

To be read in conjunction with
Consultation Paper P007-2016
15 August 2016

Supplementary Technical Specifications for QIS 2 – MA & IP

MAS

Monetary Authority of Singapore

1. BACKGROUND

1.1 The third consultation paper on the review of risk-based capital framework for insurers in Singapore (“third consultation paper”)¹, issued on 15 July 2016, stated that MAS was working with the Singapore Actuarial Society (“SAS”) on certain design parameters² for the matching adjustment (“MA”) and illiquidity premium (“IP”). The technical specifications for the MA and IP would then be issued in time for affected insurers to use these specifications to complete the second round of quantitative impact study (“QIS 2”) by 20 October 2016.

1.2 The supplementary technical specifications (“supplementary specifications”) in this document are designed to assess the impact of the MA and IP proposals under QIS 2, as well as gather additional information that might be helpful to refine the proposals. The supplementary specifications also contain the instructions for insurers to conduct some sensitivity tests relating to market movements, e.g. widening of credit spread, as well as stresses on the Ultimate Forward Rate (“UFR”) and risk-free rates.

1.3 These supplementary specifications should be read in conjunction with the third consultation paper, including the technical specifications in Annex K of the paper.

1.4 **An insurer that only writes general business (whether direct or reinsurance) need not perform the additional analyses or impact studies as set out in the supplementary specifications.**

1.5 To make the calibration of the MA and IP more meaningful for QIS 2, direct life insurers were encouraged to provide information on their assets and liabilities in June 2016. **Appendix 1** shows the list of direct life insurers that provided data for the calibration exercise, which collectively makes up a very high proportion of the industry market share.

¹ The consultation paper can be accessed via this link <http://www.mas.gov.sg/News-and-Publications/Consultation-Paper/2016/RBC-2-Third-Consultation-Paper.aspx>

² These include the calibration of the appropriate thresholds to apply under the predictability test for MA (see paragraph 4.27 in the third consultation paper), as well as the levels of IP to be tested under QIS 2 (see paragraph 4.33 in the third consultation paper).

2. APPLICABILITY AND SUBMISSION REQUIREMENTS

2.1 Insurers that **write direct life business and/or life reinsurance business** are required to perform the additional analyses or impact studies specified in these supplementary specifications. As set out in paragraph 4.15 of the third consultation paper, MAS is of the view that the MA and IP might not be applicable for general business given its typical liability profile. Nonetheless, views are sought (through Question 3) in the third consultation paper as to whether the MA and IP would be relevant and helpful for general business.

Scope of MA and IP

2.2 The following table summarises the applicability of the MA and IP with respect to the type of insurer, currency, product and insurance fund under QIS 2.

	MA	IP
Applicable Insurers (See note 1)	Insurers writing direct life business	Insurers writing life business ³
Applicable Currencies (See note 2)	Liabilities denominated in SGD or USD	
Applicable Products (See note 3)	All products that can meet the eligibility criteria as specified in Appendix 3 , <u>with the exception of investment-linked products (“ILPs”)</u>	For direct life business, non-ILPs which are classified as Whole Life, Endowment, or Annuity in Form 14 For life reinsurance business, IPs should only apply for reinsurance arrangements which exhibit similar characteristics as the direct life insurance products eligible for IP
Applicable Funds (See note 4)	Participating Fund and Non-Participating Fund	

Note 1:

- The MA and IP are applicable for life business only. For the MA, whilst the intention is to apply it for both direct life and life reinsurance business, MAS will **focus on testing the impact of the MA on direct life business first under QIS 2**, and engage reinsurers with life business at a subsequent stage on the MA calibration. MAS has also sought views on the relevance of the MA for life reinsurance business through Question 4(d) in the third consultation paper.

³ For avoidance of doubt, this would include both direct life and life reinsurance business.

- **The IP, on the other hand, is applicable for both direct life business and life reinsurance business for QIS 2.** However, as the calibration of the IP was based on the products offered by, and the profile of corporate bonds held by direct life insurers (**Appendix 1**), MAS reserves the right to review and refine the IP for life reinsurance business after QIS 2.

Note 2:

- **The MA and IP are applied to SGD- and USD-denominated liabilities** that form more than 99% of liabilities for direct life insurers.
- As the calibration of the IP was based on data provided by direct life insurers, the IP is likewise restricted to SGD- and USD-denominated liabilities for life reinsurance business.

Note 3:

- **Insurers will not be allowed to apply MA on ILPs under QIS 2** as there is less predictability in the cash flows arising, for example, from fluctuations in fund management fees due to price movements in the underlying assets of the ILP funds. Although this can be accounted for by including an equity shock component in the predictability test, this may inevitably increase the complexity of the MA framework.
- For the same reason as above, **insurers will also not be allowed to apply IP on ILPs under QIS 2.** A consultation question has been included in the Supplementary Questionnaire on whether the MA and/or IP should be applicable to ILPs and how the MA or IP may be adjusted for ILPs.
- **IP is applied only on non-ILPs classified as Whole Life, Endowment, or Annuity in Form 14, without the need for the insurer to apply the predictability test to ascertain eligibility.** The decision to not apply the predictability test was based on industry feedback to keep the IP framework simple yet sufficiently risk-sensitive.
- Based on the data collected from the direct life insurers (as listed in **Appendix 1**) in June 2016 to calibrate the MA and IP, Whole Life, Endowment and Annuity products were found to be more illiquid⁴ compared with other products such as Term and Accident and Health ("A&H") products. Moreover, Term and A&H products often have lower levels of liabilities (or even negative liabilities) and as such, IP may yield limited benefits for these products.
- However, there are some Term products, such as term with refund of premium or survival benefits, that may behave similarly to Whole Life or Endowment products. Whilst the IP will not be applicable for these products in QIS 2, insurers are asked in the Supplementary Questionnaire whether this exclusion is appropriate and if not, how such products should be deemed as illiquid and eligible for inclusion. Insurers are also asked to provide an estimate of

⁴ Illiquidity was assessed based on the results of the predictability test on the data collected.

the improvement in Capital Adequacy Ratio (“CAR”) if such products were to be eligible for the IP.

- **For avoidance of doubt, for any product, either the MA or IP may be applied (subject to meeting the necessary conditions), but not both at the same time.**
- For life reinsurance business, the IP should only be applied to reinsurance arrangements that exhibit similar characteristics as the direct life insurance products (e.g. Whole Life, Endowment and Annuity Products) that qualify for IP. The reinsurer should make its own assessment on the reinsurance arrangements which can qualify for IP, and provide justification in the Supplementary Questionnaire.

Note 4:

- Based on the explanation in note 3 on the exclusion of ILPs, **investment-linked funds will not be eligible for MA or IP.**

Bases for Calculations

2.3 Insurers are to submit QIS results on the following bases:

- (a) **Basis 1:** Insurers will be required to incorporate all RBC 2 proposals with the exception of the MA and IP. This is already a requirement set out in Annex K (i.e. QIS 2 technical specifications) of the third consultation paper;
- (b) **Basis 2:** Insurers will be required to incorporate all RBC 2 proposals including the MA and IP. Basis 2 is further sub-divided into the following:
 - i. **Basis 2A:** Where MA and IP are based on the design described in Section 3 of this document. Insurers can choose to apply MA (if applicable⁵) and/or IP, but not both on any one product.
 - ii. **Basis 2B:** Same as Basis 2A, except that the IP is 150% of the level described in Section 3⁶.

Scenarios tested under QIS 2

2.4 To evaluate the impact of the MA and IP more comprehensively, insurers are required to submit the QIS 2 results on the bases and scenarios specified in the

⁵ As mentioned in paragraph 2.2, MA will not be applicable for insurers writing life reinsurance business under QIS 2. For insurers writing direct life business, MA can be applied provided the criteria in paragraph 2.2 and Section 3 are met.

⁶ Please note that the 150% factor is a sensitivity test and should not be construed as the eventual level of the IP.

table below. The stress scenarios are designed to assess the impact arising from changes in credit spreads, UFR and risk-free rates.

2.5 Separate Excel workbooks are to be provided for each scenario and basis.

	Basis 1	Basis 2A	Basis 2B
Base Scenario	✓ ✧	✓ ⊕	✓ ⊕
Scenario 1 ⁷ Credit spread widens	✓ ⊕	x	✓ ⊕
Scenario 2 UFR moves down	✓ ⊕	x	x
Scenario 3 Risk-free rates move up	✓ ⊕	x	x
Scenario 4 Risk-free rates move down	✓ ⊕	x	x

✧ - Applicable for all insurers as specified in Annex K of the third consultation paper

⊕ - Applicable for insurers writing life business (direct or reinsurance)

2.6 The details for the relevant assumptions and shocks for each of the scenarios are provided in **Appendix 2**.

Submission of Documents and Deadline

2.7 The following documents/files accompany these supplementary specifications:

- (a) **Workbook MAS_QIS2_MA_IP.xlsx** - This is the main workbook for insurers to complete for the application of the MA and IP proposals under QIS 2. A separate workbook should be submitted for each applicable basis within a scenario;

⁷ Basis 2B (and not Basis 2A) is selected for Scenario 1 as it is easier to see the impact of credit spread widening on a higher IP level. Please note that the IP level assumed in Basis 2B should not be construed as the eventual level of the IP.

- (b) **Workbook MAS_QIS2_Simplified.xlsx** - This is similar to the workbook issued on 15 July 2015 for Basis 1, but simplified to capture the essential results on the sensitivity tests (i.e. Scenarios 1 to 4) under Basis 1. A separate workbook should be submitted for each applicable scenario;
- (c) **Workbook MAS_MA_2.0.xlsx** – This workbook provides the instructions and methodology for calculating the MA. The MA calculated by this workbook should be used to calculate the results in workbook MAS_QIS2_MA_IP.xlsx. For a particular scenario and basis, a separate workbook should be submitted for each MA portfolio. Please refer to Section 3 for details on the construction of an MA portfolio;
- (d) **QIS 2_Discount Rates for SGD and USD_All Scenarios.xlsx** - This is similar to the EXCEL spreadsheet issued on 15 July 2015, but updated to include the discount rates to be used for SGD- and USD-denominated liabilities for the additional scenarios (i.e. Scenarios 1 to 4) to be tested; and
- (e) **Supplementary Questionnaire for QIS 2.docx** – This is to capture additional qualitative information required to further fine-tune the MA and IP design.

2.8 For each scenario, the following workbooks are to be submitted to MAS:

	Basis 1	Basis 2A	Basis 2B
Base Scenario	MAS_QIS2.xlsx (workbook has already been provided on 15 July 2016)	MAS_QIS2_MA_IP.xlsx MAS_MA_2.0.xlsx	MAS_QIS2_MA_IP.xlsx MAS_MA_2.0.xlsx
Scenario 1 Credit spread widens	MAS_QIS2_Simplified.xlsx		MAS_QIS2_MA_IP.xlsx MAS_MA_2.0.xlsx
Scenario 2 UFR moves down	MAS_QIS2_Simplified.xlsx		
Scenario 3 Risk-free rates move up	MAS_QIS2_Simplified.xlsx		
Scenario 4 Risk-free rates move down	MAS_QIS2_Simplified.xlsx		

2.9 Each workbook submitted should be labelled with the name of the insurer as the prefix and “_Sce X_Basis Y” as the suffix, where X denotes the scenario and Y denotes the basis in which the results are calculated. For example, the workbook MAS_QIS2_MA_IP.xlsx for Scenario 1 Basis 2B for insurer ABC should be labelled as ABC_MAS_QIS2_MA_IP_Sce 1_Basis 2B.xlsx.

2.10 The workbooks must not be modified in any way other than that specified in the instructions within the Workbook. **In addition to the workbooks, insurers are required to complete the Supplementary Questionnaire.** Any material assumptions made should be disclosed in the Supplementary Questionnaire.

2.11 The completed workbook(s) and Supplementary Questionnaire should be submitted to MAS no later than **20 October 2016**. Insurers are strongly encouraged to send all QIS-related queries to QIS_2@mas.gov.sg. **The submitted results are to be based on the valuation date of 31 December 2015.** All amounts are to be shown in thousands of Singapore dollars (SGD).

2.12 **The workbooks and supplementary questionnaire should be submitted by the insurer via an email attachment to the insurer’s liaison officer in MAS, using AES 256 encryption or higher.** The insurers should deliver the corresponding alphanumeric password of minimum 12 characters in length or encryption key via a separate transmission channel (e.g. telephone) to MAS. MAS uses WinZip12 AES 256 encryption to protect such information.

3. DETERMINATION OF MATCHING ADJUSTMENT AND ILLIQUIDITY PREMIUM

Matching Adjustment

3.1 The rationale and operation of the MA and IP are explained in the third consultation paper. The criteria for the MA is specified in Annex C of the third consultation paper. For the purpose of QIS 2, MAS has updated the eligibility criteria following further consultation with SAS. See **Appendix 3** for the updated criteria, with updates marked up as red underlined text.

3.2 Flexibility is provided to structure MA portfolios according to specific investment pools. Insurers can define the assets and liabilities to be included within each investment pool. However, the MA portfolios in an insurance fund should at least be segregated⁸ by the Form 14 classification i.e. Whole Life, Endowment, Annuity, or Others⁹. This would be the minimum level of granularity¹⁰ that is allowed in the Excel workbook for Basis 2. The predictability test for the MA should be applied at the level of the MA portfolio¹¹. SGD- and USD-denominated products may be included into the same MA portfolio.

3.3 As the assets and liabilities within each MA portfolio should be explicitly identified and managed separately from the other assets in the insurance fund, each MA portfolio should have sufficient assets to meet both the guaranteed and non-guaranteed benefits of the products within the portfolio¹². MAS will work together with the industry to specify and operationalise the wider set of requirements for the MA portfolio after QIS 2. For the purpose of QIS 2, however, the requirements specified below apply to the liabilities for guaranteed benefits of the products within the MA portfolio and the assets backing these liabilities within the MA portfolio.

⁸ This safeguard is introduced to mitigate the impact of the inability to maintain the MA portfolio later (e.g. due to the lack of available assets or if the MA portfolio is no longer able to meet the predictability criteria). Failure to maintain the MA portfolio would result in disqualification of the portfolio from MA for the next 24 months.

⁹ Others would include Term and A&H reported in Form 14.

¹⁰ Insurers can construct more granular MA portfolios i.e. there can be multiple MA portfolios within an insurance fund for a given product type. For different product types, however, for example Whole Life and Endowment products, they would not be allowed in the same MA portfolio.

¹¹ This contrasts with the data collection exercise in June 2016 where the predictability test was applied at the product level as it was necessary to ensure that the calibration of the predictability test is sufficiently robust.

¹² For example, equities and other assets may be needed to support the non-guaranteed benefits for participating products within the MA portfolio.

3.4 **Predictability will be evaluated based on the aggregate change in the Best Estimate Liabilities (“BEL”) of the MA portfolio, measured against future cash outflows [i.e. Change in BEL/Present Value of Benefits and Expenses], to avoid distortion by small or negative best estimate liabilities in response to the following shocks¹³:**

- (a) Mortality;**
- (b) Longevity;**
- (c) Disability;**
- (d) Dread Disease;**
- (e) Other Insured Events; and**
- (f) Lapse.**

The BEL for non-participating products is the sum of the liabilities for guaranteed benefits corresponding to the products, before the application of the Provision of Adverse Deviations (“PAD”) and is allowed to be negative.

The BEL for participating products is based on guaranteed benefits i.e. the sum of the minimum condition liabilities, before the application of the PAD and is allowed to be negative.

The magnitude of the shocks to be applied shall be the same as the corresponding C1 risk factors set out in Annex K of the third consultation paper. The same correlation matrix used to determine the diversified C1 requirements for life business is to be used to determine the net increase in BEL.

3.5 To qualify for the MA, the MA portfolio as a whole should meet the predictability criteria using the above evaluation method. For QIS 2, a **predictability threshold of not more than 8.00%¹⁴ is to be used, i.e. Change in BEL/Present Value of Benefits and Expenses \leq 8.00%.**

3.6 A consultation question is included in the Supplementary Questionnaire seeking feedback from insurers on the minimum granularity of MA portfolios.

¹³ Expenses have been excluded for simplicity, as this is usually within the control of the insurers. Moreover, its impact is immaterial. Likewise, conversion option is excluded due to its immaterial impact.

¹⁴ The 8% threshold was chosen to allow for a comparable proportion of products qualifying for MA at the industry level, with the 20% threshold proposed in the second consultation of the RBC 2 Review, where the denominator used in the predictability test was BEL. MAS calibrated this revised threshold based on the data collected data from insurers in June 2016.

3.7 Compared with the cash flow matching criteria proposed in QIS 1 and the second consultation paper of the RBC 2 review, **the revised criteria in Appendix 3 only requires cash flow matching in the first 20 years following each valuation date**. This modification was made taking into account the availability of long-dated bonds in Singapore, whilst at the same time ensuring that a reasonable cash flow match can be implemented to reduce the risk of forced asset sales to meet unexpected claims. In addition, excess cash flows that may arise in a particular year can also be brought forward to meet later year shortfalls, but the MA portfolio yield will be adjusted to be consistent with the “revised” asset cash flows. **Appendix 4** includes an example on how the MA portfolio yield should be adjusted. The adjustment in yield is necessary as the pattern of the cash flows is now changed.

3.8 **The MA for a particular MA portfolio is determined as the average yield of the assets backing the liabilities for guaranteed benefits over the average risk-free liability discount rate, less the spreads for default and downgrade**. The calculation of the MA is automated in the workbook MAS_MA_2.0.xlsx.

Illiquidity Premium

3.9 The IP operates in a similar manner to MA, and is intended to be applied to products that have a lower level of cash flow predictability than the MA, or where the insurer is unable or unwilling to meet the more stringent requirements under the MA. The framework for the IP is provided in Annex E of the third consultation paper, and is also reproduced in **Appendix 5**, with some updates on the parameters.

3.10 Based on the asset data collected from insurers (as listed in **Appendix 1**), MAS has calibrated the IP based on a Reference Portfolio of SGD- and USD- denominated bonds of at least investment grade¹⁵ held by the industry in the participating fund and non-participating fund. For QIS 2, the IP applicable for the Reference Portfolio was determined to be 45bps, and applies to both Qualifying Debt Securities and Other Debt Securities¹⁶. This calibration of the IP was based on 40% of the Reference Spread, and is further explained in **Appendix 6**.

3.11 MAS has specified the calibrated IP for both Qualifying Debt Securities and Other Debt Securities. The actual fund level IP applicable to insurers should be calculated at the insurance fund level by the insurer taking into account the actual asset composition of the fund as at 31 December 2015 per the audited Form 1. This calculated fund level IP should

¹⁵ Including multilateral agencies and Singapore statutory boards.

¹⁶ The IP for Other Debt Securities is limited to that for Qualifying Debt securities to mitigate the risk of insurers increasing the proportion in lower rated debt securities in the Reference Portfolio.

then be applied to the risk-free discount rate for all eligible products in the insurance fund. An example of how the fund level IP should be determined is provided in **Appendix 6**.

Asset Data Collection for Illiquidity Premium

3.12 Under Bases 2A and 2B, insurers are requested to submit QIS 2 results incorporating the MA and IP. The creation of MA portfolios by insurers is likely to change the composition¹⁷ of the Reference Portfolio that was used to calibrate the IP for QIS 2. The IP may need to be re-calibrated in the future to take into account changes in the composition of the Reference Portfolio.

3.13 To assess the impact of potential changes to the IP arising from the introduction of the MA, MAS is likely to conduct a second round of IP calibration. This would be done at a later stage, after the framework for the MA has been substantially firmed up.

¹⁷ For example, moving longer dated bonds to MA portfolios to satisfy the cash flow matching requirement for MA may result in a shortening in the overall duration of the remaining bonds which may impact the calibration of the IP.

4. IMPACT OF MATCHING ADJUSTMENT AND ILLIQUIDITY PREMIUM ON RISK REQUIREMENTS AND REGULATORY ADJUSTMENT

4.1 The C1, C2 and operational risk requirements as well as any negative reserves recognised as regulatory adjustment, should be computed assuming that both MA and IP do not apply¹⁸, other than an adjustment to the C2 credit spread risk requirement arising from the application of the MA. However, the minimum condition liability of the participating fund used in the calculation of the allowance for provision for non-guaranteed benefits (“APNGB”) of a participating fund should be determined taking into account the MA and IP.

4.2 For portfolios where the MA is applied, the C2 credit spread risk requirement can be reduced by a modified MA. The modified MA should be calculated based a percentage of the credit spread adjustment applicable to the assets within an MA portfolio. This modified MA will then be added to the risk-free discount rate used in valuing liabilities for guaranteed benefits. The overall impact is a lower C2 credit spread risk requirement of the MA portfolio due to the reduction in liabilities for guaranteed benefits.

4.3 The modified MA, (“ MA’ ”) is to be calculated as follows:

$$MA' = \sum W_i * F_i * CS_{adj\ i} \text{ where;}$$

W_i is the weight corresponding to the proportion of bonds in rating and duration band category i ; and

F_i is the adjustment factor for rating and duration band category i . For the purpose of this QIS, the adjustment factor is set at 80% for bonds with AAA, AA and A credit ratings, and 50% for assets with BBB credit rating; and

$CS_{adj\ i}$ is the credit spread adjustment for rating and duration band category i (as prescribed in paragraph 4.9 of Annex K of the third consultation paper)

¹⁸ There is a risk that the MA portfolio may ‘break’, due to either qualifying assets or liabilities within the portfolio falling out of the eligibility criteria over time, or that unexpected stress events may occur, necessitating early realisation of the assets. Similarly, the IP is a more generic adjustment to address the illiquidity of insurance liabilities. It is therefore reasonable and prudent that the risk charging be done on the basis that the MA and IP do not apply. However, since the purpose of the MA is to mitigate the volatility of the insurer’s solvency position to changes in credit spreads, some allowance can be given to reduce the insurer’s credit spread risk requirement.

The values of $CS_{adj\ i}$ and F_i are provided in the following table:

Credit Rating	Maturity (years)	$CS_{adj\ i}$ (bps)	F_i
AAA	[0, 5]	105	80%
AA	[0, 5]	120	80%
A	[0, 5]	165	80%
BBB	[0, 5]	245	50%
AAA	[5.001, 10]	95	80%
AA	[5.001, 10]	115	80%
A	[5.001, 10]	145	80%
BBB	[5.001, 10]	230	50%
AAA	[10.001, 15]	90	80%
AA	[10.001, 15]	95	80%
A	[10.001, 15]	125	80%
BBB	[10.001, 15]	215	50%
AAA	>15	90	80%
AA	>15	95	80%
A	>15	125	80%
BBB	>15	215	50%

4.4 Please note that the derivation of the MA' has been built into the workbook MAS_MA_2.0.xlsx.

Treatment of Diversification

4.5 The assets and liabilities within each MA portfolio should be explicitly identified and managed separately from the other assets in the Insurance fund, to ensure that they are not exposed to the risk of forced sale to support other liabilities. The benefits of diversification for each MA portfolio are therefore limited to diversification within the MA portfolio only. This has been taken into account in the workbook MAS_QIS2_MA_IP.xlsx.

5. OTHER CONSIDERATIONS

Safeguards to Meet Financial Resources

5.1 The MA and IP would reduce the liabilities for guaranteed benefits¹⁹. As a result, the fund solvency and capital adequacy position of the insurer are likely to increase²⁰. In order to avoid reliance on MA and IP to meet minimum solvency requirements, the financial resources of each insurance fund and for company as a whole should at least meet the MCR at the respective fund and company levels. However, as the MCR will only be calibrated at a later stage, this potential safeguard can be revisited once the MCR is calibrated.

5.2 Question 9 in the third consultation paper seeks views on the proposed safeguard to require financial resources to meet at least 100% of MCR before²¹ the application of the MA and IP.

Validation of the MA and IP

5.3 MAS would like to encourage insurers to engage their external auditors at an early stage with regard to the application of the MA and IP proposals as external auditors will be expected to review and validate the MA and IP results in future after RBC 2 is implemented.

¹⁹ This may not be the case if there are negative reserves.

²⁰ This is due to potentially lower policy liabilities in the non-participating fund, and potentially higher APNGB in the participating fund.

²¹ Please note that there is a typographical error in question 9 of the third consultation paper. The proposed safeguard is on whether financial resources “before” the application of MA and IP should at least meet 100% of MCR. This has been updated in the errata on the MAS website.

Appendix 1**DIRECT LIFE INSURERS PROVIDING DATA FOR THE CALIBRATION OF MA AND IP**

1. AIA Singapore Pte. Ltd.
2. Aviva Ltd
3. AXA Life Insurance Singapore Private Limited
4. Etiqa Insurance Pte. Ltd.
5. The Great Eastern Life Assurance Company Limited
6. HSBC Insurance (Singapore) Pte. Ltd.
7. Life Insurance Corporation (Singapore) Pte. Ltd.
8. Manulife Singapore Pte. Ltd.
9. NTUC Income Insurance Co-operative Limited
10. Prudential Assurance Company Singapore (Pte) Limited
11. Tokio Marine Life Insurance Singapore Ltd.
12. Transamerica Life (Bermuda) Ltd. (Singapore Branch)

Appendix 2

DETAILS OF ASSUMPTIONS AND SHOCKS TO BE APPLIED FOR EACH SCENARIO

The relevant details of each scenario and the shocks applicable to each scenario are provided below.

	Details
Base Scenario	<p><u>Basis 1</u> As set out in Annex K of the third consultation paper.</p> <p><u>Basis 2A</u> (a) MA based on the design described in Section 3 of this document (including the predictability threshold of 8%); and/or (b) IP based on the design described in Section 3 of this document (including IP being calibrated as a spread²² of 45bps for Qualifying Debt Securities and Other Debt Securities).</p> <p><u>Basis 2B</u> Same as Basis 2A, except where the IP level is 150% of that assumed under Basis 2A, i.e. IP is 65bps²³ for Qualifying Debt Securities and Other Debt Securities.</p>
Scenario 1 – Credit Spread widens	<p><u>Basis 1</u> An upward shock of 150 bps on corporate spreads.</p> <p><u>Basis 2B²⁴</u> (a) An upward shock of 150 bps on corporate spreads; (b) MA is increased²⁵ by 150 bps from that used in Base Scenario; (c) Modified MA i.e. MA' used in the calculation of the C2 credit spread risk requirement should be recalculated by increasing the credit spread adjustments used in Base Scenario by 150 bps; and (d) IP of 155bps²⁶ for Qualifying Debt Securities and Other Debt Securities.</p>

²² Based on a k-factor of 40% for the Reference Portfolio. Please refer to **Appendix 6** for the determination of the k-factor.

²³ Based on approximately 150% of the k-factor.

²⁴ Basis 2B (and not Basis 2A) is selected for Scenario 1 as it is easier to see the impact of credit spread widening on a higher IP level. Please note that the IP level assumed in Basis 2B should not be construed as the eventual level of the IP.

²⁵ An implicit simplifying assumption was made that the spread for default and downgrade remains unchanged in the stress scenario. This simplifying assumption is not unreasonable as the spread for default and downgrade provided for the base scenario are based on long term probabilities of default and long term transition matrix from Standard & Poors. Assuming no change in the asset composition of the MA portfolio, the MA used by insurers would be increased by the same magnitude as the credit spread shock.

²⁶ The IP for Qualifying Debt Securities and Other Debt Securities is increased by $60\% * 150 = 90$ bps from Base Scenario, with 60% being the k-factor for the Reference Portfolio.

Scenario 2 – UFR moves down	<p><u>Basis 1</u> A downward shock of 50bps is applied to the UFR.</p> <p>Please refer to the workbook QIS 2_Discount Rates for SGD and USD_All Scenarios.xlsx for the actual set of discount rates (i.e. insurer does not need to separately determine the discount rates).</p>
Scenario 3 – Risk-free rates move up	<p><u>Basis 1</u> A parallel upward shock of 50 bps is applied on the risk-free yield curve. For discount rates, the upward shock is applied only up to the LLP.</p> <p>Please refer to the workbook QIS 2_Discount Rates for SGD and USD_All Scenarios.xlsx for the actual set of discount rates (i.e. insurer does not need to separately determine the discount rates).</p>
Scenario 4 – Risk-free rates move down	<p><u>Basis 1</u> A parallel downward shock of 50 bps is applied on the risk-free yield curve. For discount rates, the downward shock is applied only up to the LLP.</p> <p>Please refer to the workbook QIS 2_Discount Rates for SGD and USD_All Scenarios.xlsx for the actual set of discount rates (i.e. insurer does not need to separately determine the discount rates).</p>

Note: As the actual IP takes into account the insurer's actual asset allocation, the determination of the actual discount rates to be used at the fund level is to be done by the insurer. The resulting fund-level IP should be added to the entire discount rate curve for Basis 1 of the Base Scenario. Insurers are requested to provide the fund level IPs for each applicable insurance fund in the workbook MAS_QIS2_MA_IP.xlsx.

Appendix 3

ELIGIBILITY CRITERIA TO BE MET FOR APPLYING MATCHING ADJUSTMENT

The eligibility criteria for MA was presented in Annex C of the third consultation paper. For the purpose of QIS 2, updates have been made to the eligibility criteria, and are shown as red underlined text. For avoidance of doubt, the requirements below apply to the liabilities for guaranteed benefits and the assets backing the liabilities for guaranteed benefits.

Conditions	Specified in the Second Consultation	Revised Conditions for Third Consultation
Eligible Assets	<p>The following assets are eligible:</p> <ul style="list-style-type: none"> • SGS or SGD corporate bonds of investment grade quality²⁷; • US treasury securities or USD corporate bonds of investment grade quality; and • Cash denominated in SGD or USD. 	<p>No change except to allow for USD Treasury Securities or USD corporate bonds to back SGD liabilities, subject to the insurer putting in place a suitable currency swap to convert the resulting USD payments to SGD cash flows.</p> <p>In the absence of a currency swap, a 12% haircut²⁸ in cash flows would be imposed in the assessment of the cash flow mismatch test below.</p>
	Eligible assets should have only fixed cash-flows (in terms of timing and currency) and no issuer options (such as call or put options).	Propose to only recognise cash flows before 1st call in cash flow matching criteria.
	Bonds with credit rating from BBB- to BBB+ will be limited to 30% of the total eligible assets.	The limit of 30% has been removed.

²⁷ SGD debt securities issued by Singapore Statutory Board are also allowed to be recognised as an eligible asset, and for the purposes of the MA, be treated as having a “AAA” credit rating.

²⁸ Consistent with the foreign currency mismatch charge proposed under RBC 2.

Conditions	Specified in the Second Consultation	Revised Conditions for Third Consultation
	Eligible assets are to be explicitly identified and managed separately from the other assets in the Insurance fund, to ensure that they are not exposed to the risk of forced sale to support other liabilities.	No change. Details of how this can be done can be addressed at a later stage.
Eligible products	Products denominated in SGD or USD will be eligible for the MA.	No change.
	<p>All life products that have predictable cash flows from risks arising from mortality, lapse, disability, dread disease and other insured events are eligible.</p> <ul style="list-style-type: none"> • Predictability will be evaluated based on tests which measure the change in the best estimate liabilities after applying specified insurance C1 shocks on mortality, lapse, disability, dread disease, and other insured events. • The resulting total increase in best estimate liabilities from the shocks must not be more than x% (to be calibrated). • For participating products, the predictability test is to be applied on the liabilities for guaranteed benefits. 	<p>Predictability test to be applied annually to ensure liabilities remain eligible.</p> <p><u>Flexibility is provided to structure MA portfolios according to specific investment pools. Insurers can define assets and liabilities in each investment pool. However, the MA portfolios in an insurance fund should at least be segregated by the Form 14 classification i.e. Whole Life, Endowment, Annuity, or Others. This would be the minimum level of granularity²⁹ that is allowed in the Excel workbook for Basis 2. SGD and USD denominated products may be included into an MA portfolio.</u></p> <p><u>For clarity, ILPs are excluded from the scope of the MA.</u></p> <p><u>Predictability will be evaluated based on the aggregate change in the Best Estimate Liabilities (“BEL”) of the MA portfolio, measured against future cash outflows [i.e. Change in BEL/Present Value of Benefits and Expenses], to</u></p>

²⁹ Insurers can construct more granular MA portfolios i.e. there can be multiple MA portfolios within an insurance fund for a given product type but for example, Whole Life and Endowment products would not be allowed in the same MA portfolio.

Conditions	Specified in the Second Consultation	Revised Conditions for Third Consultation
		<p><u>avoid distortion by small or negative best estimate liabilities in response to the following shocks:</u></p> <ul style="list-style-type: none"> (a) <u>Mortality;</u> (b) <u>Longevity;</u> (c) <u>Disability;</u> (d) <u>Dread Disease;</u> (e) <u>Other Insured Events; and</u> (f) <u>Lapse.</u> <p><u>The BEL for non-participating products is the sum of the liabilities corresponding to the products, before the application of the PAD and is allowed to be negative.</u></p> <p><u>The BEL for participating products is based on guaranteed benefits i.e. the sum of the minimum condition liabilities, before the application of the PAD and is allowed to be negative.</u></p> <p><u>The magnitude of the shocks to be applied shall be the same as the corresponding C1 shocks. The same correlation matrix used to determine the diversified C1 requirements for life business is to be used to determine the net increase in BEL.</u></p> <p><u>To qualify for the MA, the MA portfolio as a whole should meet the predictability criteria using the above evaluation method. For QIS 2, a predictability threshold of not more than 8.00% is to be used, i.e. Change in BEL/Present Value of Benefits and Expenses \leq 8.00%.</u></p>

Conditions	Specified in the Second Consultation	Revised Conditions for Third Consultation
	The best estimate liabilities for the eligible products should be net of reinsurance ceded.	No change.
Constraints on extent of cash flow mismatching	The cash flows from the eligible assets are required to adequately match the net liability cash flows in each future year of projection. A maximum cash flow shortfall of 15% in aggregate is allowed.	<p>Cash flow matching to be required only in the first 20 years following each valuation date.</p> <p>Excess cash flows from the matching assets over liabilities can be rolled forward (i.e. reallocated) to meet shortfalls in later years but the yield of the MA portfolio used to determine the MA will be adjusted accordingly. <u>An example has been included in Appendix 4 to illustrate how the yields should be adjusted³⁰ due to the reallocation of excess cash flows to subsequent years. The impact of excess cash flow reallocation is taken into account in the calculation of MA in the workbook MAS MA 2.0.xlsx.</u></p> <p>The maximum cash flow shortfall of 15% in aggregate is retained.</p>
Other Criteria	<p>The MA is the single additional spread of the weighted average yield-to-maturity of the asset portfolio over the average risk-free liability discount rate, less the spread for default and downgrade:</p> <ul style="list-style-type: none"> The spread for default and downgrade will be prescribed by MAS and captures the cost of default and the cost associated 	<p>[Minor changes to reflect the way the MA is determined in QIS 2]</p> <p><u>For a particular MA portfolio, the MA is determined as the average yield of the assets backing the liabilities for</u></p>

³⁰ The key risk is that excess cash flows in earlier years may not be available to meet shortfalls in later years. This can happen for example, if the excess cash flows were not maintained in cash but were instead invested in instruments such as corporate bonds. This may then require such bonds be liquidated at some point in the future to meet the expected cash flow shortfalls (or part of it), which exposes the insurer to market risk or credit spread fluctuations. The adjustment to the yield of the MA portfolio is then made to reflect this risk.

Conditions	Specified in the Second Consultation	Revised Conditions for Third Consultation
	<p>with maintaining the credit quality of the asset portfolio should a downgrade occur.</p>	<p><u>guaranteed benefits over the average risk-free liability discount rate, less the spread for default and downgrade.</u></p> <p>The party responsible for calculating and updating the spread (i.e. MAS or industry association(s)) for default and downgrade can be further discussed once the MA framework is reasonably finalised.</p>
	<p>The spread for BBB assets will be constrained to the highest of the calculated assets for AAA, AA and A rated assets.</p>	<p>No change.</p>
	<p>No “cherry picking” - insurers that choose to apply the MA to a portfolio of eligible products will not be allowed to revert to the approach that does not include the MA:</p> <ul style="list-style-type: none"> • Where an insurer that applies the MA is no longer able to comply with the conditions, it should take the necessary steps to restore compliance within a period of three months. Beyond that period, it shall cease applying the MA and will only be allowed to apply the MA again after a period of 24 months. 	<p>No change.</p>

Appendix 4

EXAMPLE OF ROLLOVER OF SURPLUS TO LATER YEARS AND IMPACT TO MA PORTFOLIO YIELD

In the first example below, there is a surplus cash flow in year 5 of \$950. The second example allows for this surplus to be reallocated to meet future cash flow shortfalls of 100 per year from year 6 - 10. Costs of default and downgrade are ignored in this example. Similarly, premium income from liability cash flows can be reallocated to meet future shortfalls.

Example 1: No rolling forward of excess

		Cash Flows \$										
	Yield	Value	1	2	3	4	5	6	7	8	9	10
Asset Cash Flow	2.83%	-1500	50	50	50	50	1,050	100	100	100	100	100
Liability Cash Flows	1.17%	-1200	50	50	50	50	100	200	200	200	200	200
Excess	1.66%		0	0	0	0	950	-100	-100	-100	-100	-100

Example 2: Allow rolling forward of excess

		Cash Flows \$										
	Yield	Value	1	2	3	4	5	6	7	8	9	10
Asset Cash Flow			50	50	50	50	1,050	100	100	100	100	100
Adj Asset Cash Flows	2.45%	-1,500	50	50	50	50	550	200	200	200	200	200
Liability Cash Flows	1.17%	-1,200	50	50	50	50	100	200	200	200	200	200
Excess			0	0	0	0	450	0	0	0	0	0
MA	1.28%	= Adjusted Asset Yield (i.e. 2.45%) - Liability Yield (i.e. 1.17%)										

Allow surplus cash flow at time 5 to be rolled over

Appendix 5

PROPOSED FRAMEWORK FOR IP

The framework for the IP was presented in Annex E of the third consultation paper. For the purpose of QIS 2, the k-factor to be applied to the Reference Spread is 40%. For the purpose of QIS 2, updates have been made to the eligibility criteria, and are shown as red underlined text.

Please refer to Appendix 5 for more information on how the k-factor is determined.

Eligibility	<p><u>For direct life business, all SGD- and USD- denominated products classified as Whole Life, Endowment, or Annuity in Form 14 are eligible. ILPs are not eligible.</u></p> <p><u>For life reinsurance business, the IP should only be applied to reinsurance arrangements that exhibit similar characteristics as the direct life insurance products (e.g. Whole Life, Endowment and Annuity Products) that qualify for IP (see note 3 of paragraph 2.2).</u></p>
Illiquidity Premium ("IP")	To be specified as <u>40%</u> of the Reference Spread , subject to a possible cap.
Determination of Reference Spread	<p>The Reference Spread ("RS") will be determined based on the average credit spread of a notional Reference Portfolio of assets. It consists of the spread from the Reference Portfolio less costs associated with credit risks i.e. cost of default, and floored at zero.</p> <p>The cost of default is consistent with those used in the calibration of the MA.</p> <p>RS = Average Corporate Spread from Reference Portfolio, adjusted for Cost of Default</p> <p>The Reference Portfolio is determined based on the holding pattern of investment grade bonds held by industry. To smooth the yearly fluctuations, the Reference Portfolio may take into account bond compositions over the past years. The use of a shorter period would give more weight to recent economic environment, whilst a longer period would produce a more stable IP.</p> <p>The Reference Portfolio can be updated at appropriate frequency, e.g. every <u>X years</u>, or as required by MAS, to ensure that it remains relevant. The frequency chosen should balance the objectives of risk</p>

	<p>responsiveness and the effort required to update the Reference Portfolio.</p> <p>A cap of Y% would be applied to the IP to remove the effects of extreme or anomalous market movements.</p>
Impact of IP on Valuation Framework	<p>IP will be the spread added to the valuation discount rate.</p> <p>The IP will not vary by duration, and will apply to the entire valuation curve.</p> <p>The IP will not be applicable to products where the MA is applied.</p>
Impact to Capital Requirements	<p>Overall, the IP would not affect the calculation of the total risk requirements.</p>
Other Comments	<p>The procedures for updating the IP (including the frequency of update) in the future will be decided later once the elements of the framework has been reasonably finalised. In general, it is important to strike an appropriate balance between risk sensitivity (e.g. updating the IP at a higher frequency) and practicality (e.g. cost and effort in updating the IP).</p>

Parameters in grey highlights are subject to further fine-tuning after QIS 2.

Appendix 6**CALIBRATION OF THE IP AND DERIVATION OF THE FUND LEVEL IP**

1 To make the calibration of IP more meaningful, MAS collected data from life insurers listed in **Appendix 1**, which were offering participating and non-participating products, in June 2016. Information was collected, amongst others, on the yields on existing corporate bonds, which are of investment grade and above (including multilateral agencies and Singapore statutory boards) denominated in SGD and USD.

2 The Reference Portfolio was based on the collective portfolio of bonds which are of investment grade and above, held at the industry level, as provided by the insurers listed in **Appendix 1**.

3 The IP for the Reference Portfolio was determined as k% of the Reference Spread. The Reference Spread is the average credit spread (over the corresponding yield of government securities of a matching duration) of the Reference Portfolio after deducting the spread for default³¹, and floored at zero. Haircuts were subsequently applied to account for the following:

- (a) Basis risk arising from the difference between the actual compositions of investment grade bonds held by any insurer and the Reference Portfolio; and
- (b) Allowance for a higher level of liquidity in products eligible for the IP (as compared to MA).

4 **Based on analyses of the data collected, the haircut was determined to be around 60%, and hence the proposed k-factor to be used in QIS 2 is 40%.**

5 **The Reference Spread for corporate bonds held in the participating and non-participating funds combined was determined to be 110bps.**

6 **The IP for the Reference Portfolio is hence $40\% * 110 = 44\text{bps}$, or 45bps rounded to the nearest 5bps.**

7 The final fund level IP to be applied by insurer should be calculated by the insurer based on the actual asset allocation as shown in the insurer's audited Form 1 as at 31 December 2015. The following example illustrates how the fund level IP is determined.

³¹ The spread for default is the same with that used in MA.

	Participating Fund		Non-Par Fund	
	Values (\$m)	Spread (%)	Values (\$m)	Spread (%)
Qualifying Debt Securities	48.0	0.45%	30.0	0.45%
Other Debt Securities	5.0	0.45%	3.0	0.45%
Government Debt Securities	20.0	0	6.0	0
Equity securities	20.0	0	1.0	0
Land and buildings	5.0	0	0.2	0
Loans	3.0	0	0.2	0
Other invested assets	1.0	0	0.1	0
Investment income due or accrued	0.5	0	0.3	0
Outstanding premiums and agents' balances	0.5	0	0.8	0
Deposits withheld by cedants	-	0	-	0
Reinsurance recoverables (on paid claims)	0.2	0	0.1	0
Income tax recoverables	-	0	-	0
Fixed assets	1.0	0	0.5	0
Inter-fund balances and intra group balances (due from)	0.2	0	0.5	0
Other assets	0.6	0	0.8	0
Fund Level IP (Weighted Average)	105.0	0.23%	43.5	0.34%

8 From the example above, the fund level IPs are 23bps and 34bps for the participating fund and non-participating fund respectively. The fund level IPs are to be added to the risk-free discount curve in valuing the liabilities for guaranteed benefits for eligible products.