

# **SOLVENCY ADVISORY COMMITTEE**

**QUÉBEC CHARTERED LIFE INSURERS**

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## **MARKET RISK QUANTITATIVE IMPACT STUDY 2 – SUMMARY RESULTS**



**AUTORITÉ  
DES MARCHÉS  
FINANCIERS**

## SOLVENCY ADVISORY COMMITTEE

The financial industry is exposed to a changing environment. In its efforts to maintain relevant and up-to-date capital adequacy requirement guidelines, the Autorité des marchés financiers (“AMF”) has initiated a number of work streams to address, among other factors, the impact on the Capital Adequacy Requirements Guideline (“CAR”) of changes in the life and health industry risk profile, the risk measurement methodologies, professional standards (accounting and actuarial) and international developments.

For the CAR standard approach in general (excluding segregated fund guarantees), priority projects were to develop methodology for credit and market risk before dealing with insurance and other risks. Again, the significant uncertainty related to changes in International Financial Reporting Standards (“IFRS”) on the calculation of insurance liabilities was an important factor for this sequencing. Assuris and the Office of the Superintendent of Financial Institutions (“OSFI”) are valuable partners in this process as members of the Standardized Approach Advisory Group (“SAAG”).

The development of a new standardized approach for determining the credit and market risk solvency buffer has also required participation from the industry, mainly through Quantitative Impact Studies (“QIS”). The purpose of these studies is to assist the regulators, both AMF and OSFI, to assess the appropriateness of proposed methodology, assumptions and other requirements.

The first QIS explored the impact on CAR of changes to capitalization in respect of credit and market risks. The results on credit risk indicated that the methodology is generally satisfactory but will require refinement and further calibration prior to implementation. The methods tested for market risk were not satisfactory and required additional investigation, which necessitated a second QIS. The AMF and its SAAG partners would like to thank all insurers who participated in the second QIS.

The attached QIS report was prepared by the SAAG and is intended to be a high level summary of the results and findings. The report concludes that work will continue in order to refine and calibrate the new methods. It has not been determined yet whether another QIS is required. It is likely that an integrated QIS for credit, market and insurance risk components will be performed to permit better calibration of the solvency buffers for all risks.

Although, as the report explains, more work is required on certain aspects of market risk, the work is nearing completion and some of the issues can only be resolved at a later stage. The AMF therefore intends to move ahead, in consultation with the SAAG, and begin its review of the methodology for determining requirements for insurance risk. Factors to be considered during the review of insurance risk requirements will include, among others, the impact of mortality improvement and of IFRS 4 Phase II.

Prospective changes to CAR are expected to be consistent with the Total Asset Requirement (TAR) approach outlined in the Joint Committee of OSFI, AMF and Assuris paper Framework for a New Standard Approach to Setting Capital Requirements dated November 2008. The TAR approach requires that an insurer hold assets which are equal to or greater than its liabilities under extreme circumstances. When TAR is expressed as a solvency buffer over best-estimate obligations, the solvency buffer is designed to withstand risks at a high level of confidence. Although the AMF is proceeding with the TAR approach for both its standard and internal models capital regimes, it is clear that a measure of capital adequacy will remain an important component in the overall regulatory model. However, because unknown changes to

IFRS are likely to significantly impact the way in which best-estimate liabilities are calculated, the path to implementation of CAR standard approach changes will require further definition as IFRS 4 Phase II is finalized. Subject to IFRS 4 Phase II continuing to be a foundation on which a solvency buffer can be added to the best-estimate insurance obligations, the AMF continues to expect that its standard approach capital regime for insurance obligations will build on accounting best-estimate insurance liabilities. Indeed, it is good practice to rely on the same financial statements as industry for regulatory reporting and capital determination. We hope the IFRS 4 Phase II standard will be compatible with AMF's capital framework and allow us to continue this practice. In future work, making appropriate changes to insurance capital requirements to correspond to changes arising from Basel III will also be considered.

The AMF remains committed to developing appropriate risk-based capital requirements and we appreciate the collaboration, time and support of the industry. Should you have any questions related to the future direction of life and health capital rules, please contact Mr. Sylvain St-Georges at [sylvain.st-georges@lautorite.qc.ca](mailto:sylvain.st-georges@lautorite.qc.ca) or by telephone at 418-525-0337, extension 2385.

**Market Risk Quantitative Impact Study 2  
Summary Results**

**Joint Committee of OSFI, AMF, and Assuris**

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## MARKET RISK QUANTITATIVE IMPACT STUDY 2 - SUMMARY RESULTS

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This report summarizes the results of the second Quantitative Impact Study for market risk (QIS 2). The information used in this study is based on company results for year end 2009. The focus of QIS 2 was on interest rate risk, equity risk and real estate risk. Liability market option risk and other requirements for segregated fund guarantees were not part of this study. The approach to this risk is currently being developed separately.

The purpose of this study is to assist the regulators, both OSFI and AMF, to assess the impact of proposed regulatory capital changes related to market risk.

### Market Risk

The table below summarizes the results for market risk compared to current requirements. The interest rate risk buffer included in the total market risk buffer is derived from the base scenario and stressed scenarios. The base and stressed scenarios cash flows are discounted using risk free rates plus a spread.

(\$000's)	<b>Total Industry</b>
Total market risk buffer	39,652,976
Required market risk capital under MCCSR rules <sup>1</sup>	13,010,660
Actuarial liability C3 provisions (incl. Pfads)	<u>25,974,647</u>
Total current requirements	<u>38,985,307</u>
Additional (reduction in) buffer using QIS 2 rules	<u>667,669</u>
Ratio of Market Buffer to Current Requirements	101.7%

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<sup>1</sup> This number is the total required capital as reported under the current MCCSR rules and therefore has been reduced for the Par business. The new buffer of \$39.7 billion is before any Par reduction. The \$13 billion current requirement would become about \$15 billion before any Par adjustment and would result in a reduction in buffer of about \$2 billion.

If the interest rate risk buffer included in the total market risk buffer is derived from the base scenario and stressed scenarios as above, except that cash flows are discounted using risk free rates (without an additional spread), then the additional buffer required is as follows.

(\$000's)	<b>Total Industry</b>
Additional (reduction in) buffer using QIS 2 rules	10,053,175
Ratio of Market Buffer to Current Requirements	125.8%

Appendix I provides further details on the results by the risk areas tested.

QIS 2 results show that the approach taken for capital standards for market risk produces aggregate results that are lower than obtained in the first QIS<sup>2</sup> and similar in amount to the results for the sum of the current *Minimum Continuing Capital and Surplus Requirements* (MCCSR) market risk components and the actuarial liability for C3 provisions.

There is significant concern that, although the methodology and principles used seem sound in many respects, the overall capital requirements calculated in QIS 2 may not appropriately account for the various risks at the required level. Additional research, historical studies and data is required to further support some of the parameters and assumptions used in QIS 2. Therefore, additional work will be conducted to properly calibrate the parameters and address unresolved matters.

Further calibration will be needed for interest rate risk and, in particular, the shocks for the ultimate discount rate (UDR). Analysis of the interest rate risk before and after 30 years revealed that insurer exposure to reinvestment risk beyond 30 years varies significantly by insurer and represents, in some instances, over 50% of the total interest rate risk exposure. While the mismatch risk prior to 30 years could be considered hedgeable, the risk beyond 30 years is predominantly unhedgeable. The former risks can be reasonably assessed using the various interest rate paths in QIS 2; nonetheless, we also wish to consider ongoing developments with respect to the determination of the *International Financial Reporting Standards* (IFRS) liability discount rates. The QIS 2 shock for the UDR may need strengthening to properly take into account a terminal provision for interest rate risk. The UDR used in QIS 2 is an average of long term rates. The shock in QIS 2 was an estimate of how much that average could change over a one year time horizon. The terminal provision however, should likely cover the risk, at an appropriate confidence level, that the average could change further in subsequent years. Determining the appropriate balance in the interest rate risk buffer between short and long term risk will require further study.

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<sup>2</sup> Appendix II provides a summary of the significant changes from QIS 1 to QIS 2.

## Par Reduction

The reduction in the solvency buffer for future participating products, although developed with the market risk QIS, impacts the solvency buffer for other risk areas and will likely be a reduction from the total solvency buffer.

Our work in this area is not complete but the table below summarizes the reported reduction to solvency buffers for participating products under QIS 2:

(\$000's)	Total Industry
Reduction for participating products	11,609,391
Reduction for participating products using current MCCR rule <sup>3</sup>	2,050,000

Additional information has been requested from the companies for adjustments for participating products and adjustable products. We are in the process of reviewing this information to determine the appropriate approach and adjustments for these products. We may require a selection of companies to complete further analysis to assist us in determining the appropriate approach.

## Impact of IFRS

The finalization of the market risk approach will consider developments in IFRS standards for insurance contracts and any impacts this standard may have on liability cash flows used in the valuation of liabilities including the discount rate and risk margins and the impact on capital standards.

## Next Steps

In addition to dealing with the above unresolved matters, we also plan to further address some of the issues raised by industry participants. For example, we will look at interest rate risk buffer volatility, the need for a transition period, consideration of correlations and other matters. A summary of participant comments, including these and other matters, along with initial thoughts is included in Appendix III.

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<sup>3</sup> Par Reduction using the current MCCR 50% factor for market risk only.

## Summary of Buffers by Risk

(\$000's)	Total Industry
<b>Interest Rate Risk Buffer</b>	
Interest rate risk buffer	22,427,747
Required interest rate risk capital under MCCR rules (incl. C3 provisions) <sup>4</sup>	<u>30,668,447</u>
Additional (Reduction of) capital needed using QIS 2 rules	<u>(8,240,700)</u>
Ratio of Interest Rate Risk Buffer to Current Required Capital	73.1%
<b>Equity Risk Buffer</b>	
Equity risk buffer	7,013,230
Required Equity Market Risk Capital under MCCR rules <sup>4</sup>	<u>2,127,522</u>
Additional capital needed using QIS 2 rules	<u>4,885,708</u>
Ratio of Equity Risk Buffer to Current Required Capital	329.6%
<b>Real Estate Risk Buffer</b>	
Real estate risk buffer	4,897,714
Required Real Estate Risk Capital under MCCR rules <sup>4</sup>	<u>1,759,484</u>
Additional capital needed using QIS 2 rules	<u>3,138,230</u>
Ratio of Real Estate Risk Buffer to Current Required Capital	278.4%
<b>Other Risk Buffer</b>	
Other risk buffers	5,314,285
Required Other Risk Capital under MCCR rules	<u>4,429,854</u>
Additional capital needed using QIS 2 rules	<u>884,431</u>
Ratio of Other Risk Buffer to Current Required Capital	120.0%
<b>Total Market Risk Buffer under QIS 2</b>	<b>39,652,976</b>

<sup>4</sup> The current MCCR required capital for Interest rate, Equity and Real Estate risks is reduced for the Par business (as normally reported) while the new buffer is before any Par reduction.



### What changed from QIS 1 to QIS 2?

The significant changes to QIS 2 from QIS 1 relate to interest rate risk and real estate risk. Other changes to approach are described for equity risk and currency risk.

#### Interest Rate Risk

##### *1. Interest Rates*

For the purposes of this QIS 2, OSFI and AMF tested two different base and scenarios discount rates, risk free rates plus a spread and risk free rates. The discount rates for risk free interest rates plus a spread were based on corporate A rated bonds. QIS 1 used only risk free rates.

We consider that it would be preferable that the base discount rates used for the interest rate shocks be consistent with IFRS Phase II for Insurance Contracts. However, Phase II of the Insurance Contracts standard is an Exposure Draft and the determination of an appropriate discount rate is still under discussion.

For QIS 2, cash flows beyond 30 years were discounted using a ultimate discount rate (UDR), calculated as the average of the last 10 year-end risk free spot rates for 20-year obligations plus the average of the 20-year spreads for last 10 year-ends. QIS 1 used a flat 6% discount rate consistent with the average historical long term interest rates from 1924 to 2007.

Also, under QIS 2, cash flows between years 20 and 30 were discounted using linearly interpolated rates between the 20-year discount rate and the UDR. QIS 1 used risk free spot rates between years 20 and 30.

##### *2. Shocks*

The shocks for QIS 2 took into account the correlation between the short rates (1 year) and the long rates (20 years) in recognition that shocking both parts of the interest curve independently most likely produces results over the 99.5% CTE. Also, the shocks applied to the discount rates between the 90 day rate and 20 year rate, were applied using a linear interpolation for all intervening years.

In QIS 1, the shocks that were applied to the discount rates were linearly interpolated between the 90 day rate and the 30 year rate.

Test scenarios were also eliminated for QIS 2 that were considered to be implausible. Those scenarios were shocks on the long term rate in opposite direction to the UDR.

In QIS 2, the UDR beyond 30 years was shocked by 50 basis points, while in QIS 1 this shock was 100 basis points.

For insurers operating in Canadian and United States currencies, the solvency buffer for QIS 2 was based on the scenario which produced the highest buffer on a combined basis for the two currency/interest environments. This recognized that interest rates in the two countries tend to move in similar directions. For QIS 1 the highest buffer was used for each currency independently.

### *3. Other*

Other changes in QIS 2 for interest rate risk include the allowance of reinvestment assumptions for universal life as the contract continues after the end of any interest guaranteed period. Also contractually fixed real estate cash flows were permitted in the period they relate to.

#### Real Estate Risk

In QIS 2, for income producing real estate, the solvency buffer was calculated using a combination of a credit risk and market risk component. The credit risk was based on the present value of the contractual cash flows using the credit risk for assets from QIS 1 for credit risk. The market risk component for the present value of the remaining cash flows was a downward shock of 30%. In QIS 1, real estate risk was solely based on a downward shock of 20% applied on the whole value of the real estate.

#### Equity Risk

In QIS 2, the downward shock for equities was 30%. Under QIS 1, the shock for equity index stocks was 20% and for all managed equity portfolios was 30%.

#### Currency Risk

The approach taken for QIS 2 is to use the existing MCCR capital requirements. Under QIS 1, the solvency buffer was based on a mismatch of cash flows in each currency with a change of +/- 20% against the Canadian dollar.

### Summary Comments and Initial Responses

The following are high level summaries of comments received from industry participants and corresponding responses.

#### Interest Rate Risk

The general feedback was that the results from QIS 2 were more reasonable and less severe than the results from QIS 1. However, there were concerns that the new interest rate risk buffer could be more volatile and lack comparability with current MCCSR requirements. Parameter calibration would be required for the transition and it was suggested that a transition period be provided as a result. Also, it was noted that the results are highly dependent on the starting point (yield curve) and its relationship to the shock.

*We agree with these comments regarding calibration and they will be considered in the final calibration.*

#### Interest Rate Shocks

There was some concern that using an additive shock could result in a solvency buffer that varies according to the interest rate environment, i.e. the additive shock would be more significant in a low interest rate environment than a high interest rate environment.

*We are investigating whether the use of a multiplicative shock to the discount rate would better define another approach to the UDR shock and we may seek further study or suggestions from the CIA and industry.*

#### Interest Rate Correlation

A comment was made to consider the correlation between interest rates in jurisdictions that have a strong correlation with US/Canadian interest rates.

*We are considering the possibility of using a correlation factor.*

## Transition of Discount Rates

Comments were received regarding the use of linear interpolation between the short-term rate and the UDR. Alternative approaches and considerations were suggested.

*Linear interpolation using forward rates instead of spot rates was considered. However, there were practical issues in developing the methodology.*

*A concern was expressed over the potential resulting negative forward rate using the QIS2 methodology. We determined that this was not an issue since an inverted yield curve is possible and would lead to negative forward rates.*

## Real Estate Risk

The general feedback was that the results from QIS 2 were more reasonable than the results from QIS 1, but some companies felt that the solvency buffer for real estate is still severe. A comment was made regarding the severity of the shock as drops of 30% in property values are rarely seen.

*The shock is based on the residual market value of the real estate. Residual real estate is very similar to equities. The requirement is supposed to be based on a CTE 99.5%; the solvency buffer must therefore be sufficient to cover a one year shock that is relatively stressful yet plausible. Some indices show one year drops close to 30%. It is the view of SAAG members that a 30% decrease in residual value is a plausible adverse scenario.*

Another comment made was that even though the residual real estate value (removing the PV of the fixed lease cash flows that are contractually expected to be received) is used, this does not fully capture the difference in risk characteristics between equity and real estate. Another issue was that there was no provision for the renewal of leases and the thought was that this treatment was severe.

*For the standard approach, it is difficult to capture all risk characteristics without making the approach too complicated.*

## Credit Ratings on Real Estate

More guidance was requested to map foreign real estate external credit ratings of real estate tenants.

*Rating agencies use the same rating system internationally. If the rating is by an agency that is not recognized by OSFI, then the rating for the tenant is considered unrated (see current MCCSR rules under 3.1.1).*

## Equity Risk

Comments were made regarding the appropriateness of the 30% shock in certain circumstances, including the application of the shock to the bond portion of balanced mutual funds and the punitive nature of the shock when applied to equities backing liabilities.

A comment was also made regarding the consideration of hedging in the final calibration.

*We will further consider the comments with respect to the severity of the shock, but we do not see compelling evidence that a 30% shock is implausible as such changes do take place. Hedging however is not likely a significant calibration matter, but it is rather an issue that we will consider as we finalize our approach on market risk.*

## Simultaneous Shocks

A concern over a simultaneous occurrence of rising short-term rates and dropping stock equities seems severe and unlikely.

*This is a limitation to the standard approach, but may be considered for the advanced approach. Another consideration is that historical correlations may not always continue in the future.*

## Capital

There were concerns that including capital in the interest rate buffer calculation would add to the buffer where there is no requirement currently. An example would be surplus assets used to back lapse risk. Lapse rate risk increases when interest rates fall, which would result in additional capital required. These surplus assets would again be subject to additional buffer testing if interest rate risk is calculated on these assets. In the case of a branch or subsidiary with large excess capital, it is an incentive for the parent company to repatriate capital. It could also cause an incentive to shift to equities with time zero cash flows rather than bonds with fixed cash flows. A possible solution would be to ignore any free surplus assets over those required to absorb the sensitivity of required capital and liabilities to changes in interest rates.

*The current methodology produces reasonable results. Assets are inherently risky and any movement in interest rates will cause asset values to fluctuate. To the extent that changes in asset values impact available capital, then that needs to be considered in the calculation of required capital and be subject to appropriate buffer testing. The concerns regarding the lapse component for capital will be reviewed when developing the insurance risk buffer. The approach taken uses best-estimate cash flows with provisions for adverse deviations (Pfads), which is consistent with the Canadian Asset Liability Method (CALM), but will be reviewed when IFRS 4 Phase II is finalized.*

Although the buffer may be similar to current requirements, if some of the margin currently held in reserve is reallocated to capital, this would add conservatism since capital is held at a multiple level. The final calibration will need to consider this.

*The QIS 2 design work has been based on a total balance sheet approach and a goal that the target capital requirement would not require a multiplier. To the extent that a multiplier will be needed, the concern raised will need to be addressed.*

### Adjustable Products

A comment was made that there was no credit given for the ability of products to pass experience to policyholders.

*A supplementary request to companies on the impact of the adjustable features contained in the adjustable products will be made in Q1 2011. The approach being evaluated for providing credit for adjustments on these products is based on the PV of potential future adjustments to the premiums, charges or payments to the policyholders that are adjustable in the worst scenarios. The impact of these adjustments on lapse or mortality rates should be considered. Minimum guarantee features should also be considered. The reduction in the market risk buffer for the adjustable products could be the difference between the PV of the net cash flows with and without the adjustments.*

There was also a comment to extend the treatment of reinvestments for Universal Life to other products (i.e. participating whole life).

*The new capital standards will use the cash flows for the liabilities based on the approach that will be used for IFRS. For purposes of this QIS, we needed a separate approach for Universal Life to deal with lapses.*

## Par Products

There was a comment regarding the wide array of approaches to par business and consideration should be given to provide guidance for better convergence between different approaches.

*We are considering a cap on the PV of the dividend reduction. All components for par business will be considered and the overall par adjustment should take into account a minimum par requirement.*

## Provisions for Adverse Deviation

Comments were received regarding the merits of including and excluding Pfads in cash flows when calculating the interest rate buffer.

*The approach taken will depend on how risk margins will work under IFRS 4 Phase II. For the purposes of this QIS, Pfads were included as this is the current practice under CALM.*