my normal generic risk assessment for a Canadian utility of a beta range of 0.45-0.55. In fact, the persistent low beta estimates suggest that an even lower risk assessment may now be appropriate.

SCHEDULE 1



SCHEDULE 2

Regression Statistics	
Multiple R	0.443
R Square	0.196
Adjusted R Sc	0.192
Standard Errc	3.283
Observations	363

Utilities Against the Stock Market and Bond Returns
1988-2018

ANOVA

	df	*SS*	*MS*	*F*	*ignificance F*
Regression	2	947.6064767	473.8032	43.947025	8.37E-18
Residual	360	3881.244871	10.78124		
Total	362	4828.851348			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*Upper 95.0%*
Intercept	0.189	0.175	1.079	0.281	-0.156	0.534	-0.156	0.534
TSX	0.269	0.044	6.135	0.000	0.183	0.355	0.183	0.355
CANRET	0.460	0.073	6.271	0.000	0.316	0.604	0.316	0.604

Regression Statistics	
Multiple R	0.626
R Square	0.391
Adjusted R Sc	0.370
Standard Errc	2.538
Observations	60

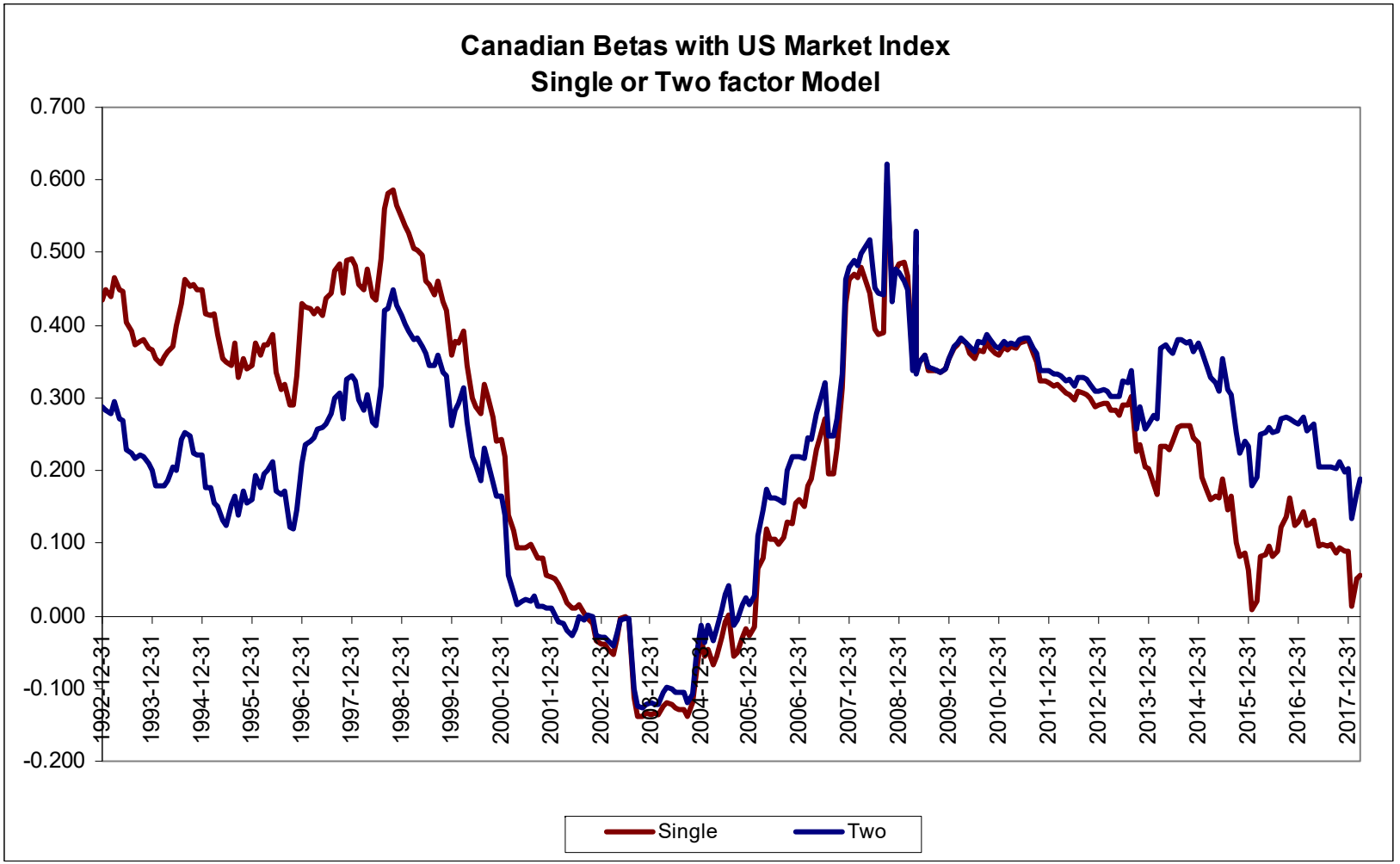
Utilities Against the Stock Market and Bond Returns
2013-2018

ANOVA

	df	*SS*	*MS*	*F*	*ignificance F*
Regression	2	236.2506192	118.1253	18.334383	7.11E-07
Residual	57	367.2413023	6.44283		
Total	59	603.4919215			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*Upper 95.0%*
Intercept	0.100	0.338	0.297	0.768	-0.576	0.777	-0.576	0.777
TSX	0.401	0.149	2.697	0.009	0.103	0.698	0.103	0.698
CANRET	0.776	0.143	5.440	0.000	0.490	1.062	0.490	1.062

SCHEDULE 3


Canadian Betas with US Market Index
Single or Two factor Model
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
-0.100
-0.200
1992-12-31
1993-12-31
1994-12-31
1995-12-31
1996-12-31
1997-12-31
1998-12-31
1999-12-31
2000-12-31
2001-12-31
2002-12-31
2003-12-31
2004-12-31
2005-12-31
2006-12-31
2007-12-31
2008-12-31
2009-12-31
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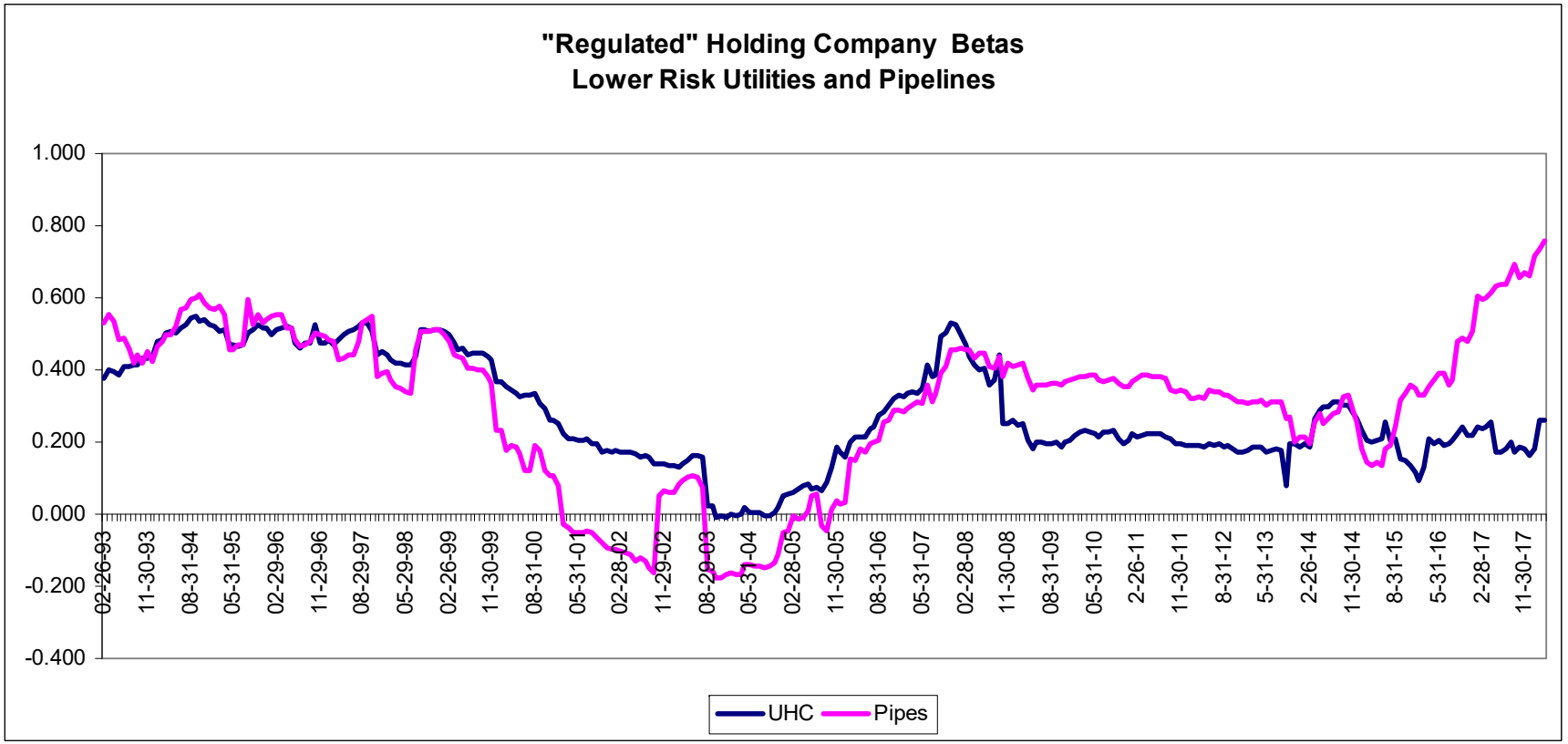
2014-12-31
2015-12-31
2016-12-31
2017-12-31
Single
Two


"Regulated" Holding Company Betas
Lower Risk Utilities and Pipelines
1.000
0.800
0.600
0.400
0.200
0.000
-0.200
-0.400
02-26-93
11-30-93
08-31-94
05-31-95
02-29-96
11-29-96
08-29-97
05-29-98
02-26-99
11-30-99
08-31-00
05-31-01
02-28-02
11-29-02
08-29-03
05-31-04
02-28-05
11-30-05
08-31-06
05-31-07
02-28-08
11-30-08
08-31-09
05-31-10
2-26-11
11-30-11
8-31-12
5-31-13
2-26-14
11-30-14
8-31-15
5-31-16
2-28-17
11-30-17
UHC
Pipes

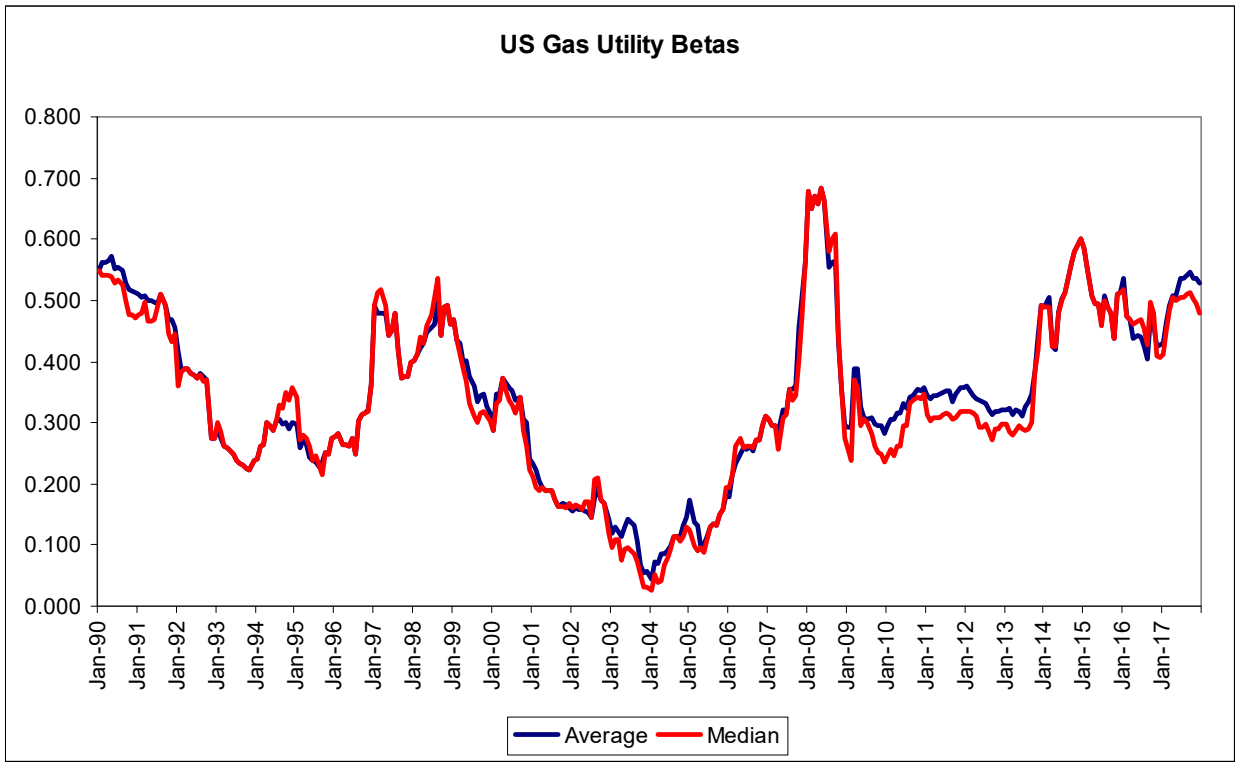
SCHEDULE 5

Canadian Utility Holding Companies (UHCs) and Pipelines

	CUL	Emera	Fortis	GMI	UHCs	Enbridge	TRP	VERESEN	PPL	Pipelines
12-29-00	0.36	0.28	0.22	0.18	0.26	0.05	0.17			0.11
12-31-01	0.25	0.21	0.13	0.10	0.17	-0.13	-0.07			-0.10
12-31-02	0.18	0.16	0.13	0.07	0.14	-0.20	-0.08			-0.14
12-31-03	0.05	-0.05	-0.05	0.02	-0.01	-0.40	-0.40	0.02		-0.26
12-31-04	0.03	-0.02	0.03	0.16	0.05	-0.32	-0.19	0.10		-0.13
12-30-05	0.21	0.05	0.23	0.19	0.17	-0.18	-0.19	0.19	0.29	0.03
12-29-06	0.33	0.09	0.48	0.42	0.33	0.22	0.30	0.33	0.30	0.29
12-31-07	0.53	0.21	0.61	0.75	0.53	0.52	0.48	0.33	0.50	0.46
12-31-08	0.18	0.14	0.20	0.51	0.26	0.32	0.37	0.51	0.45	0.41
12-31-09	0.09	0.16	0.20	0.38	0.21	0.32	0.40	0.44	0.33	0.37
12-31-10	0.09	0.22	0.16	0.35	0.20	0.34	0.40	0.37	0.30	0.35
12-31-11	0.06	0.21	0.15	0.36	0.19	0.32	0.37	0.35	0.32	0.34
12-31-12	0.01	0.23	0.13	0.32	0.17	0.22	0.33	0.40	0.29	0.31
12-31-13	0.03	0.25	0.28	0.18	0.18	0.19	0.33	0.22	0.12	0.21
12-31-14	0.20	0.32	0.26	0.27	0.26	0.11	0.28	0.34	0.29	0.25
12-31-15	0.10	0.08	0.06	0.23	0.12	0.26	0.33		0.46	0.35
12-31-16	0.47	0.09	0.00	0.25	0.20	0.41	0.47		0.64	0.51
12-31-17	0.49	0.00	0.01	0.15	0.16	0.62	0.57		0.79	0.66

Pembina Pipeline (PPL) doubled its market value by buying Versen in 2017 for $9.7 billion

SCHEDULE 6


US Gas Utility Betas
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
Jan-90
Jan-91
Jan-92
Jan-93
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
Average
Median

SCHEDULE 7

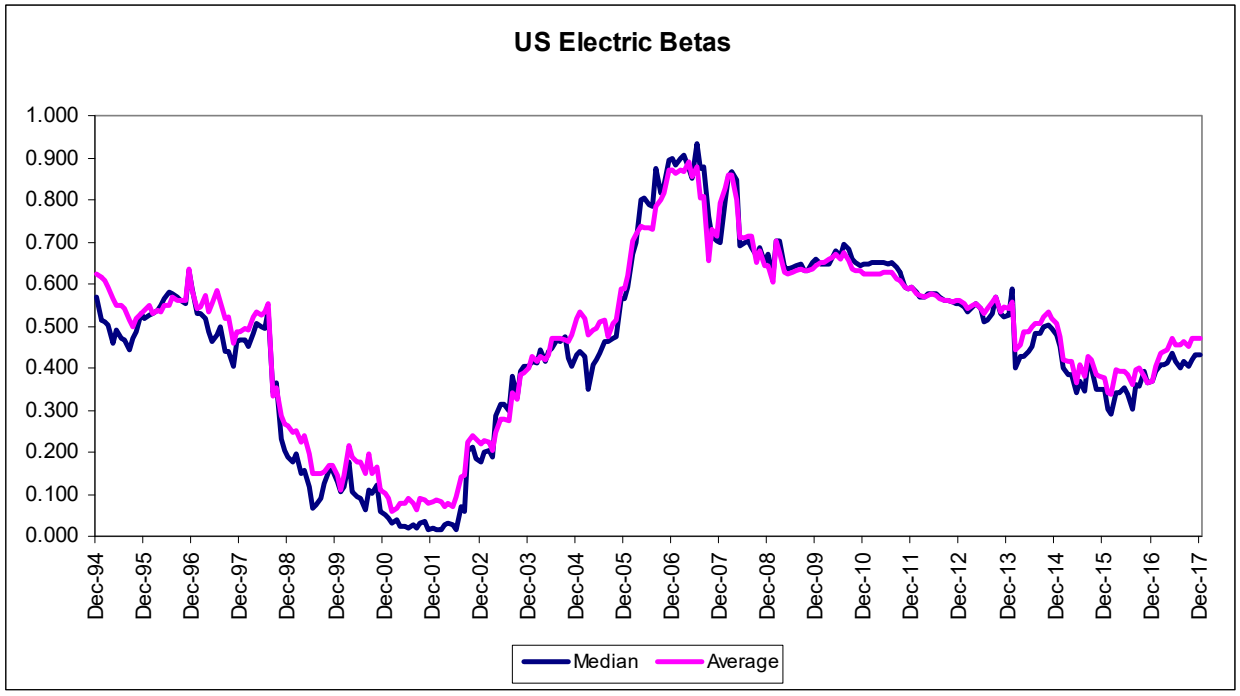
US Gas Company Betas

	VVC	WGL	PNY	NWN	NJR	LG	ATO	SWX	Average	Median
2000-12-29	0.22	0.26	0.17	0.12	0.36	0.21	-0.02	0.61	0.24	0.22
2001-12-31	0.17	0.21	0.17	0.08	0.24	0.05	-0.18	0.54	0.16	0.17
2002-10-31	0.22	0.21	0.20	0.01	0.16	0.04	-0.01	0.57	0.17	0.18
2003-12-31	0.36	0.14	-0.05	-0.21	0.03	0.01	-0.01	0.19	0.06	0.02
2004-12-31	0.40	0.21	0.10	-0.04	0.09	0.13	0.01	0.28	0.14	0.11
2005-12-30	0.34	0.22	0.26	0.06	-0.04	0.15	0.19	0.26	0.18	0.21
2006-12-29	0.52	0.27	0.34	0.14	0.03	0.49	0.45	0.23	0.31	0.31
2007-12-31	0.49	0.57	0.46	0.60	0.44	0.79	0.72	0.42	0.56	0.53
2008-12-31	0.27	0.26	0.10	0.36	0.14	0.10	0.50	0.63	0.30	0.27
2009-12-31	0.37	0.16	0.18	0.24	0.12	0.01	0.49	0.70	0.28	0.21
2010-12-31	0.43	0.27	0.27	0.35	0.22	0.08	0.51	0.73	0.36	0.31
2011-12-30	0.39	0.29	0.31	0.32	0.25	0.06	0.50	0.72	0.36	0.32
2012-12-31	0.35	0.22	0.30	0.26	0.23	0.07	0.44	0.69	0.32	0.28
2013-12-31	0.53	0.43	0.56	0.39	0.44	0.32	0.54	0.73	0.49	0.48
2014-12-31	0.53	0.71	0.63	0.57	0.62	0.45	0.57	0.73	0.60	0.59
2015-12-31	0.46	0.55	0.85	0.31	0.53	0.37	0.43	0.59	0.51	0.50
2016-12-30	0.63	0.56		0.31	0.39	0.35	0.27	0.47	0.43	0.39
2017-12-29	0.84	0.68		0.40	0.43	0.31	0.41	0.62	0.53	0.43

Notes:

1) WGL was purchased By AltaGas July 6, 2018
2) Laclede Group (LG) was renamed Spire (SR) May 4, 2016
3) Piedmont Natural gas was purchased by Duke Energy October 31, 2016

SCHEDULE 8


US Electric Betas
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
Dec-94
Dec-95
Dec-96
Dec-97
Dec-98
Dec-99
Dec-00
Dec-01
Dec-02
Dec-03
Dec-04
Dec-05
Dec-06
Dec-07
Dec-08
Dec-09
Dec-10
Dec-11
Dec-12
Dec-13
Dec-14
Dec-15
Dec-16
Dec-17
Median
Average

SCHEDULE 9

US Electric Company Betas

	DUK	OGE	ALE	GXP	PNW	WR	ES	Average	Median
30-Dec-94	0.45	0.43	0.62	0.57	1.16	0.71	0.43	0.62	0.57
29-Dec-95	0.54	0.48	0.59	0.52	0.47	0.65	0.49	0.54	0.52
31-Dec-96	0.47	0.53	0.46	0.61	0.59	0.73	0.70	0.58	0.59
31-Dec-97	0.48	0.40	0.43	0.37	0.47	0.56	0.72	0.49	0.47
31-Dec-98	0.18	0.19	0.14	0.29	0.28	0.19	0.57	0.26	0.19
31-Dec-99	0.05	0.01	0.07	0.18	0.16	0.13	0.41	0.14	0.13
29-Dec-00	-0.04	0.05	0.00	0.31	-0.13	0.14	0.40	0.10	0.05
31-Dec-01	-0.08	0.02	-0.14	0.22	-0.06	0.17	0.45	0.08	0.02
31-Dec-02	0.18	0.07	0.01	0.37	0.15	0.39	0.36	0.22	0.18
31-Dec-03	0.51	0.18	0.25	0.50	0.25	0.72	0.41	0.40	0.41
31-Dec-04	0.64	0.34	0.39	0.64	0.33	0.85	0.43	0.52	0.43
30-Dec-05	0.75	0.35	0.47	0.56	0.65	0.88	0.46	0.59	0.56
29-Dec-06	1.26	0.55	0.95	0.87	0.90	1.10	0.45	0.87	0.90
31-Dec-07	1.00	0.60	1.19	0.81	0.64	0.61	0.70	0.79	0.70
31-Dec-08	0.44	0.73	0.82	0.67	0.56	0.60	0.69	0.64	0.67
31-Dec-09	0.44	0.77	0.66	0.80	0.66	0.64	0.53	0.64	0.66
31-Dec-10	0.44	0.78	0.65	0.75	0.58	0.65	0.51	0.62	0.65
30-Dec-11	0.37	0.79	0.66	0.72	0.54	0.59	0.47	0.59	0.59
31-Dec-12	0.32	0.72	0.63	0.69	0.52	0.55	0.47	0.56	0.55
31-Dec-13	0.28	0.72	0.62	0.76	0.51	0.53	0.38	0.54	0.53
31-Dec-14	0.19	0.68	0.71	0.61	0.42	0.46	0.48	0.51	0.48
31-Dec-15	0.04	0.61	0.61	0.43	0.34	0.26	0.35	0.38	0.35
30-Dec-16	0.12	0.65	0.49	0.37	0.28	0.37	0.29	0.37	0.37
29-Dec-17	0.27	0.92	0.48	0.48	0.39	0.43	0.32	0.47	0.43

Appendix A Yahoo Beta estimates and financial data for Canadian UHCs

Valener Inc (VNR.TO) ☆ Add to watchlist

Toronto - Toronto Delayed Price. Currency in CAD

20.32 -0.11 (-0.54%)

At close: 4:00PM EDT

Summary | Chart | Conversations | Statistics | Profile | Financials | Options | Holders | Historical Data | Analysis | Sustainability NEW

Previous Close	20.43	Market Cap	794.498M
Open	20.40	Beta	0.52
Bid	20.31 x 0	PE Ratio (TTM)	17.32
Ask	20.42 x 0	EPS (TTM)	1.17
Day's Range	20.27 - 20.54	Earnings Date	09-May-2018 - 14-May-2018
52 Week Range	19.73 - 23.28	Forward Dividend & Yield	1.16 (5.75%)
Volume	91,304	Ex-Dividend Date	2018-06-28
Avg. Volume	45,907	1y Target Est	22.58

Fortis Inc. (FTS.TO) ☆ Add to watchlist

Toronto - Toronto Delayed Price. Currency in CAD

42.88 +0.21 (+0.49%)

At close: 4:20PM EDT

Summary | Chart | Conversations | Statistics | Profile | Financials | Options | Holders | Historical Data | Analysis | Sustainability NEW

Previous Close	42.67	Market Cap	18.215B
Open	42.66	Beta	-0.03
Bid	42.83 x 0	PE Ratio (TTM)	18.20
Ask	42.92 x 0	EPS (TTM)	2.36
Day's Range	42.58 - 43.09	Earnings Date	01-Nov-2018 - 05-Nov-2018
52 Week Range	39.38 - 48.73	Forward Dividend & Yield	1.70 (4.03%)
Volume	784,732	Ex-Dividend Date	2018-05-17
Avg. Volume	813,774	1y Target Est	48.50

Emera Incorporated (EMA.TO)

☆ Add to watchlist

Toronto - Toronto Delayed Price. Currency in CAD

41.62 -0.62 (-1.47%)

At close: 4:20PM EDT

Summary | Chart | Conversations | Statistics | Profile | Financials | Options | Holders | Historical Data | Analysis | Sustainability NEW

Previous Close	42.24	Market Cap	9.597B
Open	42.23	Beta	0.25
Bid	41.62 x 0	PE Ratio (TTM)	40.60
Ask	42.49 x 0	EPS (TTM)	1.02
Day's Range	41.62 - 42.63	Earnings Date	08-Aug-2018 - 13-Aug-2018
52 Week Range	39.08 - 49.48	Forward Dividend & Yield	2.26 (5.31%)
Volume	728,089	Ex-Dividend Date	2018-07-31
Avg. Volume	620,512	1y Target Est	48.55

1D 5D 1M 6M YTD 1Y 5Y Max | Full screen

Canadian Utilities Limited (CU.TO)

☆ Add to watchlist

Toronto - Toronto Delayed Price. Currency in CAD

31.97 +0.12 (+0.39%)

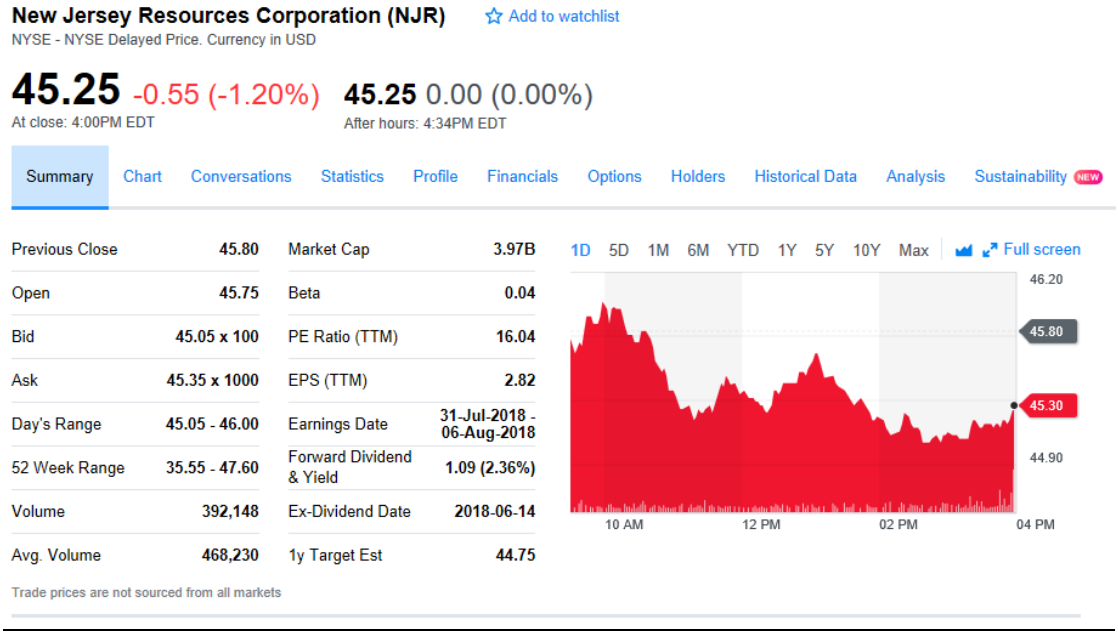
At close: 4:20PM EDT

Summary | Chart | Conversations | Statistics | Profile | Financials | Options | Holders | Historical Data | Analysis | Sustainability NEW

Previous Close	31.85	Market Cap	8.664B
Open	31.92	Beta	0.41
Bid	31.87 x 0	PE Ratio (TTM)	23.52
Ask	32.04 x 0	EPS (TTM)	1.36
Day's Range	31.60 - 32.03	Earnings Date	24-Oct-2018 - 29-Oct-2018
52 Week Range	30.80 - 39.88	Forward Dividend & Yield	1.57 (4.69%)
Volume	242,595	Ex-Dividend Date	2018-05-09
Avg. Volume	260,673	1y Target Est	36.00

1D 5D 1M 6M YTD 1Y 5Y Max | Full screen

Appendix B. Yahoo Beta estimates and financial data for US Gas companies



New Jersey Resources Corporation (NJR) ☆ Add to watchlist

NYSE - NYSE Delayed Price. Currency in USD

45.25 -0.55 (-1.20%) At close: 4:00PM EDT

45.25 0.00 (0.00%) After hours: 4:34PM EDT

Summary | Chart | Conversations | Statistics | Profile | Financials | Options | Holders | Historical Data | Analysis | Sustainability NEW

Previous Close	45.80	Market Cap	3.97B
Open	45.75	Beta	0.04
Bid	45.05 x 100	PE Ratio (TTM)	16.04
Ask	45.35 x 1000	EPS (TTM)	2.82
Day's Range	45.05 - 46.00	Earnings Date	31-Jul-2018 - 06-Aug-2018
52 Week Range	35.55 - 47.60	Forward Dividend & Yield	1.09 (2.36%)
Volume	392,148	Ex-Dividend Date	2018-06-14
Avg. Volume	468,230	1y Target Est	44.75

1D 5D 1M 6M YTD 1Y 5Y 10Y Max Full screen

Trade prices are not sourced from all markets

Northwest Natural Gas Company (NWN) ☆ Add to watchlist

NYSE - NYSE Delayed Price. Currency in USD

64.60 -0.65 (-1.00%) At close: 4:02PM EDT

64.60 0.00 (0.00%) After hours: 4:34PM EDT

Summary | Chart | Conversations | Statistics | Profile | Financials | Options | Holders | Historical Data | Analysis | Sustainability NEW

Previous Close	65.25	Market Cap	1.859B
Open	65.10	Beta	0.14
Bid	63.65 x 100	PE Ratio (TTM)	N/A
Ask	65.05 x 100	EPS (TTM)	-1.89
Day's Range	63.95 - 65.40	Earnings Date	07-Aug-2018
52 Week Range	51.50 - 69.50	Forward Dividend & Yield	1.89 (2.95%)
Volume	138,336	Ex-Dividend Date	2018-07-30
Avg. Volume	135,920	1y Target Est	56.33

1D 5D 1M 6M YTD 1Y 5Y 10Y Max Full screen

Trade prices are not sourced from all markets

Spire Inc. (SR) ☆ Add to watchlist

NYSE - NYSE Delayed Price. Currency in USD

71.75 -0.75 (-1.03%) At close: 4:02PM EDT

71.75 0.00 (0.00%) After hours: 4:34PM EDT

Summary | Chart | Conversations | Statistics | Profile | Financials | Options | Holders | Historical Data | Analysis | Sustainability NEW

Previous Close	72.50	Market Cap	3.613B
Open	72.40	Beta	-0.12
Bid	0.00 x 0	PE Ratio (TTM)	14.77
Ask	0.00 x 0	EPS (TTM)	4.86
Day's Range	71.45 - 72.70	Earnings Date	31-Jul-2018
52 Week Range	60.09 - 82.85	Forward Dividend & Yield	2.25 (3.03%)
Volume	197,428	Ex-Dividend Date	2018-06-08
Avg. Volume	332,652	1y Target Est	73.14

Trade prices are not sourced from all markets

Vectren Corporation (VVC) ☆ Add to watchlist

NYSE - NYSE Delayed Price. Currency in USD

71.44 -0.01 (-0.01%) At close: 4:02PM EDT

71.44 +0.01 (0.01%) After hours: 4:02PM EDT

Summary | Chart | Conversations | Statistics | Profile | Financials | Options | Holders | Historical Data | Analysis | Sustainability NEW

Previous Close	71.45	Market Cap	5.935B
Open	71.36	Beta	0.36
Bid	46.17 x 100	PE Ratio (TTM)	N/A
Ask	71.59 x 100	EPS (TTM)	N/A
Day's Range	71.29 - 71.47	Earnings Date	01-Aug-2018
52 Week Range	58.00 - 71.71	Forward Dividend & Yield	1.80 (2.52%)
Volume	278,354	Ex-Dividend Date	2018-05-14
Avg. Volume	847,046	1y Target Est	70.00

Trade prices are not sourced from all markets

Atmos Energy Corporation (ATO)

Add to watchlist

NYSE - NYSE Delayed Price. Currency in USD

90.88 -0.43 (-0.47%)
At close: 4:02PM EDT

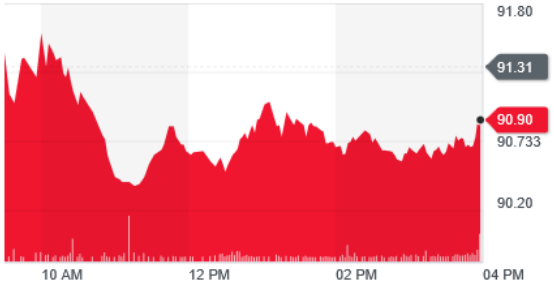
90.80 -0.10 (-0.11%)
After hours: 4:11PM EDT

Summary | Chart | Conversations | Statistics | Profile | Financials | Options | Holders | Historical Data | Analysis | Sustainability NEW

Previous Close	91.31	Market Cap	10.094B
Open	91.42	Beta	0.09
Bid	25.97 x 100	PE Ratio (TTM)	16.45
Ask	0.00 x 0	EPS (TTM)	5.52
Day's Range	90.37 - 91.57	Earnings Date	08-Aug-2018
52 Week Range	76.46 - 93.56	Forward Dividend & Yield	1.94 (2.11%)
Volume	270,453	Ex-Dividend Date	2018-05-18
Avg. Volume	460,261	1y Target Est	92.86

Trade prices are not sourced from all markets

1D 5D 1M 6M YTD 1Y 5Y 10Y Max | Full screen



Southwest Gas Holdings, Inc. (SWX)

Add to watchlist

NYSE - NYSE Delayed Price. Currency in USD

77.47 -1.02 (-1.30%)
At close: 4:02PM EDT

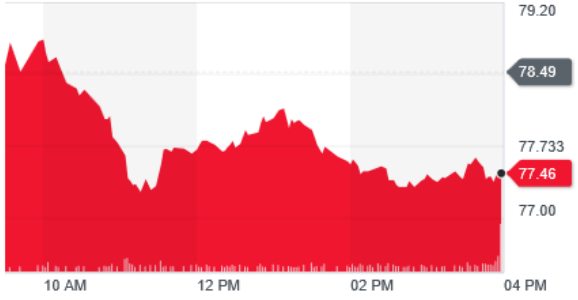
77.47 0.00 (0.00%)
After hours: 4:34PM EDT

Summary | Chart | Conversations | Statistics | Profile | Financials | Options | Holders | Historical Data | Analysis | Sustainability NEW

Previous Close	78.49	Market Cap	3.746B
Open	78.56	Beta	0.34
Bid	54.48 x 100	PE Ratio (TTM)	19.18
Ask	0.00 x 0	EPS (TTM)	4.04
Day's Range	77.27 - 78.82	Earnings Date	22-Feb-2017 - 27-Feb-2017
52 Week Range	62.54 - 86.87	Forward Dividend & Yield	2.08 (2.60%)
Volume	111,433	Ex-Dividend Date	2018-08-14
Avg. Volume	250,403	1y Target Est	77.00

Trade prices are not sourced from all markets

1D 5D 1M 6M YTD 1Y 5Y 10Y Max | Full screen



Appendix B. Yahoo Beta estimates and financial data for US Electric companies

Duke Energy Corporation (DUK) ☆ Add to watchlist

NYSE - Nasdaq Real Time Price. Currency in USD

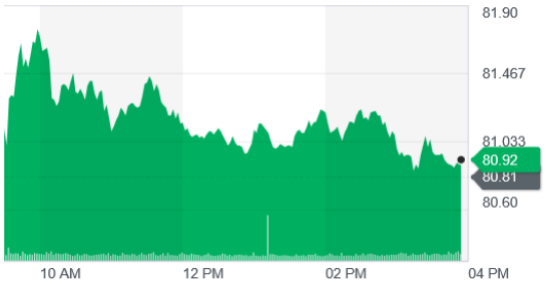
80.95 +0.14 (+0.17%)

As of 3:56PM EDT. Market open.

Summary | Chart | Conversations | Statistics | Profile | Financials | Options | Holders | Historical Data | Analysis | Sustainability NEW

Previous Close	80.81	Market Cap	57.665B
Open	80.98	Beta	0.03
Bid	80.91 x 900	PE Ratio (TTM)	20.48
Ask	80.92 x 800	EPS (TTM)	3.95
Day's Range	80.85 - 81.80	Earnings Date	01-Nov-2018 - 05-Nov-2018
52 Week Range	71.96 - 91.80	Forward Dividend & Yield	3.71 (4.61%)
Volume	3,050,868	Ex-Dividend Date	2018-08-16
Avg. Volume	3,549,973	1y Target Est	84.50

1D 5D 1M 6M YTD 1Y 5Y Max Full screen



Trade prices are not sourced from all markets

ALLETE, Inc. (ALE) ☆ Add to watchlist

NYSE - Nasdaq Real Time Price. Currency in USD

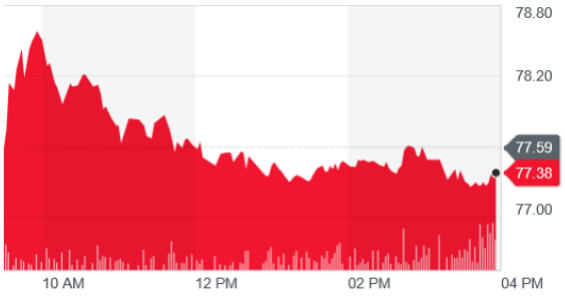
77.30 -0.29 (-0.37%)

As of 3:58PM EDT. Market open.

Summary | Chart | Conversations | Statistics | Profile | Financials | Options | Holders | Historical Data | Analysis | Sustainability NEW

Previous Close	77.59	Market Cap	3.97B
Open	77.58	Beta	-0.04
Bid	77.25 x 1000	PE Ratio (TTM)	23.50
Ask	77.30 x 800	EPS (TTM)	3.29
Day's Range	77.24 - 78.58	Earnings Date	30-Oct-2018 - 05-Nov-2018
52 Week Range	66.64 - 81.24	Forward Dividend & Yield	2.24 (2.91%)
Volume	119,776	Ex-Dividend Date	2018-08-14
Avg. Volume	225,425	1y Target Est	73.88

1D 5D 1M 6M YTD 1Y 5Y Max Full screen



Trade prices are not sourced from all markets

Eversource Energy (ES)

Add to watchlist

NYSE - Nasdaq Real Time Price. Currency in USD

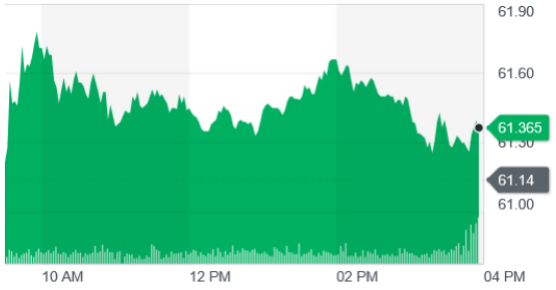
61.36 +0.22 (+0.36%)

As of 3:59PM EDT. Market open.

Summary | Chart | Conversations | Statistics | Profile | Financials | Options | Holders | Historical Data | Analysis | Sustainability NEW

Previous Close	61.14	Market Cap	19.444B
Open	61.30	Beta	0.19
Bid	61.30 x 800	PE Ratio (TTM)	19.30
Ask	61.31 x 800	EPS (TTM)	3.18
Day's Range	61.22 - 61.79	Earnings Date	30-Oct-2018 - 05-Nov-2018
52 Week Range	52.76 - 66.15	Forward Dividend & Yield	2.02 (3.31%)
Volume	1,006,323	Ex-Dividend Date	2018-05-23
Avg. Volume	1,974,535	1y Target Est	63.43

1D 5D 1M 6M YTD 1Y 5Y Max | Full screen



Trade prices are not sourced from all markets

OGE Energy Corp. (OGE)

Add to watchlist

NYSE - Nasdaq Real Time Price. Currency in USD

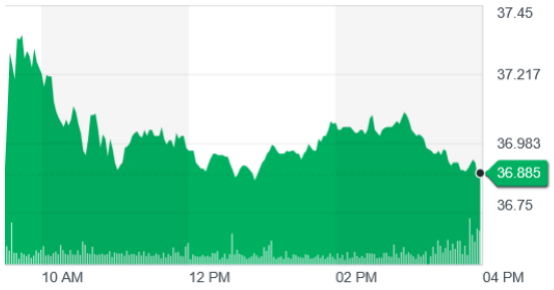
36.89 +0.01 (+0.03%)

At close: 3:59PM EDT

Summary | Chart | Conversations | Statistics | Profile | Financials | Options | Holders | Historical Data | Analysis | Sustainability NEW

Previous Close	36.88	Market Cap	7.368B
Open	37.00	Beta	0.76
Bid	36.88 x 800	PE Ratio (TTM)	11.57
Ask	36.89 x 1400	EPS (TTM)	3.19
Day's Range	36.86 - 37.37	Earnings Date	01-Aug-2018 - 06-Aug-2018
52 Week Range	29.59 - 37.37	Forward Dividend & Yield	1.33 (3.66%)
Volume	1,326,444	Ex-Dividend Date	2018-07-09
Avg. Volume	1,570,135	1y Target Est	37.67

1D 5D 1M 6M YTD 1Y 5Y Max | Full screen



Trade prices are not sourced from all markets

Pinnacle West Capital Corporation (PNW)

Add to watchlist

NYSE - Nasdaq Real Time Price. Currency in USD

81.32 +0.01 (+0.01%)

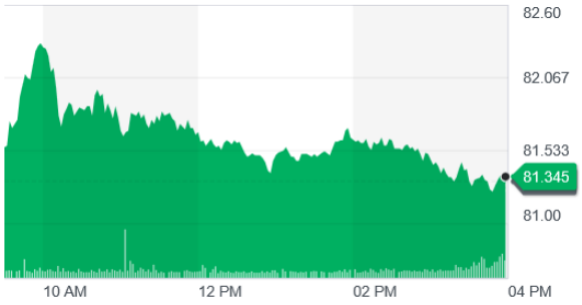
At close: 3:59PM EDT

Summary | Chart | Conversations | Statistics | Profile | Financials | Options | Holders | Historical Data | Analysis | Sustainability NEW

Previous Close	81.31	Market Cap	9.106B
Open	81.56	Beta	0.03
Bid	81.36 x 900	PE Ratio (TTM)	19.55
Ask	81.36 x 900	EPS (TTM)	4.16
Day's Range	81.22 - 82.38	Earnings Date	01-Nov-2018 - 05-Nov-2018
52 Week Range	73.41 - 92.48	Forward Dividend & Yield	2.78 (3.44%)
Volume	487,424	Ex-Dividend Date	2018-07-31
Avg. Volume	848,770	1y Target Est	83.33

Trade prices are not sourced from all markets

1D 5D 1M 6M YTD 1Y 5Y Max | Full screen



Evergy, Inc. (EVRG)

Add to watchlist

NYSE - Nasdaq Real Time Price. Currency in USD

57.67 +0.65 (+1.15%)

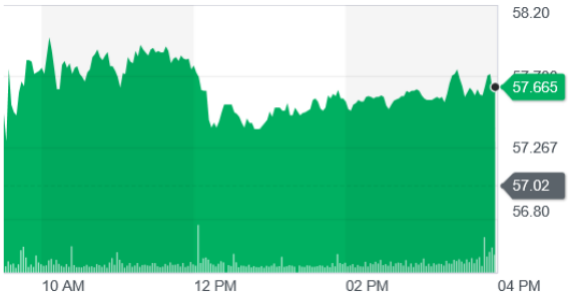
At close: 3:59PM EDT

Summary | Chart | Conversations | Statistics | Profile | Financials | Options | Holders | Historical Data | Analysis | Sustainability NEW

Previous Close	57.02	Market Cap	15.65B
Open	57.12	Beta	0.26
Bid	57.60 x 1000	PE Ratio (TTM)	25.41
Ask	57.61 x 800	EPS (TTM)	2.27
Day's Range	57.16 - 57.99	Earnings Date	N/A
52 Week Range	50.89 - 57.99	Forward Dividend & Yield	1.60 (2.84%)
Volume	1,362,742	Ex-Dividend Date	2018-05-29
Avg. Volume	2,545,662	1y Target Est	59.25

Trade prices are not sourced from all markets

1D 5D 1M 6M YTD 1Y 5Y Max | Full screen



APPENDIX D

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 (C_t). 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,

$$P_0 = \sum_{t=1}^{\infty} \frac{C_t}{(1+K)^t}$$

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 bond and 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 then published in the newspaper as an objective measure of the investors' required rate of return for a default free security. I already 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 this 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 as a whole, 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 to get:

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

where 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,

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

which states that the investor's required rate of return 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.

Further it is 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. Note that while *K* is the return that investor's require, *r* is the actual return on equity (*ROE*) the firm is

[1] This assumes that the only change in shareholder's equity comes from retentions, that is, everything flows through the income statement.

expected to earn.[2]

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.

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 stock holders, implying that the regulator should lower the firm's allowed rate of return. In our example the *ROE* exceeds the required rate of return by 2% which results in a market to book ratio of 150%.

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

[2] There is an additional term if the firm repeatedly sells shares at a premium to its book value, but this term is small and usually dwarfed by estimation problems.

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 regulated utilities, so the DCF estimate is particularly appropriate for use in determining the fair rate of return for a regulated utility. However, for non-regulated firms and utility holding companies (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.

Circularity

When we apply the DCF model to estimate a fair return we estimate the dividend yield and future growth rate. In the example in Schedule 1 the dividend is forecast to be $1.20 which with a $30 stock price means a 4% dividend yield. When this is added to the sustainable growth rate of 6% we get back the investor's fair rate of return of 10.0%. However, it is sometimes alleged that this DCF estimate is circular, since the ROE used to forecast the future growth rate of 12% differs from the investor's required or fair rate of return estimated at 10%. The allegation is that if a regulatory body were to accept the 10% estimate and reduce the allowed ROE then future growth will drop and with it the stock price. As a result, there is an inconsistency between the forecast ROE and the DCF fair return estimate. However, this inconsistency or circularity is *false.*

Note that there will always be a difference between the forecast ROE and the investor's fair return, whenever the market to book ratio differs materially from 1.0.[3] However, this does not affect the estimate produced by the DCF model. Suppose for example the ROE was decreased to 10%, after the fair return is correctly estimated at 10% using the DCF model, what happens? In this case the forecast earnings per share drop to $2 from $2.40 and with the same 50% payout the dividend is cut to $1.0 and the forecast growth rate drops to 5% (50% retention times the 10% ROE). However, using the same DCF equation the market price will fall back to its book value of $20.

$$P_0 = \frac{\$1}{0.10 - 0.05} = \$20$$

At the new price the dividend yield increases to 5% ($1/$20), so that with the new lower forecast

[3] We see this every day in the bond market where a bond selling above (below) par has a stated coupon interest rate higher (lower) than the current market interest rate.

growth rate of 5%, we again estimate the investor's fair return accurately at 10%.

Investors will be far from happy that the allowed ROE has been cut from 12% to 10%, but that does not invalidate the use of the DCF model to estimate their fair, or required, rate of return of 10%. Similarly, if the regulator for some reason increases the allowed ROE to 14% then the dividend would increase to $1.40 and the forecast growth to 7%. In this case the stock price would increase to $46.67 and the dividend yield drops to 3.0%, so again the dividend yield plus growth correctly estimates the investor's fair rate of return of 10.0%.

The fact is that the DCF model simply reverse engineers the forecast cash flows to extract the investor's fair rate of return; it says nothing about whether or not the investor would be happy if the firm earned that rate of return on its book value. Further proponents of this circularity argument often apply the DCF model based on analyst growth estimates, yet these same analysts have to get their forecast growth rates from somewhere and invariably they are based on future profitability, that is, forecast ROEs. Moreover, even if they are not explicitly based on a forecast ROE, one is always implicit in any growth forecast. For example, if an analyst's growth forecast of 7% is used in a DCF model, then with a 50% dividend payout this means by definition the analyst is forecasting an ROE of 14%. It is impossible to ignore the result that any forecast growth rate carries with it a forecast ROE which will almost certainly deviate from the investor's required rate of return.

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 as a whole, 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 3 is a graph of the dividend yield on the TSX Composite (Cansim V122628) along with the yield to maturity on the long Canada (LTC) bond (Cansim V122501). Currently the TSX dividend yield is about 2.92%, while the Long Canada yield is 2.27%. This is an unusual situation that has prevailed since the end of 2011. It is unusual since equities are a claim on real resources and 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 the investor can earn if 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.

In Schedule 4 is a graph of the after tax profits and dividends earned and paid in Canada by Canadian corporations. The data is from the GDP accounts and goes back to 1956 and in both cases is scaled by dividing by GDP. The after tax profits are those reported for tax purposes and do not reflect the accounting "games" that are often used to inflate accounting or GAAP profits to "please" investors. For example, non-cash items like capital gains are removed and inventories are adjusted to remove inflationary gains. As is to be expected, aggregate dividends (right side axis) are more stable than aggregate after tax profits. After-tax profits plummeted, for example, during the recessions in 1981, the early 1990s, marginally in the early 2000s and during the recent financial crisis. Overall average (median) dividends have been 3.2% (2.7%) of GDP and average (median) after tax corporate profits 6.6%, (6.7%) but much more variable. Until recently after tax profits have been above these long run averages and reached over 10.0% in 2008 before the financial crisis as high resource prices benefitted Corporate Canada.

Dividends are more stable than earnings as firms don't like to cut their dividends. This is important since some utility analysts "key" dividend growth forecasts off earnings forecasts. This is suspect since the greater variability in earnings means that their average growth rate always exceeds that of dividends in the same way that the arithmetic return always exceeds that of the geometric (compound) growth rate.[4] However, with this caveat it is hard not to conclude that in the long-run dividends and after tax profits grow at about the same rate as the overall economy, but are more variable. The average real Canadian growth rate since 1961 has been 3.20%, similar to that for 2017, while the Bank of Canada's operating band for inflation centres on 2.0%.[5] This implies a long-run growth rate in dividends and earnings of about 5.3%

[4] The standard deviation of after tax profits as a % of GDP has been about twice that of dividends.

[5] Schedule 5 has the Canadian CPI inflation rate back to 1914 and shows how successful the Bank of Canada's policy has been.

(1.02*1.032). This is probably a low estimate for two reasons. First, the GDP accounts have become less reliable as the economy has shifted to a knowledge-based economy, since it has become more difficult to estimate the value of productivity changes. Second, the arithmetic vs compound growth rate problem also affects the GDP accounts, which are less variable than similar accounts for companies. However, with this caveat the DCF estimate for the Canadian market as a whole is 8.37% (1.0292*1.053-1).

An alternative estimate of future growth for the market as a whole is to use the "*br*" or sustainable growth rate. In Schedule 6 is the aggregate dividend payout from the GDP accounts. We can see very clearly the jump in the payout during the severe recessions in the early 1980s and 1990s when Corporate Canada had serious profitability problems. The median dividend payout is 42%. This is more reliable than the average, which is biased due to very low earnings in some recessionary years. In Schedule 7 is the return on equity (ROE) earned by Corporate Canada as reported by Statistics Canada. Again we can see the business cycle as very low profitability in the mid 1990's and again in 2003 and 2009 which makes the median more useful. Combining the median retention rate (1-dividend payout) and median ROE gives a sustainable growth rate of 5.77% and DCF equity cost of 8.86%.

These two DCF equity cost estimates of 8.37% and 8.86% would seem to be reasonable estimates assuming that the economy is neither in recession or booming. Otherwise, there might be short run growth built into the dividend yield. In Schedule 9 is the Statistics Canada capacity utilisation showing that the economy is running very close to full capacity. The median capacity utilisation levels since 1987 have been 83.6 & 81.8% for non-farm and manufacturing respectively, very close to the maximum levels recorded. This observation is confirmed by the August 2018 unemployment rate of 6.0% and the unemployment data graphed in Schedule 10. The unemployment rate and the capacity data would both put the Canadian economy at close to the peak of the business cycle when inflationary pressures set in. This assessment is confirmed

by the Bank of Canada's business outlook survey in Schedule 11, where there has been a clear shift in business assessment of increasing capacity problems in the near future.[6]

In Schedule 12 is a graph of the dividend yield on the S&P500 index and in Schedule 13 a graph of the dividend payout rate on the S&P500 firms. The average dividend payout since 1956 is 48.4% while the median payout is 43.2% meaning that typically 56.8% 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 and 1990s.

In Schedule 14 is the S&P ROE data for the S&P500 firms since 1977, where the average ROE was 13.35% and the median ROE 13.77%. 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. Over this same period the average and median retention rates were 51.6% and 56.8%. If I pair the median payout and ROE the "*br*" growth rate is 7.83% and if I pair the averages the growth rate is 6.88% reflecting both the higher average payout and lower average ROE. Combining these with the current dividend yield on the S&P500 index of 1.77% gives a fair return on the S&P500 of 8.77-9.73%. Note the higher sustainable growth rate for the S&P500 is offset by its lower US dividend yield. As a result, the estimate for the S&P500 is only about 0.50% higher than for the overall Canadian market.

Using the DCF model to estimate the market's required return on equity (equity cost) would indicate a value of 8.37-8.86% for Canada and about 0.50% higher for the US. These numbers look more accurate than they really are, but a value of 8.5% to 9.50% would seem reasonable. More importantly this range of estimates for the market as a whole provides a ceiling for the required return for utility investors, since utilities are unambiguously lower risk than the market as whole.

[6] Monetary Policy Report, July 2018.

S&P US Utility DCF cost estimates

As well as the data for the S&P500 as a whole, Standard and Poors also publishes data on the utilities that meet the requirements to be included in the S&P500 index. In Schedule 15 is the summary data for the electric utilities in the S&P500 index. Note that the S&P data includes the firms that at the time were classified into industry sub groups where the data for each year reflects the S&P value weighted average of the firms for that year.

The schedules provide the basic data needed for a DCF analysis. The data includes dividends, earnings, book value per share, average market values and the return on equity. From this it is possible to calculate several pieces of useful information. First, is the average payout, which is in the fourth column followed by the retention ratio. Utilities as low risk and low growth investments have relatively high payouts. For the electric utilities the average and median payouts are both 74%. This is corroborated by the very high average (median) dividend yield of 4.47% (4.40%). The very high dividend payout means that the growth potential for these utilities is low, which reduces the error in using the DCF model. It also means that utilities are quintessentially dividend or income stocks. The average 2017 dividend yield for the electric utilities was 3.57% or twice that for the S&P500 index as a whole.

To estimate the future growth rate I can assume that each year the utility is expected to earn its current *ROE,* so that its earnings will grow by the retention rate times this *ROE*. For example, in 1993 the retention rate was 10.57% and the ROE 11.25% for the electric utilities implying future earnings growth of 1.19%, which is the *g (b*ROE)* in the next column. For 1993 the dividend yield for the S&P Electric utilities was 5.73% (column 8), so that the DCF equity cost estimate was 6.99%, which is in column 10. In 1993 the average long term (ten year) US Treasury yield was 5.80% implying that the electric utility risk premium was only 1.18%. Column 11 gives the market to book ratio for these utilities, which in 1993 was 1.59, implying correctly that the ROE of these utilities of 11.25% exceeded their equity cost.

The above calculation is a *mechanical* exercise and includes estimation error in both the earned

ROE, which affects both the forecast ROE and the retention rate. To reduce individual estimation errors the exercise is repeated for each year from 1993 until 2017. This gives the average and median electric utility risk premium of 3.36% and 3.49%. However, the *br* growth rate is sensitive to the actual earnings, which affect the retention rate and may not capture the full amount of growth expectations. To check for this the last two columns estimate the utility risk premium with two alternative growth expectations. URP2 assumes that the expected ROE is the median ROE for the whole period 1993-2017, which avoids the problem of fluctuating earned returns. URP3 also assumes that the retention rate is the constant median retention rate for the whole period. This avoids the problem of declining retention rates as earnings are squeezed and the dividend maintained. The average and median URP2 is 3.18% and 3.74% and for URP3 the values are 3.20% and 2.94%.

As a final check I looked at the growth in the dividend per share for the electric utilities relative to GDP.[7] Over the period from January 1994 to 2017 the average (median) nominal US GDP growth rate was 4.39% (4.39%), whereas the average (median) dividend per share growth rate of the S&P500 Electrics was 1.88% (2.04%) or less than half that of the US economy.[8] In Schedule 12 is a graph of the ten year US Treasury yield against the dividend yield of the S&P500 electrics. The correlation is over 0.50 and clearly dividend yields have dropped with the drop in US market interest rates indicating that these companies are seen as defensive interest rate sensitive investments. A naïve forecast would be that these utilities have dividend growth rates of no more than 50% of US GDP or about 2%. This would produce a DCF estimate of less than 6.0%.

From the data in Schedule 15, I derive two conclusions:

- Risk premiums of the order of 3.00-3.70% for a typical US electric utility over ten year US government bond yields is reasonable, since it reflects the experience of the

[7] The dramatic reduction in the number of gas companies makes their use problematic and even for the electrics where the number of firms is not constant there are problems.

[8] In 1993 the average DPS was $7.11 whereas in 2017 it was $10.57 for a compound growth rate of 1.66% well below the real growth rate in the US economy let alone the nominal growth rate.

last 25 years.

- The most recent 2017 data reflect a risk premium of 3.60-4.18% over the currently lower US Treasury yields indicating slightly higher current risk premiums.

Individual company estimates

The DCF estimates for the market as a whole and the S&P utility indexes are more reliable than 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 market as a whole is constrained in the long run by the growth rate in the economy. However, the growth rates are mechanically estimated and do not reflect market estimates. Consequently, some use analyst forecast of earnings growth as a proxy for the sustainable growth rates in the former estimates. However, in my judgment these are no more reliable as can be illustrated by looking at the sample of US electric utilities I analysed in Appendix C plus those included in Mr. Coyne's report.

Schedule 17 has data I extracted on September 18, 2018. The data consists of the analyst forecast five year growth rate and the past 5 year growth from Yahoo Finance, which sources their data from S&P's capital IQ data service. If the 5 year forecast growth rate is combined with the current dividend yield, it provides the equity cost based on 5 year analyst growth expectations (K(Est g)). At first glance, this estimate might look reasonable since the average (median) value across all 11 companies is 8.85% (8.90%). However, there are several problems.

First, these UHCs are clearly lower risk than the overall market and an estimate of 8.95% is very similar to that of the market as a whole. This is confirmed by their average beta of -0.01 confirming the discussion in Appendix C that UHC stock prices are currently being driven by interest rate risk, rather than market risk. Second, the average five-year growth forecast is 4.99% earnings growth. However, the past average 5 year growth rate was only 0.96%, that is, these analysts are forecasting a 5X increase in earnings growth. Of importance is that only one out of the 11 companies has a forecast growth rate less than that for the previous 5 years and this is Eversource, where the numbers are very similar. What this indicates is the "optimism bias"

amongst security analysts. This bias is simply a cognitive bias and not a fraudulent or intentional bias, that is, analysts tend to be optimistic about the companies they follow. In the same way, Professor Flyvberg apparently informed the public inquiry into the Muskrat Falls cost over runs that the same optimism bias tends to lead proponents of mega projects to under-estimate costs.[9] This optimism bias is compounded by the relatively small number of analysts, where there is sometimes only one analyst providing revenue forecasts.

It also has to be emphasised that the DCF model assumes growth *forever* at this constant forecast growth rate. The average forecast growth rate of 4.99% might seem reasonable but the Mr. Coyne (page 32 of his report) estimates US growth of just 4.35%. It is inconceivable that low risk US utilities can consistently grow faster than the US economy that supports them.

At Schedule 18 is a reprint of a Globe and Mail article reporting on an update of a study by the consulting firm, McKinsey. They report that analysts start out optimistic when making their five year forecast, but gradually as they get more information (generally from the company) they hone in on the correct number and this number is invariable lower. In Schedule 19 is an extract from the Royal Bank of Canada's Investment Strategy Playbook (February 2016) reporting the same phenomena.

This optimism bias has been in the academic literature for some time. Easton and Sommers[10] 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]

[9] Canadian Press, 09-09-2018, 'optimism bias' common cause of cost overrun: project expert on Muskrat falls.

[10] "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.

These estimates are in line with my own estimate of the expected return on the US market even though their estimates were based on data several years ago. More importantly there is no reason to believe that analyst optimism has suddenly disappeared anymore than construction costs are now accurately estimated. In fact, this optimism bias persists in current studies to the extent that authors refer to it as "well documented"[11] 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."[12] A Google search on analyst optimism produced 5,510,000 hits up from just 645,000 three years ago!

Mark Grinblatt of UCLA recently looked at the optimism bias and a summary of his research on May 30, 2018[13] reported that

> "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%.

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. From the data on the US electric utilities in Schedule 17 their retention rate of earnings averages just 14%. This is biased low by two firms actually paying more in dividends than is being earned. For this reason the median value of 32%

[11] See Huang and Tan, for example, "Analyst target price optimism around the world," November 2013.

[12] Sarah Gordon, "European corporates thwart analyst's optimism," Financial Times, April 27, 2014.

[13] https://www.anderson.ucla.edu/faculty-and-research/anderson-review/analyst-bias

is more reasonable meaning that 68% of earnings are paid out as dividends similar to the earlier data from S&P's Analyst Handbook. As we would expect, these mature utilities reinvest less of their earnings than do typical companies so we would expect them to grow at less than the average earnings growth rate. With the recent average ROE for each utility the sustainable growth rate averages just 2.27% and the median slightly higher at 2.61%. This growth forecast is more consistent with a US economy growing at under 5.0%, the mature nature of their operations and adjusting their analyst growth rates down to reflect persistent optimism.

This produces an average (median) equity cost of 5.90% (5.63%) consistent with their average (median) market to book (MB) ratio of 1.82 (1.87), and investors being happy with the average (median) earned ROE of 8.56% (9.06%). Notably the difference between these estimates and those obtained by using analyst forecasts is almost exactly the same as the optimism bias of 2.84% bias as reported by Easton and Summers.[14] Further, we can always back out from analyst growth forecasts an implicit rate of return. For example, with an average growth forecast of 4.99% for these electric utilities and a retention rate of 32%, the implied rate of return on investment is ROE = .0499/.32 or 15.59%[15] which exceeds their current median ROE of 9.06% by 72%.

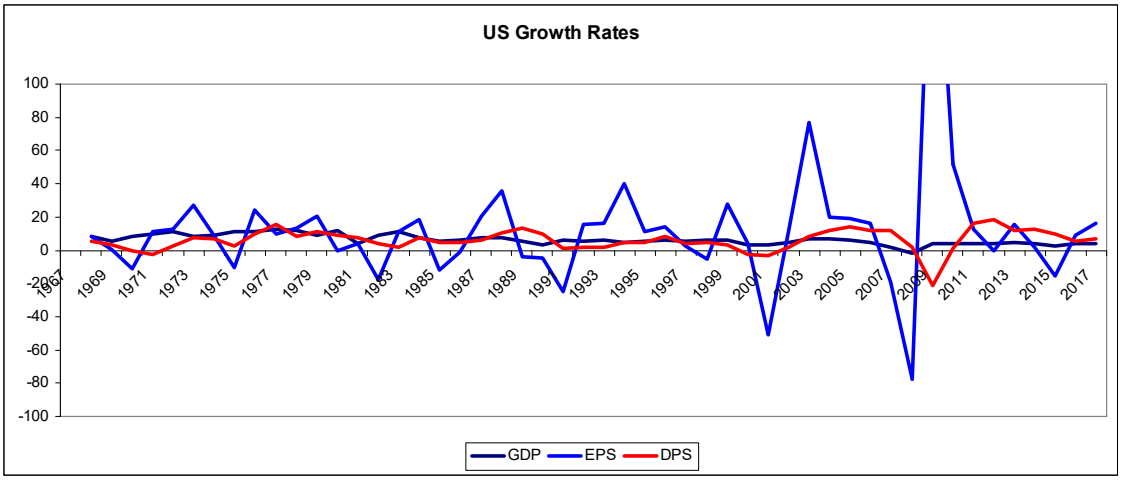
Earnings versus dividends

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! As Schedule 5 showed earnings are more volatile than dividends even after we aggregate over all firms. What this means is that the short term growth forecast for earnings is on average higher than for dividends, even if their long run, or compound, growth rates are unbiased and exactly 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 due to temporary factors.

[14] These estimates are slightly lower than those I presented in 2016.

[15] This just reverses g = b*ROE.

To illustrate the problem in using earnings I used the S&P Analyst Handbook for the S&P500 index. This index comprises the majority 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 these growth rates.



The earnings series is clearly more volatile even for this index of 500 companies that 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. This phenomenon is exactly the same as the arithmetic versus compound growth rate problem encountered in estimating the market risk premium in Appendix B. The fact is more volatile series always have higher arithmetic growth rates.

Over the entire period from 1967, US nominal GDP has grown by about 5.92%-6.40% depending on whether you emphasise arithmetic, median, ordinary least squares (OLS) or compound growth rates. The range is relatively small due to the small volatility of these growth

rates (3.00%). We get a similar result for DPS growth rates where the range is 5.68%-6.00% or 0.24-0.40% less, but very similar. For EPS growth rates, in contrast, there is a wide range from 6.11% to 11.94% since the volatility of the annual growth rates is very large at 40.6% or 6.4X the volatility on the DPS growth rates. Of critical importance is that long run, the earnings of the S&P500 index has broadly tracked GDP growth as one would expect, so the "best" estimate of earnings growth (OLS) is exactly the same as the growth rate in GDP.[16] However, short run, the average growth rate can be much higher, since it takes into account the base from which this growth is earned.

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 short term and at most for five years. Long term the best estimate for earnings growth is the growth rate in GDP since both EPS and DPS growth have tracked GDP growth over the last 51 years.

Conclusion

From the forgoing DCF estimates I draw the following conclusions:

- The Overall equity market return in Canada is in a range 8.00%-9.00% and that in the US slightly (0.50%) higher;

- The US S&P electric utility risk premium has been 3.0-3.70% over ten year US government bond yields, but has recently been slightly higher due to very low bond yields;

- The individual DCF estimates for US electric utilities based on analyst growth forecasts would put their equity cost at just under 9%. However, these forecasts are biased high and inaccurate estimates of their underling DPS growth rates. Removing this bias by using sustainable growth forecasts lowers this estimate to under 6.0%.

Given the errors attached to any estimate, I judge the DCF equity market required return to be in a range 8.5-9.5% and the fair return to a US electric utility to be around 7.0% largely the same estimates I presented in 2016.

[16] This simply confirms my prior assumption that long run earnings and dividends tend to track GDP

1

growth.

Schedule 1

YEAR	BEGINNING BOOK VALUE 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%

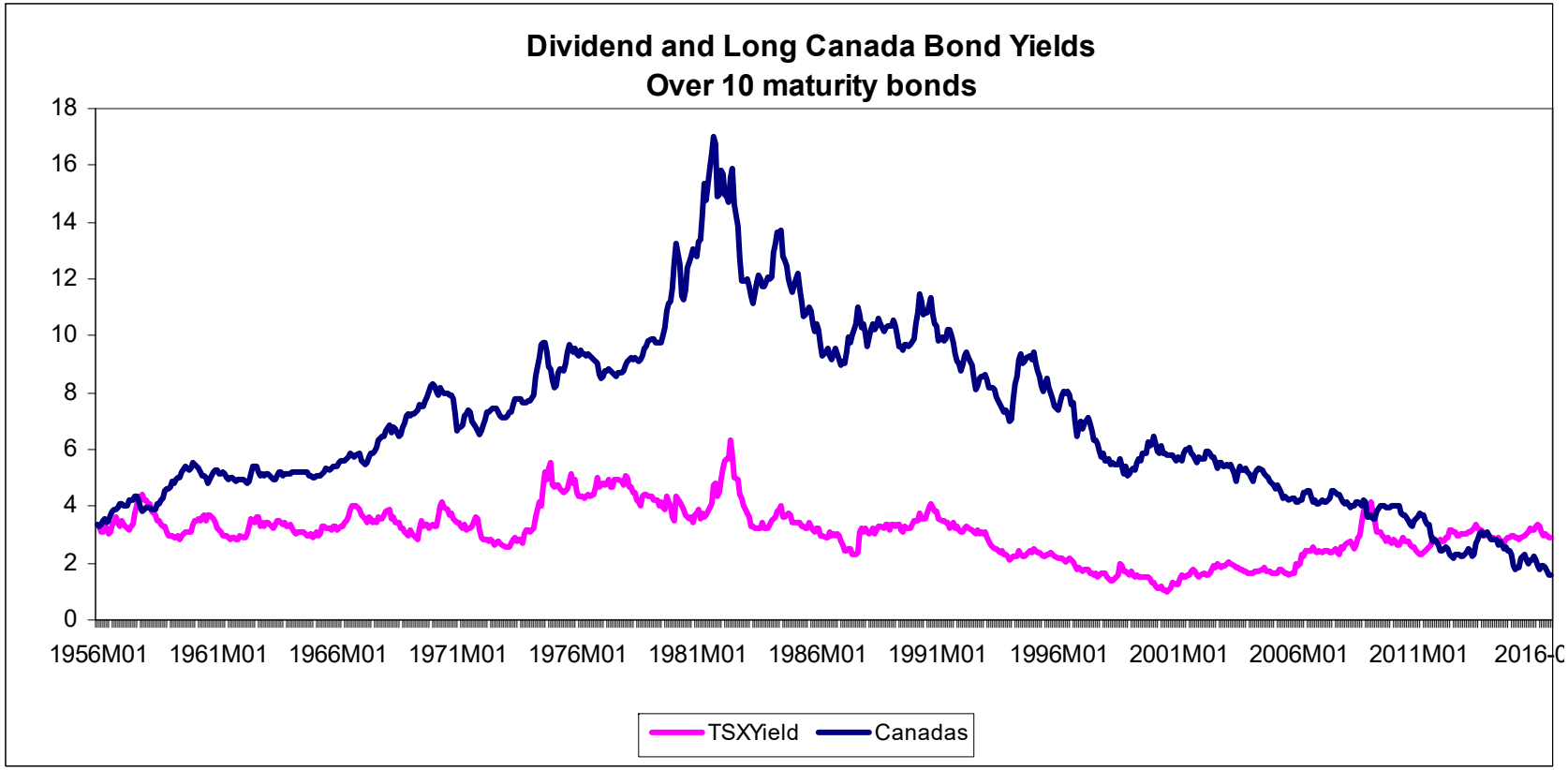
SCHEDULE 2

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

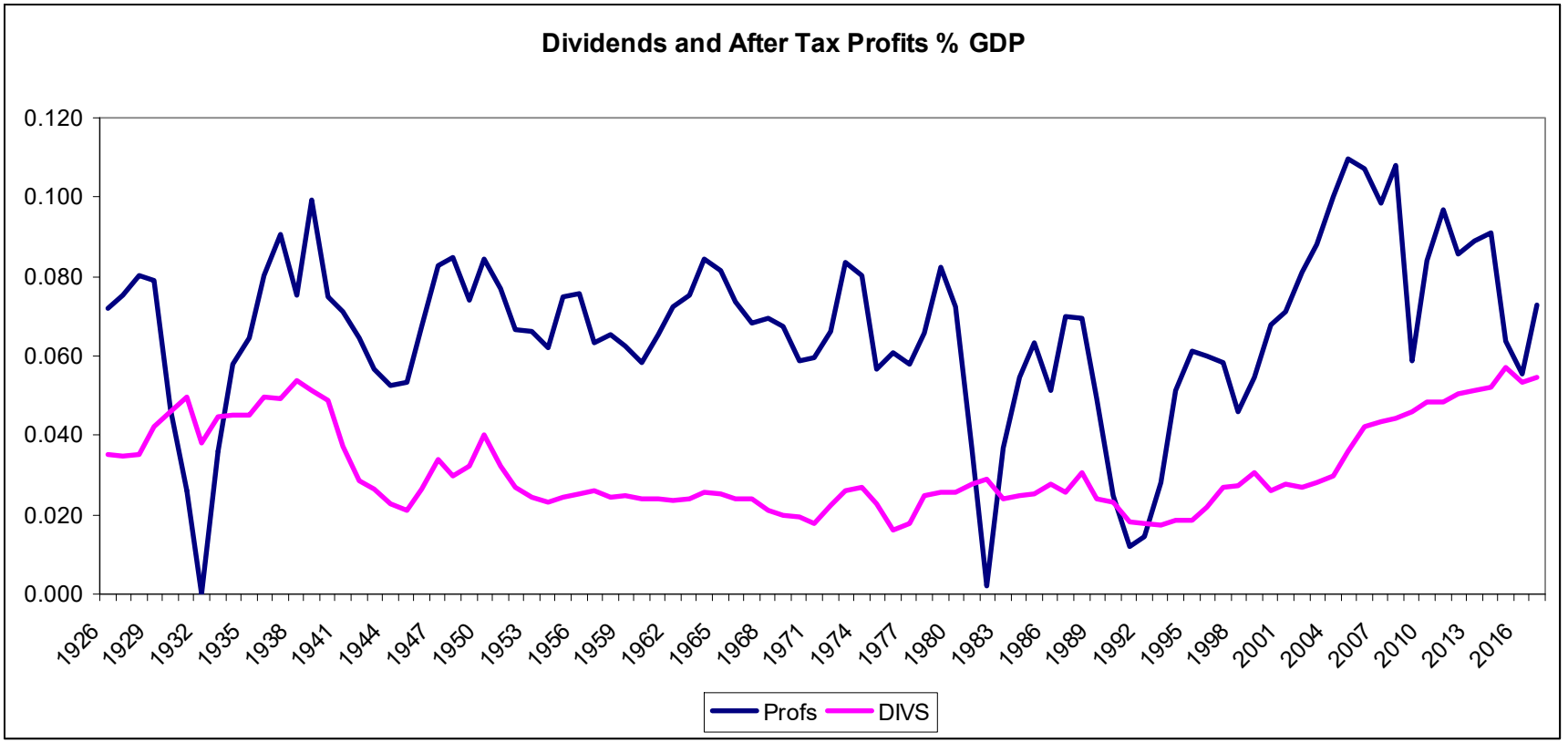
ASSUMPTIONS:

Return on Equity	=	12%
Dividend Payout	=	50% + 2% p.a.
Required Return	=	10%

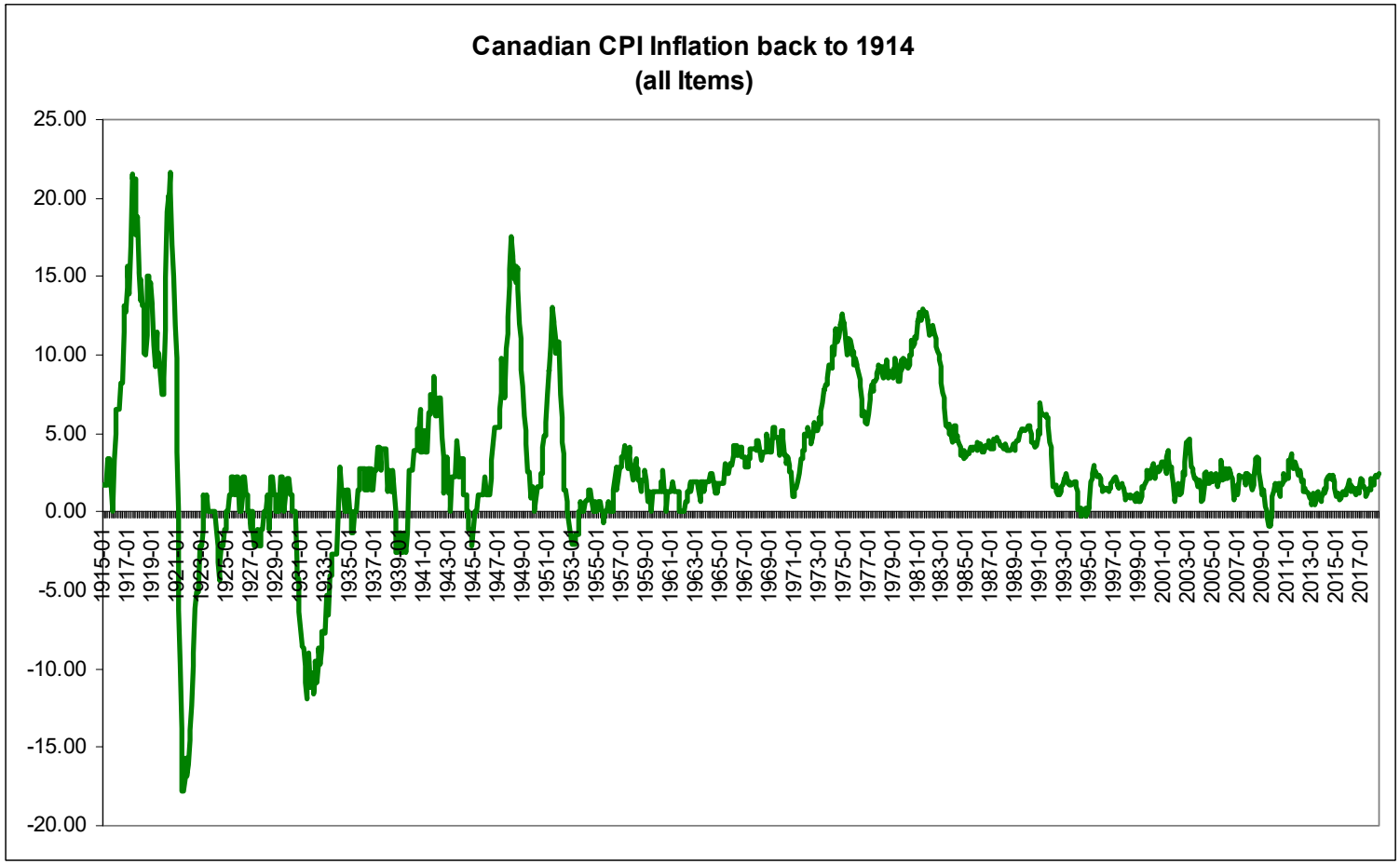
SCHEDULE3


Dividend and Long Canada Bond Yields
Over 10 maturity bonds
18
16
14
12
10
8
6
4
2
0
1956M01
1961M01
1966M01
1971M01
1976M01
1981M01
1986M01
1991M01
1996M01
2001M01
2006M01
2011M01
TSXYield
Canadas

SCHEDULE 4



Note: Statistics Canada issued a new revision of the GDP accounts starting in June 2012 where there was a substantial revision to profits and dividends to reflect the importance of inter corporate dividend payments.


Canadian CPI Inflation back to 1914
(all Items)
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
-10.00
-15.00
-20.00
1915-01
1917-01
1919-01
1921-01
1923-01
1925-01
1927-01
1929-01
1931-01
1933-01
1935-01
1937-01
1939-01
1941-01
1943-01
1945-01
1947-01
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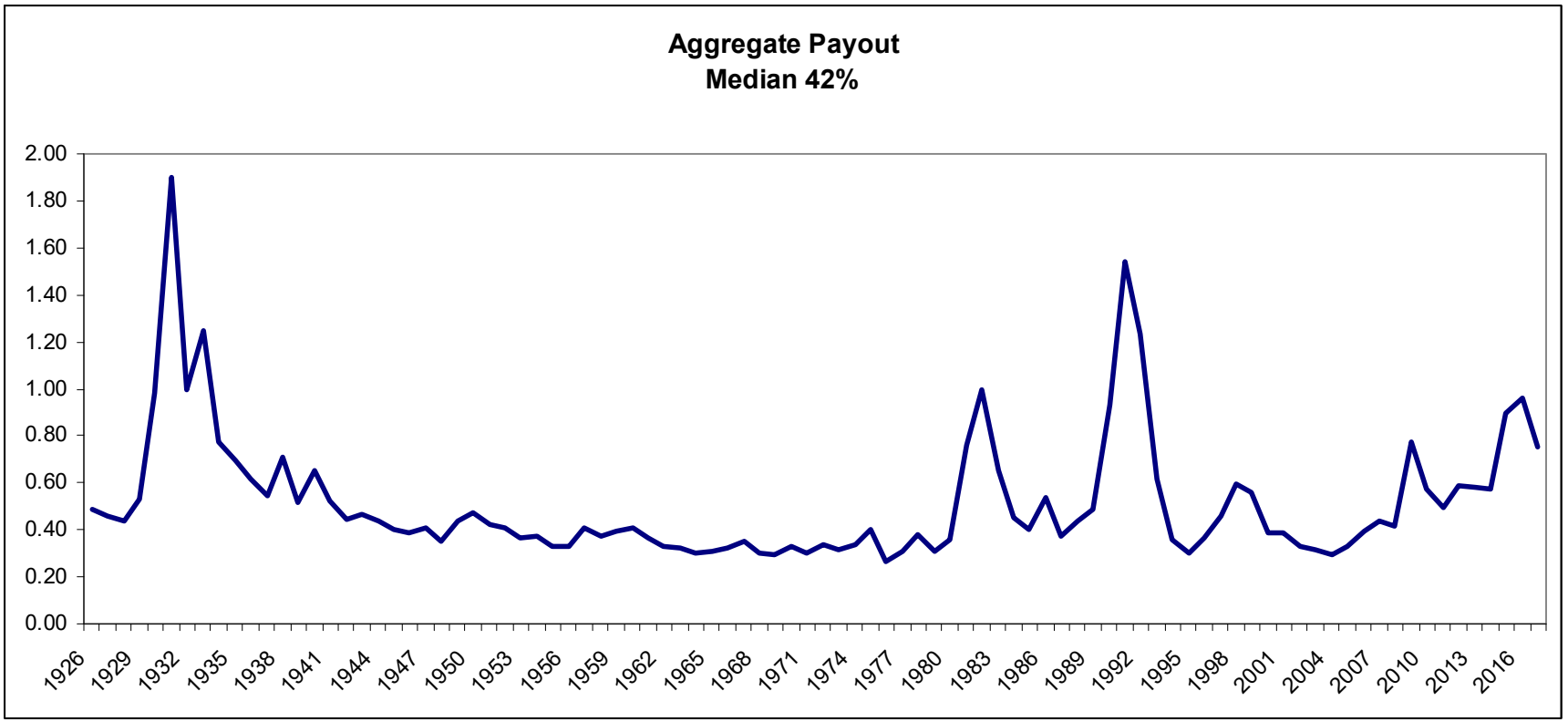
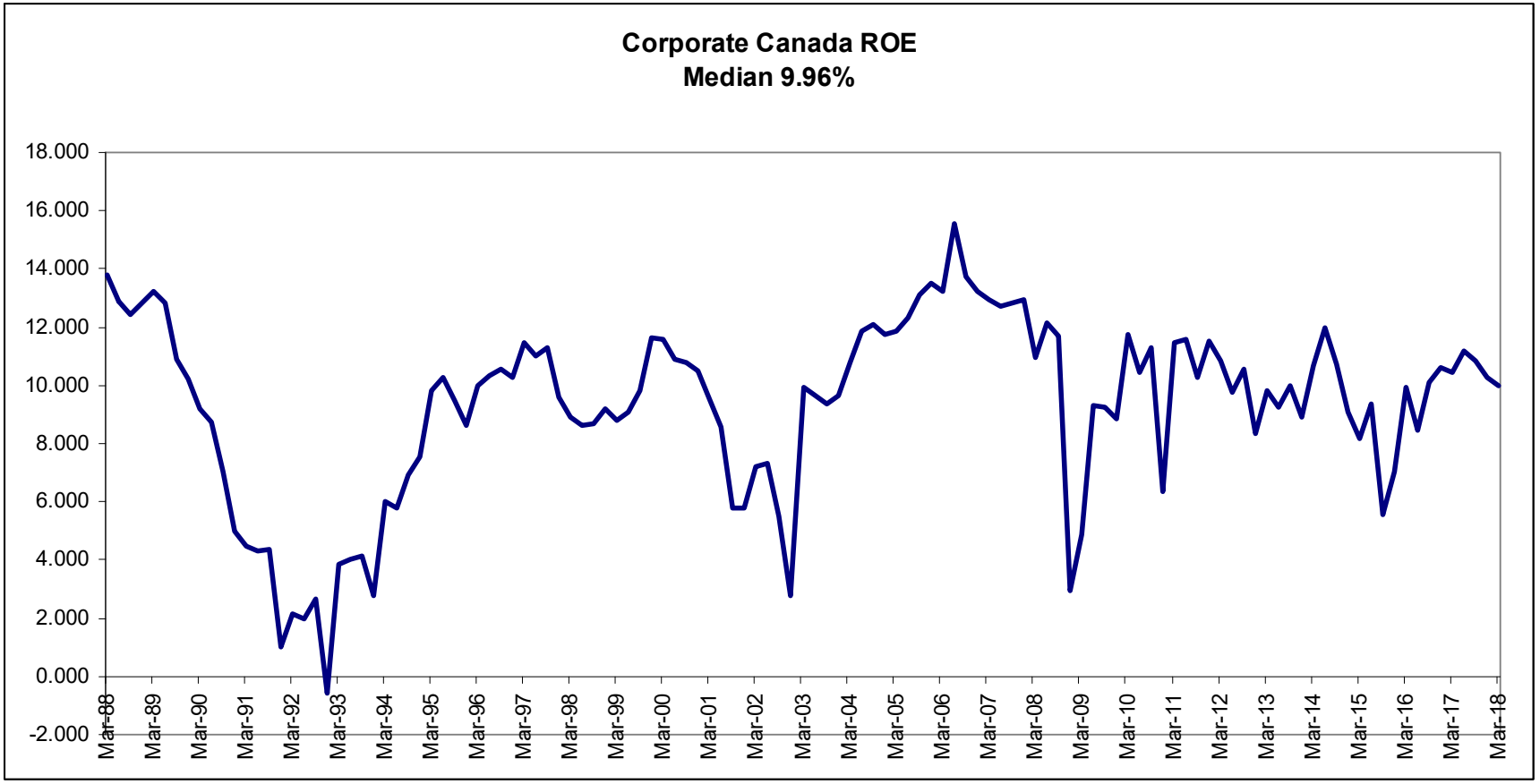
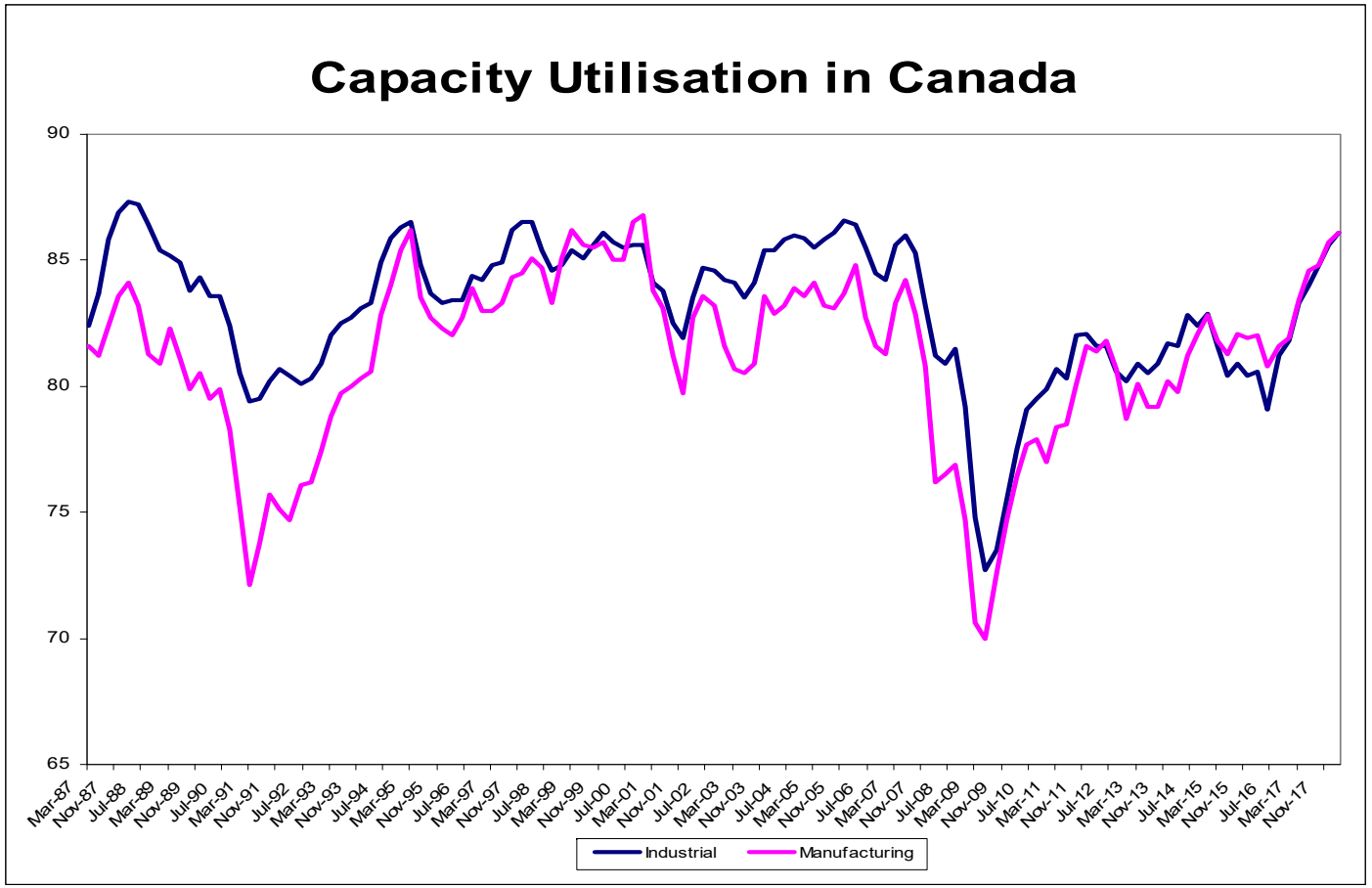
1987-01
1989-01
1991-01
1993-01
1995-01
1997-01
1999-01
2001-01
2003-01
2005-01
2007-01
2009-01
2011-01
2013-01
2015-01
2017-01

SCHEDULE 6



Note in several years profits were negative in which case the payout was set at 100%.


Corporate Canada ROE
Median 9.96%
18.000
16.000
14.000
12.000
10.000
8.000
6.000
4.000
2.000
0.000
-2.000
Mar-88
Mar-89
Mar-90
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
Mar-05
Mar-06
Mar-07
Mar-08
Mar-09
Mar-10
Mar-11
Mar-12
Mar-13
Mar-14
Mar-15
Mar-16
Mar-17
Mar-18

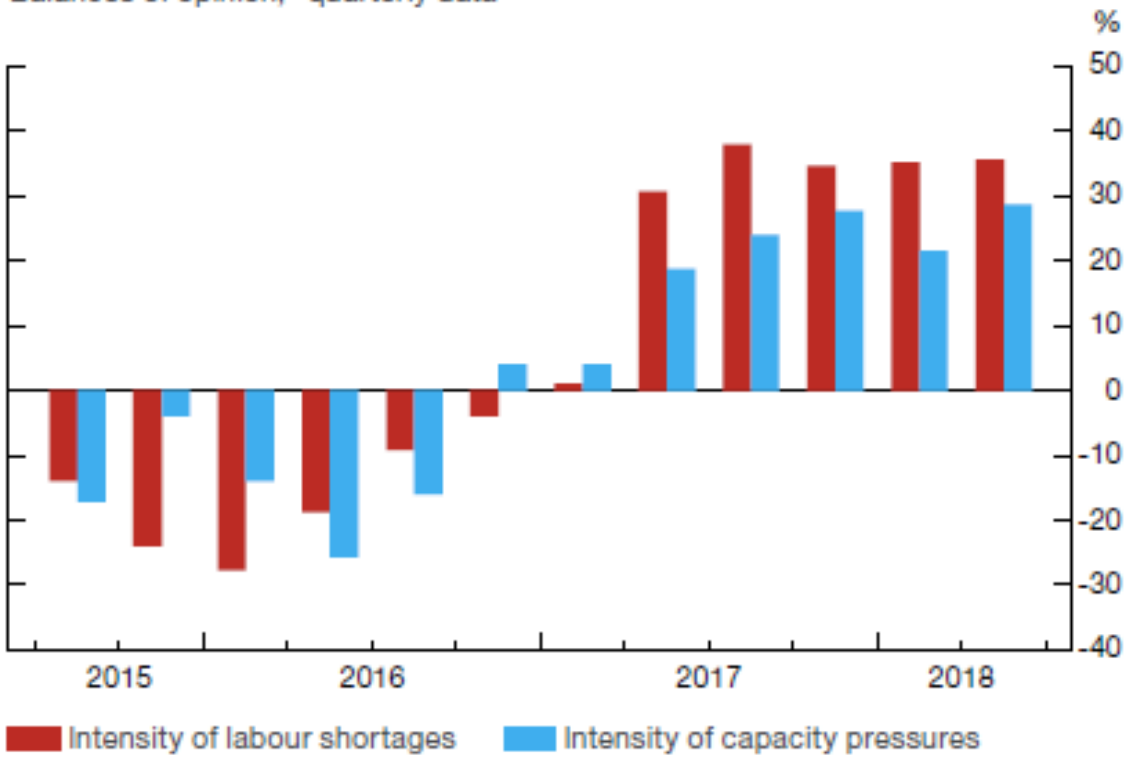

Capacity Utilisation in Canada
90
85
80
75
70
65
Mar-87
Nov-87
Jul-88
Mar-89
Nov-89
Jul-90
Mar-91
Nov-91
Jul-92
Mar-93
Nov-93
Jul-94
Mar-95
Nov-95
Jul-96
Mar-97
Nov-97
Jul-98
Mar-99
Nov-99
Jul-00
Mar-01
Nov-01
Jul-02
Mar-03
Nov-03
Jul-04
Mar-05
Nov-05
Jul-06
Mar-07
Nov-07
Jul-08
Mar-09
Nov-09
Jul-10
Mar-11
Nov-11
Jul-12
Mar-13
Nov-13
Jul-14
Mar-15
Nov-15
Jul-16
Mar-17
Nov-17
Industrial
Manufacturing

SCHEDULE 9

SCHEDULE 10

Chart 8: Both capacity pressures and labour shortages have intensified

Balances of opinion,* quarterly data



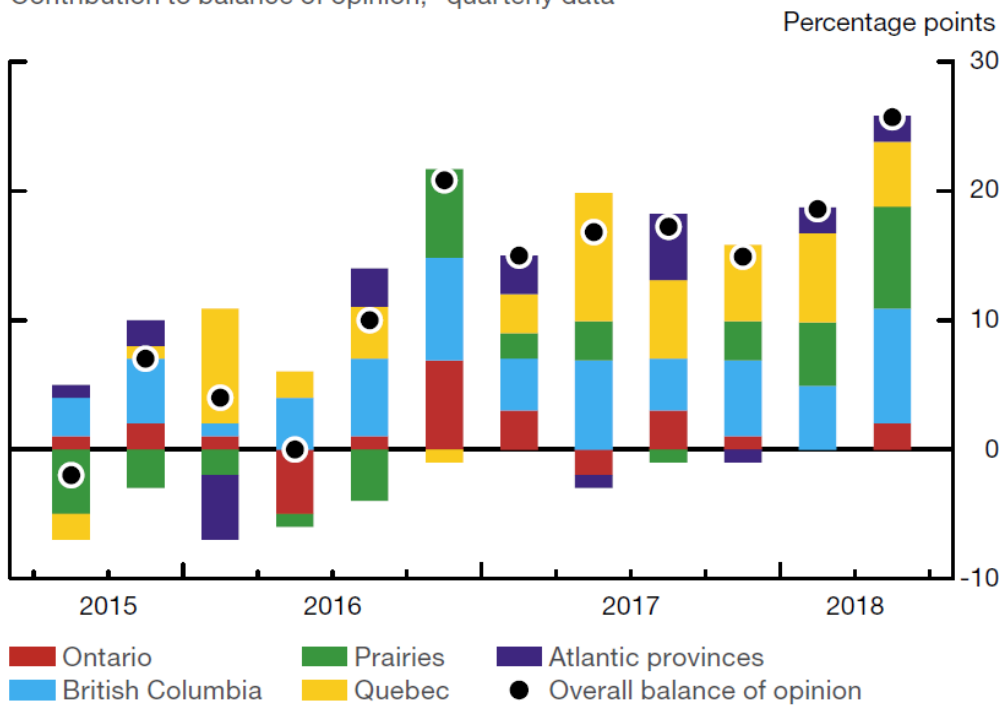
* Percentage of firms responding to the *Business Outlook Survey* reporting more intense capacity pressures (or labour shortages) compared with 12 months ago minus the percentage of firms reporting less intense capacity pressures (or labour shortages)

Source: Bank of Canada

Last observation: 2018Q2

Chart 10: Firms in all regions expect capacity pressures to intensify

Contribution to balance of opinion,* quarterly data

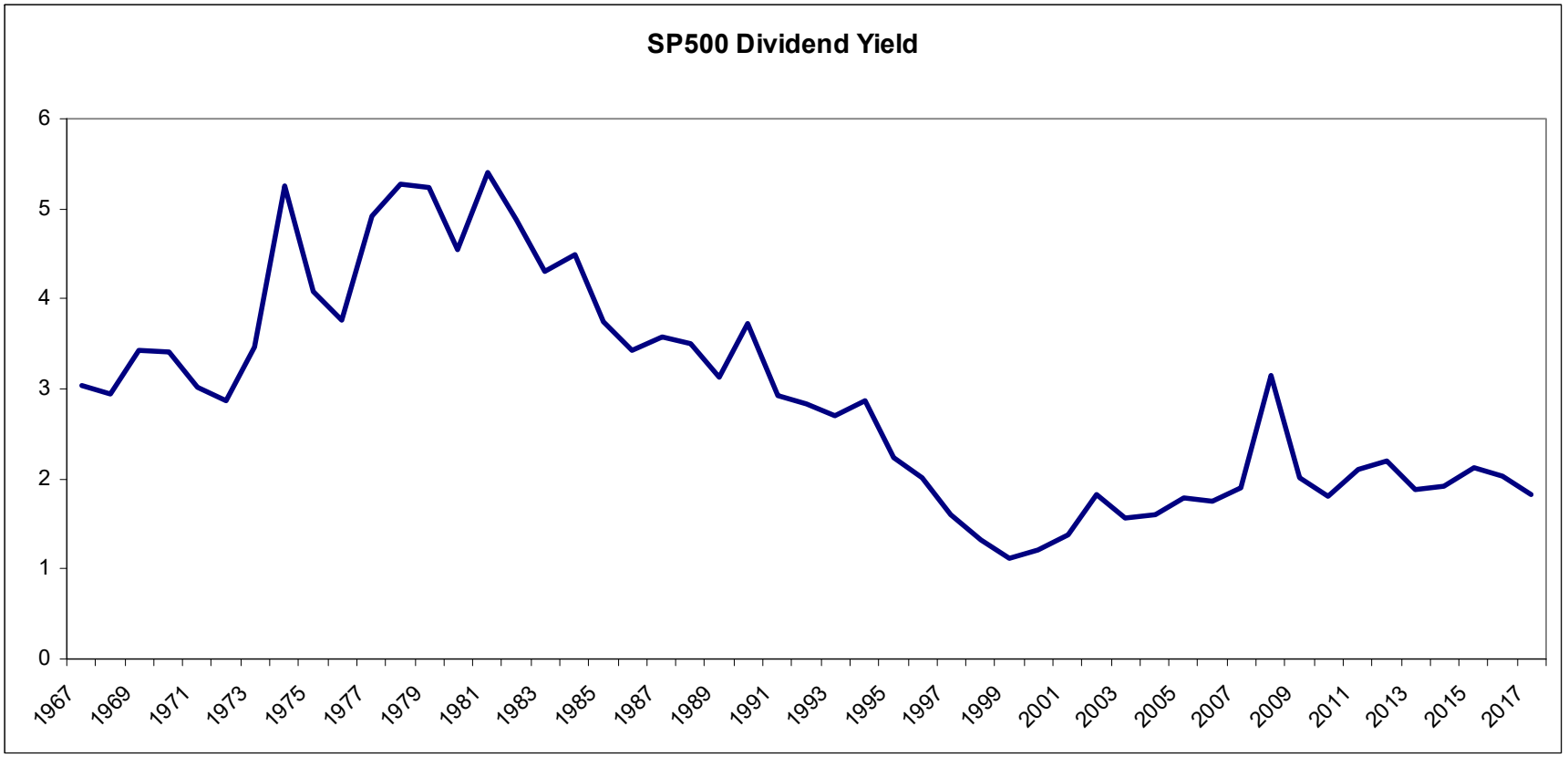


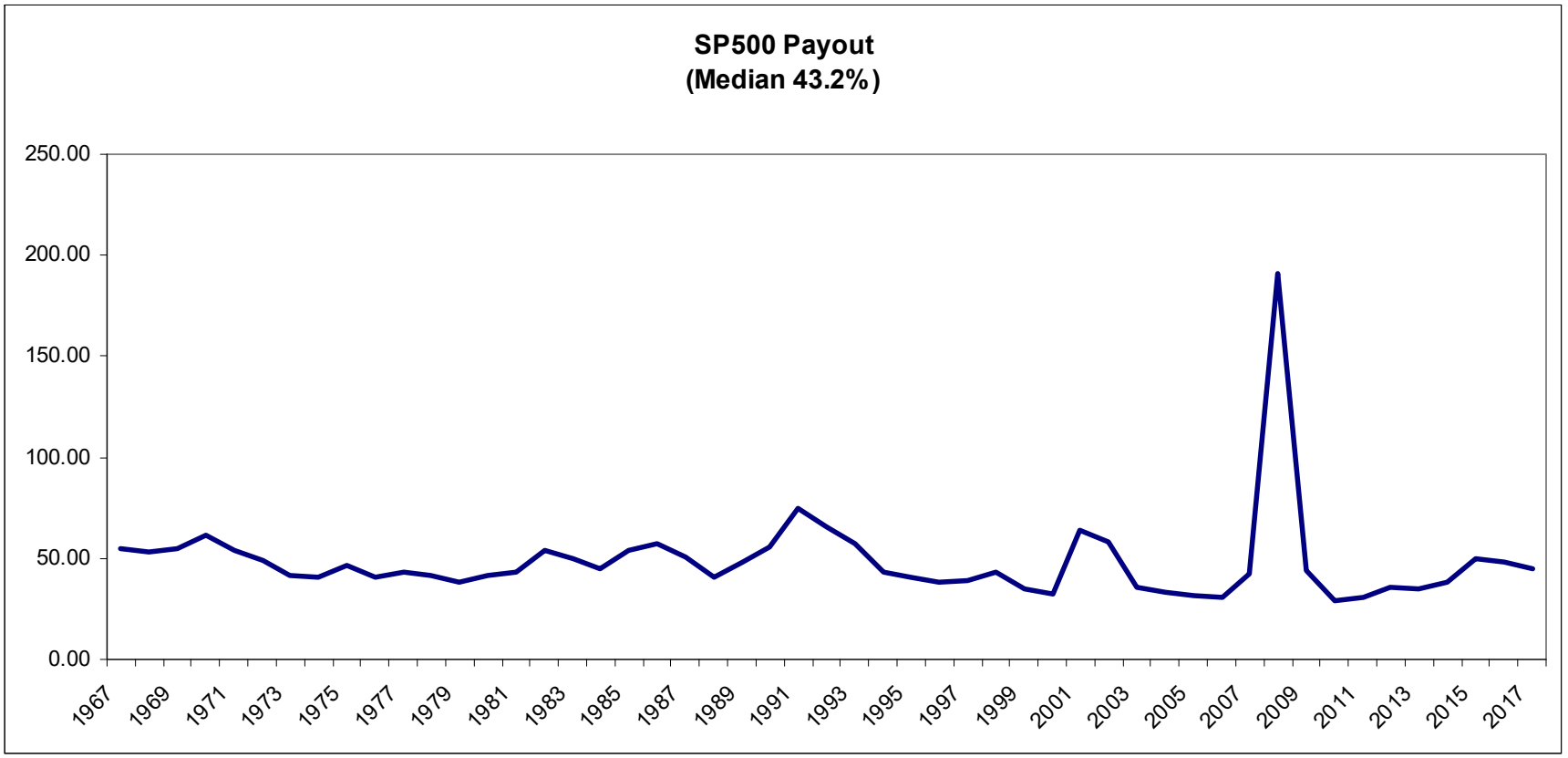
* Percentage of firms responding to the *Business Outlook Survey* expecting more intense capacity pressures over the next 12 months minus the percentage of firms expecting less intense capacity pressures

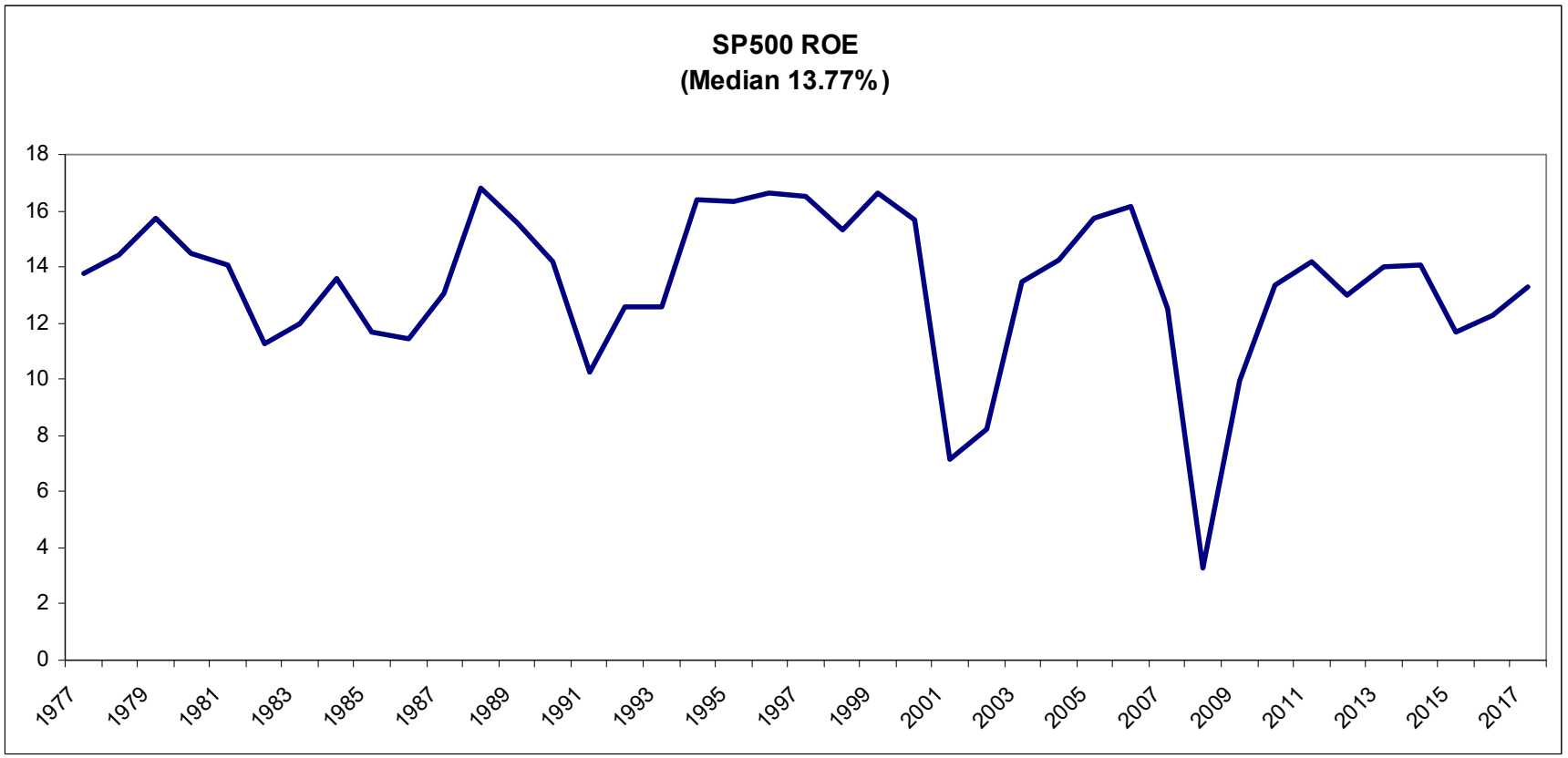
Source: Bank of Canada

Last observation: 2018Q2

SCHEDULE 12


SP500 Dividend Yield
6
5
4
3
2
1
0
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


SP500 Payout
(Median 43.2%)
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

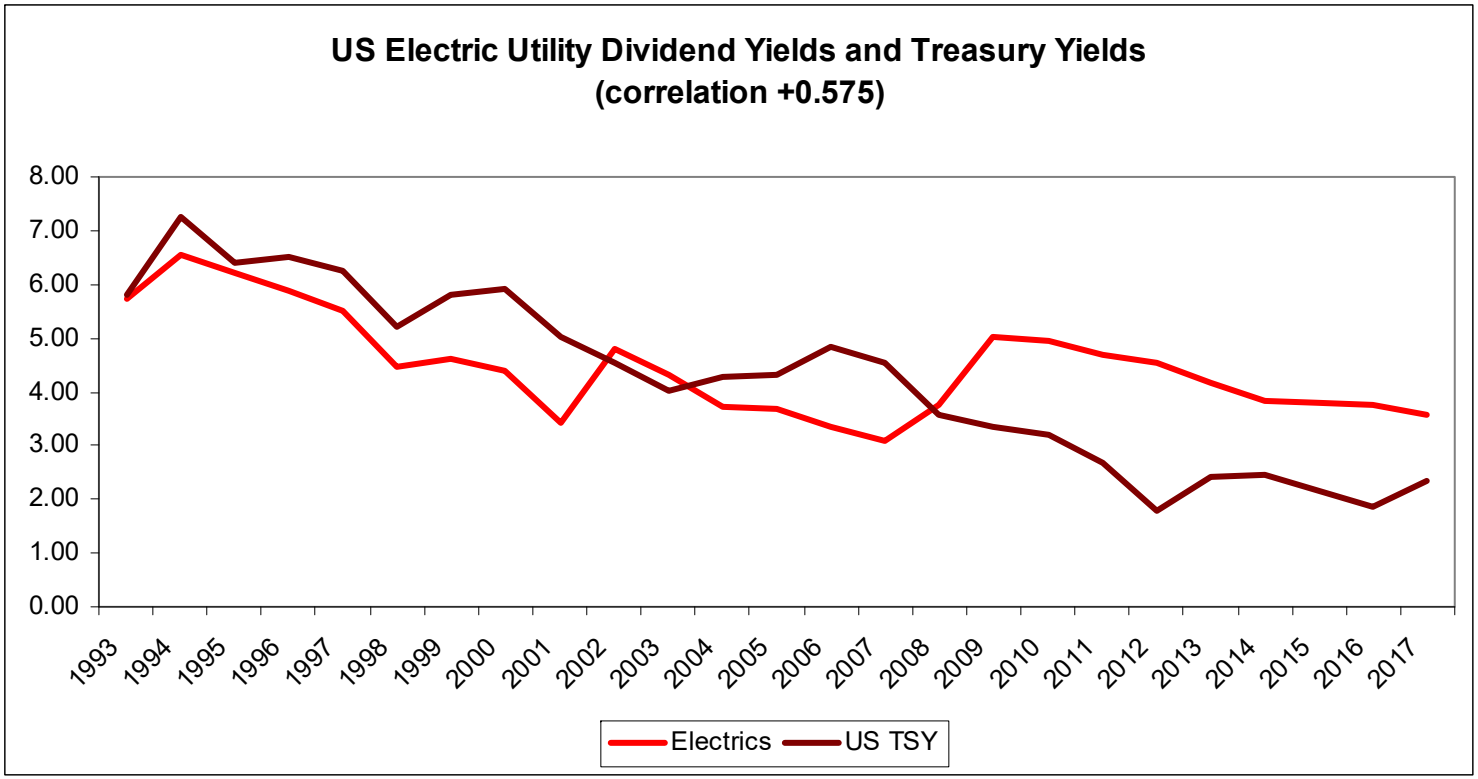

SP500 ROE
(Median 13.77%)
18
16
14
12
10
8
6
4
2
0
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017

SCHEDULE 15

S&P Electric UHC Data

	EPS	DPS	PAYOUT	RETAIN	ROE	g (B*ROE)	YIELD	US TSY	K	MB	URP	URP2	URP3
1993	7.95	7.11	89.43	10.57	11.25	1.19	5.73	5.80	6.99	1.59	1.18	1.15	2.94
1994	8.45	7.05	83.43	16.57	11.71	1.94	6.55	7.25	8.62	1.37	1.37	1.24	2.35
1995	9.23	6.97	75.51	24.49	12.36	3.03	6.23	6.40	9.45	1.39	3.04	2.68	2.86
1996	9.07	6.96	76.74	23.26	11.64	2.71	5.86	6.52	8.73	1.43	2.21	2.04	2.37
1997	7.63	6.64	87.02	12.98	10.16	1.32	5.49	6.27	6.88	1.49	0.62	0.73	2.24
1998	8.52	6.5	76.20	23.80	11.05	2.63	4.45	5.20	7.19	1.82	2.00	1.98	2.23
1999	9.31	6.24	67.02	32.98	12.36	4.08	4.60	5.80	8.87	1.69	3.07	2.59	1.79
2000	6.06	6.36	104.95	-4.95	7.04	-0.35	4.40	5.90	4.04	1.80	-1.87	-2.07	1.48
2001	10.58	5.42	51.23	48.77	13.63	6.65	3.41	5.01	10.28	1.88	5.27	3.93	1.35
2002	7.31	5.93	81.12	18.88	10.18	1.92	4.82	4.53	6.83	1.63	2.30	2.46	3.28
2003	8.44	5.29	62.68	37.32	10.61	3.96	4.31	4.02	8.44	1.51	4.42	4.56	3.27
2004	11.12	5.77	51.89	48.11	12.37	5.95	3.74	4.28	9.91	1.68	5.63	4.93	2.42
2005	10.22	6.85	67.03	32.97	11.86	3.91	3.69	4.31	7.75	2.04	3.44	3.14	2.35
2006	12.35	6.99	56.60	43.40	12.68	5.50	3.37	4.82	9.06	2.13	4.24	3.46	1.50
2007	14.82	7.85	52.97	47.03	12.81	6.02	3.09	4.54	9.30	2.20	4.76	3.86	1.49
2008	15.27	8.57	56.12	43.88	12.83	5.63	3.75	3.57	9.59	1.92	6.03	5.18	3.15
2009	13.37	8.8	65.82	34.18	10.53	3.60	5.01	3.36	8.79	1.38	5.44	5.59	4.65
2010	14.56	9.06	62.23	37.77	10.96	4.14	4.96	3.19	9.30	1.38	6.12	6.12	4.76
2011	13.94	9.49	68.08	31.92	10.1	3.22	4.70	2.67	8.07	1.47	5.40	5.69	5.02
2012	12.46	9.78	78.49	21.51	8.38	1.80	4.53	1.80	6.41	1.45	4.62	5.20	5.72
2013	11.52	9.52	82.64	17.36	7.47	1.30	4.18	2.43	5.54	1.48	3.11	3.74	4.73
2014	12.67	9.43	74.43	25.57	8.04	2.06	3.82	2.46	5.95	1.57	3.49	4.27	4.32
2015	14.1	9.8	69.50	30.50	8.85	2.70	3.81	2.15	6.61	1.61	4.46	5.13	4.62
2016	7.56	10.32	136.51	-36.51	4.8	-1.75	3.77	1.87	1.95	1.74	0.08	-2.26	4.86
2017	14.29	10.57	73.97	26.03	8.8	2.29	3.57	2.34	5.94	1.82	3.60	4.18	4.18
average			**74.06**	**25.94**	**10.50**	**3.02**	**4.47**	**4.26**	**7.62**	**1.66**	**3.36**	**3.18**	**3.20**
Median			**73.97**	**26.03**	**10.96**	**2.71**	**4.40**	**4.31**	**8.07**	**1.61**	**3.49**	**3.74**	**2.94**

URP assumes actual br growth, URP2 assumes that the expected ROE is the median value and URP3 also assumes a median retention rate. Source data is Standard & Poors Analyst's Handbook 2018.


US Electric Utility Dividend Yields and Treasury Yields
(correlation +0.575)
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
Electrics
US TSY

US Electric's Financial Data

	5 year Growth Past	Future	# Analysts	Yield	K (Est g)	ROE	Retention	SUST G	K	MB	DPS	EPS	Beta
Duke Energy	-0.14	4.13	7	4.54	***8.86***	6.66	0.06	0.41	***4.97***	1.37	3.71	3.953	-0.08
Allete Inc.,	5.76	6	1	2.95	***9.13***	8.17	0.32	2.61	***5.63***	1.87	2.24	3.29	-0.13
Eversource	5.98	5.8	6	3.18	***9.16***	9.06	0.36	3.30	***6.59***	1.78	2.02	3.18	0.07
OGE Energy	-3.54	4.7	1	3.56	***8.43***	17.44	0.59	10.24	***14.16***	1.91	1.33	3.22	0.71
Pinnacle West	-6.96	3.72	4	3.46	***8.90***	9.6	0.33	3.18	***6.75***	1.8	2.78	4.16	-0.12
Evergy	-1.19	9.2	4	3.19	***12.68***	4.94	0.21	1.04	***4.26***	1.43	1.84	2.33	0.19
Alliant	3.69	5.75	2	3.06	***8.99***	11	0.36	3.95	***7.13***	2.35	1.34	2.09	-0.07
American Electric	2.82	5.59	5	3.42	***9.20***	10.61	0.37	3.88	***7.43***	1.9	2.48	3.91	-0.14
Edison International	-0.13	3.44	5	3.54	***7.10***	2.68	-0.91	-2.43	***1.03***	1.88	2.42	1.27	-0.25
PNM	3.26	4.45	3	2.67	***7.24***	4.91	-0.17	-0.82	***1.83***	1.87	1.06	0.909	-0.17
Southern	0.98	2.1	8	5.47	***7.68***	9.14	-0.04	-0.36	***5.09***	1.91	2.4	2.31	-0.15
Average	0.96	4.99	4.18	3.55	***8.85***	8.56	0.14	2.27	***5.90***	1.82			-0.01
Median	0.98	4.70	4.00	3.42	***8.90***	9.06	0.32	2.61	***5.63***	1.87			-0.12

All data from Capital IQ as reported by Yahooo Finance

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.

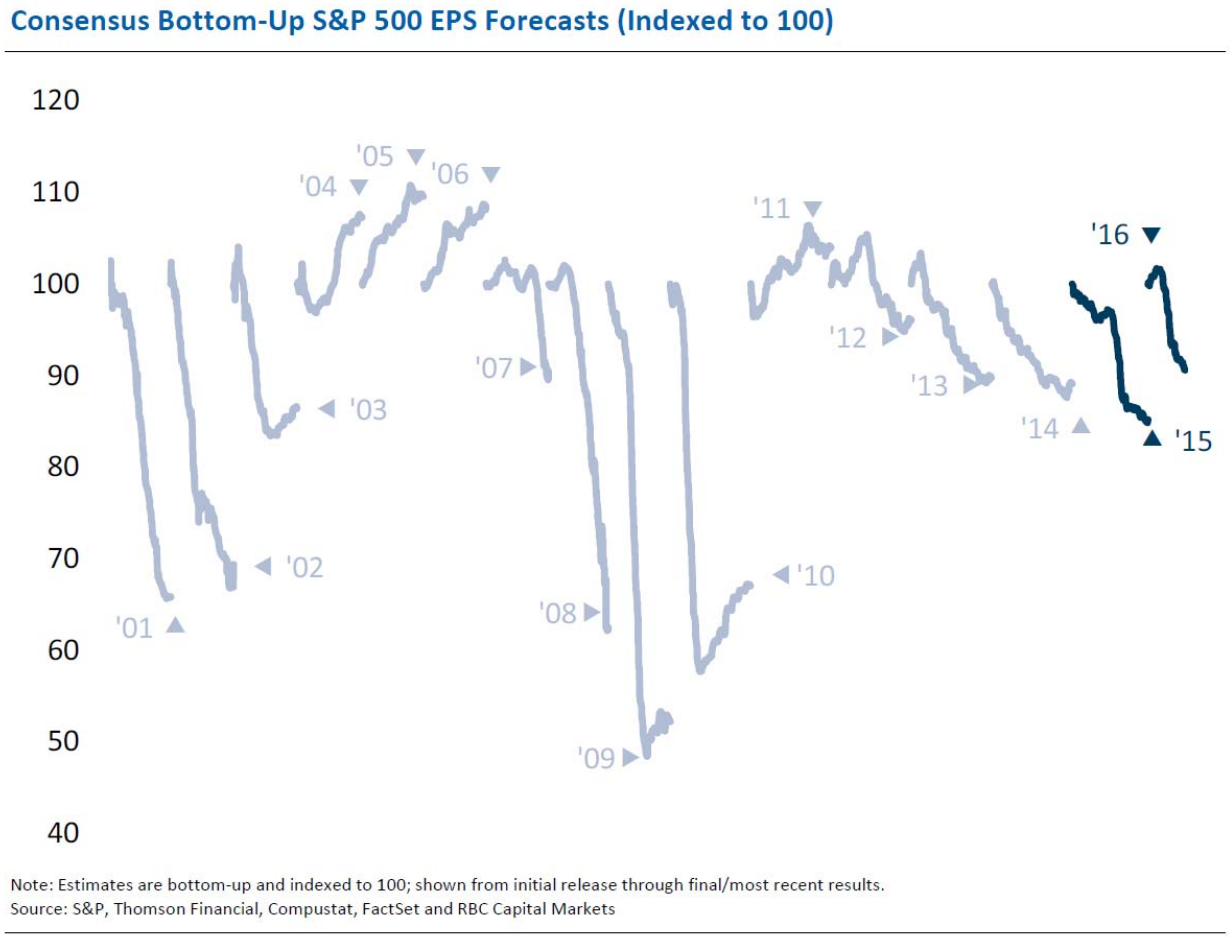
Broken-clock accuracy Looking at five-year rolling average growth estimates, there have only been two periods in the past 25 years when the earnings met or exceeded analysts' forecasts. Both were in recovery periods after the U.S. recessions of the early 1990s and the early 2000s.

"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 sort 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."

SCHEDULE 19



Source: RBC Investment Strategy Playbook, February 2016

S&P500 Growth rates versus Nominal GDP

	GDP	EPS	DPS
1			
2	8.18	8.07	5.14
3	5.47	0.35	2.93
4	8.53	-11.25	-0.63
5	9.81	11.11	-2.23
6	11.43	12.63	2.61
7	8.41	27.10	7.30
8	9.04	8.95	6.51
9	11.19	-10.46	2.22
10	11.12	24.50	10.05
11	12.96	9.89	15.31
12	11.73	13.22	8.57
13	8.75	20.52	11.44
14	12.24	-0.27	9.03
15	4.26	3.64	7.63
16	8.68	-17.71	3.62
17	11.11	11.00	1.75
18	7.46	18.60	7.73
19	5.55	-12.20	4.91
20	6.02	-0.89	4.81
21	7.85	20.86	6.40
22	7.74	35.71	10.44
23	5.70	-3.71	13.57
24	3.27	-4.98	9.41
25	5.88	-25.03	0.91
26	5.19	15.78	1.48
27	6.25	16.07	1.62
28	4.84	39.79	4.77
29	5.67	10.98	4.63
30	6.25	14.05	8.05
31	5.66	2.56	3.96
32	6.27	-5.06	4.58
33	6.46	27.74	3.02
34	3.21	3.80	-2.52
35	3.35	-50.60	-3.26
36	4.77	11.70	2.16
37	6.59	76.62	8.15
38	6.74	20.15	11.73
39	5.97	19.44	14.36
40	4.61	16.56	12.02
41	1.81	-18.82	12.01
42	-1.79	-77.51	1.83
43	3.76	242.54	-21.06
44	3.67	51.76	1.43
45	4.21	12.40	16.23
46	3.63	-0.49	18.24
47	4.39	15.82	12.00
48	3.98	2.11	12.72
49	2.68	-15.43	10.02
50	4.16	9.27	5.32
51	4.32	16.22	7.07

Growth Rates

	GDP	EPS	DPS
Arithmetic	6.38%	11.94%	6.00%
Median	5.92%	10.99%	5.86%
Compound	6.40%	6.11%	5.68%
OLS	6.32%	6.32%	5.68%
Volatility	3.00%	40.56%	6.36%