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# C-ROSS Implication on Investment

## - Aligning the Investment Strategy with C-ROSS

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- Introduction of C-ROSS Regime
- Asset Side Capital Charge under C-ROSS
- Aligning the Investment Strategy with C-ROSS



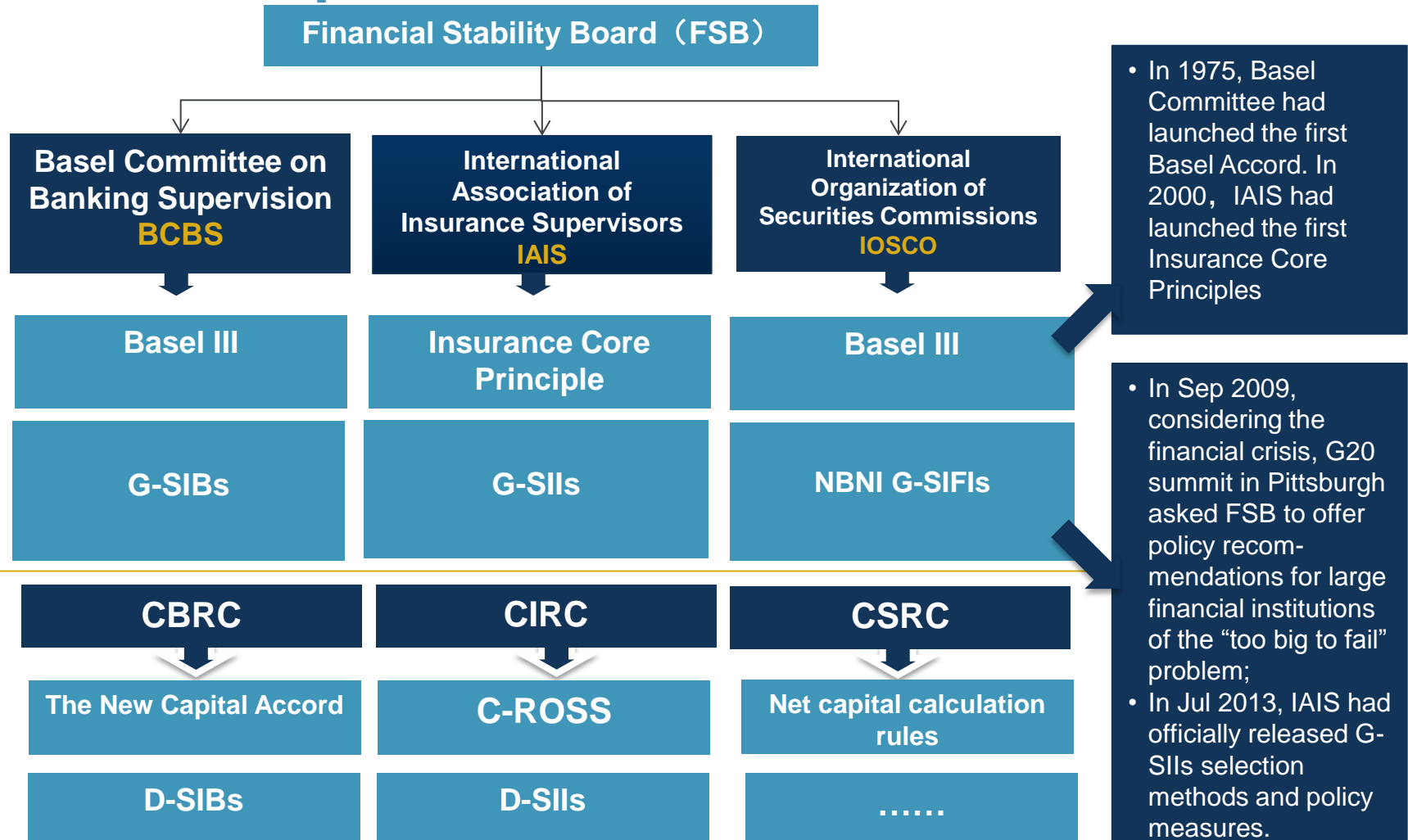
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# Introduction of C-ROSS Regime

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ponsorship  
Thought leadership  
Progress  
Community  
Sessional Meetings  
Education  
Working parties  
Volunteering  
Research  
Shaping the future  
Networking  
Professional support  
Enterprise and risk  
Learned society  
Opportunity  
International profile  
Journals  
Support

# International financial supervisory system and the development



# Background of C-ROSS Development

- The increasing risk scale and difficulty of risk management of insurance industry

- Market-oriented strategy of “release the top-end, hold the back-end”

- International insurance regulatory rules become increasingly convergent.
- Banking has unified regulatory rules.
- There is no unified rules for insurance industry all over the world

- C-SI is not suitable for emerging market.
- It is urgent to enhance risk management of insurance industry
- Develop a risk oriented solvency system

## Chinese

Full name: 中国风险导向的偿付能力体系

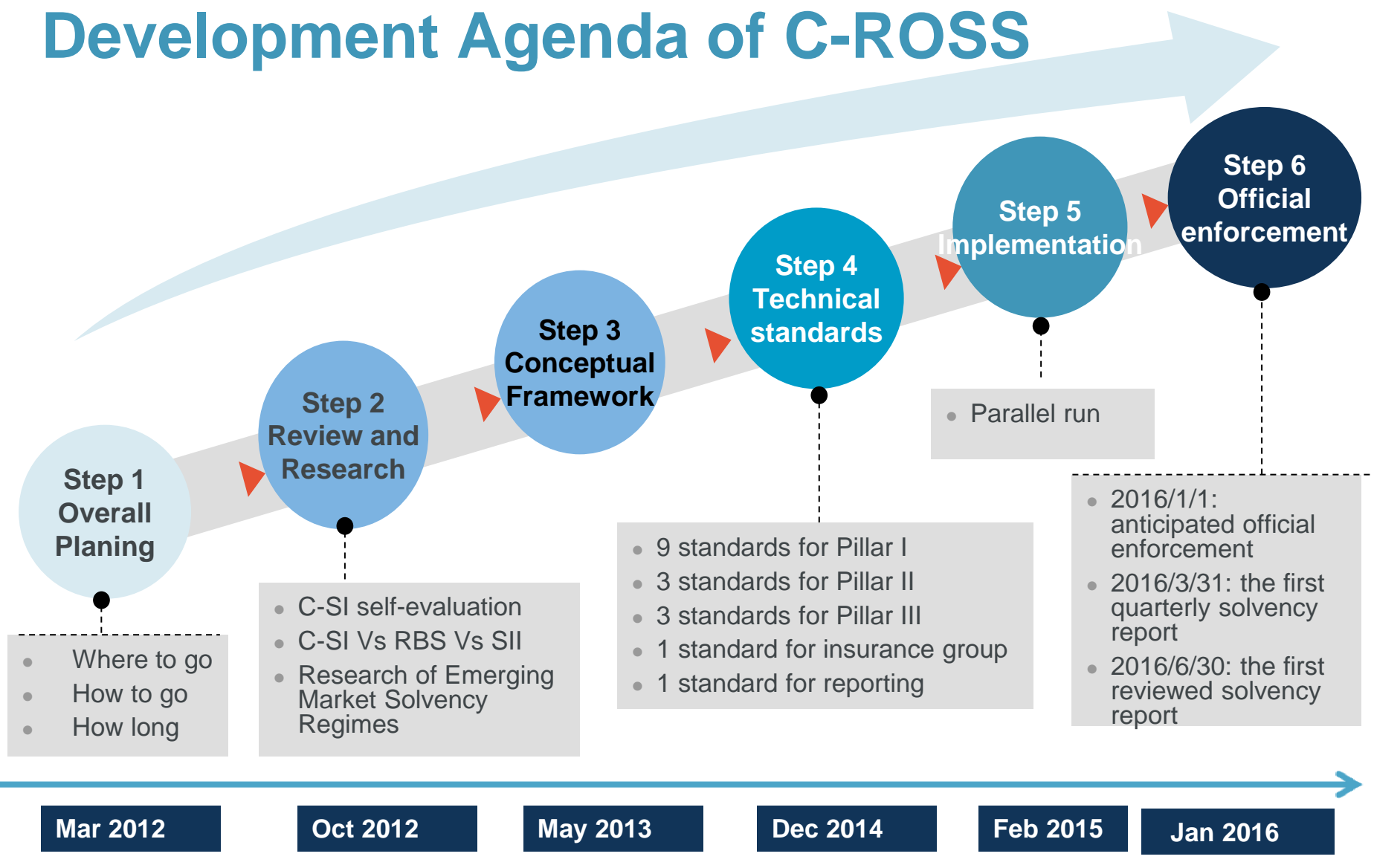
Simplified name: 偿二代

## English

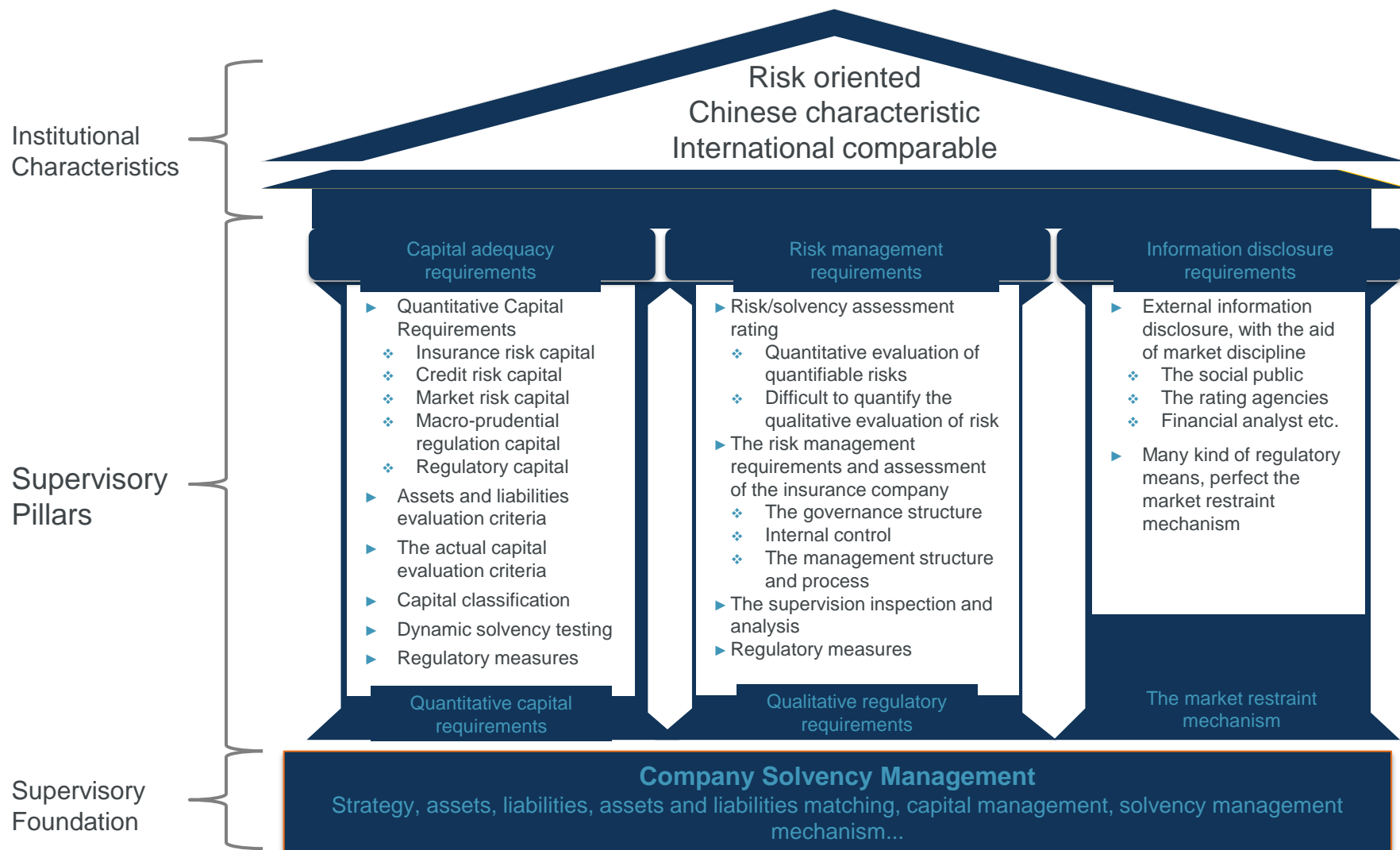
Full name : China Risk Oriented Solvency System

Simplified name : C-ROSS

# Development Agenda of C-ROSS



# Conceptual Framework: Three-Pillar Framework



# Conceptual Framework

- On Feb 13 2015, CIRC has issued 17 regulatory rules of “China Risk Oriented Solvency System”(C-ROSS).(Notice of the issuance of insurance company solvency regulatory rules (No. 1-17))
- On Feb 15 2015,CIRC issued the notice of relevant issues of C-ROSS implement in transition period, and raise some request for the commissioning of C-ROSS.

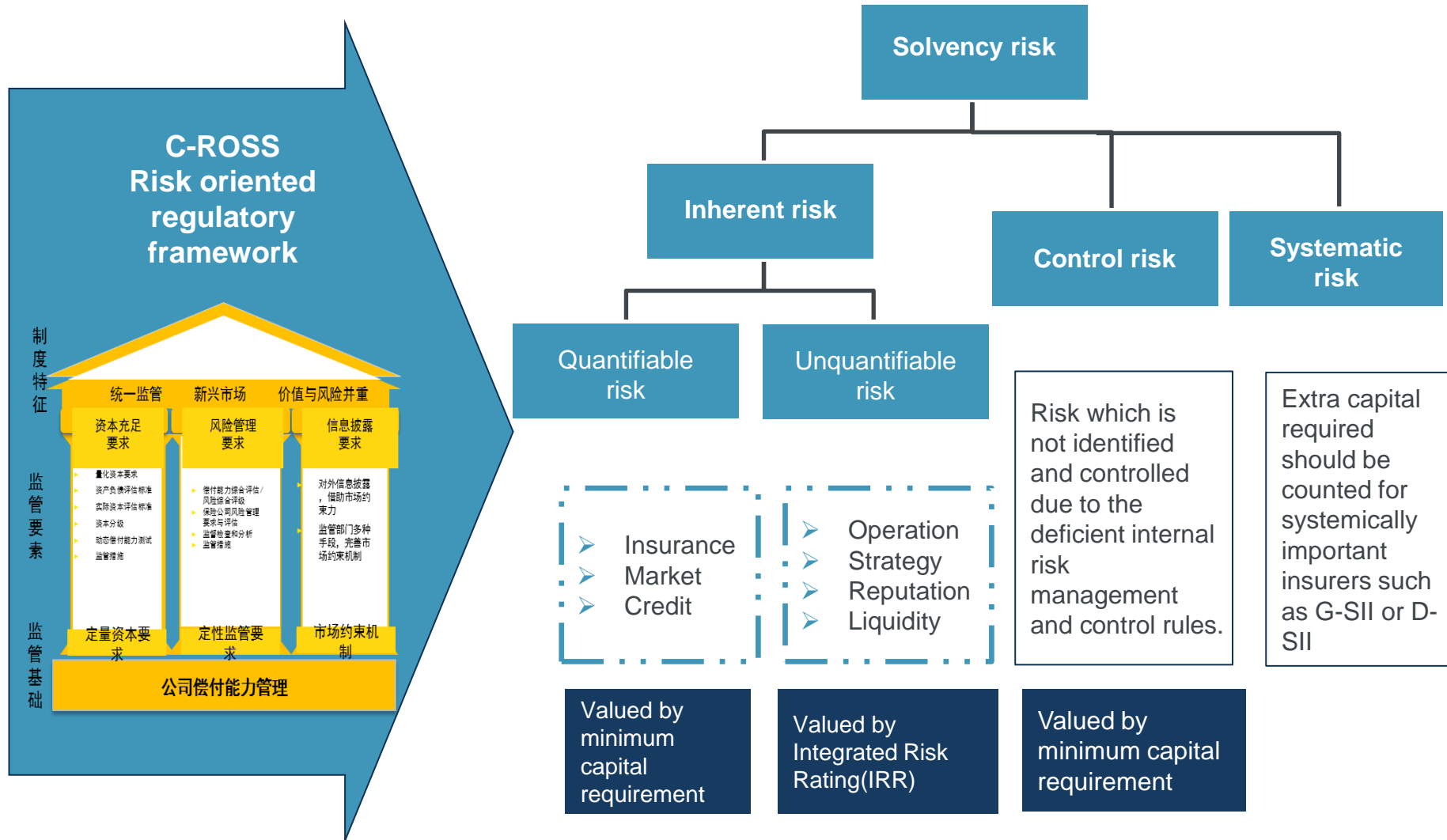
Pillar I	<b>Actual Capital</b> <ul style="list-style-type: none"> <li>▶ Measures the admitted assets and admitted liabilities based on accounting value</li> <li>▶ Capital tiering classifications based on characteristics of capital</li> </ul>	<b>Minimum Capital Requirements</b> <ul style="list-style-type: none"> <li>▶ Contains quantifiable risks, as well as the MCR of risk control and any capital add-ons</li> <li>▶ Contains loss absorbing rules</li> </ul>	<b>Life insurance liability valuation</b> <ul style="list-style-type: none"> <li>▶ Contains best estimate and risk margin and TVOG calculated by factor methods.</li> <li>▶ Assumptions should satisfy the regulatory criteria.</li> </ul>	<b>Insurance Risk (Non-life)</b> <ul style="list-style-type: none"> <li>▶ Calculate premium risk, reserve risk and catastrophe risk separately.</li> <li>▶ Aggregate premium risk and reserve risk first, and then aggregate them with catastrophe risk</li> </ul>	<b>Insurance Risk (Life)</b> <ul style="list-style-type: none"> <li>▶ Each sub-risk is calculated by scenario approach</li> <li>▶ Aggregate loss ratio risk, lapse risk and expense risk capital requirement</li> </ul>
	<b>Insurance Risk (Reinsurance)</b> <ul style="list-style-type: none"> <li>▶ Proportional reinsurance can refer to the approach of direct insurance; non-proportional has an separate factor.</li> <li>▶ Aggregate proportional and non-proportional business according to business lines.</li> </ul>	<b>Market Risk</b> <ul style="list-style-type: none"> <li>▶ Risk exposure determined based on accounting value instead of admissible proportion under previous solvency regime</li> <li>▶ Interest rate risk is classified by life, non-life and reinsurance company.</li> </ul>	<b>Credit Risk</b> <ul style="list-style-type: none"> <li>▶ Determine factors according to the asset credit situation, credit risk exposure determined based on accounting value</li> <li>▶ Includes credit spread risk and default risk, and aggregate them by correlation matrix</li> </ul>	<b>Stress Test</b> <ul style="list-style-type: none"> <li>▶ It is classified by life and non-life insurer, and it sets stress test under the basic scenario and stress scenario.</li> <li>▶ Given some simplified approach of the anticipation of capital required.</li> </ul>	



# Conceptual Framework

Pillar II	<b>Integrated Risk Rating (IRR)</b> <ul style="list-style-type: none"> <li>Assesses overall quantifiable and unquantifiable risk, and classify insurers by risk rating.</li> <li>Imply different policies and measures to insurers of different class</li> </ul>	<b>SARMRA</b> <ul style="list-style-type: none"> <li>It puts forward specific requirement of risk management to insurers, establishes a regular evaluation mechanism, and then it is scored by CIRC.</li> <li>The assessment is linked to solvency requirement and IRR.</li> </ul>	<b>Liquidity Risk</b> <ul style="list-style-type: none"> <li>Establish liquidity risk management process, set up risk monitoring program of monitoring indicators and cash flow liquidity risk stress tests.</li> <li>Cash flow stress test needs to distinguish life and non-life insurers</li> </ul>
Pillar III	<b>Company Information Disclosure</b> <ul style="list-style-type: none"> <li>Prepare quarterly summary report, including key indicators, capital cases, ratings, risk management and other information;</li> <li>Require to disclose the solvency status among various activities</li> </ul>	<b>Regulator Information Disclosure</b> <ul style="list-style-type: none"> <li>Establish a pattern of solvency regulation of information disclosure of CIRC.</li> <li>Other methods of solvency information exchange</li> </ul>	<b>Credit Rating</b> <ul style="list-style-type: none"> <li>Including the main rating and debt rating</li> <li>The requirements of the rating agencies</li> <li>Standards for rating behavior</li> <li>Regulatory requirements</li> </ul>
Comprehensive	<b>Solvency Report</b> <ul style="list-style-type: none"> <li>Standards to the contents and submission of solvency report;</li> <li>Solvency report includes quarterly report, quarterly newsletter, and interim reports, etc.</li> </ul>		<b>Insurance Group</b> <ul style="list-style-type: none"> <li>Requirement to solvency ratio, capital requirement and actual capital of insurance group.</li> <li>Strengthen the special risk management to group beyond the seven risks of insurers.</li> </ul>

# Risk classification and management





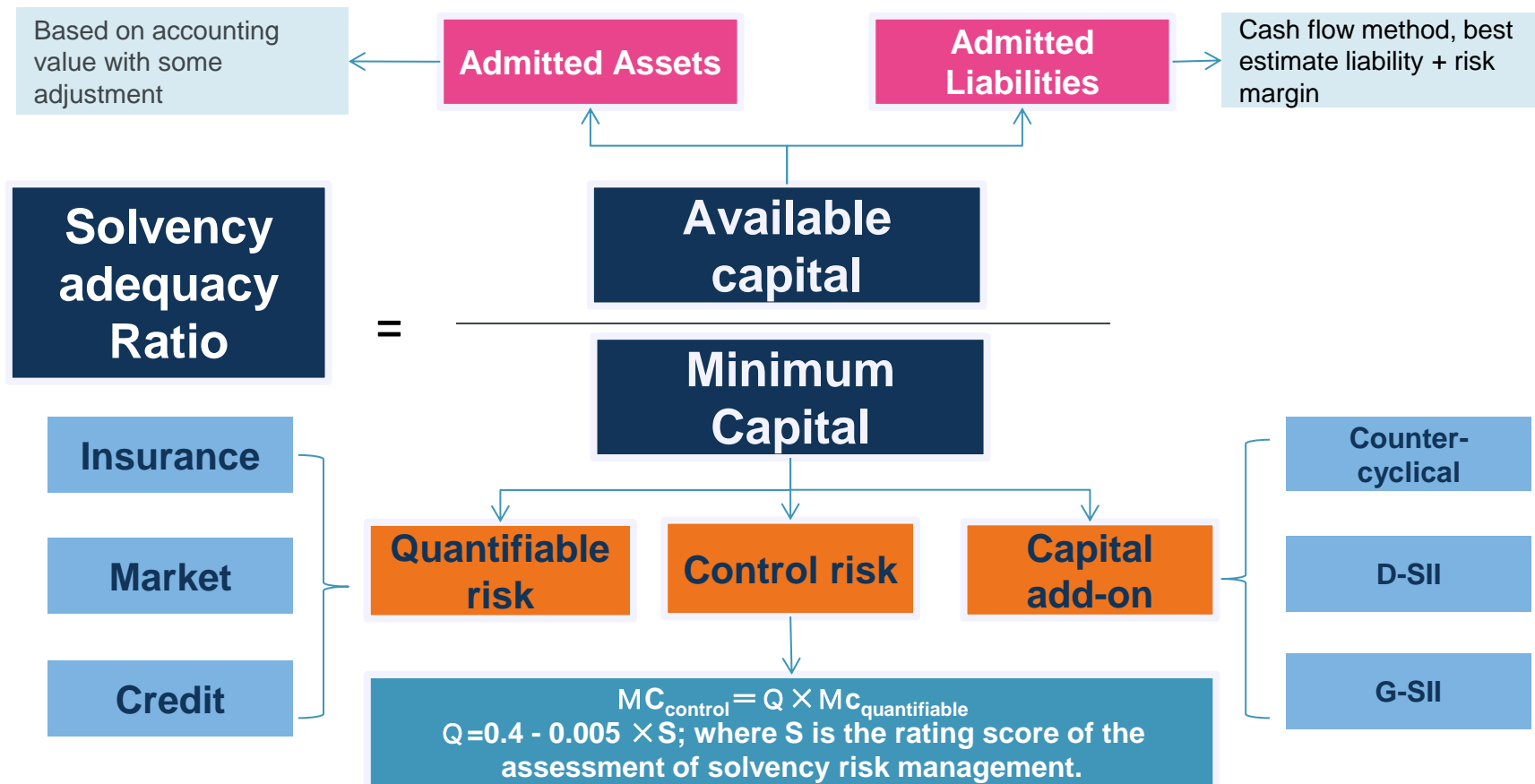
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# Asset Side Capital Charge under C-ROSS

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# Solvency Ratio Requirement



**Core Solvency Ratio = Core Capital/ Minimum Capital**

**Comprehensive Solvency Ratio = (Core Capital + Supplementary Capital)/ Minimum Capital**

# Minimum Capital of Market Risk

The calculation of asset market MC include:

Interest  
rate  
risk

Bond

Asset  
Backed  
Securities

Derivative  
s of  
Interest

Other  
fixed  
income  
products

Equity  
price  
risk

Stock  
Unlisted equity

Security funds  
Convertible bond

Investment plan  
in infrastructure  
equity

Investment plan  
in unlisted equity

Asset  
management  
products  
Equity trust

Stock index  
future

Preferred stock

Long equity  
investment plan

Real  
estate  
price  
risk

real right-  
formalism

project  
company-  
formalism

Oversea  
asset  
price risk

Oversea  
fixed  
income  
asset

Oversea  
equity  
asset

Exchange  
rate risk

Foreign currency  
liquidity  
management tool

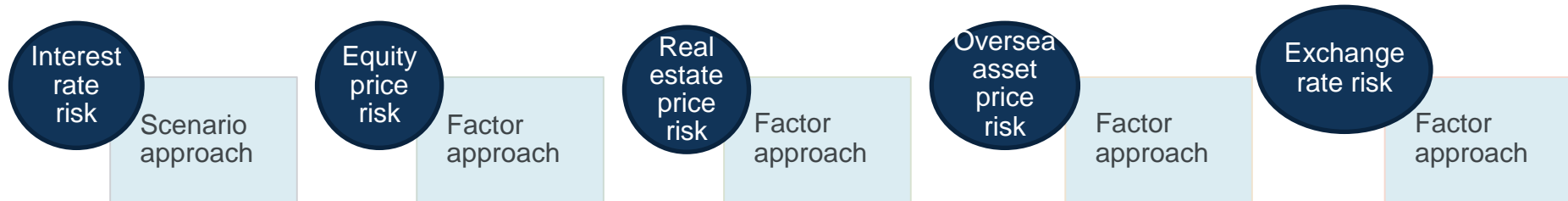
Foreign currency  
fixed income  
asset

Foreign currency  
equity asset

Foreign currency  
derivatives

Other foreign  
currency asset  
Foreign currency  
liability

# Capital Charge for Market Risk



Formula of factor approach:

- $MC_{\text{market}} = EX \times RF$ ; where,  $MC_{\text{market}}$  is the minimum capital of a kind of risk; EX is the exposure of this kind of asset.
- RF is the risk factor,  $RF = RF_0 \times (1 + K)$ ;  $RF_0$  is the basic factor; K is the character factor, where  $K \in [-0.25, 0.25]$ ;

For the interest rate risk for life insurance company, MC is calculated by scenario approach, the formula is:

$$MC_{\text{interest}} = \text{Max}[(AA_{\text{basic scenario}} - PV_{\text{basic scenario}}) - (AA_{\text{adverse scenario}} - PV_{\text{adverse scenario}})]$$

- The adverse interest rate of asset =  $(1 + SF_1) \times \text{risk free interest rate}$ ;
  - The adverse discount rate of cash flow of life insurance business =  $(1 + SF_2) \times \text{discount rate of cash flow}$
-

# Minimum Capital for Credit risk

## Credit risk MC

### Credit spread risk MC

- Bonds, include financial bond, corporate bond, etc. except convertible bond
- Asset Backed Securities, include special management plans of securities companies and credit asset-backed securities
- Fixed income trust;
- Other fixed income products

### Counterparty default risk MC

- Cash and liquidity management tools
- Fixed income investment asset
- Exchange forward and interest rate swap
- Policy loans
- Reinsurance assets, including accounts receivable reinsurance reserve, reinsurance receivables
- Premiums receivable
- Interest receivable
- Other receivables and prepayments
- Debt Guarantee

## Calculation of Market Risk MC:

- The formula of each asset MC is:

$$MC_{\text{credit}} = EX \times RF$$

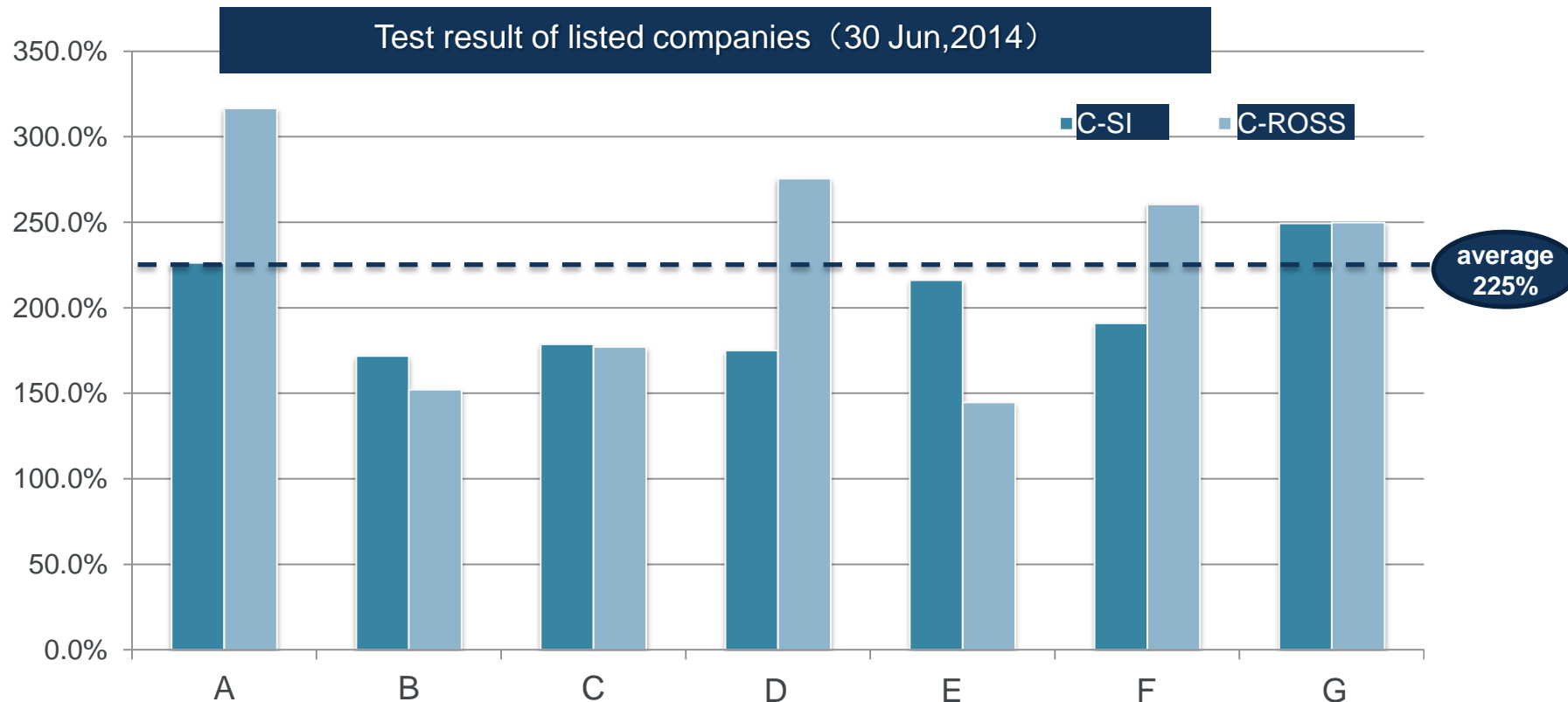
- Where EX is exposure, credit risk exposure equals to the admit value without any special regulatory;
- RF is risk factor,  $RF = RF_0 \times (1 + k)$ ;  
RF<sub>0</sub> is basic factor; K is character factor
- The calculation of credit risk MC is :

$$MC_{\text{信用}} = \sqrt{MC_{\text{利差}}^2 + 2\rho \times MC_{\text{利差}} \times MC_{\text{交易对手违约}} + MC_{\text{交易对手违约}}^2}$$

# C-ROSS Opportunities and Challenges

## Capital release, no pressure of financing, largely develop business

- ▶ In accordance with the field testing results of 30 Jun 2014, after C-ROSS has been implemented, most of life insurers' solvency ratio will be strengthened. The reason of the improvement is that (1) the release of residual margin in comparison to PRC GAAP reserve; and (2) the loss absorbing effect from the product types with variable benefit.
- ▶ Both available capital and minimum capital increases and become more fluctuating compared to Solvency I. Hence the solvency management will become more challenging.







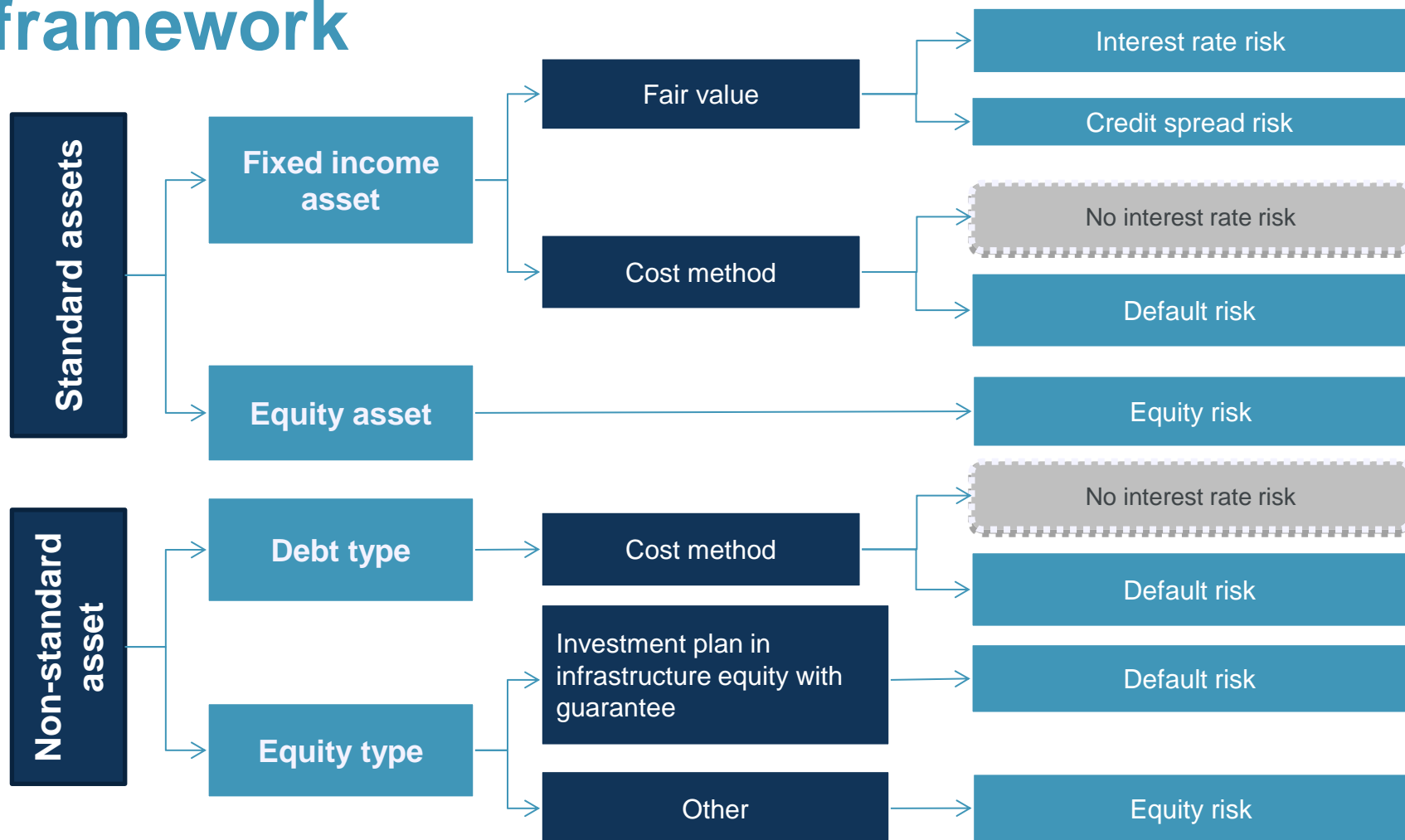
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# Aligning the Investment Strategy with C-ROSS

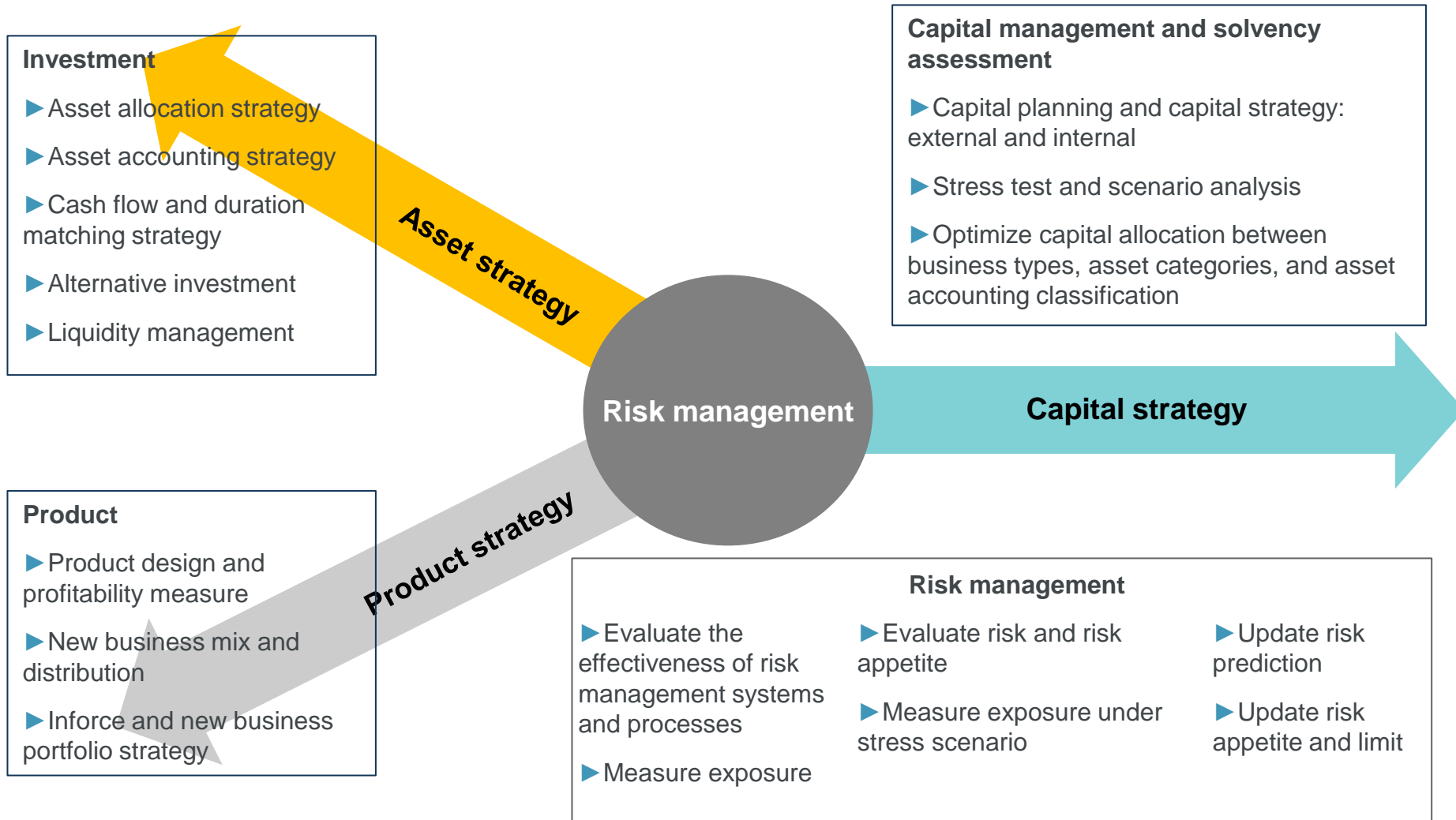
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# C-ROSS market risk capital charge framework



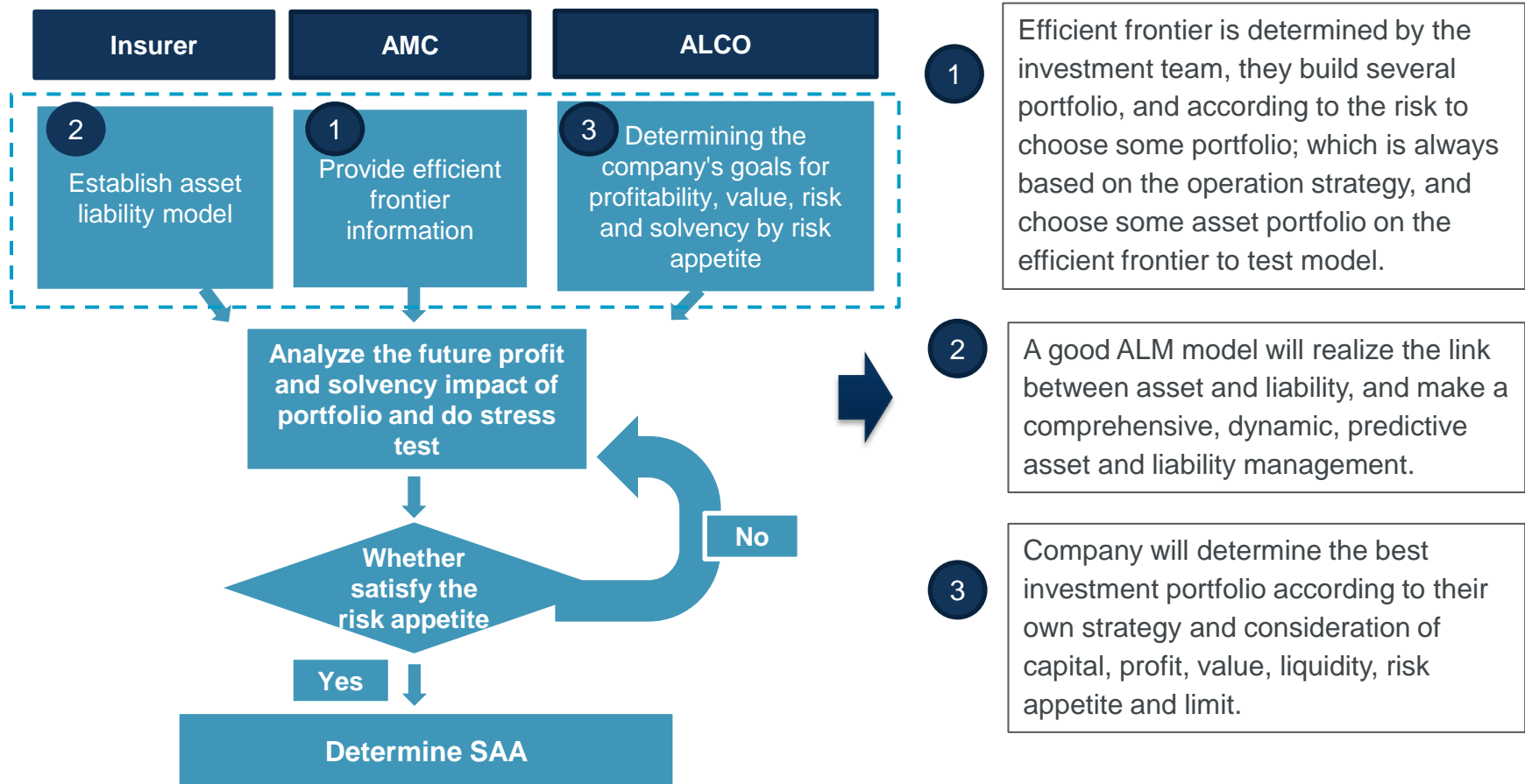
# C-ROSS requires company to align investment, product strategy, capital management and risk management.



# Asset Liability Management and Strategic Asset Allocation

## Risk appetite under C-ROSS

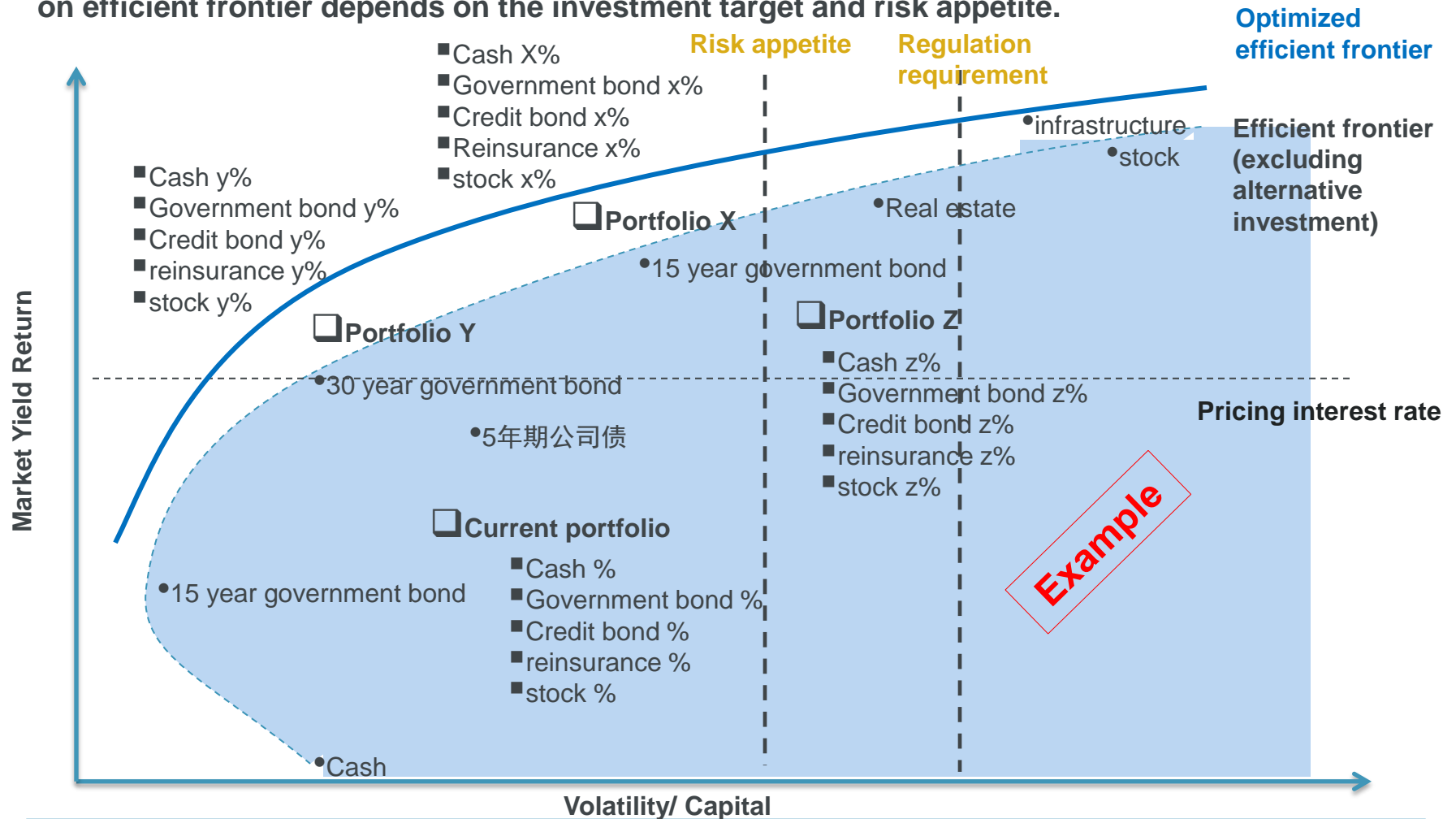
Optimize the choice of SAA, which is based on the combination of the efficient frontier, asset and liability management model and risk appetite, and by running ALM model, based on the risk appetite, to determine the optimal asset allocation on the efficient frontier portfolio, so to maximize the company's earnings targets.



# Strategic Asset Allocation (SAA)

## Determine efficient frontier and choose SAA

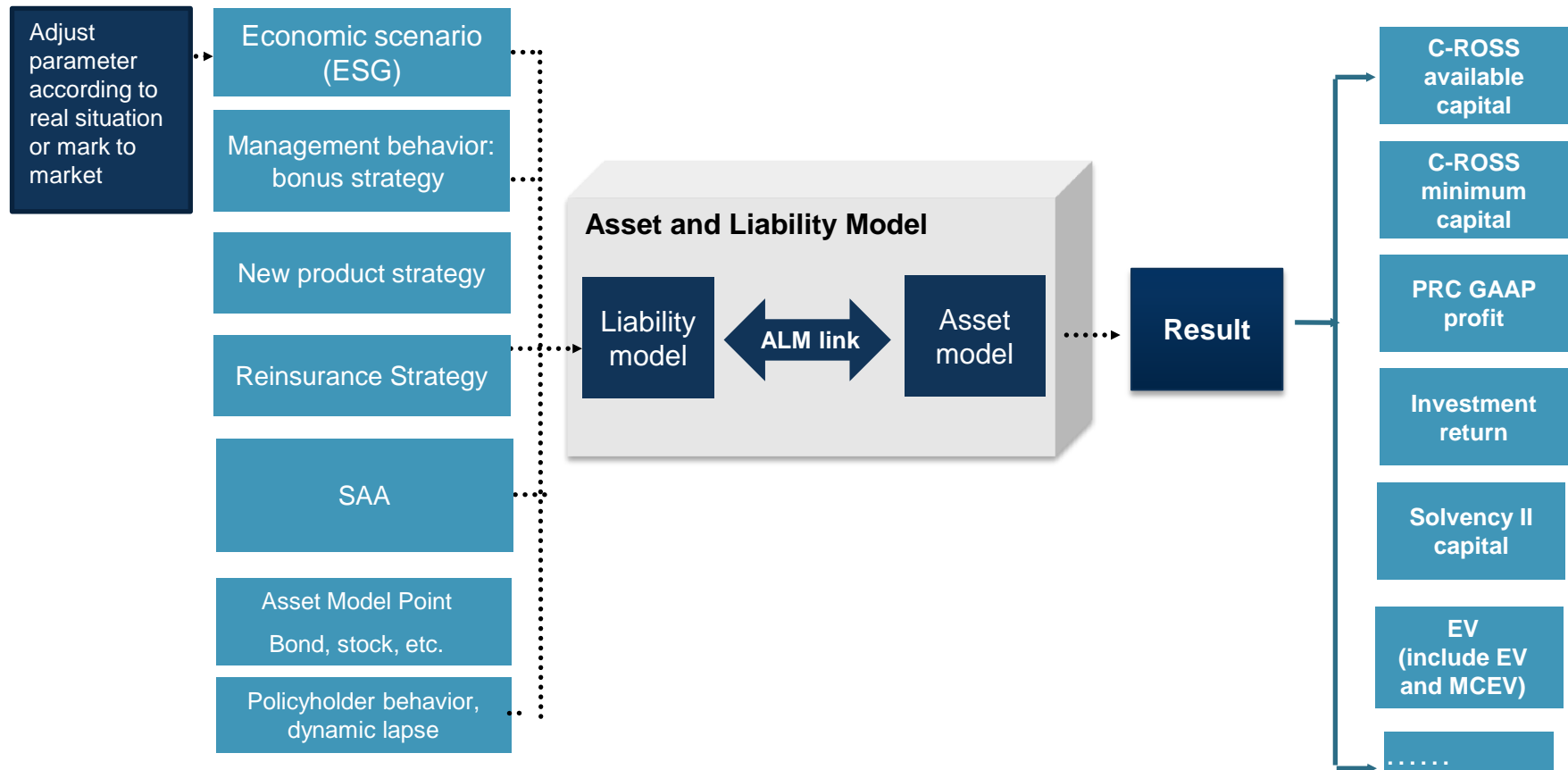
Efficient frontier reflects the top return portfolio given the level of risk, the optimized portfolio on efficient frontier depends on the investment target and risk appetite.



# Asset liability management and SAA

## Asset liability model is required to predict solvency under C-ROSS

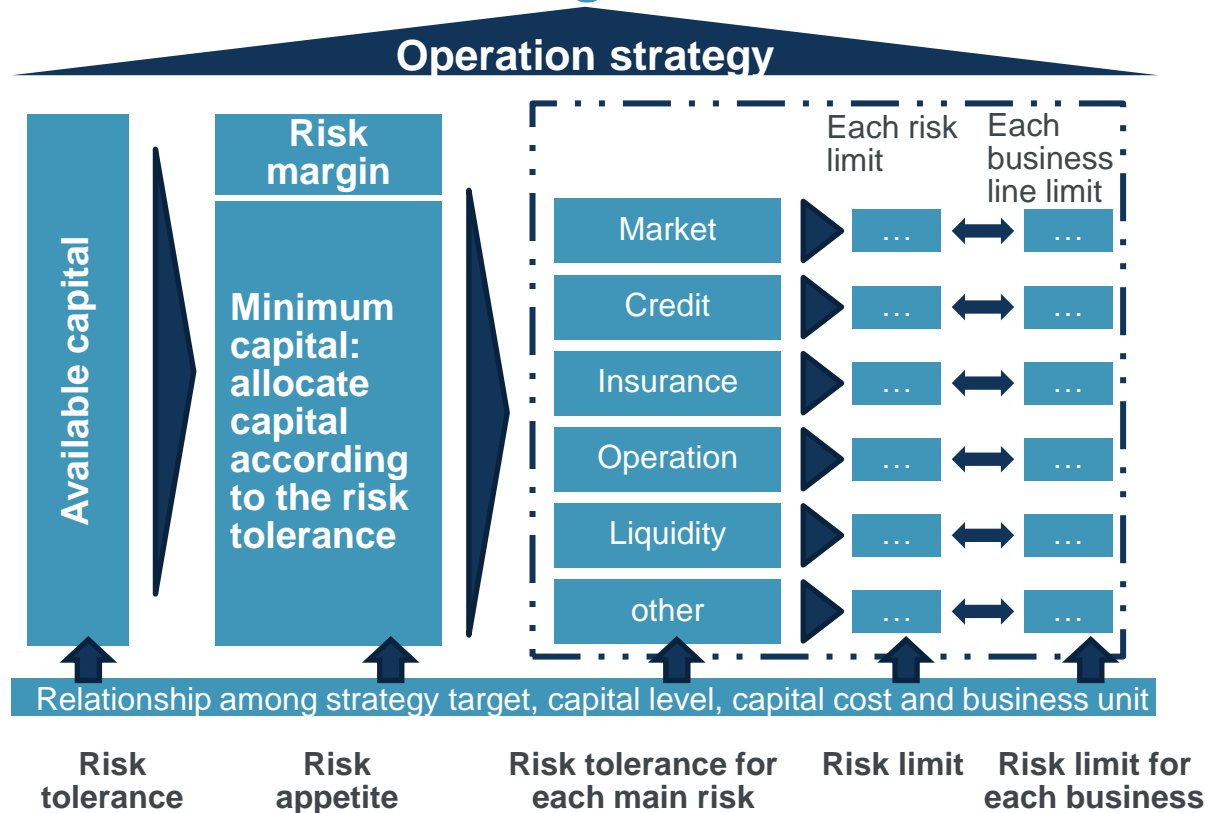
Prophet ALS model is used to project the financial performance incl. C-ROSS; and evaluate the solvency and profit impact under each candidate SAA.





# Risk appetite framework

Establish a risk appetite in accordance with solvency target, and cascade to the management dimension



	Example
Whole limit	Limit for each risk category, asset category, business line: EaR, VaR 与 CaR
Asset concent ration	% each asset ratio
	% each investment region ratio
	% each bond preference ratio
	% each credit rating ratio
ALM	Equity asset term
	Mismatch limit
	...
Liability concent ration	% premium ratio of each produce or business line
	% reinsurance and credit rating ratio
	...

**Example**

Embed risk appetite in operation and support operation





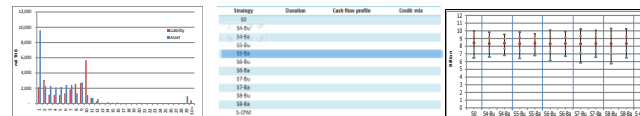
# Optimize SAA within risk appetite framework

## Risk appetite index

Using the ALM model test the impact of SAA to solvency, profit, EV, risk exposure

## Risk valuation result and suggestion

- ▶ **Asset liability match:**  
(duration convexity)



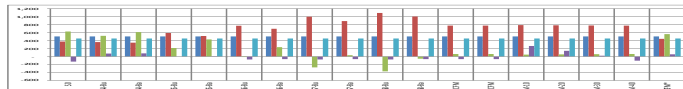
- ▶ a: increase short-term investment, decrease duration gap

- ▶ **Solvency:**

Strategy	Cash flow Profile	Cap Bond Allocation	Surplus position (mil)	Total Risk Requirement (Solvency Ratio)	Type of bonds	% credit risk charge	Marginal increase in risk charge	Cost of Capital (EVO)
SOB	Original	Original		All Corp as SOE	Government or Govt Backed SOE bond			
SC-CRM-10	CFM	10%		No SOE	Other SOE bond			
SC-CRM-20	CFM	20%			Other Debtors - AAA			
SC-CRM-30	CFM	30%			Other Debtors - AA			
SC-CRM-40	CFM	40%			Other Debtors - A			
					Other Debtors - BBB			
					Other Debtors - BB			
					Other Debtors - B			

- ▶ b: increase short-term bond investment to satisfy liquidity demand

- ▶ **Accounting profit:**



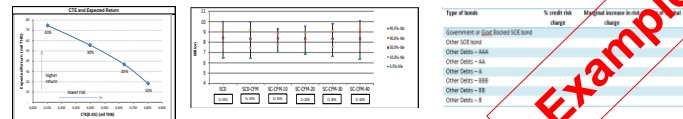
- ▶ c: increase high yield short-term asset to raise profit, raise the ratio of AFS, using the floating profitability to smoothing accounting profit.

- ▶ **Liquidity risk exposure:**

Bond Duration	Potential loss in MV	Asset required.	Risk Type
2 years			Interest rate shocks - 2 year bond term
5 years			Interest rate shocks - 5 year bond term
7 years			Interest rate shocks - 7 year bond term
10 years			Interest rate shocks - 10 year bond term
			Credit BB (International)/A(local)
			Mass Lapse

- ▶ d: increase short-term bond investment to respond the lapse risk

- ▶ **Credit risk exposure:**



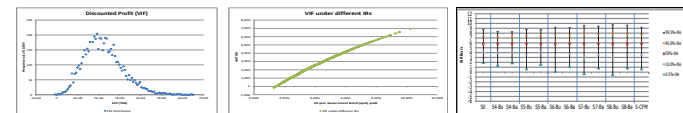
- ▶ e: decrease x% corporate bond investment, increase x% government bond investment, maintain the current risk exposure

- ▶ **Deposit:**

Issuer	Amount (mil THB)	Yield	Rating	Maturity Date
银行 a				
银行 b				
银行 c				

- ▶ f: decrease deposit ratio, increase investment ratio

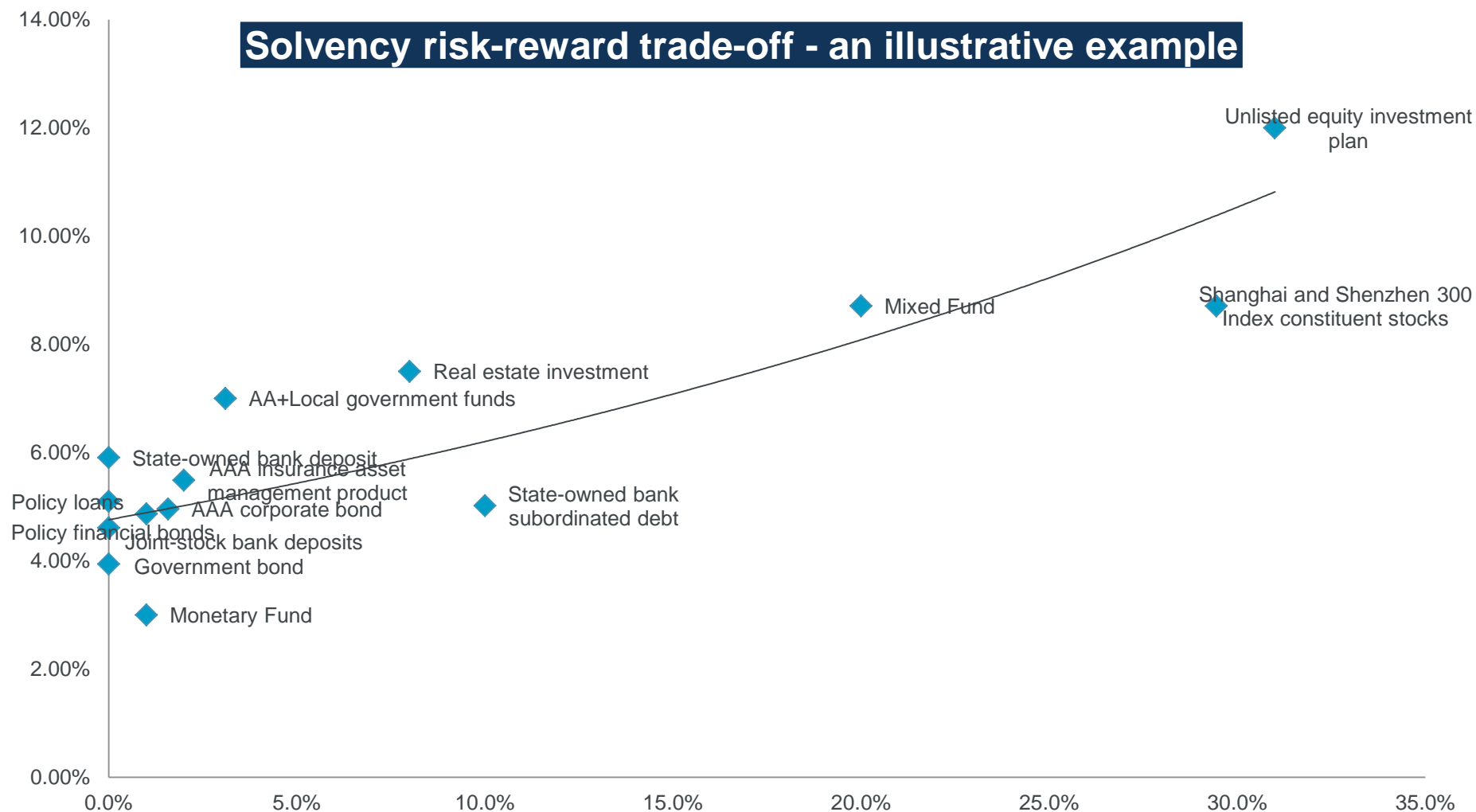
- ▶ **EV impact:**



- ▶ g: no big influence

# Experience sharing:

Establish the curve between investment return vs. capital charge



# Experience sharing: EY's optimizer to plot investment return vs. volatility (or capital charge) efficient frontier

- Step 1: basic input for each asset category (1) investment return assumption; (2) risk factor (volatility or MC parameter); (3) asset allocation limit

Sample Illustration

**Strategic Asset Allocation Optimizer**

**Asset Input**

Note: Enter weighting of existing and new asset classes to be tested, along with the asset return and volatility assumptions under various scenarios. Uses can test new asset strategies by adjusting the constraints on asset allocation (e.g. assign zero to minimize allocation to exclude certain assets).

Asset Class	Category	Asset Duration	Constraint: Min Allocation	Constraint: Max Allocation	Asset Weighting in Base SAA	Expected Asset Return	Expected Asset Risk (Volatility)	RBC Charge
Cash & Time Deposits	Cash & Deposit	0.2	0.0%	0.0%	0.0%	0.50%	0.00%	0.00%
Corporate Bond	Bonds	4.2	0.0%	40.0%	40.0%	5.0%	4.0%	6.3%
Domestic Equities	Equities	-	0.0%	50.0%	50.0%	8.0%	8.0%	18.0%
Domestic Govt Bond	Bonds	8.5	0.0%	20.0%	20.0%	3.5%	2.5%	15.0%
Structured Notes	Bonds	4.4	0.0%	10.0%	10.0%	4.0%	2.0%	10.0%
US High Yield Bonds	Bonds	4.8	0.0%	15.0%	15.0%	5.0%	3.0%	18.0%
EM Corp Bonds	Bonds	5.0	0.0%	10.0%	10.0%	5.0%	3.0%	18.0%
Petal Loan	Loans	1.0	0.0%	10.0%	10.0%	4.7%	3.0%	18.0%
Private Equity	Private Equity	5.0	0.0%	10.0%	10.0%	14.0%	14.0%	20.0%
Policy Loan	Loans	-	0.0%	0.0%	0.0%	7.1%	5.0%	4.0%
Other	Other	-	0.0%	0.0%	0.0%	6.0%	4.0%	5.0%
Domestic Property	Real Estate	5.0	0.0%	0.0%	0.0%	5.0%	5.0%	7.0%
Foreign Property	Real Estate	10.0	0.0%	0.0%	0.0%	6.0%	6.0%	7.0%
ETF US Credit A	Bonds	10.0	0.0%	0.0%	0.0%	5.0%	4.0%	5.0%
ETF US Govt Bond 20 Yr	Bonds	17.0	0.0%	0.0%	0.0%	3.0%	2.0%	3.0%
Portfolio Level		5.2			100.0%	4.8%	4.0%	6.0%

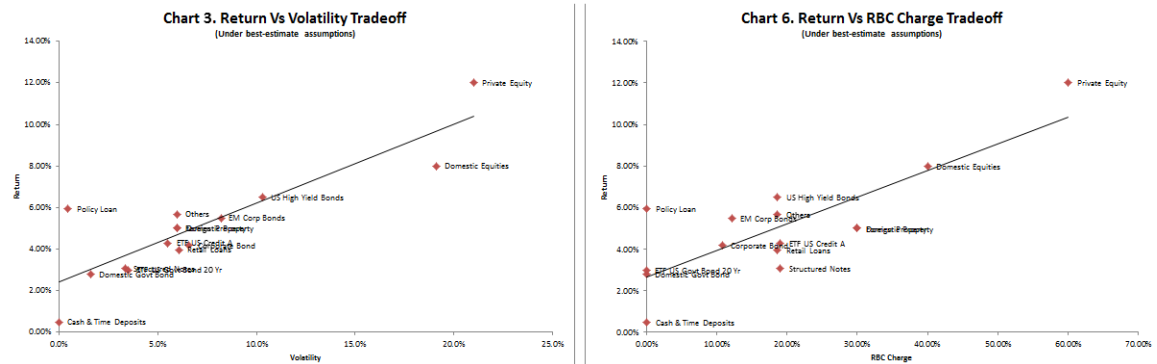
Note: Enter the min and max volatility/duration levels that define the range of efficient frontier. Press the macro button to start the "SAA optimization".

Macro #1 - Generate Efficient Frontier between Return and Volatility

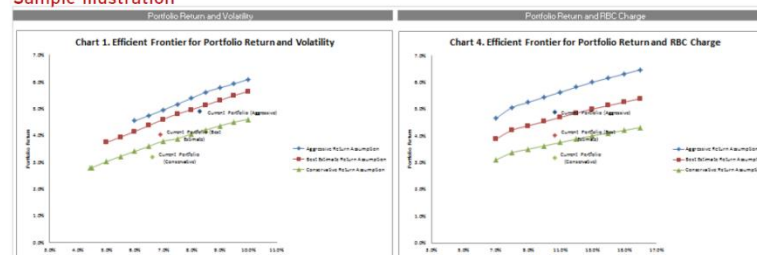
Macro #2 - Generate Efficient Frontier between Return and Duration

Macro #3 - Generate Efficient Frontier between Return and RBC Charge

- Step 2: reasonableness check for investment return assumption vs volatility (capital charge)
- Step 3: using Excel Solver embedded macro to find SAA on efficient frontier (1) investment return vs volatility; (2) investment return vs capital charge



Sample Illustration



# Thanks

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