Determining the Manitoba Public Insurance Rate Stabilization Reserve

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Terms of Retainer

CAC Manitoba, through the Public Interest Law Centre, has retained my services to provide expert analysis regarding the Manitoba Public Insurance 2015 Rate Application. In particular, I have been asked to provide expert analysis on issues associated with risk management and the appropriate range or target for MPI's Rate Stabilization Reserve.

Qualifications

I have a PhD from the London School of Economics (1977) and am a Full Professor in the Department of Economics at the University of Manitoba, where I have taught since 1979. My areas of academic expertise include labour economics, applied econometrics, applied microeconomics, and economic and social policy analysis. I have authored or co-authored three books and more than fifty peer-reviewed articles on these and related topics, including two papers on the impact of risk on the behaviour of the firm. I am currently on the editorial board of *Canadian Public Policy*, Canada's foremost peer-reviewed academic journal for economic and social policy, and the executive council of the Canadian Economics Association. I was a 2014 recipient of the McCracken award for the development and analysis of economic statistics from the Canadian Economics Association.

In addition to my academic career, I have worked at the Bank of Canada, the federal Department of Labour, and the Economic Council of Canada. I have also served as a consultant to the private sector and government, primarily in the areas of labour economics and policy evaluation. In recent years, I have served as an expert advisor to Prairie Research Associates (PRA) Inc. and Human Resources and Skill Development Canada as well as to CAC Manitoba through the Public Interest Law Centre. I have provided expert opinion to the Public Utilities Board on behalf of CAC Manitoba at the 2007 Hearing to Cap Payday Loan Fees, at the 2007, 2010 and 2013 Manitoba Public Insurance Rate Applications on the Rate Stabilization Reserve and investment strategy, and at the 2014 Needs for and Alternatives to Review of Manitoba Hydro's Preferred Development Plan.

My professional expertise in applied microeconomics and applied econometrics[1] provides a foundation for the analysis of issues related to the management of risk by firms and to the assessment of risk using modern economic and statistical techniques. My expertise also provides a framework to assess the contributions of equities, bonds and interest rates to investment risk.

1 Applied microeconomics is the study of the behavior of individual agents (e.g., firms and households) in the market using modern theory and empirical methods. It seeks to apply the analysis to practical problems such as risk management and investment strategies. Applied econometrics uses specific statistical techniques, particularly regression methods, to analyze and predict economic behavior and apply it to practical social problems.

1. Purpose of the Rate Stabilization Reserve

The purpose of the RSR does not appear to be in contention. The most recent Board Order 151/13 in this regard reinforces statements in earlier Orders:

> "The stated purpose of the Rate Stabilization Reserve (RSR) is to protect motorists from rate increases made necessary by unexpected events and losses arising from nonrecurring events or factors" (p.33).

The MPI 2015 Rate Application concurs:

> "The purpose of the Rate Stabilization Reserve (RSR) is to protect motorists from rate increases made necessary by unexpected events and losses arising from nonrecurring events or factors" (Vol.II, Rate Stabilization Reserve, 3)

This statement of purpose is vague, however, on how to establish and maintain a RSR that will achieve this objective.

2. Determination of the RSR to Date

In 1988, the Kopstein Report on Auto Insurance in Manitoba recommended a simple strategy for determination of the RSR. The Report recommended that the RSR should be set in a range of 10-20% of annual premiums. There is a fairly straightforward logic to this approach, since growth in the RSR range is indexed to growth in annual premiums that reflect growth in the business. An important feature of the Kopstein recommendation was that the RSR should not be a specific target but that the RSR should fall within a range. That is, if the RSR were to fall below 10% of annual premiums, then this would trigger a strategy to rebuild the RSR which, in the absence of an anticipated rebound in retained earnings, could involve a rate premium. And if the RSR were to rise above 20% of annual premiums, then this would trigger a strategy to reduce the RSR which, in the absence of an anticipated decline in retained earnings, could involve a rate rebate.

This Kopstein approach to establishing the RSR has been adopted at a succession of rate hearings. Its appeal appears to be its simplicity, transparency and stability, since the RSR will grow in a stable fashion with growth in premiums. It is more difficult to argue, however, that this mechanical approach to establishing the RSR captures the risks facing MPI. For this reason, it is reasonable to argue that an alternative approach to establishing the RSR might be superior, and a succession of methodologies to set the RSR have been proposed by MPI to replace the Kopstein approach: the Risk Analysis Approach (RAA, now known as the Operational and Investment Risk Analysis or RA/VaR) introduced by MPI in the 2000 GRA, the Minimum Capital Adequacy Test (MCT) introduced by MPI in the 2005 GRA, and the Dynamic Capital Adequacy Test (DCAT) introduced by MPI in the 2010 GRA (MPI 2013 Rate Application, Vol.III, AI.3). The 2015 Rate Application has again promoted the use of the DCAT to establish an RSR target and replace the existing methodology for establishing a range for the RSR:

> "The Corporation is proposing a minimum RSR target of $194 million as of February 28, 2014 based on the results of the 2014 Dynamic Capital Adequacy Test (DCAT). As shown in Volume II Pro Formas, the 2013/14 RSR balance of $100 million is significantly less than the Corporation's proposed DCAT-based minimum RSR target. Over the outlook period, the 2014/15 and 2015/16 projected RSR balances, of $62 million and $55 million respectively, are below both the DCAT-based minimum ($194 million) and the PUB-based minimum RSR targets in those years ($83 million and $89 million respectively). As a result of these actual and forecasted financial results, the Corporation has requested a 1.0% RSR Rebuilding Fee on the 2015/16 rates, with the additional fee assumed to remain in place over the forecast period. The Corporation intends to reassess the required RSR Rebuilding Fee at each GRA submission" (MPI 2015 Rate Application, Vol.II, Rate Stabilization Reserve, 5-6)

The "PUB-based minimum RSR targets" to which MPI refers are those established by the Kopstein approach, i.e. 10% of annual premiums.

3. Issues in the Determination of the RSR

The potential attraction of the DCAT as a replacement for, or a supplement to, the Kopstein approach is its explicit connection of the determination of the RSR to the risks faced by MPI. The DCAT uses a blend of evidence and judgment to identify and quantify the risks faced by the Corporation in the form of a series of adverse scenarios. It then simulates how these adverse scenarios would impact retained earnings to establish a RSR target that will mitigate these financial risks. In my previous report for the 2013 rate application, I argued that the DCAT analysis, while promising, should not replace the Kopstein approach:

> "The report recommends that the DCAT/MCT analysis, as it evolves and improves, should be an important, but not the sole indicator of the target RSR. The report does not find a compelling case to alter the current practice of using the Percentage of Premium (Kopstein), RA/VaR (RAA), and DCAT/MCT calculations to inform the Board on the target RSR and does not recommend a change in practice. While the Percentage of Premium (Kopstein) methodology is unrelated to the risks faced by MPI, it has the advantage of being "the incumbent" method of calculating the target RSR that is easily understood by the public, while the RA/VaR and DCAT/MCT methodologies address the risks faced by MPI and offer alternative useful tools to assess the size of the RSR, particularly when important new risks emerge." ("Manitoba Public Insurance Rate Risk Management and the Rate Stabilization Reserve," 2013, p.18)

While the DCAT addresses risk explicitly, I expressed concerns about the transparency of the DCAT model and the evidence used to develop its adverse scenarios. In particular, I concentrated on the "decline in equities" adverse scenario that was justified by adverse equity

returns from the TSX grounded in the depression of the 1930s and argued that such scenarios were less likely to occur under modern economic stabilization policies, such as those employed in the most recent sharp recession. Since those rate hearings, MPI has conducted a DCAT technical conference and revised its DCAT model in response to Board Orders 151/13 and 157/12. In addition, I would note that the current DCAT analysis develops a decline in equities scenario using only equity returns on the TSX from 1955 to the present, as I recommended in my 2013 report.

Although progress has been made, there are still problems with the DCAT analysis and its implications for the proposed RSR. In this report I will focus on two issues: (1) the issue of a target RSR as opposed to a range and (2) the issue of the manner in which the DCAT scenarios are constructed.

4. Issue 1: RSR Target or Range?

Although discussion may focus on the size of the RSR, it is important to remember that the current approach establishes a range for the RSR, which I would interpret as a range outside which action should be considered to restore the RSR to its range. RSR outcomes within the range would not be of concern. For 2014/15 this range is projected to be a minimum of $83 million and a maximum of $166 million, or [$83M, $166M], based on annual premiums. The MPI rate application recommends a "target" or "target minimum" for the RSR of $194 million based on the results of the 2014 DCAT. Although the DCAT report refers to a "target minimum" there is no discussion of a corresponding target maximum in that document. In a brief accompanying document, the Minimum Capital Test at 100% is determined to be $325 million, which "the Corporation is willing to accept . . . as the upper level for the RSR" (MPI 2015 Rate Application, Vol.II, Rate Stabilization Reserve, MCT, 1). Since this issue is peripheral to the DCAT report, I focus on the RSR target established in the report before returning to the question of the role of the MCT in establishing bounds for the RSR.

The focus of the DCAT report on a target is not inconsequential if we are considering a fund whose purpose is rate stabilization. Consider three simple examples. In the first case, a RSR target of $200 million is established and rates are adjusted to achieve this target each year. In the second case, there is no RSR and rates are adjusted to offset any losses or rebate any gains. In the third case, a range for the RSR of $100 million to $300 million is established and rates are only adjusted to keep the RSR within this range.

As losses or gains arise from "nonrecurring events or factors," rates are adjusted identically in the first two cases to achieve targets of $200 million and $0, respectively. In each case, there is no tolerance for deviation from the target lasting more than the following year. No rate stabilization is achieved in the sense that rates are just as volatile in the first case with the RSR target set at $200 million as in the second case with no RSR. There is no motorist protection in the RSR for "rate increases made necessary by unexpected events and losses arising from nonrecurring events or factors." The only difference in the two cases is that motorists must pay higher rates initially to establish the RSR of $200 million in the first case and have less money for personal consumption and investment decisions, which seems like a poor arrangement for both motorists and the economy.

Now compare the first case of a RSR target of $200 million with a third case of a range for the RSR of $100 million to $300 million. With a range, there is true rate stabilization, since

rates are not adjusted as long as the RSR falls within the range. Suppose that the impact of a nonrecurring event leaves the RSR in the range of $100 million to $200 million at year end. Then, unlike the first case with a target of $200 million, no rate premiums are required to restock the RSR. Similarly, suppose that the impact of a nonrecurring event leaves the RSR in the range of $200 million to $300 million. Again, unlike the first case with a target of $200 million which has now been exceeded, there is no need to pay rebates to motorists. Rate increases and rebates occur under a more restricted and therefore less likely set of circumstances with a RSR range to achieve a substantial degree of rate stabilization compared to the case of a RSR target. Thus, the objective of establishing a range for the RSR rather than a target seems more appropriate to any goal of avoiding rate increases to offset unexpected events and losses arising from the sort of nonrecurring events or factors discussed in the DCAT report. Indeed, an RSR target, strictly applied, seems antithetical to the goal of rate stabilization and no better than no RSR at all.

The key qualifier here is "strictly applied," since we have assumed that rates are adjusted to achieve the RSR target each year. In reality, only some portion of the projected shortfall of retained earnings from the RSR target might be claimed each year as is suggested in the DCAT report, where an RSR rebuilding fee of 1% is proposed for four years starting in 2015/16 to correct the shortfalls in the RSR relative to its target level in 2013/14. The principle is the same, however, in that the proposed RSR rebuilding premium arises in response to retained earnings relative to the RSR target in the previous year, generating instability in rates of the sort the RSR is designed to avoid, albeit on a smaller scale that if a rebuilding fee of 4% were proposed in 2015/16.

In 2013/14 the range established by the percentage of premiums (Kopstein) method is [$81M, 162M]. Losses in 2012/13 and 2013/14 of $63M and $69M, respectively, leave a retained earnings balance in the RSR of $100M, above the minimum of the target range. It should be noted that the losses in 2013/14 are largely the result of a nonrecurring and unexpected event associated with the harsh winter and road conditions. In other words, the "high claims" adverse scenario characterized in the 2013 DCAT report came to pass. In response to my first round interrogatory CAC (MPI) 1-161, MPI characterized the claims loss in 2013/14 as a 1-in-20 year event:

> Question: "In view of the fact that the winter weather of 2013-14 was the worst (coldest) on record in a century, how does the claims loss compare to historical claims losses in terms of the high-loss scenario, i.e. is it a 1-in-100 year for claims losses?
>
> Response: "Per page 36 of Volume II Claims Incurred, section CI.4, ultimate collision costs in 2013/14 are estimated to be $31.6 million (or +10.0%) over budget. Per the stochastic modeling results in the DCAT report (pages 74 and 75); the Corporation's modeling predicts that the 95th percentile of ultimate collision claims in a given year is approximately 10.6% higher than the 50th percentile. Therefore, the Corporation estimates that the observed collision experience would occur about 1 in every 20 years, or 5% of the time." (CAC (MPI) 1-161 (c)).

Despite the occurrence of this high-claims adverse event, however, retained earnings remain $19M above the RSR minimum established by the PUB, suggesting that no rate premium should be applied to rebuild the RSR.

This situation serves as an example of the superior rate stabilization features of a RSR range compared to a target. Suppose that the RSR target were the midpoint of the current RSR range of [$81M, $162M], or $122M. If this RSR target replaced the RSR range, then the prescription might be different. The current retained earnings of $100M would now lie below the RSR target by $22M, motivating a RSR rebuilding premium that would not arise under the established RSR range.

This discussion ignores projected future retained earnings. The DCAT base scenario with the 0.9% rate increase approved by the PUB forecasts that retained earnings will fall to $62M in 2014/15, below the established RSR minimum of $81M and the projected minimum of $83M in 2014/15. The base scenario assumes the 2.4% rate increase requested in this rate hearing and a 1% RSR rebuilding fee will still result in a further decline in retained earnings to $51M in 2015/16 and that retained earnings will remain below the RSR minimum through 2018/19 in spite of additional RSR rebuilding premiums of 1% in each of 2016/17, 2017/18, and 2018/19. Thus, RSR rebuilding might be justified on the basis of the projections contained in the base scenario if not the realized financial position in 2013/14. We therefore turn in the next section to issues arising from the development of the scenarios in the DCAT report.

Before turning to the development of the scenarios, there is the peripheral question of establishing an RSR maximum based on a 100% Minimum Capital Test (MCT) that only appears in the short accompanying document to the DCAT report. This document appears to grant that a RSR range is appropriate rather than a target, as I have argued. The question, then, is whether the MCT provides an appropriate basis to determine all or part of that range.

The MCT was proposed as a basis for the establishment of the RSR in the 2005 GRA and the issues surrounding its use as a basis for the determination of the RSR have been summarized in my previous report to the PUB:

> "[T]he MCT provided only indirect evidence regarding the RSR but, more importantly, . . . the MCT was designed to assess the capital required for a private company in a competitive industry to forestall insolvency. It was therefore questionable whether the test was applicable to a public crown corporation with a monopoly over basic insurance. First, the competitive sanctions associated with setting the product price (vehicle insurance premiums), in the form of lost market share, simply do not exist or are very weak because vehicle owners in Manitoba must have basic insurance and must purchase it from MPI. Second, as a crown corporation, MPI is protected from insolvency by the government, financed by the same taxpayers who purchase vehicle insurance.
>
> MPI appeared to concede that it is in a different category from private companies in competitive industries in arguing that a target MCT of 50%, rather than 100%, is appropriate for a crown corporation, but this percentage is arbitrary and unsubstantiated by

> evidence or clear argument. Although MPI has since shifted its choice of methodology to establish the RSR target from the MCT to the Dynamic Capital Adequacy Test (DCAT), the same argument may still apply, since the DCAT analysis is usually directed to the adequacy of total retained earnings to achieve some specified MCT ratio. In other words, is an instrument designed to manage the risk of insolvency in competitive industries in the private sector (like the MCT and/or DCAT) appropriate for the design of an RSR target to protect consumers of a crown corporation from the risk of excessive price increases? MPI refers to the MCT as an "indicative analysis tool" to assess the financial position or capital adequacy of an insurance enterprise, but do the market conditions in which the enterprise operates matter to the application of the tool?" ("Manitoba Public Insurance Rate Risk Management and the Rate Stabilization Reserve," 2013, pp.3-4)

The issues associated with the usefulness of the MCT in the context of monopoly crown corporation have not been resolved. Consequently, any target for the MCT, whether 100% or 50% or some other number, remains arbitrary and particularly so in the context of the assessment of risks facing MPI and an appropriate target or range for the RSR. I cannot see how a 100% MCT can provide a reasonable basis to establish a maximum for the RSR in conjunction with a minimum target determined by the DCAT analysis.

5. Issue 2: Scenarios in the DCAT Report

5.1 The Base Scenario

The base scenario is expected to be established on "a realistic set of assumptions used to forecast the insurer's financial position over the forecast period . . . [and normally] consistent with the insurer's business plan" (MPI 2015 Rate Application, Vol.II, Rate Stabilization Reserve, 21). Providing assumptions about volume growth, vehicle upgrades, inflation, interest rates and investment returns, and changes in premium deficiency and write-down of deferred policy acquisition costs, the DCAT report forecasts retained earnings will fall from $100 million in 2013/14 to $71 million in 2014/15. This decline in earnings can be understood in the context of the PUB approved vehicle premium increase of 0.9% for 2014/15, since this premium increase falls short of the consensus inflation forecast of 1.7% for Manitoba and 1.5% for Canada in 2014/15. Although MPI's operational costs may differ somewhat from changes to the all-items Consumer Price Index, it is reasonable to expect that the rate inflation of costs at MPI could exceed the rate of premium increase such that retained earnings will decline.

From this perspective, however, it is less clear why retained earnings only rebound to $85 million in 2015/16. The base scenario incorporates the following rate change assumptions (MPI 2015 Rate Application, Vol.II, Rate Stabilization Reserve, 22):

Policy Year	Rate Change	RSR Rebuilding Fee
2014/15	0.9% (PUB Approved)	0.0%
2015/16	2.4% (Proposed)	1.0% (Proposed)
2016/17	0.0% (Assumed)	1.0% (Assumed)
2017/18	0.0% (Assumed)	1.0% (Assumed)
2018/19	0.0% (Assumed)	1.0% (Assumed)

The proposed 3.4% rate increase in 2015/16, which includes a 1% RSR rebuilding fee, is proposed to take effect while inflation is assumed to be only 2%. Put in real (net of inflation) terms, if the real rate increase for 2014/15 is -0.8% and retained earnings fall by $29 million, it is not entirely clear why retained earnings only rebound by $14 million when the real rate increase is +1.4% for 2015/16.

Rising costs likely account for the relatively slow rebound in retained earnings despite the proposed 3.4% increase in rates in 2015/16, and the validity of the argument underlying these rising costs should be assessed. I would note, for example, the following third round interrogatory PUB(MPI) 3-10 on the claims forecast for the base scenario:

> "Question: Please explain the factors that have led the Corporation to forecast an increasing annual number of claims for 2014 through 2018 compared to the flat forecast at last year's GRA.
>
> Response: For the claims counts referenced in PUB (MPI) 1-55 (c), the forecast was generated based on the five-year average growth rates for (i) overall claims less (ii) Extension and SRE only claims. In this year's forecast the five year average growth rate was 1.81% for overall claims and 1.22% for Extension and SRE only claims. However, in last year's forecast the five year average growth rate was 0.16% for overall claims and 1.35% for Extension and SRE only claims. The assumed 0.16% overall growth rate resulted in the flat forecast. The reason that the five year average was so low in last year's forecast is because of the -10.12% decrease in overall claims that occurred in the 2008/09 year, which is no longer part of the five year average in this year's forecast. The Corporation will review this methodology prior to the next year's GRA."

I would encourage MPI to develop a more sophisticated analysis of the time pattern of claims using standard time series techniques. It is unclear why a five-year moving average has been used, which leads to the instability in the claims forecast for the base scenario and contributes to the disappointing retained earnings forecast in the base scenario. A proper time series analysis would establish the trend growth in claims for the base scenario by allowing the data to determine the appropriate length for the moving average process that underlies the data and, if appropriate, by adding an autoregressive component to improve forecast accuracy.[2]

2 An autoregressive component explains current claims on the basis of past claims and would be in addition to the moving average component in a standard (ARMA) time series model.

If we extend this perspective to future years, retained earnings rise steadily in the base scenario to $98 million in 2016/17, $141 million in 2017/18 and $154 million in 2018/19. This recovery in retained earnings occurs despite assumed rate increases of 1% that fall short of assumed inflation of 2%. In other words, despite assumed real rate increases of -1%, retained earnings recover to $154 million by 2018/19, which is well within the RSR range of [$102M, $204M] based on annual premiums in that year. The puzzle is why the proposed increases of 1% are designated as a RSR rebuilding fee and no vehicle premium rate increase is assumed in a period when inflation, a rough indicator of the rate of increase in operational costs, is rising steadily at 2%. In such an environment, it is unreasonable to assume that MPI would not request rate increases that reflect its anticipated operation cost increases and that the PUB would not grant such increases at least partially if it determines that MPI is operating efficiently. It seems more reasonable, therefore, to reclassify the assumed rate increases in the base scenario above (MPI 2015 Rate Application, Vol.II, Rate Stabilization Reserve, 22) as follows:

Policy Year	Rate Change	RSR Rebuilding Fee
2014/15	0.9% (PUB Approved)	0.0%
2015/16	2.4% (Proposed)	1.0% (Proposed)
2016/17	1.0% (Assumed)	0.0% (Assumed)
2017/18	1.0% (Assumed)	0.0% (Assumed)
2018/19	1.0% (Assumed)	0.0% (Assumed)

The table above still assumes that vehicle premium rate increases will fall short of inflation by 1% from 2016/17 to 2018/19. Overall, premiums rise 6.4% from 2015/16 to 2018/19 while inflation is forecast to rise 7.7%, but the premium increases are “front loaded” in 2015/16. This begs the question of what difference it would make to the base scenario if the premium increase were spread equally over the four years and no RSR rebuilding fee were designated, that is if the table were recast as follows:

Policy Year	Rate Change	RSR Rebuilding Fee
2014/15	0.9% (PUB Approved)	0.0%
2015/16	1.6% (Proposed)	0.0% (Proposed)
2016/17	1.6% (Assumed)	0.0% (Assumed)
2017/18	1.6% (Assumed)	0.0% (Assumed)
2018/19	1.6% (Assumed)	0.0% (Assumed)

While there would be lower retained earnings in 2015/16, retained earnings would likely recover to something close to $154 million by 2018/19 with rate increases just short of inflation. And, again, this recovery leaves retained earnings right in the middle of the RSR range that would be established using annual premiums, as is the current practice. Front loading the rate increase to 2015/16 and including an RSR rebuilding fee seems unnecessary to rebuild the RSR over time in the base scenario.

5.2 The Adverse Scenarios

As in recent DCAT reports, the current DCAT report considers four adverse scenarios: interest rate decline, equity decline, high-loss ratio, and a combined scenario. The equity decline is presented in terms of a one-year and two-year decline. Unlike the 2012 DCAT report, the equity decline scenario is no longer the most adverse, since it now results in retained earnings that only decline from the expected $72 million in 2013/14 to $53 million (the one-year decline)

and $63 million (the two-year decline) in 2015/16 and recover to $156 million (one-year) and $160 million (two-year) by 2018/19, again about the middle of the RSR range determined by the Kopstein (annual premiums) method. Indeed, the DCAT report concludes that the PUB's minimum RSR target is sufficient to withstand adverse equity decline events at the 1-in-40 year probability level. Similarly, the high-loss ratio scenario reduces retained earnings from $72 million in 2013/14 to $12 million in 2015/16 but retained earnings recover to $143 million by 2018/19 with management action and the DCAT report concludes again that the PUB's minimum RSR target is sufficient to withstand this adverse event scenario at the 1-in-40 year probability level.

In contrast to previous reports, it is the interest rate decline scenario that is now the most adverse and the basis for the RSR target recommendation. The interest rate decline scenario reduces retained earnings from $72 million in 2013/14 to a loss of $13 million in 2015/16. Retained earnings deteriorate farther to a loss of $34 million by 2018/19, leading to the conclusion that the RSR minimum based on annual premiums would be insufficient to maintain the RSR balance above zero and that an RSR target minimum of $190 million is needed. The interest rate decline scenario likely also drives the combined scenario, where retained earnings fall in a similar fashion to a loss of $15 million in 2015/16 and a loss of $40 million by 2018/19, leading to a recommendation of a slightly higher RSR target minimum of $194 to withstand the adverse combined event.

5.2.1: The Equities Decline and High-Loss Ratio Risk Scenarios

The interest rate decline and combined scenarios form the basis for the RSR target recommendation in the DCAT report. Before turning to these more severe adverse scenarios, I make some observations about the equities decline and high-loss ratio risk scenarios as they are constructed in the current DCAT report.

It is worth noting that the relative importance of the equity decline scenario has weakened at least in part because of the elimination of the S&P/TSX Composite Total Return Index data before 1955. The pre-1956 data, and specifically the data from the Great Depression of the 1930s, dominated the lower tail of four-year equity outcomes in earlier DCAT analysis, as I argued in my report to the 2013 rate hearings ("Manitoba Public Insurance Rate Risk Management and the Rate Stabilization Reserve," 2013). Absent this experience, which I argued is both old and the product of monetary policy errors unlikely to be repeated today, the adverse equity decline scenarios are less serious, as reflected in this report. I believe this to be one important advantage of transparent, evidence-based scenario selection for the DCAT, where the PUB and intervenors can scrutinize the basis for risk assessment and mitigation.

One other change in the equity decline scenario, however, is the adoption of one-year and two-year equity declines rather than the four-year decline used earlier. This approach ignores the "rebound" in equity values captured in the third and fourth years after a stock market reversal. Consider the table of adverse equity returns (MPI 2015 Rate Application, Vol.II, Rate Stabilization Reserve, 30):

Selected Adverse Scenarios by Percentile and Return Period (Cumulative)

	Return Period (Years)			
Percentile	**1**	**2**	**3**	**4**
1st	-31.6%	-27.7%	-22.2%	-9.7%
2.5th	-25.0%	-21.6%	-14.8%	-4.8%
5th	-19.3%	-15.9%	-8.2%	0.0%

What is evident is the smaller equity declines over four years compared to one or two years; that is, that there is a rebound in the third and fourth years. This table can therefore be recast to reflect the rebound in equity returns in years 3 and 4 as follows:

	Return		Recovery	
	1	**2**	**3**	**4**
Percentile				
1st	-31.6%	-27.7%	7.6%	24.8%
2.5th	-25.0%	-21.6%	8.7%	21.4%
5th	-19.3%	-15.9%	9.2%	18.9%

That is, in order for equity returns to recover to -22.2% in year 3 and -9.7% in year 4 under the 1st percentile scenario, the returns in years 3 and 4 must be 7.6% and 24.8%, respectively. Similarly, in order for equity returns to recover to -14.8% in year 3 and -4.8% in year 4 under the 2.5th percentile scenario, the returns in years 3 and 4 must be 8.7% and 21.4% and, in order for equity returns to recover to -8.2% in year 3 and 0% in year 4 under the 5th percentile scenario, the returns in years 3 and 4 would be 9.2% and 18.9%. It would appear that the adverse equity scenario uses the assumptions for the base scenario in years 3 and 4, which implies a lower return to equities than appears in columns 3 and 4 above. If that is the case, the one- and two- year equity decline scenarios overstate the adverse impact to the investment portfolio to 2018/19.

The high-loss ratio scenario associated with unusually high claims costs needs little justification, since a 1-in-20 year claims loss event of $31 million occurred in 2013/14 as a result of a particularly harsh winter. The claims experience of MPI provides a potentially rich data base to establish a distribution of claims outcomes in various categories as the basis for determining adverse outcomes at specified risk tolerance levels. MPI has chosen to limit the data analysis to the period since 2001, however, without a clear justification in this report. The effect of choosing this relatively short period is to reduce the reliability of the fitted claims distributions (MPI 2015 Rate Application, Vol.II, Rate Stabilization Reserve, Appendix A, pp.61-62), since it is based on only 13 annual observations.

5.2.2: The Interest Rate Decline and Combined Risk Scenarios

It seems curious to discuss the risk of an interest rate decline in the current environment of sustained low interest rates arising out of the recovery from the last recession in 2008-09. From the perspective of monetary policy, there appear to be no options available to reduce interest rates. Otherwise, these options would very likely have already been taken to stimulate an economy that the latest Bank of Canada *Monetary Policy Report* describes as having "persistent slack" that "will take a little longer than expected in April for the Canadian economy to return to full capacity" (*Monetary Policy Report*, July, p.11).

I would note here that interest rates, unlike equity returns and claims frequencies, cannot fluctuate without limit. In particular, there exists a *de facto* lower bound of zero on interest rates to avoid financial disruptions, since cash becomes a more attractive option at negative interest rates. This lower bound is associated with the problem of the liquidity trap in severe recessions, in which monetary policy is ineffective in stimulating economic activity because interest rates are already at or near zero and cannot be reduced further.[3] That situation is not far from where we remain today as we await a full economic recovery, and it accounts for the consensus forecast that interest rates will rise, since they have nowhere else to go. The consensus forecast for Treasury Bill rates rises from 0.99% in 2014/15 to 4.50% in 2018/19 and the forecast for Government of Canada 10-year bonds rises from 3.14% in 2014/15 to 4.62% in 2018/19 (MPI 2015 Rate Application, Vol.II, Rate Stabilization Reserve, 22)

The consensus forecast of rising interest rates is built into the baseline scenario. The interest rate decline scenario assesses the risk that would arise if rising interest rates were not realized and interest rates actually fell:

> "The rising interest rate forecast in this year's base scenario produces favourable net income to the Corporation relative to a flat or declining interest rate forecast. Therefore, there is a risk that this rising interest rate forecast will not materialize" (MPI 2015 Rate Application, Vol.II, Rate Stabilization Reserve, 40)

To motivate and implement this scenario, the DCAT analyzes long-term bond yields from 1956 to April, 2014 because Government of Canada 10-year bond yields are only available since 1989.[4] Much like the equity decline scenario, bond yields are considered over return periods of one to four years and 1-in-100, 1-in-40 and 1-in-20 outcomes are calculated for the lower tail of the fitted distribution for each return period.

The DCAT interest rate decline scenario recognizes this limiting condition on interest rates but only in a perfunctory way. The decline in interest rates starting in 2015/16 is based on the forecast rate of 3.14% for the fourth quarter of 2014/15. Thus, interest rate declines in excess of 3.14%, which occur in the 1-in-40 (2.5%) tail for periods of 2 to 4 years, would generate negative bond yields. To overcome this problem the DCAT analysis proceeds as follows:

> "An interest rate floor of 1.68% is applied to the interest rate scenarios if the forecasted interest rate falls below this level. The interest rate floor of 1.68% is based on the lowest monthly GoC 10 year bond yield from 1989 to present" (MPI 2015 Rate Application, Vol.II, Rate Stabilization Reserve, 43)

Using the DCAT methodology and starting from a yield of 3.14%, interest rates can only fall a further 1.46%, although yields can remain at 1.68% for the duration of the scenario. Is there any

3 Monetary policy initiatives to lower interest rates are expected to stimulate lending to consumers and businesses but, at negative interest rates, lending becomes less lucrative than simply holding cash. Without lending, economic expansion is blocked and standard monetary policy is ineffective.

4 It is interesting to note that the DCAT analysis argues for a longer data series here which yields 700 monthly bond yields rather than the 172 monthly yields available for Government of Canada 10-year bonds since 1989, although the analysis of claims frequencies settled for 13 years of data when a longer series might be available.

reasonable chance that interest rates, currently at their lowest levels in recent history, will actually deteriorate further in the next four years?

My initial reaction to this scenario design was that the source of the adverse interest rate declines in the data is periods of high interest rates that are well in the past and not characteristic of our current circumstances. Normally, the process of economic growth involves a series of business cycles during which either inflation and interest rates are low and unemployment is high (recessions with low economic growth) or inflation and interest rates are high and unemployment is low (booms with high economic growth).[5] Canada and other nations went through a unique period of "stagflation" in the late 70s and early 80s, however, during which unemployment, inflation and interest rates were all very high. This period presented unique challenges to traditional stabilization policy, which either dealt with high unemployment by stimulating economic growth through lower interest rates or dealt with high inflation by restricting economic growth through higher interest rates. A number of extraordinary methods were attempted, such as wage and price controls, to reduce inflation and allow monetary policy to stimulate the economy through lower interest rates to reduce unemployment. Once inflation abated, however, the high interest rates offered an unusual opportunity to stimulate economic growth and reduce unemployment and significant interest rate declines occurred.

I would expect that this unique period of stagflation in Canada accounted for the largest interest rate declines since 1956. To illustrate that this is the case, take the same series on long-term bond yields used to construct the interest decline scenario and assess where the observations in the 1-in-40 (2.5%) tail come from. The results are presented below.

No. Below 2.5% Rate by Return Period and Time Period

	Mean rate	1 yr	2 yrs	3 yrs	4 yrs
		-2.30%	-3.24%	-3.65%	-4.23%
1956-65	4.78	0	0	0	0
1966-75	7.36	0	0	0	0
1976-85	11.49	16	21	27	21
1986-95	9.38	1	0	0	0
1996-2005	5.72	0	0	0	0
2006-14	3.62	0	0	0	0
1956-2014	7.14	17	21	27	21

Source: CansimII series v122487

5 We are concerned here with actual or nominal interest rates, which is the focus of the interest rate decline scenario, and not real interest rates (interest rates net of the inflation rate).

The observations that constitute the 2.5% tail of the interest rate decline scenario lie exclusively in the stagflationary period from 1976 to 1985. During this period nominal interest rates were very high, averaging 11.49% compared to the average of 7.14% for the period from 1956 to the present. Once inflation moderated and monetary policy to stimulate the economy kicked in, sharp declines in interest rates were registered. During other periods of time with lower interest rates, however, none of the observed interest rate declines in the 2.5% tail were observed. And we are now in circumstances where interest rates have averaged only 3.62% since 2006, far lower than in any other period in the data.

My concern about the evidence in this scenario is similar to my objection to the equity decline scenario in the 2013 DCAT. The equity decline scenario had relied for its adverse outcomes entirely on the era surrounding the Great Depression of the 1930s which, I argued, was unlikely to be repeated in modern times with improved mechanisms for stabilization policy. Similarly, the interest rate decline scenario relies entirely for its adverse outcomes on the era surrounding the Great Stagflation of the late 1970s and early 1980s when inflation and unemployment were both high and authorities were able to reduce interest rates to stimulate the economy once inflationary concerns abated. No such inflationary concerns exist today, since inflation remains low and well within the Bank of Canada's target range and unemployment and excess capacity in the economy remain the focus. I would argue again that the interest rate decline scenario is simply not credible because (a) interest rates have nowhere to decline in the current economic situation of historically low interest rates and (b) the analysis of interest rate declines in the DCAT report is skewed by the inclusion of the data from the Great Stagflation when interest rates exceeded 11% and all the major interest rate declines on which the adverse scenarios are based occurred.

The combined scenario considers the joint impact of the equity decline, high-loss ratio and interest rate decline scenarios. In response to concerns in earlier DCAT reports, correlation between equity returns and interest rates is now incorporated into the scenario, although it is very small and likely inconsequential. The adverse financial impacts at the 1%, 2.5% and 5% levels are based on one thousand simulations for each return period. The results of the combined scenario are quite similar to those obtained from the interest rate decline scenario, however, and the interest rate decline methodology is undoubtedly the main driving force of this exercise. Indeed, the level and pattern of retained earnings from 2015/16 to 2018/19 is similar for the interest rate decline scenario and the combined scenario, and the recommended RSR in the two scenarios differ by only $4 million.

My concerns about the combined scenario are the same as those for the interest rate decline scenario. Since the interest rate decline scenario is the most adverse, it must be the main driver of the results for the combined scenario which are, in fact, quite similar to the interest rate decline scenario alone. But the interest rate decline scenario asks us to contemplate interest rate declines that are derived from the experience of the Great Stagflation forty years ago that bears no relationship to the low inflation and low interest rate circumstances of today. I therefore do not find the interest rate decline and combined scenarios credible.

6. Recommendations and Conclusions

(1) The appropriate RSR should be a range, not a target, to perform the function of rate stabilization or protection from rate shock arising from unforeseen events. An annual RSR target may be no better than no RSR in terms of rate stabilization.

(2) An alternative to the proposed RSR rebuilding fee of 1% and front loaded rate increase of 2.4% in 2015/16, followed by RSR rebuilding fees of 1% in the next three years and no rate increases, would be a stable increase of 1.6% in each of the next four years. The latter seems more reasonable in a relatively stable inflationary environment of 2% provided that MPI can demonstrate that its proposed expenditures are efficient and reasonable.

(3) The RSR target recommendation is based on the interest rate decline and combined scenarios, which both rely exclusively on interest rate declines from the era of the Great Stagflation that are not applicable today when inflation and interest rates are low. I do not find these scenarios credible.

(4) There are some concerns with the development of the equity decline and high-loss ratio scenarios. In any case, the RSR range established by the PUB using 10% to 20% of annual premiums (the Kopstein method) is sufficient to withstand these events as constructed in the DCAT report at the 1-in-40 year probability level.

(5) Use of a 100% MCT to establish a maximum for the RSR is not appropriate in the context of a monopoly crown corporation.

(6) I recommend that the Kopstein method continue to be used to establish the RSR target range.

(7) I recommend that the DCAT report continue to be used to assess risks facing MPI and that MPI should consider how the DCAT exercise can be used to establish an appropriate range for the RSR rather than a target.