

# Asia e-Alert



17 August 2017

## Hong Kong RBC – First Quantitative Impact Study

### Introduction

On 28 July 2017, the Insurance Authority (IA) of Hong Kong released the technical specifications for the First Quantitative Impact Study (QIS1) associated with its new Risk-based Capital regime (HKRBC). Following the release of these specifications, life insurance companies in Hong Kong have been “strongly encouraged” by the IA to submit QIS1 results by 1 December 2017. The IA has specifically pointed out that the objectives of QIS1 are mainly to collect data related to the economic balance sheet, assess the impact of the change from the current statutory basis to a more economic basis, and identify the key risks faced by the industry.

In this e-Alert, we give an overview of the HKRBC framework development to date and comment on some of the key issues that may have a material impact on the industry.

### Overview of HKRBC

HKRBC has the following key characteristics:

#### - **Economic balance sheet framework**

In order to better align Hong Kong’s regulations with the Insurance Core Principles (ICP) issued by the International Association of Insurance Supervisors, the proposed rules set out in QIS1 use an economic balance sheet approach, where assets and liabilities are valued on a market consistent economic basis. Under this approach, the actual risks faced by insurers are reflected on a fair value basis.

In practice, assets are measured on a market value basis, without taking into account any goodwill or intangible assets (unless the intangible assets could be sold separately). Liabilities are valued using best estimate, probability-weighted cash flows without any margin for prudence embedded in the actuarial assumptions.

No adjustment for non-hedgeable risks (also called “risk adjustment”, “risk margin” or “margin on current estimate” (MOCE)) has been considered in QIS1. However, this additional adjustment for risk is likely to be developed as a next step using either a cost of capital approach (similar to Solvency II) or a provision for adverse deviation approach (similar to most of the other RBC regimes in Asia).

Any options and guarantees not previously allowed for under the current statutory basis set out in the Insurance Companies Ordinance (Cap. 41) should be captured under HKRBC.

#### - **Risk-based capital framework**

Another element widely regarded as an improvement to the current statutory basis is that the required solvency capital will be determined according to the risk profile of the insurer’s assets and liabilities.

Similar to many other RBC regimes, HKRBC follows a modular approach whereby the material risks that an insurer is exposed to are divided into various risk modules and sub-modules. The risk charges associated with each of the risk modules and sub-modules are calculated independently using either a stress-based approach or a factor-based approach, with a correlation matrix then applied.

The various modules used in the analysis are broadly in line with those considered in other RBC regimes, and include market risk, credit default risk, long-term business underwriting risk, and operational risk.

#### - Step-by-step reconciliation of liabilities

The IA requires insurance companies to perform the following nine-step analysis of movement as of 31 December 2016 to better understand the impact of HKRBC:

Run step	Step setup	Description
1	Cap 41 basis	Begin with the valuation result as at 31 Dec 2016.
2	Gross Premium Valuation (GPV) basis	Assess the impact of going from a Net Premium Valuation (NPV) basis to a GPV basis.
3	Best estimate assumptions	Remove the provisions for adverse deviation under the assumptions.
4	New contract boundary	Switch to the contract boundary specified by HKRBC, which is the same as the one adopted under IFRS 17.
5	Discount rate – risk-free with adjustment	Assess the impact of using discount rate on a risk-free basis with illiquidity premium adjustment using the IA prescribed yield curves.
6	Include cost of options and guarantees	This is the basis specified under HKRBC and will be the base case for determining Prescribed Capital Requirement (PCR).
7	Additional sensitivity: Use discount rate – risk-free without adjustment	Quantify the impact of illiquidity adjustment.
8	Additional sensitivity: Apply cash surrender value floor to reserve	
9	Additional sensitivity: Apply zeroisation to negative reserve at policy level	

#### - Important areas not tested under QIS1

There are some important areas that are not specifically tested under QIS1 that the IA wants to investigate further before making policy decisions. While the correlation matrices among risk modules and sub-modules (and consequently the determination of deferred tax assets) will be considered by the IA at a later stage, companies have been provided with a questionnaire covering their current practices or operational details in the following areas:

- MOCE, reflecting the uncertainty in the current estimate of liability
- Tiering of capital assets based on quality
- Calibration of various risk charges
- Operational risk charge

These areas are likely to be covered in the next QIS (QIS2), which the IA currently plans to launch around mid-2018.

## Comments

### ***Conservative valuation of liabilities with a potential material impact on the industry***

Based on the framework outlined in QIS1, HKRBC appears to use a relatively conservative basis to value liabilities. This may have a material impact on the liability level and capital adequacy ratios of some insurers.

#### **- Market-consistent framework with inclusion of an illiquidity premium**

As HKRBC has been based on a market-consistent framework, insurance companies are required to use risk-free yield curves with adjustment for illiquidity premium to discount future cash flows when determining the best estimate of liabilities. The IA has allowed for an illiquidity adjustment reflecting the investments in illiquid assets with higher yields used by insurance companies to back longer-duration liabilities.

Two types of illiquidity premia are usually considered under Solvency II and some RBC regimes in Asia:

- (1) Matching adjustment, which allows insurers to fully reflect the illiquidity premium but usually only applies to a restrictive set of products (e.g., close match between assets and liabilities, no material asset risk, no lapse risk).
- (2) Volatility adjustment, which applies to all other products but only allows for a partial recognition of illiquidity.

Under HKRBC, only the volatility adjustment has been considered. Some lines of business potentially subject to a matching adjustment mechanism in other solvency regimes (e.g., annuities) could be penalised under HKRBC.

Whilst valuing liabilities using a market-consistent approach allowing for illiquidity premium is generally in line with other solvency regimes, it differs from the approach used in the current Malaysia RBC or Singapore RBC frameworks for participating and universal life products. The table below describes the approach followed in Singapore. This may have a potential impact on the relative attractiveness of Hong Kong when compared to other markets in the region, given participating and universal life products represent a material proportion of the new business sold in Hong Kong currently and companies may be required to hold higher reserves under HKRBC.

<b>Singapore RBC: Best estimate of liabilities</b>	
<b>Participating products</b>	<b>Universal life products</b>
<p>The best estimate of liabilities for participating products under Singapore RBC framework is calculated as the maximum between:</p> <p>(A) The present value of future guaranteed cash flows discounted using risk free rate</p> <p>(B) The present value of all future cash flows discounted using earned rate</p> <p>In addition, the liabilities are floored at the asset value of the par fund.</p>	<p>The best estimate of liabilities for universal life products under Singapore RBC framework is calculated as the maximum between:</p> <p>(A) The present value of all future cash flows projected at minimum guaranteed crediting rate and discounted at risk free rate</p> <p>(B) The present value of all future cash flows projected at current crediting rate and discounted using earned rate</p>

#### **- Inclusion of cost of options and guarantees**

HKRBC requires insurers to value the cost of financial options and guarantees embedded in the contracts.

The time value of financial options and guarantees (TVFOG) can be valued using various methodologies, including a stochastic approach and various proxy approaches. As the calculation of TVFOG is not required under the existing local statutory solvency requirement, insurers may need to spend extra effort to set up the functionality to perform such calculations. In particular, scenarios and parameters required for stochastic valuation are not prescribed under QIS1 and will need to be based on an insurer's own

internal methodology. For deterministic, analytical (i.e., closed-form formulae approach) and factor-based approaches, insurers will also need to choose their own scenarios or formulae. This may be onerous for companies that have not yet developed robust methodologies to determine the TVFOG.

The valuation of financial options and guarantees is also likely to have a material financial impact on some particular lines of business offering high guarantees (e.g., universal life, older participating business). This may also introduce a relatively higher reserve requirement for Hong Kong insurers, as most other RBC regimes in the region do not require insurance companies to calculate a TVFOG (e.g., Singapore, although we understand discussions are ongoing for universal life business), or require only partial recognition of the TVFOG using a factor-based approach calibrated for the whole industry (e.g., China).

#### - Impact from the prescribed yield curves

Throughout QIS1, participants are required to perform the impact study using the yield curves specified by the IA. The IA has specified that yield curves are to be derived based on an approach similar to that employed under Solvency II but using lower ultimate forward rate parameters for both US dollar (USD) and Hong Kong dollar (HKD) (as shown in the table below). Hence, when using the prescribed yield curves for discounting, there may be material differences between the results under Solvency II and HKRBC during QIS1. The difference, however, is expected to diminish going forward as the ultimate forward rates for HKD and USD under Solvency II are likely to reduce to 3.75% in 2020.

	Solvency II*	HKRBC
HKD	4.2%	3.5%
USD	4.2%	3.5%

\*Note: The ultimate forward rates for HKD and USD under Solvency II will be lowered to 4.05% starting from 1 January 2018, and likely to reach 3.75% in 2020, which is expected to lessen the gap between two frameworks going forward, but will have no impact for HKRBC QIS1 which is conducted as at 31 December 2016. (Refer to another Milliman briefing note for details on the revised ultimate forward rate methodology at: [link](#))

However, it should be noted that the illiquidity premium under HKRBC is applied to all maturities, whereas it is only applied until the last liquid point under Solvency II. In addition, the volatility adjustment is applied to both HKD and USD yield curves under HKRBC while it is only applied to USD yield curve under Solvency II. This will reduce some of the negative impact mentioned above depending on the portfolio mix of the insurer.

#### **Prescribed capital requirement framework in line with other major solvency regimes**

For QIS1, shock levels have been determined with reference to other regimes that use “Value-at-Risk (VAR) at a 99.5% confidence level over a one-year period” as a risk measure. As such, HKRBC contains risk drivers and shock levels that are comparable to many other regimes, including Solvency II, the proposed Singapore RBC2, and China’s C-ROSS. No estimation of risk charges based on Hong Kong-specific data has been performed.

The various risk modules and sub-modules used in HKRBC are broadly in line with those considered by most other RBC regimes in Asia and with Solvency II. Note that mortality catastrophe risk and mass lapse risk have been considered under HKRBC, while they are not always considered in other RBC regimes in Asia (e.g., mass lapse in Singapore). A detailed comparison on the methodology and shock levels is provided in Appendix A.

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## **Resource planning**

While QIS1 should be appreciated as an important and positive milestone in the development of HKRBC, it should also be noted that most of the specific rules are still subject to change once the IA has reviewed the QIS1 results. Given that full implementation will take time and is likely to put a strain on already stretched resources for many insurers, especially taking account of other demands (e.g., business-as-usual work, IFRS 17 implementation), companies will need to set out project plans and allocate sufficient resources as soon as possible.

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**Appendix A: Comparison on risk-based capital regimes**

Items		Hong Kong RBC (as per QIS1)	China C-ROSS Pillar 1	Europe Solvency II Pillar 1 (Standard Formula)	Singapore RBC2 (as per QIS2)
<b>Asset</b>	<b>Asset valuation</b>	Market value.	The value of long-term equity investment should follow equity accounting method. Other asset values follow China GAAP accounting basis, under which assets categorised as trading or AFS are valued on fair value basis and the other assets are valued on book value basis.	Fair value.	Fair value.
<b>Liability</b>	<b>Liability valuation</b>	Gross premium valuation.	Gross premium valuation.	Gross premium valuation.	Gross premium valuation.
	<b>Risk margin (PAD)</b>	Margin Over Current Estimate is not studied in QIS1.	Yes	Yes	Yes
	<b>Discount rate</b>	Base yield curve of USD, HKD, and Renminbi (RMB) is provided by IA; USD base interest rate curve is used for cash flows in other currencies. QIS1 base yield curve is the risk-free forward rate at valuation date, with an adjustment for liquidity. An ultimate forward rate of 3.5% for HKD/ USD and 6.8% for RMB is assumed at Year 60 for extrapolation.	Base interest curve with risk margin. The base curve is the 750-day moving average of the government bond yield curve. Higher risk margin of 70bps applies for high-interest rate guarantee products which were issued before 1999; lower risk margin of 30bps is applied for universal life, investment-linked, variable annuities, and high-cash-value products; medium risk margin of 45bps is applied to traditional, participating, and other business.	Swap curve rate plus an interest rate uplift, a volatility adjustment or matching adjustment depending on the product type and other qualifying criteria (see "Allowance to partially offset movement of asset price" below for further details).	Singapore government bond yield curve plus a matching adjustment or illiquidity premium for qualifying business lines (see "Allowance to partially offset movement of asset price" below for further details).
	<b>Cost of options and guarantees</b>	Yes - four approaches available, namely stochastic approach, deterministic approach, analytical approach, and factor approach.	Yes - factor-based approach.	Yes - stochastic evaluation.	No

Items		Hong Kong RBC (as per QIS1)	China C-ROSS Pillar 1	Europe Solvency II Pillar 1 (Standard Formula)	Singapore RBC2 (as per QIS2)
Market risk charge (C2 risk charge under RBC 2)	Interest rate risk charge	Interest rate risk up/down shocks are applied as a % change. Up shocks (ranging from 25% to 100%) are slightly more severe than the down shocks (ranging from -25% to -75%).	Interest rate up/down shocks are applied as a % change. The up shocks are slightly more severe than the down shocks.	Interest rate up/down shocks are applied as a % change. The up shocks and down shocks are quite symmetrical.	Interest rate up/down shocks are applied as a % change. The up shocks are slightly more severe than the down shocks.
	Equity risk charge	The equity risk charges are 38% for developed market listed equity, 48% for other equities, and 20% for strategic investments.	Different factors are applied for different types of equities: listed equity, unlisted equity, securities investment fund, convertible bond, and equity investment plan on infrastructure. Factors for equity risk charge range from 1% to 60%. Taking listed common stocks as an example, factors range from 23% to 60%.	The equity risk charge is 39% for type 1 exposure and 49% for type 2 exposure, and then there is a dampener of +/- 10% depending on the current position of the market relative to the expected trend.	Listed in developed markets: 40% Other equities: 50%
	Property risk charge	Generally using a factor-based approach, but a stress-based approach is applied if the assets do not respond linearly under equity shock. For assets responding linearly, 25% on all property assets.	Different factors are applied depending on method of valuation, variation of real estate market value, real estate's weight in total admitted asset, and location of the real estate. Factors for real estate risk charge range from 6% to 15%.	25% on immovable properties.	30% on immovable properties; 35% on collective investment schemes (CIS) invested in properties for investment purposes by applying a look-through approach; 55% flat on those properties not to or unable to adopt a look-through approach.
	Overseas asset risk charge	N/A	Risk for overseas assets is charged differently from risk for local sets. For overseas assets, different risk factors are applied to different asset types (overseas fixed income or overseas equity) and different Market types (developed market or emerging market).	N/A	N/A

Items		Hong Kong RBC (as per QIS1)	China C-ROSS Pillar 1	Europe Solvency II Pillar 1 (Standard Formula)	Singapore RBC2 (as per QIS2)
	<b>Currency mismatch risk charge</b>	Risk factor is applied to the net exposure by currency. The net exposure equals the difference of current estimate of liabilities and assets and floored by zero. Risk factor is 5% for HKD and USD and 25% on all other currencies. The total risk charge is the sum of the risk charge per currency.	Risk factor is applied to foreign currency net position (asset - liability). Risk factor is 3.5% for USD, 3.675% for euro & GBP, and 3.92% for other foreign currencies. The total risk charge is the arithmetic aggregation of risk charge on each foreign currency.	For each foreign currency, the risk charge is 25% of the absolute of the currency's net position. The total currency mismatch risk is the sum of risk charges of all foreign currencies.	12% of aggregate net position for both Singapore Insurance Fund (SIF) and Offshore Insurance Fund (OIF), less 10% and 20% concessions of the total value of assets for SIF and OIF, respectively.
	<b>Spread risk</b>	Fall under market risk. It is a factor shock based on credit rating and term to maturity of asset.	Spread risk falls in credit risk (not market risk) in C-ROSS. It is a factor shock that is based on credit rating and duration is applied on value of the credit risk exposure.	Spread risk falls in market risk under Solvency II. It is a factor shock that is based on credit rating and duration is applied on the value of the credit risk exposure.	Spread risk falls in C2 risk under RBC 2. It is a basis point credit spread and shock is applied based on credit rating and duration of the securities.
	<b>Diversification</b>	Correlation matrices among risk modules and among risk sub-modules are not provided in QIS1.	The market sub-risks are combined to an overall capital risk charge for market risk using a prescribed correlation matrix.	The market sub-risks are combined to an overall capital risk charge for market risk using a prescribed correlation matrix.	The market sub-risks are combined to an overall capital risk charge for market risk using a prescribed correlation matrix.
<b>Credit risk charge (C3 risk charge under RBC2)</b>	<b>Counterparty default risk</b>	A default risk charge based on credit rating of the counterparties.	Counterparty default risk is calculated as a factor shock based on asset type and credit rating applied to the value of risk exposure.	Calculated based on estimated "loss-given default" and probability of default (which are based on credit ratings).	A default risk charge based on credit rating and outstanding exposure is applied.
<b>Insurance risk charge (C1 risk charge under RBC2)</b>	<b>Mortality risk charge</b>	15% permanent increase in mortality rates; for products subject to both mortality and longevity risks, diversification within product is allowed.	10% to 20% shift upward to mortality rates depending on number of basic policies of life business.	15% shift upward to mortality rates.	20% shift upward to mortality rates.
	<b>Catastrophe risk charge</b>	+1.5 per 1,000 to mortality rates for the next 12 months.	+1.8 death per 1,000 to mortality for the next 12 months.	+1.5 death per 1,000 to mortality rates.	+1.0 death per 1,000 to mortality rates.
	<b>Longevity risk charge</b>	25% permanent decrease in mortality rates; for products subject to both mortality and longevity risks, diversification within product is allowed.	Shift downward to mortality rates based on future policy duration. Accumulated adjustment factor is used, annual decrease ratio is 3% for the first 5 years, 2% for years 6–10, 1% for years 11–20, 0% for years after 20.	20% shift downward to mortality rates.	25% shift downward to mortality rates.

Items		Hong Kong RBC (as per QIS1)	China C-ROSS Pillar 1	Europe Solvency II Pillar 1 (Standard Formula)	Singapore RBC2 (as per QIS2)
	<b>Morbidity risk charge</b>	30% permanent increase in accident & health morbidity rate; 30% permanent increase in critical illness rate; 20% permanent increase in other disability rates; 20% permanent decrease in recovery rates.	20% shift upward to morbidity assumptions, medical loss ratios, and other incident rates.	35% shift upward to disability/ morbidity rates in the first 12 months; +25% in second 12 months; +20% thereafter.	20% shift upward to disability rates; 40% shift upward to dread disease and other insured events if premium is guaranteed, and 30% shift upward if premium is not guaranteed.
	<b>Lapse risk charge</b>	+/-50% on policyholder option exercise rate.	Maximum of lapse rate deviation risk charge and mass lapse risk charge of 150% to lapses in next year; where lapse rate deviation risk charge: +/- (30% to 40%) to lapse rates depending on number of basic policies of life business.	Maximum of: +/- 50% to lapse rates and mass lapse of 40% at time 0.	+/- 50% to lapse rates.
	<b>Mass lapse risk charge</b>	Immediate 30% surrender of policies (for individual products and riders), immediate 50% surrender of policies (for group products and riders). Offset across products within each product group is allowed, while no offsetting across product groups is allowed.	Refer to above (+150% to lapse rates for the next 12 months).	Refer to above (mass lapse of 40% at time 0).	None (currently addressed within the surrender value condition risk requirement).
	<b>Expense risk charge</b>	15% increase in expense assumptions first year; 10% increase thereafter.	10% to expense.	10% to expense and +1% to inflation rate.	20% in the first year; 10% thereafter.
	<b>Conversion of options</b>	None	None	None	+/-50% to conversion rates.
	<b>Revision</b>	None	None	+3% to annual amount payable for annuities exposed.	None
	<b>Diversification</b>	Correlation matrices among risk modules and among risk sub-modules are not provided in QIS1.	Risk charge for incident rate risks is calculated using a prescribed correlation matrix and overall insurance risk is calculated using another prescribed correlation matrix.	Prescribed correlation matrix is applied to all insurance risks.	Prescribed correlation matrix is applied to all insurance risks.

Items	Hong Kong RBC (as per QIS1)	China C-ROSS Pillar 1	Europe Solvency II Pillar 1 (Standard Formula)	Singapore RBC2 (as per QIS2)
<b>Operational risk charge</b>	<p>There is no risk charge specified under QIS1. For QIS1, a data collection of simple volume and exposure-based measures will be undertaken.</p> <p>Top 10 operational risk events and corresponding loss amounts from the risk register or any other internal risk management process will also need to be provided.</p>	<p>There is no capital required for operational risk in Pillar 1 under C-ROSS. Risk management requirements on operational risk exist in Pillar 2, which can have impact on total capital required.</p>	<p>The calculation consists of applying a factor to past one-year gross premium income and policy liabilities (excluding investment-linked products) and taking whichever is higher. This is then capped at 30% of total capital requirements before operational risk charge.</p> <p>Factor: maximum of 4% on gross premium income and 0.45% on policy liabilities.</p> <p>For investment-linked products, a factor of 25% is applied to the past one-year expenses and added to the final sum.</p>	<p>The higher of:</p> <ol style="list-style-type: none"> <li>4% of <math>GP_1 + \text{Max}(0, 4\% * ((GP_1 - GP_0) - 20\% * GP_0))</math>.</li> <li>0.5% of gross (of reinsurance) policy liabilities.</li> </ol> <p>Where <math>GP_1</math> refers to the gross written premium income for the 12 months preceding the valuation date; and <math>GP_0</math> refers to the gross written premium income for the 12 months preceding <math>GP_1</math>. This is then capped at 10% of total capital requirements before operational risk charge.</p>
<b>Diversification among various risk modules</b>	<p>HKRBC allows diversification benefits and the correlation matrix would be provided at later stage.</p>	<p>C-ROSS allows diversification benefits among insurance risk, market risk and credit risk.</p>	<p>Solvency II allows for diversification benefits among all risk modules.</p>	<p>RBC2 allows for diversification benefits between C1 and C2 risk charges.</p>
<b>Allowance for discretionary benefits</b>	<p>Under stressed scenarios, insurers can reduce future discretionary benefits, until it is zero.</p>	<p>When unexpected losses happen, insurers can adjust non-guaranteed benefit cash flows for participating and universal life business based on management actions to absorb all or partial losses, which reduces the capital requirement.</p>	<p>Loss-absorbing capacity is taken into account for all shock scenarios. (For example, when investment returns drop, bonuses to policyholders are reduced through the management actions that are implemented in the model.) A cap, equal to the loss-absorbing capacity in the best estimate, is applied on the total loss absorption that is taken into account in stress scenarios to avoid double counting of the loss-absorbing capacity.</p>	<p>For participating products, policy liability is effectively set equal to value of par fund assets. The lower of the following can be recognized as a positive financial resource adjustment to support capital requirements:</p> <ol style="list-style-type: none"> <li>Aggregate present value of future non-guaranteed benefits and PAD.</li> <li>Policy assets less the Minimum Condition Liability ("MCL", which is determined as the present value of guaranteed benefits discounted at risk-free rates).</li> </ol>
<b>Treatment for negative reserves</b>	<p>Insurers are allowed to have negative best estimate reserves. The negative reserves are fully recognised in balance sheet.</p>	<p>Insurers are allowed to have negative best estimate reserves. The negative reserves are fully recognised in the balance sheet, while cash value guarantee is applied to floor reserves at (CV-Min. Capital) at the total company level.</p>	<p>Insurers are allowed to have negative best estimate reserves. The negative reserves are fully recognised in balance sheet.</p>	<p>Insurers will be able to recognise the full negative reserves, after applying all the relevant C1 insurance shocks, as positive adjustment in financial resource used to support capital requirement.</p>

Items	Hong Kong RBC (as per QIS1)	China C-ROSS Pillar 1	Europe Solvency II Pillar 1 (Standard Formula)	Singapore RBC2 (as per QIS2)
<p><b>Allowance to partially offset movement of asset price</b></p>	<p>None</p>	<p>None</p>	<p>The matching adjustment and volatility balancer are allowed Solvency II. The matching adjustment is for illiquid and pre-defined liabilities—for example, lifetime annuities without participation. This will primarily be used in the UK. The volatility balancer is for business not affected by matching adjustment. Basically it is an uplift to the base yield curve to remove some of the effects of the volatility in the interest rates.</p>	<p>Matching adjustment is allowed as a parallel upward adjustment to the risk-free rate discount rate for certain business. The adjustment is the spread of the weighted average yield to maturity of the asset portfolio over the average risk-free discount rate, less the spread for default and downgrade. Criteria for eligibility is very strict (on predictability of liability, asset class and asset-liability matching).</p> <p>Illiquidity premium, which operates in a similar manner to, but to a lesser extent than, matching adjustment, is also allowed for products that have a lower level of liability predictability, or where the insurer is unable or unwilling to meet the more stringent requirements under the matching adjustment.</p>

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