

MILLIMAN RESEARCH REPORT

# Life insurance capital regimes in Asia

Comparative analysis and implications of change

*Summary report*

July 2019

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## Introduction

Capital regulations for life insurance companies in Asia are complex and varied. They are also subject to change, with such changes often impacting how insurers manage their ongoing business. In many markets in the region, regulators are introducing new risk based capital (RBC) regimes or “upgrading” existing RBC frameworks, with increasing consideration being given to consistency with the new International Financial Reporting Standard 17 (IFRS 17), the International Capital Standard (ICS), and other capital regimes across the region/worldwide.

In view of the pace of change and the increasing focus on regulatory capital across the region, we have produced a detailed report covering the capital regimes in ten markets in Asia plus the 2018 ICS field test (which may be a reasonable proxy for the future RBC regimes in some markets like Japan, South Korea and Taiwan). The report also makes reference to Solvency II, Bermuda Solvency Capital Requirements (BSCR), Canada’s Life Insurance Capital Adequacy Test (LICAT) and the United States’ RBC regime (US RBC).

The report aims to:

- i) compare and contrast life insurance RBC regimes across selected Asian markets;
- ii) highlight some of the potential implications for businesses arising from the future development of capital regulations; and
- iii) contribute to the wider discussion on the potential impact of changes in regulation on the life insurance industry in Asia.

The report seeks to provide a comparison of key quantitative and qualitative aspects of life insurance capital regimes in Asia and an analysis of key capital results (e.g. capital ratio, risk charges, factors impacting capital) based on information publicly available and other market sources. It does not attempt to provide all of the applicable detail behind the capital regulations governing life insurance companies in the various markets analysed. It is important to recognise that the regulatory environment in Asia is changing fast and, therefore, the information contained in this report is time sensitive. The various capital regimes covered in the report are based on the applicable regulatory environment as at 15 June 2019. Some of these regulations may have changed since this date.

We have produced a summary of the full report, which we are sharing here.

Please contact one of the Milliman consultants listed at the end of the report to request a copy of the full report or to discuss the RBC frameworks in any of the markets in more detail.

## Executive summary

### Comparison of technical specifications of capital regimes

#### Overview

Most of the markets in Asia follow some form of RBC regime, although some of them, including Hong Kong and India, are still following a EU Solvency I type of approach. In many of the markets, insurance regulators are reviewing the existing capital regulations. Hong Kong is in the process of developing a new RBC regime, while China, Malaysia, Singapore and Thailand are currently in the process of “upgrading” their existing RBC requirements via quantitative impact study (QIS) exercises and consultative discussions with the industry. Table 1.1 provides an overview of the current status of capital regimes for the markets covered in this report.

**TABLE 1.1: STATUS OF THE CAPITAL REGIMES**

MARKET	INSURANCE REGULATORY/ GOVERNING BODY	EXISTING CAPITAL REGIME / APPROACH	DEVELOPMENTS
<b>CHINA</b>	China Banking and Insurance Regulatory Commission (CBIRC)	C-ROSS Risk-based	CBIRC is currently reviewing the existing China Risk Oriented Solvency System (C-ROSS) formulae and parameters. The exact timing of C-ROSS Phase II remains uncertain but most of the updated quantitative requirements are expected to be released later this year.
<b>HONG KONG</b>	Insurance Authority (IA)	EU Solvency I Non-risk based	Hong Kong is introducing a RBC framework, targeted to be introduced by 2021. Hong Kong RBC QIS 3 is scheduled to be launched by Q3 2019.
<b>JAPAN</b>	Financial Services Agency (FSA)	Risk-based (US risk-based)	The FSA is contemplating the introduction of an economic value-based solvency regime. A recent field test was based on the ICS field test, although the FSA reminded the industry that this should not be interpreted as a final direction. The exact timing of the introduction of this new regime remains uncertain.
<b>INDIA</b>	Insurance Regulatory and Development Authority of India (IRDAI)	EU Solvency I Non-risk based	The IRDAI is contemplating the introduction of a RBC regime. However, the exact framework to be adopted has yet to be defined, and the exact timing remains uncertain.
<b>INDONESIA</b>	Otoritas Jasa Keuangan (OJK)	Risk-based	There are no known planned developments to the existing framework.
<b>MALAYSIA</b>	Bank Negara Malaysia (BNM)	Risk-based	BNM has initiated a review of its current RBC framework, which has been conducted in phases since 2018. The first phase will focus on reviewing the prudential limits on assets and counterparty exposures, followed by a review of the standards for the valuation of liabilities and capital adequacy components. The exact timing remains uncertain.
<b>SINGAPORE</b>	Monetary Authority of Singapore (MAS)	Risk-based	RBC2 will come into effect from 1 January 2020.
<b>SOUTH KOREA</b>	Financial Supervisory Service (FSS)	Risk-based (US risk-based)	The FSS has announced its plan to adopt K-ICS, a principle-based RBC framework, which is similar to ICS. The target effective date is 2022, which is the same as the effective date of IFRS 17.
<b>TAIWAN</b>	Financial Supervisory Commission (FSC)	Risk-based (US risk-based)	The current RBC approach is based on prescribed risk factors multiplied by risk exposures. Going forward, Taiwan is expected to move to an ICS regime, but the exact timing remains uncertain.
<b>THAILAND</b>	Office of Insurance Commission (OIC)	Risk-based	RBC 2, using a 95% confidence interval, is due to be introduced in 2H 2019. The OIC plans to spend 2020 and 2021 working with the industry on the impact study of IFRS9 and IFRS 17 on RBC2. The 99.5% confidence interval RBC 2 draft will take into consideration these results and industry feedback. It is understood that the OIC plans to commence the 99.5% RBC 2 implementation two years after IFRS 17 applies.

#### *A move towards an economic balance sheet framework across the region, but key differences exist*

The assessment of required and available capital using an economic balance sheet approach has underpinned most of the recent changes in Asian capital regulations. A fundamental premise of the economic balance sheet framework is the endorsement of the concept that assets and liabilities should be valued on a consistent economic basis, leading to a reduction or elimination, where possible, of accounting mismatches. This economic

balance sheet approach is also consistent with Solvency II, ICS and IFRS 17 principles. In particular, for solvency purpose, an increasing number of Asian capital regimes require companies to:

- assess their assets on a market value basis (e.g. Hong Kong (new RBC), Indonesia, Singapore, Thailand, Malaysia), although some are still measuring their assets using different accounting bases (e.g. China C-ROSS, Japan regulatory capital);
- value their liabilities using a gross premium valuation (GPV) approach allowing for an additional risk margin and, potentially, a time value of options and guarantees (TVOG), using a “relatively market consistent” yield curve to determine discount factors.

Although there is a trend towards the use of an economic balance sheet framework, many regulators in Asia seem to have taken a more practical approach that reflects market specifics, while ensuring a reasonable degree of conservatism (e.g. the flooring of reserves in some markets). This leads to inconsistencies between RBC regimes across the region. Table 1.2 gives an overview of some of these differences when assessing liabilities.

**TABLE 1.2: APPROACH OF EVALUATING DETERMINISTIC INSURANCE LIABILITIES**

CAPITAL REGIME	GENERAL		RISK MARGIN		TVOG	
	APPROACH	LIABILITY FLOOR	ALLOWED?	APPROACH	ALLOWED?	APPROACH
<b>CHINA C-ROSS</b>	GPV	CSV less capital requirement	✓	PAD	✓	Deterministic only
<b>HONG KONG RBC (QIS 2)</b>	GPV	None	✓	PAD	✓	Stochastic / Deterministic
<b>JAPAN (REGULATORY)</b>	NPV	Reserves floored to zero at policy level	X	Considered implicitly	✓	Stochastic / Deterministic
<b>ICS FT 2018</b>	GPV	None	✓	PAD/CoC	✓	Stochastic / Deterministic
<b>INDIA SOLVENCY I</b>	GPV	CSV (if there is a surrender value) or reserves floored to zero at policy level	X	Considered implicitly	✓	Not explicitly specified
<b>INDONESIA RBC</b>	GPV	Reserves floored to zero at policy level	✓	PAD	X	N/A
<b>MALAYSIA RBC</b>	GPV	Reserves floored to zero at fund level	✓	PAD	✓	Stochastic / Deterministic
<b>SINGAPORE RBC 2</b>	GPV	Reserves floored to zero at policy level*	✓	PAD	X	N/A
<b>SOUTH KOREA RBC</b>	NPV	Reserves floored to zero at policy level	X	Considered implicitly	✓	Stochastic
<b>TAIWAN RBC</b>	NPV	Reserves floored to zero at product level	X	Considered implicitly	X	N/A
<b>THAILAND RBC 2 (95<sup>TH</sup> PERCENTILE)</b>	GPV	Reserves floored to zero at product level	✓	PAD	X	N/A
<b>SOLVENCY II</b>	GPV	None	✓	CoC	✓	Stochastic
<b>BERMUDA BSCR</b>	GPV	None	✓	CoC	✓	Stochastic
<b>CANADA LICAT</b>	GPV	Cap on credit taken for negative reserves and if CSV greater than reserves	✓	PAD	X	N/A
<b>US RBC</b>	NPV	Reserves floored to zero at policy level	X	Considered implicitly	X	N/A

Notes: GPV = Gross Premium Valuation, NPV = Net Premium Valuation, CSV = Cash Surrender Value, PAD = Provision for Adverse Deviation, CoC = Cost of Capital

\*Singapore RBC 2 regime continues to floor policy reserves to zero but recognises negative reserves as a reduction to financial resources

TVOG is a good example of such discrepancies. Universal life products offering guarantees are prevalent in many markets in Asia including China, Hong Kong and Singapore, but TVOG is only included in the newly proposed Hong Kong RBC (QIS 2) and China C-ROSS regimes. Moreover, under C-ROSS, TVOG is assessed using a prescribed deterministic formula that applies to the whole industry, whilst the Hong Kong regulator is encouraging companies to assess TVOG using stochastic ALM models to better reflect their own cost of financial

options and guarantees. The same discrepancies in TVOG methodology apply to participating business, which is material in many markets in Asia (e.g. Hong Kong, Singapore, Malaysia, China).

The risk margin is another example of discrepancies across RBC regimes in Asia. Whilst PADs are adopted in most of the capital regimes in the region, the approach to derive the PADs – and in particular the underlying risk charges used to calculate the PADs - differs from one market to another. In addition, the PAD approach (which is determined by recalculating liabilities by including an additional prudent margin on top of the best estimate assumptions) is not consistent with the cost of capital (CoC) approach used by Solvency II and Bermuda BSCR. It may also not be in line with the approach adopted by some Asian life insurance companies under IFRS 17 (although some companies may also decide to use a PAD approach).

#### *Discount rate: market consistency and smoothing*

Under RBC regimes, the yield curves used to assess the best estimate of liabilities are typically defined using a “bottom up” approach, whereby the discount rate reflects a market consistent risk free rate plus an adjustment for illiquidity/smoothing prescribed by regulators. However, the valuation of liabilities requires the use of a yield curve that extends to very long durations, reflecting both market conditions and long term economic views. This poses a challenge in Asia where available market data is often covering a much shorter duration than the projected cash flows. The reference yield curve is typically extrapolated from the last liquid market point (LLP) to some long-term equilibrium rate (ultimate forward rate or UFR). Table 1.3 compares the various parameters used by the various regimes.

**TABLE 1.3: DETERMINATION OF THE DISCOUNT CURVE**

CAPITAL REGIME	BASE FOR INITIAL YIELD	ILLIQUIDITY PREMIUM / SMOOTHING	LLP	UFR	INTERPOLATION/ EXTRAPOLATION
CHINA C-ROSS	Government bond yield	30 / 45 / 70 bps depending on product and issue date	20 years	4.5%	Quadratic
HONG KONG RBC (QIS 2)	Swap yield	Volatility adjustment or matching adjustment or own assets with guardrails	HKD: 30 years USD: 30 years	HKD: 3.65% USD: 3.65%	Smith-Wilson method
JAPAN (REGULATORY)	Stipulated interest rate for policies issued after March 1996 with some exceptions. Otherwise, the (guaranteed) interest rates filed with FSA upon product launch.				
ICS FT 2018	Swap rate or government bond yield	Prescribed illiquidity premium	JPY: 30 years USD: 30 years	JPY: 3.8% USD: 3.8%	Smith-Wilson method
INDIA SOLVENCY I	BE investment return	N/A, although risk-adjusted corporate-bond spreads may be included in the BE investment return	N/A	N/A	N/A
INDONESIA RBC	Government bond yield	Averaging of government bond yield plus a discretionary adjustment of up to 50bps	N/A	N/A	N/A
MALAYSIA RBC	Government bond yield	N/A	15 years	Same level as at LLP	Based on forward rate
SINGAPORE RBC 2	Government bond yield	Allowance for illiquidity premium or matching adjustment	SGD : 20 years USD: 30 years	SGD : 3.8% USD: 3.8%	Smith-Wilson method
SOUTH KOREA RBC	Assumed (guaranteed) interest rates filed with FSS at a product launch.	N/A	N/A	N/A	N/A
TAIWAN RBC	US government bond yield	N/A	N/A	N/A	N/A
THAILAND RBC 2 (95 <sup>TH</sup> PERCENTILE)	Government bond yield	Averaging of government bond yield	50 years	Same level as at LLP	N/A
SOLVENCY II	Swap rate or government bond yield	Volatility adjustment or matching adjustment	Euro: 20 years USD: 50 years	Varies by currency	Smith-Wilson method

CAPITAL REGIME	BASE FOR INITIAL YIELD	ILLIQUIDITY PREMIUM / SMOOTHING	LLP	UFR	INTERPOLATION/ EXTRAPOLATION
BERMUDA BSCR	Swap rate	Discretionary	30	Varies by currency	Potentially several methods
CANADA LICAT	Canadian statutory rate	N/A	N/A	N/A	URR (unexpired risk reserve)
US RBC	Net asset earned rates with prescribed asset spreads	N/A	N/A	N/A	N/A

N/A: not appropriate

Using the spot yield curve to set discount rates introduces an asset liability gap in the economic balance sheet of insurance companies, where the market price of assets captures the illiquid nature of the assets but this is not recognised within the liability calculations. Illiquidity premium adjustments and smoothing adjustments (e.g. volatility adjustment, UFR, averaging of spot yield curve) are, therefore, applied to narrow this gap, stabilise the net asset value (i.e. difference between assets and liabilities) and better reflect the long term nature of insurance businesses, and in particular the illiquid nature of liabilities. RBC capital adequacy ratios and the different blocks of the economic balance sheet are usually sensitive to this parameter, which is often a key component in different phases of quantitative impact studies/testing from regulators.

*Capital requirement modules and sub-modules are broadly consistent across RBC regimes in Asia, but underlying parameters differ*

The exhaustive list of risks considered in determining capital requirements varies across different capital regimes. However, key material risks considered are typically similar, and include insurance risk, market risk, counterparty default risk and operational risk.

- Life insurance risks include mortality/longevity risk, morbidity risk, lapse risk (long term and mass lapse), and expense risk. Mortality catastrophe risk is also sometimes explicitly considered.
- Market risks typically consist of equity risk, interest rate risk/ asset liability management (ALM) risk, credit spread risk, property risk and foreign exchange risk.
- Operational risk is typically quantified by applying risk factors to risk drivers, with premium being one of the most common risk drivers.

As there are natural hedges between different risks, correlation matrices are usually considered to reflect diversification benefits across various risk modules and sub-modules. In particular, most of the RBC regimes in Asia (and in particular all the RBC regimes revised recently) consider diversification benefits when aggregating the sub-modules under the insurance and market risk modules. Some RBC regimes consider the diversification between all risk components other than operational risk, while some others only consider the diversification between asset risk and insurance risk.

There is generally a trend towards making risk charge parameters/stress factors more consistent from one regime to another, to the extent possible. However, material discrepancies remain, as illustrated by the comparison of interest rate stress factors for selected markets in Asia in Table 1.4.

**TABLE 1.4: KEY PARAMETERS COMPARISON FOR INTEREST RATE FOR SELECTED TTM – SHOCK DOWN**

CAPITAL REGIME	INTEREST RATE / ALM – STRESS BASED (APPLIES TO INTEREST RATE OR OTHERWISE STATED)						
	1	3	5	7	10	15	20
TERM TO MATURITY (TTM)							
CHINA C-ROSS*	-73%	-68%	-58%	-50%	-37%	-28%	-24%
HONG KONG RBC (QIS 2)	-75%	-64%	-61%	-57%	-53%	-49%	-43%
MALAYSIA RBC**	-15%	-15%	-15%	-15%	-15%	-15%	-15%
SINGAPORE RBC 2	-70%	-65%	-60%	-50%	-40%	-30%	-25%

CAPITAL REGIME	INTEREST RATE / ALM – STRESS BASED (APPLIES TO INTEREST RATE OR OTHERWISE STATED)						
	1	3	5	7	10	15	20
TERM TO MATURITY (TTM)							
THAILAND RBC 2 (95 <sup>TH</sup> PERCENTILE)	-40%	-38%	-36%	-34%	-31%	-26%	-21%
SOLVENCY II	-75%	-56%	-46%	-39%	-31%	-27%	-29%

\* China has different shocks for assets and liabilities. The asset shocks are shown above. The liability shocks are generally lower.  
 \*\* For Malaysia, the stress is formula-based and depends on the Malaysian Government Securities (MGS) yield. The stress shown above for comparison purposes is applicable as at end of 2017.

**Comparative analysis of key capital results across Asia and impact of new RBC regimes on life insurance companies**

*Comparative analysis of capital adequacy ratios across Asia*

The figure below shows the industry average capital adequacy ratios for each market covered in this report, except for China, where there are data limitations. Most of the markets have an average regulatory solvency ratio within the range of 200% to 350%, except Japan and Indonesia, which have a relatively higher average solvency ratio (above 450%).

**FIGURE 1.1: INDUSTRY AVERAGE SOLVENCY RATIO LEVEL**



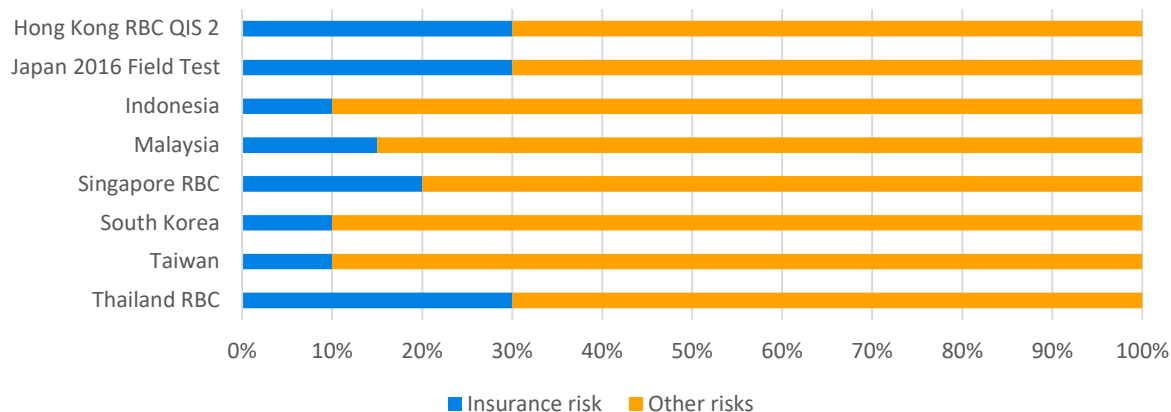
Source: Estimates based on public information and Milliman market intelligence. Some companies may experience higher or lower solvency ratios than the industry average shown above.  
 Note 1: The solvency ratios shown above are as at 31 December 2017 except: a) Japan regulatory solvency ratio and India Solvency I solvency ratio are as at 31st March 2018; and b) Japan 2016 FSA field test result is as at 31 March 2016.  
 Note 2: The Hong Kong IA carried out QIS 2 for the new RBC regime in 2017, and the resulting average industry solvency ratios were just above 100% based on a set of relatively conservative parameters, according to many industry observers. Similarly, Japan's FSA carried out an economic balance sheet RBC field test in 2016, and the resulting average solvency ratios were also just above 100%. However, both quantitative impact studies were conducted using parameters/approaches that are currently going through review and further consultation. The average industry solvency ratios under the final implemented RBC requirements are likely to differ (potentially significantly) from those shown.  
 Note 3: For Malaysia, the conventional business only includes life conventional business, and takaful business includes only family takaful business.



In general, industry level capital ratios in Asia have been relatively stable over the past few years, with small changes driven primarily by changes in the interest rate environment (government bond yields being typically used to set up the discount rate as discussed above).

For markets subject to RBC regimes, as shown in Figure 1.2, the total capital requirement tends to be mainly driven by market risks (i.e. interest rate, equity and credit spread), although lapse risk and morbidity risks are also key contributors. In some markets such as Japan, currency risk can also be material.

**FIGURE 1.2: RISK CHARGE BREAKDOWN – INSURANCE RISK VERSUS OTHER RISKS**



Source: Estimates based on public information and Milliman market intelligence.

Note: For Thailand and Singapore, the above breakdown is based on Thailand RBC 1 and Singapore RBC 1 parameters respectively given new RBC 2 regimes have not been used in practice yet.

Industry average capital adequacy ratios and the breakdown of risk charges can be explained by the nature of assets, the nature of liabilities and the matching (or lack of matching) of assets and liabilities.

More than half of the life insurance assets across these markets are invested in bonds, with insurers in some markets investing a high proportion in government bonds (e.g. Thailand), whilst investing a higher proportion in corporate bonds in others (e.g. Hong Kong). The proportion of equities varies, with markets having a material proportion of participating business (e.g. Singapore, Malaysia, Hong Kong) typically investing more in equities.

Liabilities differ significantly from one market to another. The proportion of unit-linked business is significant in some markets (e.g. Indonesia, India and Malaysia), whilst universal life business has been relatively popular in Hong Kong, Singapore and South Korea. Non-participating traditional business (e.g. endowments, whole life, credit life, term) remains a material product category for all the markets. Participating business (e.g. endowments, whole life) is also a popular line of business for some markets across the region, including Japan, South Korea, Hong Kong, Singapore and India. Unit-linked business and insurance products with lower guarantees and protection products will typically look more attractive under an economic balance sheet framework, whilst savings products with guarantees (implicit or explicit) will generally be less attractive (the degree of attractiveness being typically measured in terms of new business margin). Table 1.5 provides a high level overview of the materiality of TVOG should this be assessed as part of the RBC framework (which is currently not the case in all markets).

TABLE 1.5: MILLIMAN'S OBSERVATIONS OF TVOG IN SELECTED MARKETS

MARKET	CAPITAL REGIME	TVOG CONSIDERED?	MATERIALITY OF TVOG
HONG KONG	Solvency I (moving to RBC)	✓ (under RBC QIS)	TVOG could be relatively material for par products and universal life products which are two main product categories sold in Hong Kong.
INDIA	Solvency I	✓	Generally not material as we observe: <ul style="list-style-type: none"> <li>The level of guarantees for par products are typically low and interest rates are still relatively high. Hence, participating product guarantees are typically out of the money.</li> <li>Capital guarantees are not widespread for unit-linked business</li> </ul> However, for non-linked group funds management business, guarantee costs may be significant depending on the level of asset-liability duration mismatch.
INDONESIA	RBC	X	Generally not material as we observe most products are unit linked without guarantee.
MALAYSIA	RBC	✓	Generally not material as we observe: <ul style="list-style-type: none"> <li>TVOG for participating products is currently out of the money.</li> <li>Other products typically do not have material TVOG.</li> </ul>
SINGAPORE	RBC	X	TVOG is not assessed as part of the RBC framework, hence no formal quantification of TVOG is publicly available. Whilst TVOG is not expected to be material for most products (as guarantees are generally low and out of money), it is expected to be material for some products such as universal life and single premium participating products where guarantees can be high.
TAIWAN	RBC	X	TVOG is not assessed as part of the RBC framework, and hence no formal quantification of TVOG is publicly available. However, TVOG is expected to be material given the nature of products sold in the market.
THAILAND	RBC	X	Generally not material as we observe: <ul style="list-style-type: none"> <li>Most of the products are non-participating by nature.</li> <li>The participating component is typically not significant and does not lead to any material TVOG.</li> <li>Unit-linked (without guarantee) are also becoming more and more material.</li> </ul>

Source: Estimates based on public information and Milliman market intelligence.

The comments regarding the materiality of TVOG in the table above are general comments related to the relevant market in question, based on our observations. The situation for individual companies within the market may vary.

(\*) TVOG is not assessed as part of the RBC framework, and hence no formal quantification of TVOG is publicly available. However, TVOG is expected to be material given the nature of products sold in the market.

#### *Potential impact of changes in capital regimes for life insurance business in Asia*

Similar to what has been observed in Europe with Solvency II, a move to introduce more “economic” RBC regimes tends to incentivise life insurers to shift more risks to policyholders and third-party asset managers. It also forces life insurers to optimise their balance sheet by reducing the level and cost of guarantees, to improve ALM (e.g. refining management actions to better capture impact of stress scenarios, embedding ALM as part of the product launch process), and to optimise investment strategies (e.g. risk-adjusted investment strategy, hedging).

Under a more economic RBC regime, various elements of the value chain of a life insurance company may need to be revisited.

- When developing products, life insurers need to systematically capture the RBC impact covering both assets and liabilities. Reinsurance, hedging and diversification benefits across products/risks also need to be considered more explicitly.
- Adjustments in sales and distribution models may also be critical to supporting more fundamental changes in product development, asset management and risk management. Some insurers will need to re-evaluate the suitability of their current distribution processes in the context of new, more economic, RBC regimes. Customers may not be keen to purchase insurance products with lower/no guarantees. Well-trained intermediaries with the right tools will be required to educate customers on the benefits of more “RBC-friendly” products.

Overall, these new capital regimes will require insurers to use more advanced techniques to set and validate strategic decisions and manage their business.

- **Strategic planning.** In line with shareholder expectations, many insurers currently conduct their strategic planning with a key focus on traditional top line and bottom line growth metrics, e.g. annualised premium equivalent (APE) growth, (traditional) embedded value (EV) growth, value of one year's new business (VONB) margin / growth using one deterministic base case investment return assumption. Under the new RBC regimes (and IFRS 17), these measures would need to be accompanied by additional risk-based metrics that clearly identify the trade-off between shareholder value (e.g. measured in terms of EV or VONB) and risk (e.g. measured in terms of RBC requirements and return on capital). Strategic planning will not only be a matter of finding the appropriate business strategy to grow revenue and profitability but also a matter of optimising the allocation of capital and controlling/reducing risk, via potentially the definition of a "return on capital" type of metric. For new business in particular, life insurers will need to find the right balance between maximising top line (by selling products with potentially expensive financial options and guarantees) and optimising capital (by selling products which may not have been so attractive historically to customers). Ultimately, more emphasis is likely to be placed on recognising diversification benefits (both product and risk) for a given line of business.
- **Capital management, reinsurance and hedging strategy.** Changes in capital regulations will likely prompt insurers to revisit their existing capital management, reinsurance and hedging programs. Two main factors will drive this change:
  - o Optimising capital requirement will become an increasingly key priority. Management actions will need to be tailored to better reflect factors, impacting risks faced by insurance companies and ultimately making allowance for it in the assessment of RBC capital.
  - o The financing strategy of insurance companies may also be impacted as a result of the introduction of new definitions of eligible capital, typically grouped into tiers.

## Comparison of technical specifications

In many markets in Asia, regulators are introducing new risk-based capital (RBC) regimes or are in the process of “upgrading” existing RBC frameworks. In this section, we provide a comparative analysis of the technical specifications of these frameworks across the region. In addition, we have also compared these frameworks against those being used in other parts of the world and impacting some of the largest insurers operating in Asia, e.g. Europe’s Solvency II, Bermuda Solvency Capital Requirements (BSCR), Canada’s Life Insurance Capital Adequacy Test (LICAT) and US RBC.

### Overview

Table 2.1 provides an overview of the regulatory capital regimes in various markets in Asia. Hong Kong is developing a new RBC regime whereas China, Singapore and Thailand are currently in the process of upgrading their existing RBC requirements, so the latest developments for some of these markets are included in the comparison. Malaysia is also currently reviewing its RBC requirements. However, since the regulator has not issued an exposure draft at the date of producing this report, the current RBC framework has been used for Malaysia.

**TABLE 2.1: OVERVIEW OF THE CAPITAL REGIME UNDER COMPARISON**

CAPITAL REGIME	REGULATORY BODY	APPROACH USED TO DETERMINE CAPITAL REQUIREMENT	ALLOWANCE FOR INTERNAL MODEL
CHINA C-ROSS	China Banking and Insurance Regulatory Commission (CBIRC)	Risk-based	Not allowed
HONG KONG RBC (QIS 2)	Insurance Authority (IA)	Risk-based	Not allowed
JAPAN (REGULATORY)	Financial Services Agency (FSA)	Factor-based (US risk-based)	Not allowed
INDIA SOLVENCY I	Insurance Regulatory and Development Authority of India (IRDAI)	Factor-based	Not allowed
INDONESIA RBC	Otoritas Jasa Keuangan (OJK)	Risk-based	Not allowed
MALAYSIA RBC	Bank Negara Malaysia (BNM)	Risk-based	Not allowed
SINGAPORE RBC 2	Monetary Authority of Singapore (MAS)	Risk-based	Not allowed*
SOUTH KOREA RBC	Financial Supervisory Service (FSS)	Factor-based (US risk-based)	Not allowed
TAIWAN RBC	Financial Supervisory Commission (FSC)	Factor-based (US risk-based)	Not allowed
THAILAND RBC 2 (95 <sup>TH</sup> PERCENTILE)	Office of Insurance Commission (OIC)	Risk-based	Not allowed
SOLVENCY II	European Insurance and Occupational Pensions Authority (EIOPA)	Risk-based	Allowed
BERMUDA BSCR	Bermuda Monetary Authority (BMA)	Factor-based (US risk-based)	Allowed
CANADA LICAT	The Office of the Superintendent of Financial Institutions (OSFI)	Risk-based	Not allowed
US RBC	National Association of insurance commissioners (NAIC)	Factor-based (US risk-based)	Not allowed**

\* Except guaranteed products providing non-linear payout (participating and universal life business excluded in this category)

\*\* Except for risk components of interest rate risk for fixed annuities and single premium life insurance, and equity risk and interest rate risk of the guaranteed benefits of variable annuities

Table 2.2 summarises the minimum regulatory capital and solvency ratio that life insurers are required to maintain in different markets.

**TABLE 2.2: MINIMUM CAPITAL REQUIREMENTS**

MARKET	MINIMUM AMOUNT OF CAPITAL REQUIRED	MINIMUM SOLVENCY CAPITAL ADEQUACY RATIO (CAR)
CHINA	CNY 200 million	Minimum composite CAR is 100%
HONG KONG	HKD 2 million	Statutory minimum solvency ratio is 100% For monitoring purposes, the IA requires long-term insurers to maintain a solvency ratio of at least 150% under the current solvency I regime*
JAPAN	JPY 1 billion	Minimum Solvency Margin Ratio is 200%**
INDIA	INR 500 million (the minimum start-up capital requirement is INR 1 billion)	Minimum solvency ratio is 150% at the company level
INDONESIA***	IDR 50 – 300 billion by type of business	Minimum CAR is 100% A breach below 120% would require companies to submit financial recovery plans and restrict distribution of dividends
MALAYSIA	MYR 100 million	The supervisory target capital level (STCL) is 130% of total capital required
SINGAPORE	SGD 10 million	Minimum CAR is 100%****
SOUTH KOREA	KRW 30 billion	Minimum CAR is 100%. However the regulator has issued guidelines specifying various levels of regulatory intervention below a CAR of 150% (or in the case of a volatile CAR)
TAIWAN	NTD 2 billion	Minimum CAR is 200%
THAILAND*****	THB 50 million	Minimum CAR is 140%
EU	-	Minimum solvency ratio is 100%
BERMUDA	Depend on asset size, floored at USD 500,000	Minimum CAR is 100%
CANADA*****	CAD 5 million	90% for total LICAT ratio and 55% for core ratio
US	-	150% of authorised control level

\* The minimum CAR under Hong Kong RBC has not been defined yet.

\*\* SMR in Japan is defined as 2 x available capital / required capital

\*\*\* The initial paid up capital is IDR 50 billion whereas maintenance capital is IDR 25 billion

\*\*\*\* The Minimum CAR of 100% is for prevailing RBC2 effective from 1 Jan 2020 and 120% for RBC1

\*\*\*\*\* Minimum CAR of 140% is for prevailing RBC 2 95th percentile effective from 2019. The minimum CAR for other percentiles has not been defined yet.

\*\*\*\*\* The requirement is more stringent for new insurance companies (e.g. 150% total LICAT ratio across various scenarios)

The table below summarises the key expected future developments of the different RBC regimes across Asia.

**TABLE 2.3: FUTURE DEVELOPMENTS – RBC REGIMES ACROSS ASIA**

CAPITAL REGIME	FUTURE DEVELOPMENTS
CHINA C-ROSS	CBIRC is currently reviewing C-ROSS formulae and parameters. The exact timing of C-ROSS Phase II remains uncertain but most of the updated quantitative requirements are expected to be released later this year.
HONG KONG RBC (QIS 2)	Hong Kong is introducing a new RBC framework, targeted by 2021. Hong Kong RBC QIS 3 is scheduled to be launched by Q3 2019.
JAPAN (REGULATORY)	The FSA is contemplating the introduction of an economic value-based solvency regime. A recent field test was based on the ICS field test, although the FSA reminded the industry that this should not be interpreted as a final direction. The exact timing of the introduction of this new regime remains uncertain.
INDIA SOLVENCY I	The IRDAI is contemplating the introduction of a RBC regime. However, the exact framework to be adopted has yet to be defined and the timing remains uncertain.
INDONESIA RBC	There are no known planned developments to the existing framework.
MALAYSIA RBC	BNM has initiated a review of its current RBC framework, which has been conducted in phases since 2018. The first phase will focus on reviewing the prudential limits on assets and counterparty exposures, followed by a review of the standards for the valuation of liabilities and capital adequacy components. The exact timing of updated rules remains uncertain.

CAPITAL REGIME	FUTURE DEVELOPMENTS
<b>SINGAPORE RBC 2</b>	RBC2 will come into effect from 1 January 2020.
<b>SOUTH KOREA RBC</b>	The FSS has announced its plan to adopt K-ICS, a principle-based RBC framework, which is similar to ICS. The target effective date is 2022, which is the same as the effective date of IFRS 17.
<b>TAIWAN RBC</b>	The current RBC approach is based on prescribed risk factors multiplied by risk exposures. Going forward, Taiwan is expected to move to an ICS based regime but the timing remains uncertain.
<b>THAILAND RBC 2 (95<sup>TH</sup> PERCENTILE)</b>	The OIC plans to spend 2020 and 2021 working with the industry on the impact study of IFRS 9 and IFRS 17 on RBC2. The 99.5% confidence interval RBC 2 draft will take into consideration these results and the industry feedback. It is understood that the OIC plans to commence the 99.5% RBC 2 implementation two years after IFRS 17 applies.

### Asset basis

When assessing asset values, some capital regimes require a market-value basis approach to construct a more economic balance sheet, whereas others are still based on a local statutory balance sheet approach (e.g. some assets being classified on a book value basis), with some adjustments. It should be noted that in the following sections, ICS is included as a proxy for the potential RBC regime in Japan (it may also be the basis for the potential capital regime in South Korea and Taiwan).

**TABLE 2.4: ASSET VALUATION BASIS**

CAPITAL REGIME	ASSET BASIS	CAPITAL REGIME	ASSET BASIS
<b>CHINA C-ROSS</b>	China GAAP with adjustments	<b>SOUTH KOREA RBC</b>	Korea IFRS
<b>HONG KONG RBC (QIS 2)</b>	Market value basis	<b>TAIWAN RBC</b>	IFRS 9
<b>JAPAN (REGULATORY)</b>	Japan GAAP	<b>THAILAND RBC 2 (95<sup>TH</sup> PERCENTILE)</b>	Market value basis
<b>ICS FT 2018</b>	Market value basis	<b>SOLVENCY II</b>	Market value basis
<b>INDIA SOLVENCY I</b>	Indian GAAP	<b>BERMUDA BSCR</b>	Fair value in line with GAAP
<b>INDONESIA RBC</b>	Market value basis	<b>CANADA LICAT</b>	Canadian GAAP
<b>MALAYSIA RBC</b>	Malaysia IFRS	<b>US RBC</b>	US GAAP
<b>SINGAPORE RBC 2</b>	Market value basis or net realisable value basis		

### Liability basis

#### Overall methodology – deterministic best estimate of liabilities

The table below compares the key parameters used to determine the deterministic best estimate of liabilities across the various capital regimes analysed in this report. In particular, we cover:

- the use of a GPV method versus NPV method;
- the definition of contract boundaries, i.e. the definition of which cash flows pertain to existing contracts and which to future contracts;
- allowance of reinsurance in the deterministic best estimate of liabilities;
- the application of liability flooring; and
- allowance for future discretionary benefits.

Most of the RBC regimes considered in this report determine the best estimate of liabilities by assessing the probability-weighted present value of the future cash flows associated with the insurance liabilities. The calculation of the current estimate of liabilities is based on best-estimate assumptions which are reviewed on a regular basis.

TABLE 2.5: APPROACH OF EVALUATION OF DETERMINISTIC INSURANCE LIABILITIES

CAPITAL REGIME	GENERAL APPROACH	CONTRACT BOUNDARY	LIABILITY FLOOR	FUTURE DISCRETIONARY BENEFIT
CHINA C-ROSS	GPV	Whole insurance contract term	CSV less capital requirement	Allowed
HONG KONG RBC (QIS 2)	GPV	Broadly in line with IFRS 17 except treatment on Fund-on-deposit	None	Allowed
JAPAN (REGULATORY)	NPV	No future contracts or renewals	Reserves floored to zero at policy level	Not allowed
ICS FT 2018	GPV	No future contracts and limited IF/renewal	None	Allowed
INDIA SOLVENCY I	GPV	Full contract including renewal	CSV (if there is a surrender value) or reserves floored to zero at policy level	Allowed
INDONESIA RBC	GPV	Not explicitly mentioned	Reserves floored to zero at policy level	Allowed
MALAYSIA RBC	GPV	Contractual term with adjustment	Reserves floored to zero at fund level	Allowed
SINGAPORE RBC 2	GPV	Contractual term with adjustment	Reserves floored to zero at policy level **	Allowed*
SOUTH KOREA RBC	NPV	No future contracts or renewals	Reserves floored to zero at policy level	Not allowed
TAIWAN RBC	NPV	N/A	Reserves floored to zero at product level	Not allowed
THAILAND RBC 2 (95 <sup>TH</sup> PERCENTILE)	GPV	N/A	Reserves floored to zero at product level	Not explicitly mentioned
SOLVENCY II	GPV	In line with IFRS 17	None	Allowed
BERMUDA BSCR	GPV	Till expire / reassessment	None	Allowed
CANADA LICAT	GPV	In line with Canadian GAAP	Cap on credit taken for negative reserves and if CSV greater than reserves	Not explicitly mentioned
US RBC	NPV	Full contract including renewal	Reserves floored to zero at policy level	Not allowed

\* Provision for future discretionary benefits allowed for the purpose of calculating statutory reserves but not for the purpose of calculating capital requirements

\*\*RBC2 regime continues to floor policy reserves to zero but recognises negative reserves as a reduction to financial resources

### Risk margin and cost of options and guarantees

In addition to the deterministic best estimate of liabilities, additional layers are usually captured as part of the technical provisions:

- Insurers are required to calculate a risk margin (also known as risk adjustment or margin over current estimate or PAD) which represents an extra amount of reserves reflecting the uncertainty associated with non-hedgeable risks (e.g. insurance risk, operational risk).
- In some markets, insurers are also required to explicitly allow for the cost of options and guarantees to reflect the impact of embedded options and guarantees (e.g. guarantees of minimum investment returns, surrender options, options for policyholder to reduce or extend coverage).

Table 2.6 compares the various approaches used across the different capital regimes.

**TABLE 2.6: RISK MARGIN AND TVOG COMPARISON**

CAPITAL REGIME	ALLOWANCE FOR RISK MARGIN	COST OF OPTIONS AND GUARANTEES
CHINA C-ROSS	✓	✓
HONG KONG RBC (QIS 2)	✓	✓
JAPAN (REGULATORY)	(*)	✓
ICS FT 2018	✓	✓
INDIA SOLVENCY I	✓	✓
INDONESIA RBC	✓	X
MALAYSIA RBC	✓	✓
SINGAPORE RBC 2	✓	X
SOUTH KOREA RBC	(*)	✓
TAIWAN RBC	(*)	X
THAILAND RBC 2 (95 <sup>TH</sup> PERCENTILE)	✓	X
SOLVENCY II	✓	✓
BERMUDA BSCR	✓	✓
CANADA LICAT	✓	X
US RBC	(*)	x

(\*) Implicit margins built into each assumption

In determining the risk margin, various approaches can be used. As shown in Table 2.7, a PAD approach is adopted in most of the capital regimes in Asia, whereas the prescribed approach of Solvency II and BSCR is a cost of capital (CoC) approach. Hong Kong is still currently testing various approaches, but the base case approach retained for QIS 2 was a PAD approach. For markets without the requirement of explicit risk margin, an implicit risk margin is usually incorporated when evaluating insurance liabilities.

Table 2.7 compares the various approaches followed when determining the risk margin.

**TABLE 2.7: COMPARISON OF APPROACHES IN DETERMINING RISK MARGIN**

CAPITAL REGIME	APPROACH	CAPITAL REGIME	APPROACH
CHINA C-ROSS	PAD	SOUTH KOREA RBC	Considered implicitly
HONG KONG RBC (QIS 2)	PAD	TAIWAN RBC	Considered implicitly
JAPAN (REGULATORY)	Considered implicitly	THAILAND RBC 2 (95 <sup>TH</sup> PERCENTILE)	PAD
ICS FT 2018	PAD/CoC	SOLVENCY II	CoC
INDIA SOLVENCY I	PAD	BERMUDA BSCR	CoC
INDONESIA RBC	PAD	CANADA LICAT	PAD
MALAYSIA RBC	PAD	US RBC	Considered implicitly
SINGAPORE RBC 2	PAD		

In determining the TVOG, various approaches can be followed. In principle, a stochastic approach based on the outcomes of an ALM model is usually preferred as it better reflects the risk profile of a particular insurance company. However, in consideration of the lack of stochastic modelling capacity and the materiality of cost of



options and guarantees, deterministic/proxy approaches have been accepted by some regulators. Table 2.8 provides a comparison the approaches used when assessing TVOG across the different capital regimes.

**TABLE 2.8: COMPARISON OF APPROACHES IN ASSESSING COST OF OPTIONS AND GUARANTEES**

CAPITAL REGIME	APPROACH	CAPITAL REGIME	APPROACH
CHINA C-ROSS	Deterministic	SOUTH KOREA RBC	Stochastic
HONG KONG RBC (QIS 2)	Stochastic or deterministic/proxy	TAIWAN RBC	No explicit reference
JAPAN (REGULATORY)	Stochastic or deterministic/proxy*	THAILAND RBC 2 (95 <sup>TH</sup> PERCENTILE)	No explicit reference
ICS FT 2018	Stochastic or deterministic/proxy	SOLVENCY II	Stochastic or deterministic/proxy
INDIA SOLVENCY I **	Stochastic or deterministic/proxy	BERMUDA BSCR	Stochastic or deterministic/proxy
INDONESIA RBC	No explicit reference	CANADA LICAT	No explicit reference
MALAYSIA RBC	Stochastic or deterministic/proxy	US RBC	No explicit reference
SINGAPORE RBC 2	No explicit reference		

\* Applicable only for variable products

\*\* Required for reserving

\*\*\* Stochastic refers to an approach where TVOG is assessed using the stochastic outcomes of an ALM model. Deterministic/proxy refers to the other approaches.

### Discounting

The yield curve used to assess the best estimate of liabilities is typically defined using a bottom-up approach, where the discount rate reflects the risk free rate plus an adjustment for illiquidity / smoothing as prescribed by regulators in each capital regime. The valuation of liabilities requires the use a yield curve that extends to very long durations, reflecting both market conditions and long-term economic views. This poses a challenge in Asia in the common situation where available market data is of shorter duration than the projected liability cash flows. The reference yield curve is, therefore, typically extrapolated from the last liquid market point (LLP) to some long-term equilibrium rate (ultimate forward rate or UFR). Table 2.9 provides a comparison of methodologies use to determine the yield curve across different markets in Asia.

**TABLE 2.9: YIELD CURVE ADJUSTMENT**

CAPITAL REGIME	BASIC YIELD	ILLIQUIDITY PREMIUM /SMOOTHING	LLP	UFR	INTERPOLATION/ EXTRAPOLATION
CHINA C-ROSS	Government bond yield	30 / 45 / 70 bps depending on product and issue date	20 years	4.5%	Quadratic
HONG KONG RBC (QIS 2)	Swap yield	Volatility adjustment of 32 bps or matching adjustment	HKD: 30 years USD: 30 years	HKD: 3.65% USD: 3.65%	Smith-Wilson method
JAPAN (REGULATORY)	Stipulated interest rate for policies issued after March 1996 with some exceptions. Otherwise, the (guaranteed) interest rates filed with FSA upon product launch.				
ICS FT 2018	Swap rate or government bond yield	Prescribed illiquidity premium	JPY: 30 years USD: 30 years	JPY: 3.8% USD: 3.8%	Smith-Wilson method
INDIA SOLVENCY I	Best estimate investment return	N/A, although risk-adjusted corporate-bond spreads may be included in the best estimate investment return	N/A	N/A	N/A
INDONESIA RBC	Government bond yield	Averaging of government bond yield plus a discretionary adjustment of up to 50bps	N/A	N/A	N/A
MALAYSIA RBC	Government bond yield	N/A	15 years	Same level as at LLP	Based on forward rate

CAPITAL REGIME	BASIC YIELD	ILLIQUIDITY PREMIUM /SMOOTHING	LLP	UFR	INTERPOLATION/ EXTRAPOLATION
<b>SINGAPORE RBC 2</b>	Government bond yield	Allowance for illiquidity premium or matching adjustment	SGD : 20 years USD: 30 years	SGD : 3.8% USD: 3.8%	Smith-Wilson method
<b>SOUTH KOREA RBC</b>	Assumed (guaranteed) interest rates filed with FSS at a product launch.	N/A	N/A	N/A	N/A
<b>TAIWAN RBC</b>	US government bond yield	N/A	N/A	N/A	N/A
<b>THAILAND RBC 2 (95<sup>TH</sup> PERCENTILE)</b>	Government bond yield	Averaging of government bond yield	50 years	Same level as at LLP	N/A
<b>SOLVENCY II</b>	Swap rate or government bond yield	Volatility adjustment or matching adjustment	Euro: 20 years USD: 50 years	4.2%	Smith-Wilson method
<b>BERMUDA BSCR</b>	Swap rate	Discretionary	30	4.2%	Different approaches
<b>CANADA LICAT</b>	Canadian statutory rate	N/A	N/A	N/A	URR (unexpired risk reserve)
<b>US RBC</b>	Net asset earned rates with prescribed asset spreads	N/A	N/A	N/A	N/A

## Capital requirements

### Overview

The risks considered when determining the capital requirement vary across different regulatory regimes. Insurance risk, market risk (including asset-related risk), counterparty default risk and operational risk are the typical risk categories considered.

The following tables compare the risk measurement approach across the different capital regimes. India is not included in the comparison since it does not follow a risk-based capital framework.

**TABLE 2.10: RISK MEASUREMENT APPROACH – LIFE INSURANCE RISK**

CAPITAL REGIME	MORTALITY/ LONGEVITY	MORBIDITY	EXPENSE	LAPSE
<b>CHINA C-ROSS</b>	Stress	Stress	Stress	Stress
<b>HONG KONG RBC (QIS 2)</b>	Stress	Stress	Stress	Stress
<b>JAPAN (REGULATORY)</b>	Factor	Factor	X	X
<b>ICS FT 2018</b>	Stress	Stress	Stress	Stress
<b>INDONESIA RBC</b>	Stress	Stress	Stress	Stress
<b>MALAYSIA RBC</b>	Stress	Stress	Stress	Stress
<b>SINGAPORE RBC 2</b>	Stress	Stress	Stress	Stress
<b>SOUTH KOREA RBC</b>	Factor	Factor	X	X
<b>TAIWAN RBC</b>	Factor	Factor	X	X
<b>THAILAND RBC 2 (95<sup>TH</sup> PERCENTILE)</b>	Stress	Stress	Stress	Stress
<b>SOLVENCY II</b>	Stress	Stress	Stress	Stress
<b>BERMUDA BSCR</b>	Factor	Factor	X	X
<b>CANADA LICAT</b>	Stress	Stress	Stress	Stress
<b>US RBC</b>	Factor	Factor	X	X**

\* Indonesia has different risk pools for conventional and syariah business. The framework for conventional business is compared here and thereafter in this report.

\*\* The US is currently developing the lapse risk charge.

TABLE 2.11: RISK MEASUREMENT APPROACH – MARKET RISK

CAPITAL REGIME	EQUITY	PROPERTY	INTEREST RATE	CREDIT SPREAD
CHINA C-ROSS	Factor	Factor	Stress	Factor
HONG KONG RBC (QIS 2)	Factor	Factor	Stress	Stress
JAPAN (REGULATORY)	Factor	Factor	Factor	Factor
ICS FT 2018	Factor	Factor	Principal Component	Stress
INDONESIA RBC	Factor	Factor	Factor	Factor
MALAYSIA RBC	Factor	Factor	Stress	X
SINGAPORE RBC 2	Factor	Factor	Stress	Stress
SOUTH KOREA RBC	Factor	X	Factor	X
TAIWAN RBC	Factor	Factor	X	X
THAILAND RBC 2 (95 <sup>TH</sup> PERCENTILE)	Factor	Factor	Stress	Factor
SOLVENCY II	Factor	Factor	Stress	Stress and factor
BERMUDA BSCR	Factor	Factor	Stress or factor	Factor
CANADA LICAT	Factor	Factor	Stress	X
US RBC	Stress	Factor	Stress or factor	Factor

Counterparty default risk is taken into account in all capital regimes and follows a factor-based approach. Operational risk is also quantified explicitly under all the capital regimes except for the existing China C-ROSS (although this is reflected in the qualitative requirements and may have an impact on the final amount of capital). Typically, prescribed risk factors are applied on selected risk drivers to assess the operational risk capital requirement.

#### Life insurance risk

Life insurance risk generally considers the risk that insurance obligations are greater than expected. It is mainly composed of mortality/longevity risk, morbidity risk, expense risk and lapse risk. Tables 2.12 - 2.14 provide a comparison of key parameters used for life insurance risks.

TABLE 2.12: KEY PARAMETERS COMPARISON FOR MORTALITY AND MORBIDITY – STRESS-BASED

CAPITAL REGIME	MORTALITY/LONGEVITY APPLIES TO MORTALITY RATES OR OTHERWISE STATED	MORBIDITY APPLIES TO MORBIDITY RATES OR OTHERWISE STATED
CHINA C-ROSS	+10% or +15% or +20% depending on number of basic policies From 0% up to -30% depending on policy year Mortality catastrophe : 1.8 per mille (additive) in the first 12 months	+20% +20% on medical and health loss ratio
HONG KONG RBC (QIS 2)	+15% / -25% Mortality Catastrophe : 1.5 per mille (additive) in the first 12 months	+35% in the first 12 months +25% afterwards -20% in recovery rate
ICS FT 2018	+12.5%/-17.5%	Short-term: +20% or +25% or +20% or +25%; Long-term +8% or +20% or +12% or +20%, depending on benefit category Recovery rate -20% for category 4
INDONESIA RBC	Incorporated in 95 <sup>th</sup> percentile of premium reserve for GPV reserve*	
MALAYSIA RBC	±40% / ±20% of best estimate rates for guaranteed / non-guaranteed premium non-annuity 5 year setback rate for annuity for longevity risk	±45% / ±22.5% of best estimate rates for guaranteed / non-guaranteed premium
SINGAPORE RBC 2	+20%/-25% Mortality catastrophe : 1 per mille (additive) in the first 12 months	+20% for disability rates +40%/+30% for other insured events with/without guaranteed premiums

CAPITAL REGIME	MORTALITY/LONGEVITY APPLIES TO MORTALITY RATES OR OTHERWISE STATED	MORBIDITY APPLIES TO MORBIDITY RATES OR OTHERWISE STATED
<b>THAILAND RBC 2 (95<sup>TH</sup> PERCENTILE)</b>	±18%	±18% by default ±47% for short-term liabilities and PA / PA rider and health rider no covering TPD, temporary disability or CI
<b>SOLVENCY II</b>	+15% / -20% Mortality catastrophe : 1.5 per mille (additive) in the first 12 months	+35% in the first 12 months +25% thereafter - 20% in recovery rates
<b>CANADA LICAT</b>	Stress testing considering level, trend, volatility and catastrophe: Level: +11% to 25% on mortality Trend: permanent ±75% in mortality improvement. Volatility: $2.7 \times A \times E / F$ , where A is standard deviation of net claims, E is net amount at risk and F is net face amount. For longevity: -10% to 20% level and 75% mortality improvement Catastrophe: increase in total deaths per thousand, varying by jurisdiction. Aggregation formula to calculate aggregate required capital	Stress testing considering level, trend, volatility and catastrophe: Level: + 20 to 30% in incidence rates and – 25 to - 30% in termination rates Trend: -100% in morbidity improvement (if it is used). Volatility: + 15 to 50% shock to first year incidence rates for active lives Catastrophe: shock to first year incidence rates for active lives Aggregation formula to calculate aggregate required capital

\* Indonesia adopts a factor-based method for unearned premium reserve, claim reserve and catastrophic reserve.

**TABLE 2.13: KEY PARAMETERS COMPARISON FOR MORTALITY AND MORBIDITY – FACTOR-BASED**

CAPITAL REGIME	MORTALITY/LONGEVITY APPLIES TO NAAR OR OTHERWISE STATED	MORBIDITY APPLIES TO NAAR OR OTHERWISE STATED
<b>TAIWAN RBC</b>	0.017% to 0.3% according to product types and net amount at risk.	0% to 31.5% according to product types
<b>BERMUDA BSCR</b>	0.113% to 0.397% regressively with possible 50% adjustment Capital charge on adjusted reserves for long-term products with longevity risks	Different factors on adjusted reserve for disability income reserve, annual premium and Net Amount at Risk (NAAR) for CI
<b>US RBC</b>	0.09% to 0.23% regressively	Capital charge on net earned premium Underwriting risk charge on underwriting risk factor

**TABLE 2.14: KEY PARAMETERS COMPARISON FOR EXPENSE AND LAPSE – STRESS-BASED**

CAPITAL REGIME	EXPENSE APPLIES TO BE EXPENSE OR OTHERWISE STATED	LAPSE APPLIES TO LAPSE RATES OR OTHERWISE STATED
<b>CHINA C-ROSS</b>	+10% for all maintenance expenses	±30% or ±35% or ±40% depending on number of policies Mass lapse: 150% of base lapse within 12 months
<b>HONG KONG RBC (QIS 2)</b>	+10% for all years +1% additive in expense inflation	±40% Mass lapse: 30% (individual); 50% (group) at time 0
<b>ICS FT 2018</b>	+ 6% to 8% + 1% to 3% in inflation	±40% Mass lapse: 30% (individual); 50% (group) at time 0
<b>INDONESIA RBC</b>	Incorporated in 95 <sup>th</sup> percentile of premium reserve for GPV reserve *	
<b>MALAYSIA RBC</b>	±20%	±50%
<b>SINGAPORE RBC 2</b>	+20% for first projection year +10% after first projection year	±50% Mass lapse: 30% (individual); 50% (group) at time 0
<b>THAILAND RBC 2 (95<sup>TH</sup> PERCENTILE)</b>	±5%	±25%
<b>SOLVENCY II</b>	+10% for all years +1% additive in expense inflation	±50% Mass lapse: 40% at time 0

CAPITAL REGIME	EXPENSE APPLIES TO BE EXPENSE OR OTHERWISE STATED	LAPSE APPLIES TO LAPSE RATES OR OTHERWISE STATED
CANADA LICAT	+20% for first (projection) year +10% after first (projection) year	Varies according to whether business is lapse-sensitive or lapse-supported Stress testing considering level, trend, volatility and catastrophe: Level & trend: $\pm$ 30% Volatility: 30% shock in the first year Catastrophe: +20% for lapse sensitive and -40% for lapse supported Aggregation formula to calculate aggregate required capital

\* Indonesia adopts a factor-based method for unearned premium reserve, claim reserve and catastrophic reserve.

### Market risk

Market risks reflect how adverse movements in the level and value of various market instruments can impact assets and liabilities of a company. They mainly consist of equity risk, interest rate risk/ALM risk, property risk and credit spread risk. Tables 2.15 - 2.16 provide a comparison of the parameters used for equity and property risks in various markets.

TABLE 2.15: KEY PARAMETERS COMPARISON FOR EQUITY

CAPITAL REGIME	DOMESTIC LISTED	DOMESTIC UNLISTED	FOREIGN LISTED	FOREIGN UNLISTED	OTHERS
CHINA C-ROSS	31% to 48%	28%	30% for developed, 45% for emerging (covers both listed and unlisted)		1% to 25%
HONG KONG RBC (QIS 2)	40% for developed, 50% otherwise	50%	40% for developed, 50% otherwise	50%	20% for affiliate/strategic investment, 50% otherwise
JAPAN (REGULATORY)	20%	20%	10%	10%	N.A.
ICS FT 2018 *	35% for developed, 48% otherwise	49%	35% for developed, 48% otherwise	49%	49%
INDONESIA RBC	15% if listed on IDX or JII, 20% otherwise	30%	20%	30%	30%
MALAYSIA RBC	20%	35%	20% or 30%	35%	16% or 25% depending on type
SINGAPORE RBC 2	35% for developed, 50% otherwise	50%	35% for developed, 50% otherwise	50%	50%
SOUTH KOREA RBC		12% or 16% based on the liquidity and concentration standards			
TAIWAN RBC		20% to 37.5% depending on different types of equities			
THAILAND RBC 2 (95 <sup>TH</sup> PERCENTILE)	25%	50%	25% or 35%	50%	8% to 50%
SOLVENCY II**	39% for type I 49% for type II	49%	39% for type I 49% for type II	49%	39% for type I 49% for type II
BERMUDA BSCR		14.4% for common stocks, 0.6% to 35% for preferred socks depending on ratings			5%, 20% or 55% depending on type
CANADA LICAT	35%-50% depending on the market. Lower for preferred shares depending on rating (3% to 20%).				
US RBC	Larger of risk charge as Conditional Tail Expectation (CTE) 90 based on stochastic projection and risk charge for specified scenarios				

\* ICS FT 2018 has also implied volatility adjustment

\*\* +/- 10% for countercyclical adjustment

Type 1: equities listed in regulated markets which are members of the EEA or OECD.

**TABLE 2.16: KEY PARAMETERS COMPARISON FOR PROPERTY – FACTOR-BASED**

CAPITAL REGIME	PROPERTY APPLIES TO ADMISSIBLE VALUE OR OTHERWISE STATED
CHINA C-ROSS	8% on asset value under historical cost basis 12% on asset value under fair value basis
HONG KONG RBC (QIS 2)	44% on investment properties 22% on company-occupied properties Real estate investment trusts (REITs) are classified as equity assets and subject to equity risk
JAPAN (REGULATORY)	10%
ICS FT 2018	25%
INDONESIA RBC	4% for non-investment 7% to 40% for investment 10% for real estate investment trust
MALAYSIA RBC	8% for self-occupied properties 16% for other properties and property related investments
SINGAPORE RBC 2	30% for immovable property. 50% for collective real estate investment vehicles if look-through approach is not used
TAIWAN RBC	4% to 9% depending on its type
THAILAND RBC 2 (95 <sup>TH</sup> PERCENTILE)	9.5% for own use property 19% for others
SOLVENCY II	25%
BERMUDA BSCR	10% for company occupied 20% for others
CANADA LICAT	30% with credit for the present value of contractual lease cash flows
US RBC	Factors vary between company occupied, foreclosed and investment real estate, and further distinction whether properties have encumbrances or not.

Most regimes in Asia follows a stress-based approach when evaluating the interest rate risk and usually adopt a shock level differentiated by term to maturity (TTM). Tables 2.17 - 2.19 provide a comparison of the parameters used for interest rate risk in various markets in Asia.

**TABLE 2.17: KEY PARAMETERS COMPARISON FOR INTEREST RATE – STRESS BASED**

CAPITAL REGIME	INTEREST RATE / ALM – STRESS BASED APPLIES TO YIELD CURVE OR OTHERWISE STATED
CHINA C-ROSS	Release and adjusted by CBIRC from time to time
HONG KONG RBC (QIS 2)	+ 29% to 170% / - 19% to 75% by TTM and currency
MALAYSIA RBC	Prescribed by BNM, with stress levels varying by residual terms to maturity of the instruments
SINGAPORE RBC 2	+ 25% to 100% / - 25% to 70% by TTM
THAILAND RBC 2 (95 <sup>TH</sup> PERCENTILE)	ALM risk: 75 <sup>th</sup> percentile liability cash flows
SOLVENCY II	+ 20% to 70% / - 20% to 75% by TTM
BERMUDA BSCR	Prescribed by BMA as shock based approach
CANADA LICAT	Most adverse impact of four scenarios prescribed by OSFI
US RBC	Risk charge as CTE 90 based on selected scenarios

**TABLE 2.18: KEY PARAMETERS COMPARISON FOR INTEREST RATE – FACTOR-BASED & PRINCIPAL COMPONENT**

CAPITAL REGIME	INTEREST RATE / ALM – FACTOR-BASED
JAPAN (REGULATORY)	Factors ranging from 0.01 to 1 times interest rate on policy reserve, depending on interest rate
ICS FT 2018	Yield curve risk is split in terms of two main components plus the mean reversion scenario
INDONESIA RBC	15% on the difference between the reported premium reserve and premium reserve assessed using risk free rate, floored to zero*
SOUTH KOREA RBC	ALM risk: consists of mismatch risk, minimum-guaranteed interest rate risk and negative interest-margin risk, each follows a factor approach Interest rate risk: factor of 0.9% times duration on balance sheet amount
BERMUDA BSCR	200 bps for duration based approach
US RBC	Prescribed by NAIC

\*This is a premium deficiency reserve to reflect difference between actual reserves held calculated using Appointed Actuary's assumptions and reserves held on risk free yields as prescribed in regulations

**TABLE 2.19: KEY PARAMETERS COMPARISON FOR INTEREST RATE FOR SELECTED TTM – SHOCK DOWN**

CAPITAL REGIME	INTEREST RATE / ALM – STRESS BASED						
	APPLIES TO INTEREST RATE OR OTHERWISE STATED						
TTM	1	3	5	7	10	15	20
CHINA C-ROSS*	-73%	-68%	-58%	-50%	-37%	-28%	-24%
HONG KONG RBC (QIS 2)	-75%	-64%	-61%	-57%	-53%	-49%	-43%
MALAYSIA RBC**	-15%	-15%	-15%	-15%	-15%	-15%	-15%
SINGAPORE RBC 2	-70%	-65%	-60%	-50%	-40%	-30%	-25%
THAILAND RBC 2 (95 <sup>TH</sup> PERCENTILE)	-40%	-38%	-36%	-34%	-31%	-26%	-21%
SOLVENCY II	-75%	-56%	-46%	-39%	-31%	-27%	-29%

\* China has different shocks for asset and liability. The asset shocks are presented here and the liability shocks are generally lower.

\*\* For Malaysia, the stress is formula-based and depends on the MGS yield. The stress shown above for comparison purposes is applicable as at end of 2017.

For some Asian markets, the credit spread risk has recently been introduced. For Hong Kong and Singapore, where this is explicitly considered, a stress factor based on the widening of spreads is considered. Japan may also follow the ICS standard and adopt a stress-based approach. Other regimes follow a factor-based approach. Tables 2.20 - 2.21 provide a comparison of parameters for credit spread risk.

**TABLE 2.20: KEY PARAMETERS COMPARISON FOR CREDIT SPREAD RISK – STRESS-BASED**

CAPITAL REGIME	CREDIT SPREAD – STRESS BASED								
	APPLIES TO SPREAD OR OTHERWISE STATED (UNIT: BPS)								
CREDIT RATING	AAA			A			B		
TTM	0 to 5	5 to 10	> 10	0 to 5	5 to 10	> 10	0 to 5	5 to 10	> 10
HONG KONG RBC (QIS 2)	+95	+85	+75	+175	+145	+130	+640	+585	+530
ICS FT 2018		+100/+250%			+140/+250%			+200/+250%	
		-100/-50%			-140/-50%			-200/-50%	
SINGAPORE RBC 2	+105	+95	+90	+165	+145	+125	+540	+500	+475
SOLVENCY II		+130/ -75%			+260/ -75%			+1620/ -75%	

**TABLE 2.21: KEY PARAMETERS COMPARISON FOR CREDIT SPREAD RISK – FACTOR-BASED**

CAPITAL REGIME	CREDIT SPREAD – FACTOR-BASED
CHINA C-ROSS	Factor of 0.6%-2.24% times modified duration on admissible asset value, depending on duration and credit rating *
THAILAND RBC 2 (95 <sup>TH</sup> PERCENTILE)	Factors on admissible value, varied by issue type, rating and TTM on admissible value
SOLVENCY II	Factors on credit risk exposure varied by duration and credit rating on exposure for others
BERMUDA BSCR	Factors on admissible value varied by asset type and credit rating on admissible value
CANADA LICAT	Factors on bond market values, varied by credit rating and duration on bond market value
US RBC	Factors applied to investment types, which also vary by rating category

\* Under C-ROSS, credit spread risk is grouped under credit risk.

### Operational risk

For most of the regimes covered in this report, operational risks are quantified by applying risk factors to risk drivers as a proxy for operational risk. We have observed a wide range of underlying risk drivers with premium being one of the most commonly used one. Under some of the capital regimes, the operational risk requirement is defined as a certain percentage of the requirements of all the other risks.

**TABLE 2.22: TREATMENT COMPARISON FOR OPERATIONAL RISK – FACTOR-BASED**

KEY RISK DRIVER	CAPITAL REGIME	OPERATIONAL RISK
PREMIUM	HONG KONG RBC (QIS 2)	Max of percentage of Best Estimate Liability (BEL) and gross premium written, capped at 30% of diversified capital requirement
	SINGAPORE RBC 2	Max of percentage of BEL and premium ceded, capped at 10% of diversified capital requirement
	SOUTH KOREA RBC	1% of premium revenue in the preceding year
	TAIWAN RBC	0.5% - 5% for premium incomes and assets.
	THAILAND RBC 2	1% of gross written premium in the preceding year
	SOLVENCY II	Max of percentage of BEL and premium ceded, capped at 30% of basic capital requirement plus 25% of selected expense incurred previous 12 months
	US RBC	Factors applied to life and accident and health collected premiums and annuity considerations
	ICS FT 2018	Factor applies to gross premium income, reserve and increase in premium
CAPITAL REQUIREMENT	JAPAN (REGULATORY)	3% on undiversified capital requirement if negative unappropriated profit 2% otherwise
	BERMUDA BSCR	1% to 20% on diversified capital requirement
OTHERS	CANADA LICAT	Total operational risk capital is based on three components – business volumes (% premiums, % account values), growth in business volumes (where growth > 20%) and factor based on general required capital (5.75% of required capital for insurance, credit and market risks)
	INDONESIA RBC*	1% on general expense, 0.1% on unit-linked investment fund and 50% on deferred acquisition costs
	MALAYSIA RBC	1% of total assets

\* Indonesia has different risk pool for conventional and syariah. The framework for conventional business is compared here



### Diversification

As there are natural hedges between different areas of risk, especially those market risk related, diversification benefits are typically incorporated in the capital requirement to avoid imposing unnecessary capital constraints. Most Asian regimes (and especially the regimes updated recently) consider the diversification benefit when aggregating the sub-modules under insurance and market risk. When aggregating for the total risk charge, most regimes consider the diversification between all risk components other than operational risk, while some others consider only the diversification between asset risk and insurance risk. Table 2.23 provides a comparison of the diversifications incorporated.

**TABLE 2.23: ALLOWANCE FOR DIVERSIFICATION**

CAPITAL REGIME	OVERALL	WITHIN LIFE INSURANCE RISK	WITHIN MARKET RISK
CHINA C-ROSS	All component	✓	✓
HONG KONG RBC (QIS 2)	All components but operational	✓	✓
JAPAN (REGULATORY)	All components but operational	✓	✓
ICS FT 2018	All components but operational	✓	✓
INDONESIA RBC	No allowance	X	X
MALAYSIA RBC	No allowance (*)	X	X
SINGAPORE RBC 2	Between insurance, market and counterparty default risk	✓	✓
SOUTH KOREA RBC	All components but operational	✓	✓
TAIWAN RBC	Between asset and insurance risk	X	X
THAILAND RBC 2 (95 <sup>TH</sup> PERCENTILE)	Between asset and insurance risk and within market	X	✓
SOLVENCY II	All component but operational	✓	✓
BERMUDA BSCR	All components but operational	✓	✓
CANADA LICAT	All components but operational	✓	X
US RBC	Between asset, insurance and market risk	X	✓

\* No allowance under RBC but allowance under Internal Capital Adequacy Assessment Process (ICAAP).

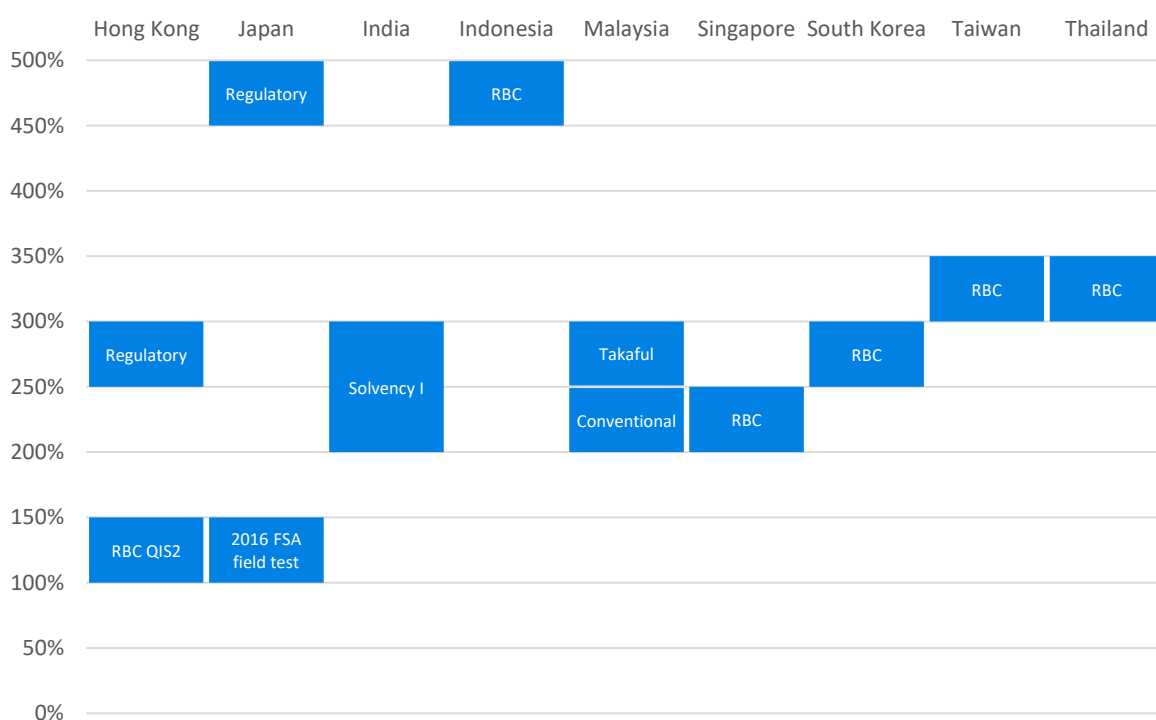
## Comparative analysis of key capital results across the region

In this section, we compare the key statistics in relation to the quantitative requirements of regulatory capital regimes across different Asian markets. China C-ROSS is not included as part of this analysis due to data limitations. In some markets, regulators are in the progress of introducing new RBC regimes and, therefore, have carried out field tests. The results of such filed test are also shown in this section. Data has been sourced from both public disclosures as well as other market sources. For Singapore and Thailand, statistics have been based on current RBC1 regimes.

### Overview

Figure 4.1 summarises the industry average solvency ratios for each market covered in this report, except for China. Most of the markets have an average local regulatory solvency ratio within the range of 200% to 350%, except Japan and Indonesia, which have a relatively higher average solvency ratio (above 450%).

FIGURE 4.1: INDUSTRY AVERAGE SOLVENCY RATIO LEVEL



Source: Estimates based on public information and Milliman market intelligence. Some companies may experience higher or lower solvency ratios than the industry average shown above.

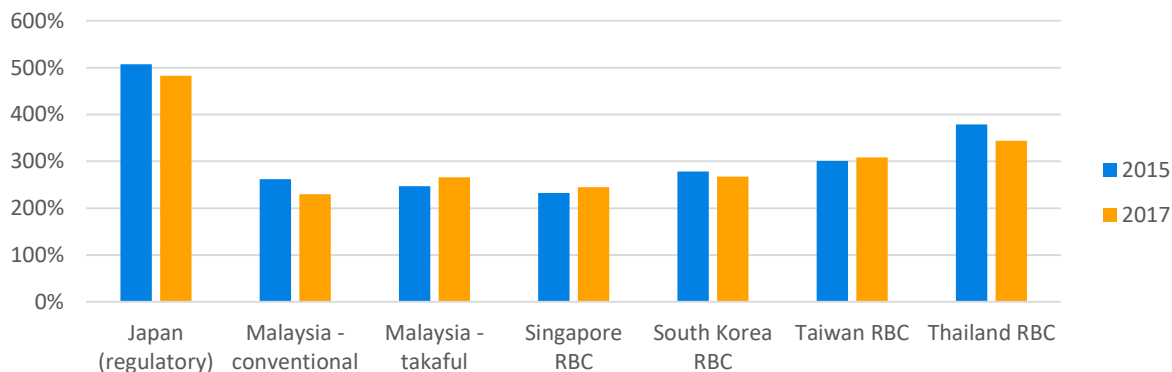
Note 1: The solvency ratios shown above are as at 31 December 2017 except: a) Japan regulatory solvency ratio and India Solvency I solvency ratio are as at 31st March 2018; and b) Japan 2016 FSA field test result is as at 31 March 2016.

Note 2: The Hong Kong IA carried out QIS 2 for the new RBC regime in 2017, and the resulting average industry solvency ratios were just above 100% based on a set of relatively conservative parameters, according to many industry observers. Similarly, Japan's FSA carried out an economic balance sheet RBC field test in 2016, and the resulting average solvency ratios were also just above 100%. However, both quantitative impact studies were conducted using parameters/approaches that are currently going through review and further consultation. The average industry solvency ratios under the final implemented RBC requirements are likely to differ (potentially significantly) from those shown.

Note 3: For Malaysia, the conventional business only includes life conventional business, and takaful business includes only family takaful business.

Historical capital ratios for some of the markets are summarised in the figure below. In general, the industry level solvency ratios have been relatively stable over the past few years, with small changes driven primarily by changes in the underlying interest rate environment.

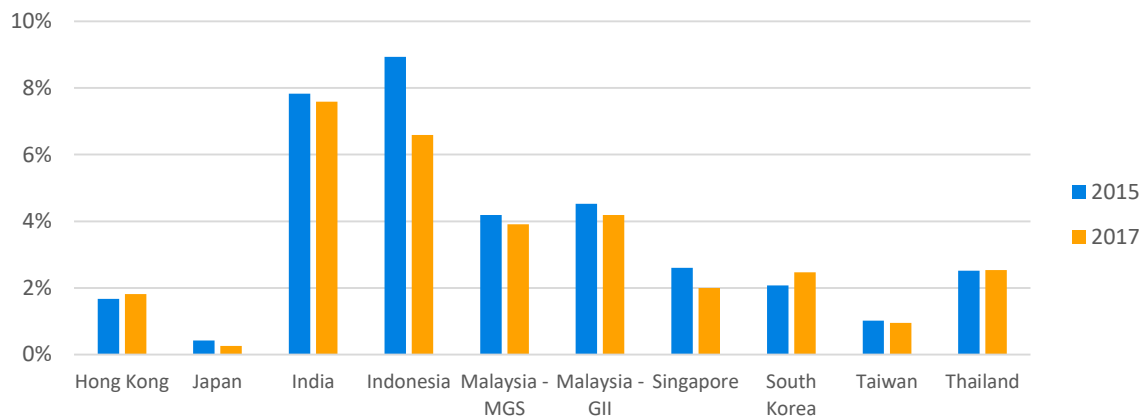
FIGURE 4.2: INDUSTRY LEVEL SOLVENCY RATIO - 2015 AND 2017



Note: The solvency ratios shown for 2015 and 2017 are as at December except for Japan, of which the solvency ratios are as at March.

In most markets, government bond yields are typically used as a basis to set up the discount rate when producing the solvency balance sheet. Changes in government bond yields, therefore, impact the solvency position of companies. The figure below compares the 10-year bond yield as at year-end 2015 and as at year-end 2017.

FIGURE 4.3: 10-YEAR GOVERNMENT BOND YIELD – YEAR END 2015 AND YEAR END 2017

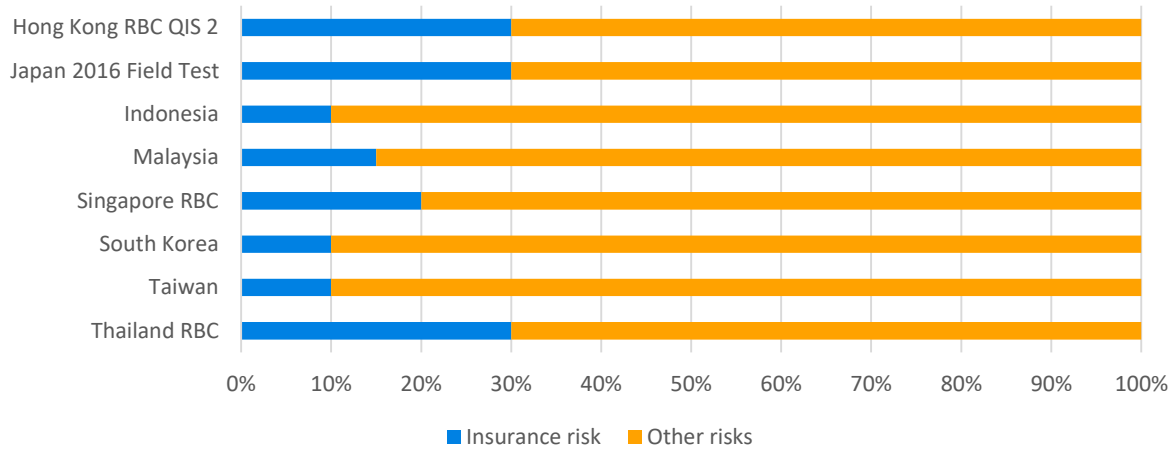


Note: Japan 10-year swap rates are shown rather than 10-year government bond yields since swap rates are used as discount rates in the 2016 field test.

### Capital requirement

The figure below summarises the split of capital requirements between insurance risk and other risks in the markets subject to an RBC regime. The other risks are mainly market risk related.

**FIGURE 4.4: RISK CHARGE BREAKDOWN – INSURANCE RISK VERSUS OTHER RISKS**



Source: Estimates based on public information and Milliman market intelligence.

Note: For Thailand and Singapore, the above breakdown is based on Thailand RBC1 and Singapore RBC 1 parameters respectively given new RBC 2 regimes have not been used in practice yet.

For markets subject to RBC regimes, the total capital requirement is generally driven by market risks, although lapse risk and morbidity risks are also key contributors. In some markets such as Japan, currency risk can also be material. The breakdown of market risk varies by market. Most market risk is related to interest rates, credit spreads and equity returns. Interest rate risk is material in most of the markets (except markets with significant unit-linked business), while credit spread risk is material under Hong Kong RBC QIS 2, Singapore RBC and South Korea RBC.

**FIGURE 4.5: MARKET RISK CHARGE BREAKDOWN**



Source: Estimates based on public information and Milliman market intelligence.

Industry average solvency ratios and the risk charge breakdown are explained by the nature of assets, the nature of liabilities and the matching (or lack of matching) of assets and liabilities.

### Liability overview

Liabilities differ significantly from one market to another. The proportion of unit-linked business is significant in some markets (e.g. Indonesia, India and Malaysia), while universal life business has been relatively popular in Hong Kong, Singapore and South Korea. Non-participating traditional business (e.g. endowment, whole life, credit life) remains a material product category for all ten markets. Participating business (e.g. endowment, whole life) is also a popular line of business for some markets across the region, including Japan, South Korea, Hong Kong, Singapore and India.

TABLE 4.1: HIGH LEVEL OVERVIEW OF THE PRODUCT LANDSCAPE BY MARKET

	TRADITIONAL NON-PAR	TRADITIONAL PAR	UNIVERSAL LIFE	UNIT-LINKED	VARIABLE ANNUITY
HONG KONG	Material	Material	Material	Moderate	Low or none
JAPAN	Material	Material	Low or none	Moderate	Material
INDIA	Material	Material	Low or none	Material	Low or none
INDONESIA	Material	Low or none	Low or none	Material	Low or none
MALAYSIA	Material	Material	Low or none	Material	Low or none
SINGAPORE	Material	Material	Material	Moderate	Low or none
SOUTH KOREA	Material	Material	Material	Moderate	Moderate
TAIWAN	Material	Moderate	Moderate	Material	Material
THAILAND	Material	Low or none	Low or none	Moderate	Low or none

<span style="display: inline-block; width: 20px; height: 10px; background-color: #4CAF50; margin-right: 5px;"></span> Material	<span style="display: inline-block; width: 20px; height: 10px; background-color: #FFC107; margin-right: 5px; margin-left: 100px;"></span> Moderate	<span style="display: inline-block; width: 20px; height: 10px; background-color: #9E9E9E; margin-right: 5px; margin-left: 200px;"></span> Low or none
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Source: Estimates based on public information and Milliman market intelligence.

The level of guarantees could potentially be significant for some product categories such as universal life, variable annuities and short term endowments. In Japan, South Korea and Taiwan, variable annuities usually offer various guaranteed minimum benefits (commonly referred to collectively as GMxBs), whereas in Hong Kong and Singapore, universal life typically offers interest rate guarantees. These products are also exposed to a material disintermediation risk<sup>1</sup> since policyholders tend to behave more rationally and dynamically in response to interest rate changes, leading to a potential material TVOG. Participating products, which are popular in Hong Kong, Singapore, India and Malaysia, also offer interest rate guarantees but guarantees are typically quite low and out of money, and hence TVOG is not expected to be material in general.

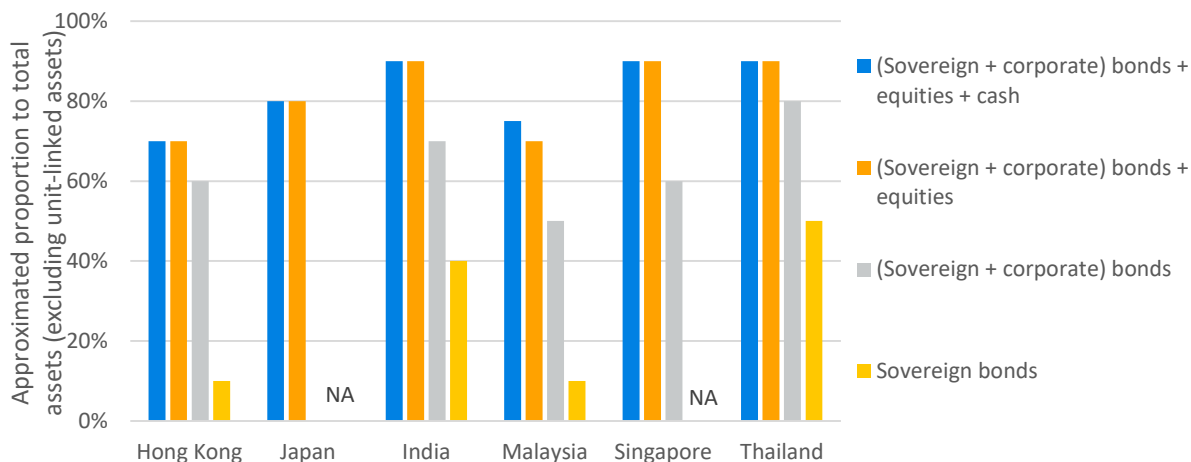
Unit-linked business and insurance products with lower guarantees and protection products will typically look more attractive under an economic balance sheet framework, while savings products with guarantees (implicit or explicit) will not be so attractive (the degree of attractiveness being typically measured in terms of new business margin).

<sup>1</sup> It refers to the potential that policyholders may relinquish policies due to rising interest rates

**Asset overview**

Cash and securities account for the majority of a typical asset portfolio of insurance companies (excluding unit-linked assets). The figure below shows the approximated asset proportion to total assets excluding unit-linked assets (the ratio has been approximated given public information may not be available for all markets). More than half of the assets are invested in bonds, and furthermore, insurers in Thailand and India tend to allocate more assets to sovereign bonds. Malaysian takaful companies typically hold more cash or money market securities compared with Malaysian conventional life insurers, given the limited availability of shariah-compliant assets.

**FIGURE 4.6: APPROXIMATED PROPORTION TO TOTAL ASSETS (EXCLUDING UNIT-LINKED ASSETS)**



Note: The above asset categories are not mutually exclusive.  
 Source: Estimates based on public information and Milliman market intelligence.  
 Note: NA means data not available.

## Acronyms

AFS : Available for Sale	ICS : Insurance Capital Standard
ALM : Asset Liability Management	IRDAI : Insurance Regulatory and Development Authority of India
APNGB : Allowances for Provisions for Non-Guaranteed Benefits	ITCL: Individual Target Capital Level
AT : Additional Tier	LICAT : Life Insurance Capital Adequacy Test
AV : Account Value	LLP : Last Liquidity Point
BE : Best Estimate	MAD : Margin for Adverse Deviation
BEL : Best Estimate Liability	MAS : Monetary Authority of Singapore
BMA : Bermuda Monetary Authority	MGIR : Minimum-Guaranteed Interest Rate
BNM : Bank Negara Malaysia	MGS : Malaysian Government Securities
BSCR : Bermuda Solvency Capital Requirements	MOCE : Margin Over Current Estimate
CAR : Capital Adequacy Ratio	MTM : Mark to Market
CBIRC : China Banking and Insurance Regulatory Commission	NAAR: Net amount at risk
CE : Current Estimate	NAIC : National Association of Insurance Commissioners
CET : Common Equity Tier	NAV : Net Asset Value
CMP : Capital Management Plan	NLP : Net Level Premium
CoC : Cost of Capital	NPV : Net Premium Valuation
C-ROSS : China Risk Oriented Solvency System	OIC : Office of Insurance Commission
CSV : Cash Surrender Value	OJK : Otoritas Jasa Keuangan
CTE: Confidence Tail Expectation	ORSA : Own Risk and Solvency Assessment
DAC : Deferred Acquisition Costs	OSFI : Office of the Superintendent of Financial Institutions
EIOPA : European Insurance and Occupational Pensions Authority	PAD : Provision for Adverse Deviation
ERM : Enterprise Risk Management	PCR : Prescribed Capital Requirement
FSA : Financial Services Agency	PVFCF : Present Value of Future Cash Flows
FSC : Financial Supervisory Commission	QIS : Quantitative Impact Study
FSR : Fund Solvency Ratio	RBC : Risk-Based Capital
FSS : Financial Supervisory Service	REITs : Real Estate Investment Trusts
GMAB : Guaranteed Minimum Accumulation Benefit	RM: Risk Margin
GMDB : Guaranteed Minimum Death Benefit	SARMRA : Solvency - Aligned Risk Management Requirement and Assessment
GMxB: Guaranteed Minimum benefits (collectively term)	SST : Stress and scenario testing
GPV : Gross Premium Valuation	TCR : Total Capital Requirement
IA : Insurance Authority	TTM : Term To Maturity
IBPA : Indonesia Bond Pricing Agency	TVOG : Time Value of Options and Guarantees
ICAAP : Internal Capital Adequacy Assessment Policy	UFR : Ultimate Forward Rate
	UPR : Unearned Premium Reserve



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