New Change, New Promotion

Implications of C-ROSS to Actuarial Professionals

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China Insurance Regulatory Commission
14th May 2015

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II Thinking Model for Solvency System

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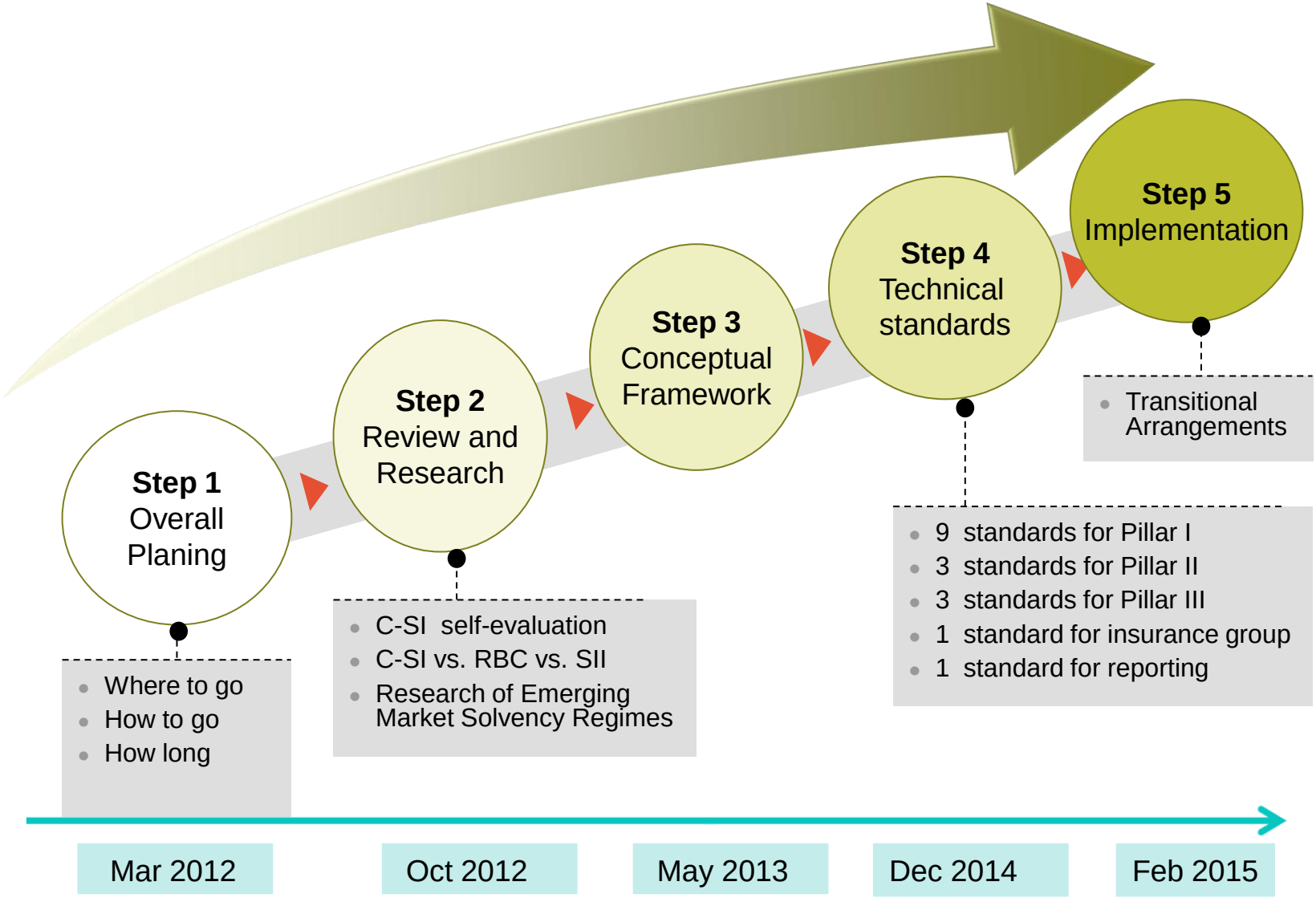
Timeline of C-ROSS: China Risk Oriented Solvency System



Facts and Main Issues of China Solvency I （C-SI）

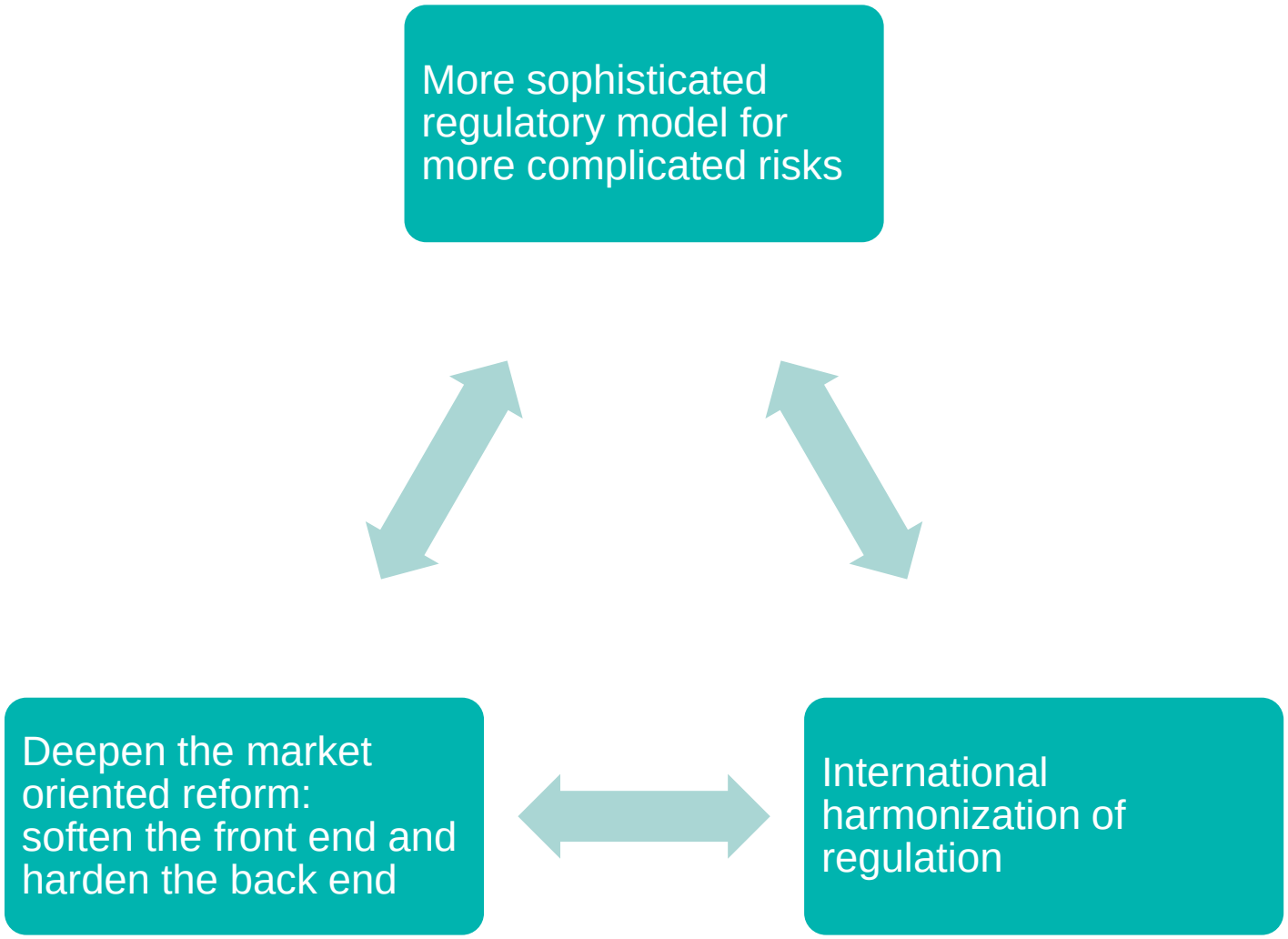
Facts

- Prudent asset and liability valuation
- Volume based fixed ratio capital requirement
  - 16%/18% of non-life insurance net premium
  - 4% of life insurance reserve

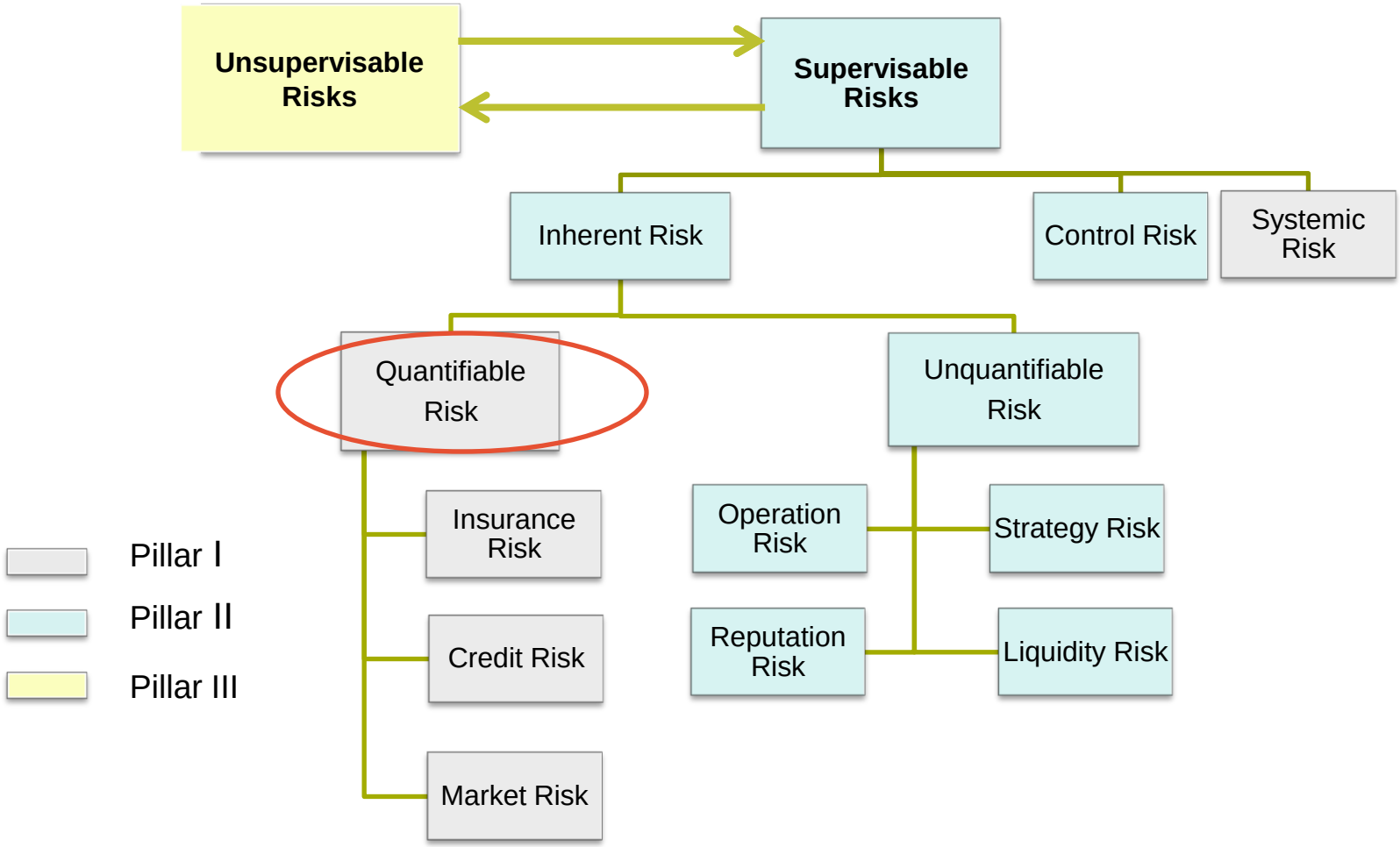
Main Issues

- Does not comprehensively reflect risks
- Low sensitivity to risks
- Capital requirement rather than risk management

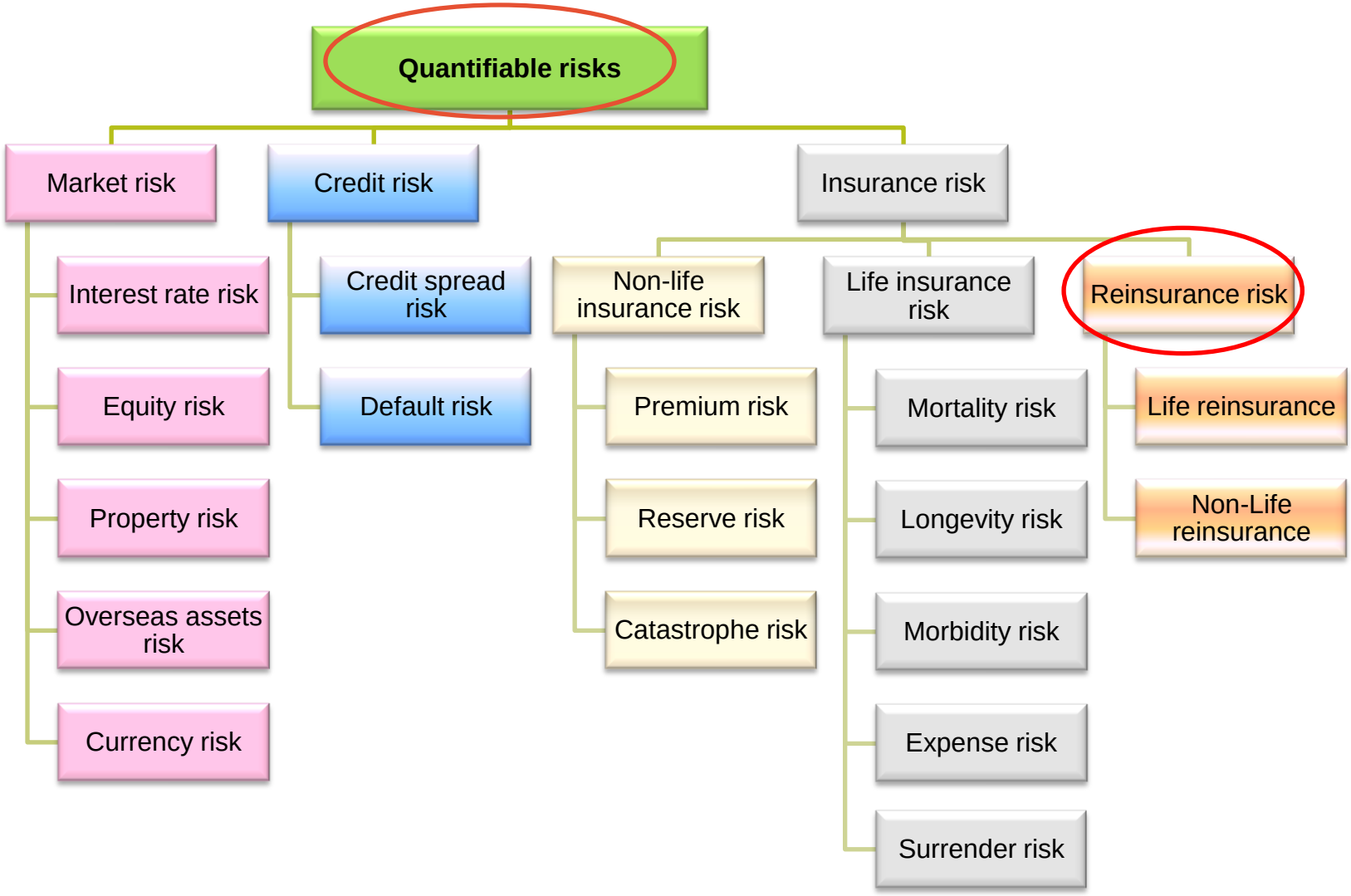
Three Drivers of Developing C-ROSS



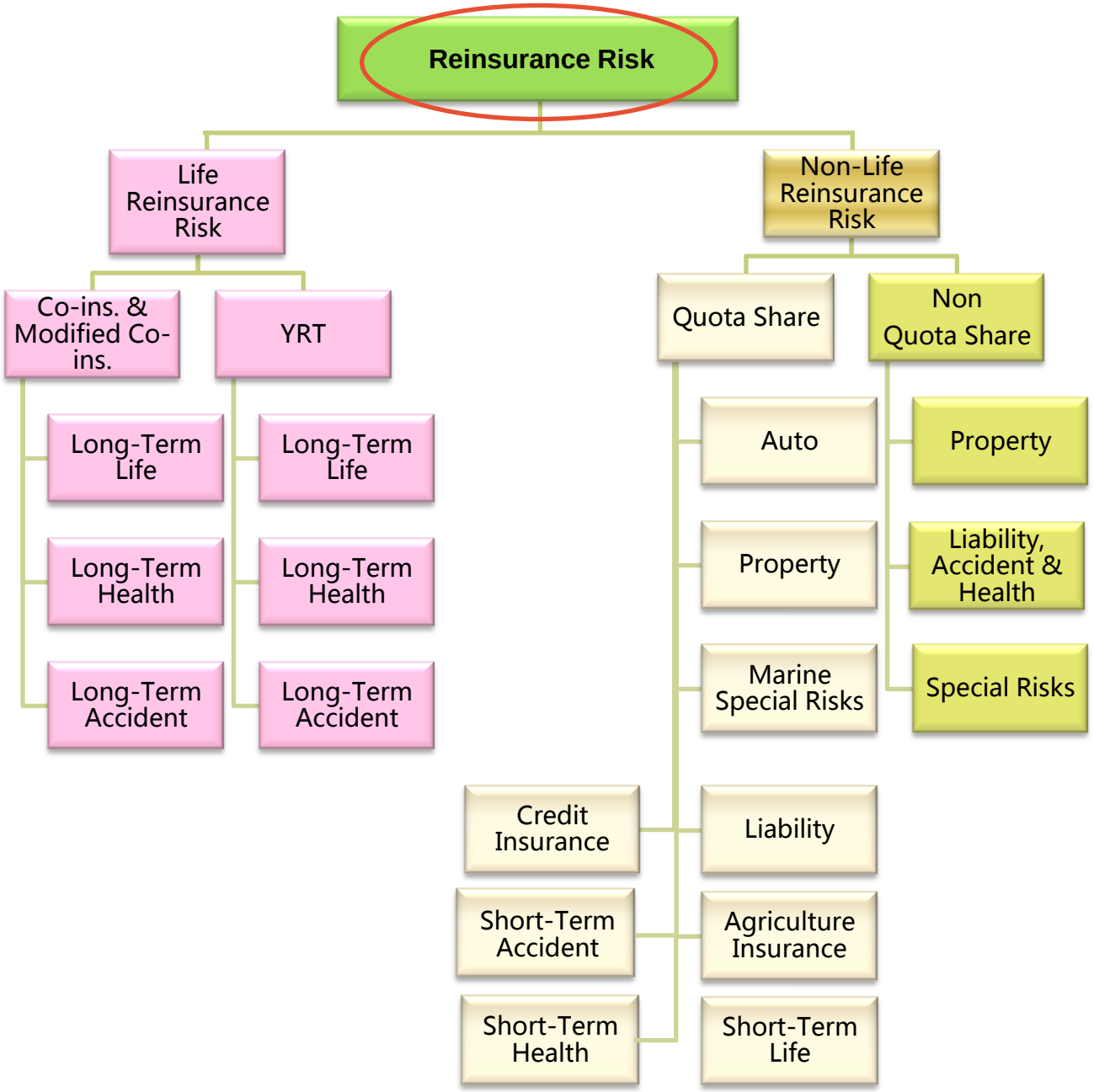
Risk Stratification Model



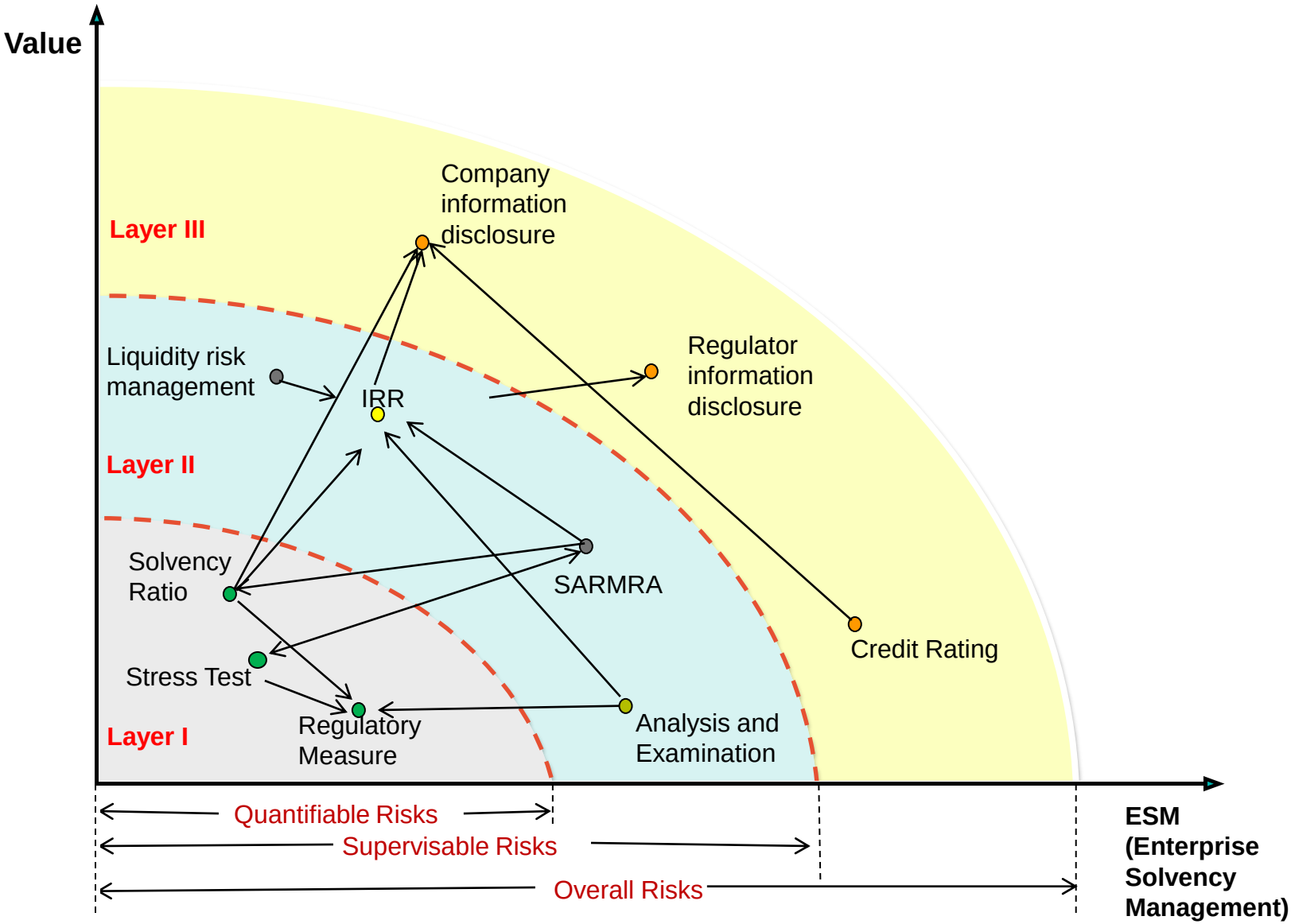
Risk Stratification Model (cont.)



Risk Stratification Model (cont.)



Three-Layer Regulatory Framework: Risk, Capital and Value



Three-Pillar Regulatory Framework

Quantitative Capital Requirement

Quantifiable Risks
- Insurance Risk
- Credit Risk
- Market Risk

Regulatory Tools
- Quantitative capital requirement
- Actual capital assessment
- Capital stratification
- Stress test
- Regulatory measure

Regulatory Discipline
- Comprehensive Solvency Ratio
- Core Solvency Ratio

Qualitative Supervisory Requirement

Unquantifiable Risks
- Operation Risk
- Strategy Risk
- Reputation Risk
- Liquidity Risk

Regulatory Tools
- Integrated Risk Rating（IRR）
- Solvency Aligned Risk Management Requirements and Assessment（SARMRA）
- Liquidity Risks
- Analysis and Examination (A&E)
- Regulatory Measure

Regulatory Discipline
- IRR Ratings
- Control Risk Scores

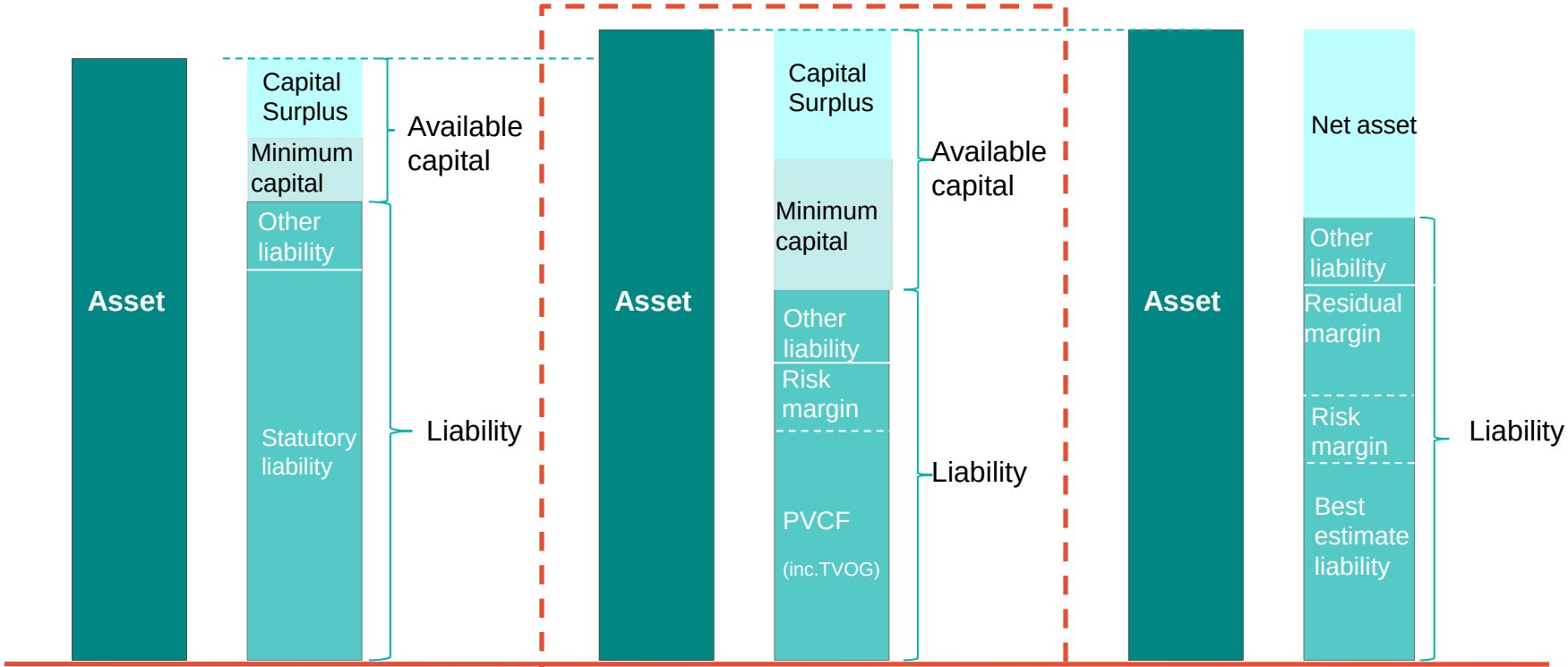
Market Discipline Mechanism

Unsupervisable Risks

Regulatory Tools
- Company Information Disclosure
- Regulator Information Disclosure
- Credit Rating

Market Discipline
- … …
- … …

Pillar I: Total Balance Sheet Approach



C-SI

Asset: admitted value

Statutory liability:
1. Net premium based
2. Overly conservative assumptions

Minimum capital: fixed ratios of reserve and premium size

C-ROSS

Asset: market and amortised

Policy liability:
1. Gross premium based
2. BEL+Risk Margin (assumptions subject to certain regulatory requirements)，should cover the cost of guarantees

Minimum capital: quantify the risk capital more elaborately

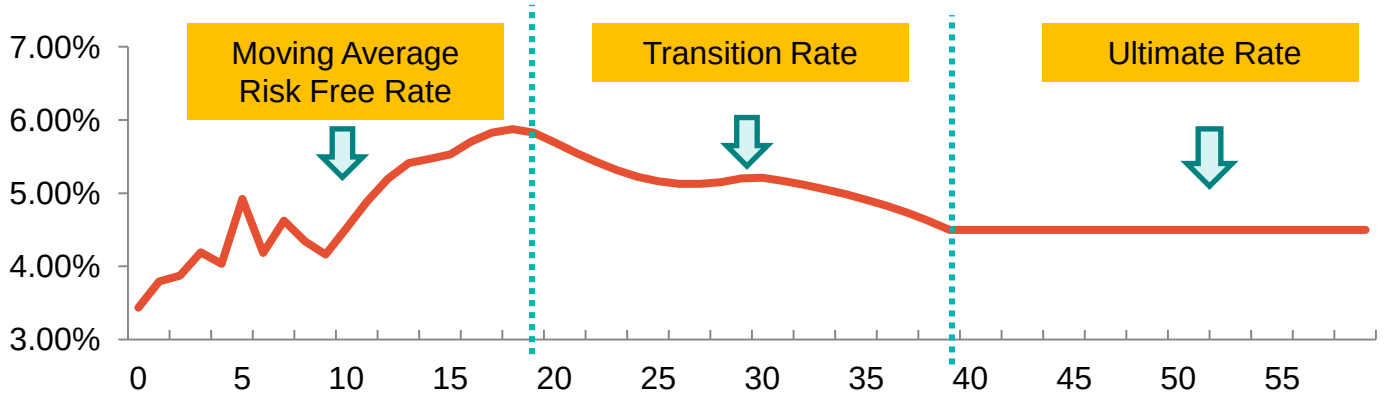
China GAAP

Asset: market and amortised

Policy liability:
1. Gross premium based
2. BEL+Risk Margin +Residual Margin (assumptions based on best estimates)

Valuation of Insurance Liabilities Under C-ROSS

Discounting Curve



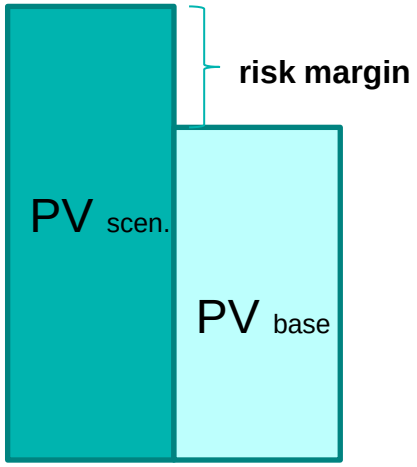
Risk Margin Calculation

Approach 1: Cost of Capital

- Article 21 of the Regulatory Standards No. 3: Insurance liabilities for life insurance contracts states the cost of capital method should be adopted in calculating risk margin

OR

Approach 2: Scenario Based



Pillar I：Capital Definition and Categorization

❑ Capital Definition:

Available capital shall demonstrate four key characteristics:

- Permanence
- Subordination
- Availability
- Absence of Encumbrances

❑ Capital Categorisation

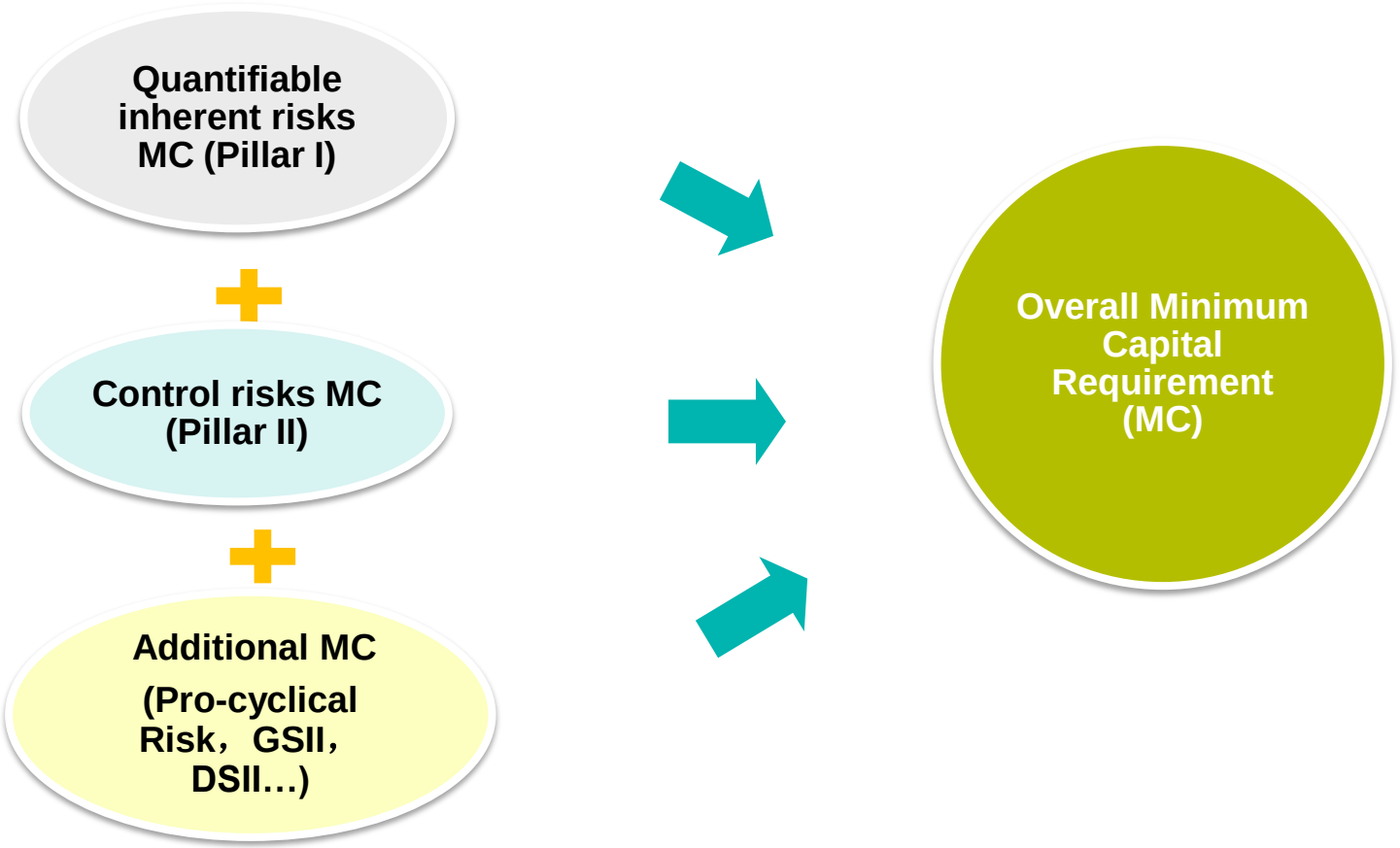
Distinguish available capital resources from high quality to low quality according to their loss absorbing capacity：

- Tier 1 Core
- Tier 2 Core
- Tier 1 Supplemental
- Tier 2 Supplemental

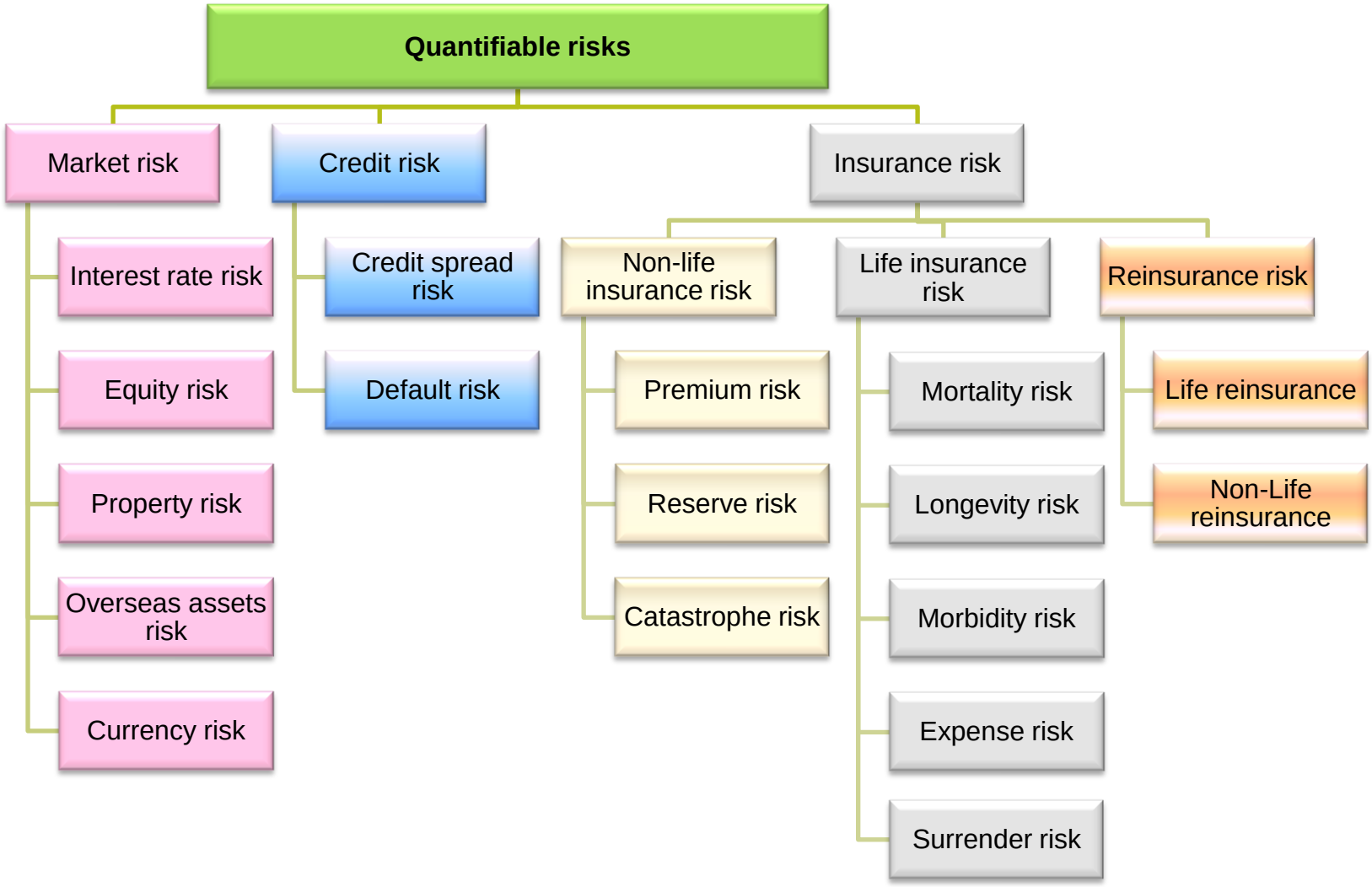
Pillar I : Capital Requirement

Net Risk Model

Net Risk = Inherent Risk × Control Risk × Systemic Risk



Pillar I : MC Components



Pillar I : MC Calculation Methods

- **Composite factor based method:**

  MC=EX × RF

  which: EX is the risk exposure;

  RF is the risk factor; RF = RF_0 × (1+K)

  RF_0 is the base risk factor, K is the characteristic factor

$$K = \sum_{i=1}^{n} k_i = k_1 + k_2 + k_3 + \cdots + k_n$$

  K_i is the characteristic factor based on specific risk or entity , n is the number of characteristic factors

- **Scenario based method:**

  Used to calculate one year VaR;

  Applied on catastrophe risk for non-life, interest rate risk and insurance risk for life insurers

K-Factor Approach to Address Sophisticated Business Nature

K factor is introduced to reflect the characteristic of the business nature and risk

$$K = \sum_{i=1}^{n} k_i = k_1 + k_2 + k_3 + \cdots + k_n$$

Entity-Specific K-Factor

- When calculating the counterparty default risk of reinsurers, the characteristic factor k_1 depend on whether the domestic reinsurer counterparty is legal entity or not, k_1 value is set and assigned as follows:

$K_1 =$ { **0** — **legal entity**; **0.05** — **non legal entity** }

Risk-Specific K-Factor

- When calculating the counterparty default risk of the reinsurers' risk exposure, the characteristic factor k_1 depend on whether the counterparty provides asset – backing securities, k_1 value is set and assigned as follows:

$K_1 =$ { **-0.25** — **The part with asset backing securities**; **0.25** — **The part without asset backing securities** }

Pillar I：Minimum Capital Aggregation

- Considering risk diversification effects, minimum capital requirements for particular risks are calculated using correlation matrix to aggregate, using life policy as example:

$$MC_{Market} = \sqrt{MC_{Vector} \times M_{\substack{Correlation \\ coefficient}} \times MC_{Vector}^{T}}$$

MC $_{Vector}$ **= (MC** $_{Interest\ rate}$**, MC** $_{Equity\ price}$**, MC** $_{Real\ estate}$**, MC** $_{Overseas\ fixed\text{-}income}$**, MC** $_{Overseas\ equity}$ **and MC** $_{Exchange\ rate}$**)**

$$MC_{Credit} = \sqrt{MC_{Spread}^{2} + 2\rho \times MC_{Spread} \times MC_{Counterparty\ default} + MC_{Counterparty\ default}^{2}}$$

$$MC_{Non\text{-}life\ insurance} = \sqrt{MC_{Premium\ and\ reserve}^{2} + 2\rho \times MC_{Premium\ and\ reserve} \times MC_{Catastrophe} + MC_{Catastrophe}^{2}}$$

$$MC_{life\ insurance} = \sqrt{MC_{vector} \times M_{\substack{Correlation \\ coefficient}} \times MC_{Vector}^{T}}$$

MC $_{vector}$**=(MC** $_{loss\ rate}$**, MC** $_{surrender}$**, and MC** $_{cost}$**)**

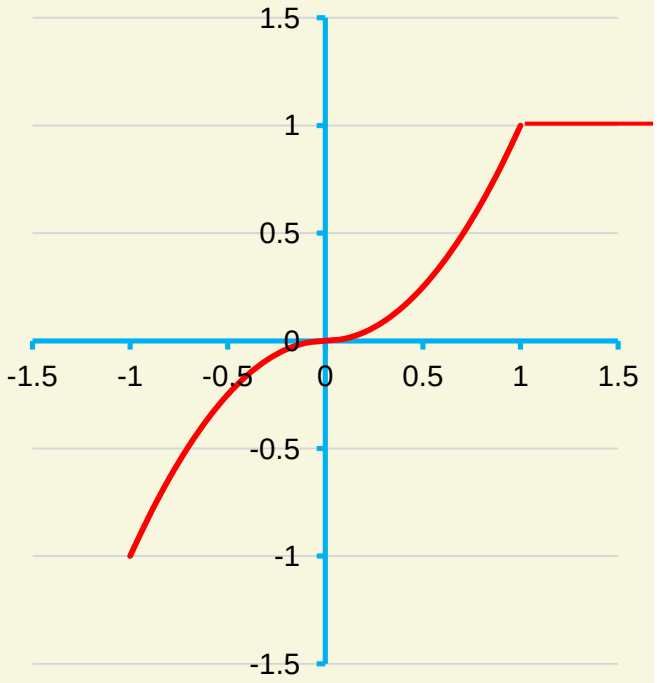
$$MC^{*} = \sqrt{MC_{Vector} \times M_{\substack{Correlation \\ coefficient}} \times MC_{Vector}^{T}}$$

MC $_{Vector}$ **= (MC**$_{Insurance}$**, MC**$_{Market}$**, MC**$_{Credit}$**)**

Pillar I：Counter-Cyclical Regulation

Entity Level

- K factor for counter-cyclicality for trading equity and real estate assets



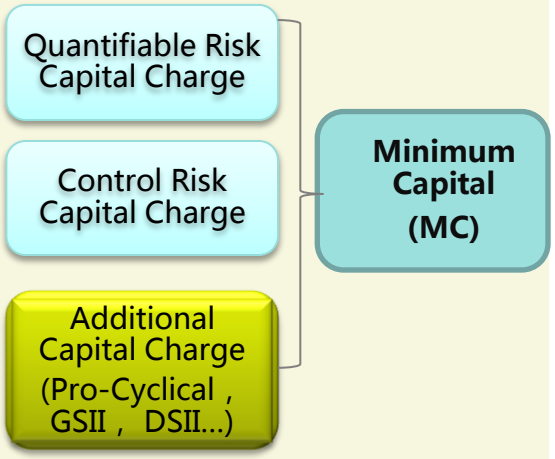
Industry Level

- Life policy valuation curve consists of base curve and comprehensive premiums
- Comprehensive premiums take into consideration of counter-cyclical capital adjustment

Category	Comprehensive Premium
High Risk / Liquidity	70BP
Medium Risk / Liquidity	45BP
Low Risk / Liquidity	30BP

Macro Level

- Article 19 of the Regulatory Standards No. 2: insurers shall measure counter-cyclical supplementary capital according to CIRC requirements



Pillar I: Regualtory Intervention

Different levels of regulatory intervention：

- **Ordinary regulatory intervention**

  Applicable: when Comprehensive Solvency Ratio falls below 100%

- **Extraordinary regulatory intervention**
  - **Suspending new sales**: Core Solvency Ratio is constantly below specific standard “A1”or available capital drops below certain absolute amount “A2”
  - **Take-over & restructuring**: Core Solvency Ratio is constantly below specific standard “B1”or available capital drops below certain absolute amount “B2”
  - **Bankruptcy & Liquidation**: Core Solvency Ratio is constantly below specific standard “C1”or available capital drops below certain absolute amount “C2”

Pillar II： Integrated Risk Rating (IRR)

Pillar I Quantitative Risks
- Insurance Risk
- Market Risk
- Credit Risk
- Pro-Cyclical Risk
- Systemically Important Risk

Integrated Risk Rating（IRR）

A B C D

Pillar II Qualitative Risks
- Operation Risk
- Strategy Risk
- Reputation Risk
- Liquidity Risk

Regulator assesses the overall risk of the insurance company quarterly

Pillar II : Integrated Risk Rating (IRR) (cont.)

Rating	Quantitative risk	Qualitative risk
A	Solvency ratio meet regulatory requirements	Small operational risk, strategic risk, reputational risk and liquidity risk
B	Solvency ratio meet regulatory requirements	Relatively small operational risk, strategic risk, reputational risk and liquidity risk
C	Solvency ratio meet or not meet regulatory requirements	Relatively big risks such as operational risk, strategic risk, reputational risk or liquidity risk
D	Solvency ratio meet or not meet regulatory requirements	Severe risks such as operational risk, strategic risk, reputational risk or liquidity risk

Pillar II : Integrated Risk Rating (IRR) (cont.)

Weighted average method

Depending on the absolute level and variance of the solvency ratio

IRR

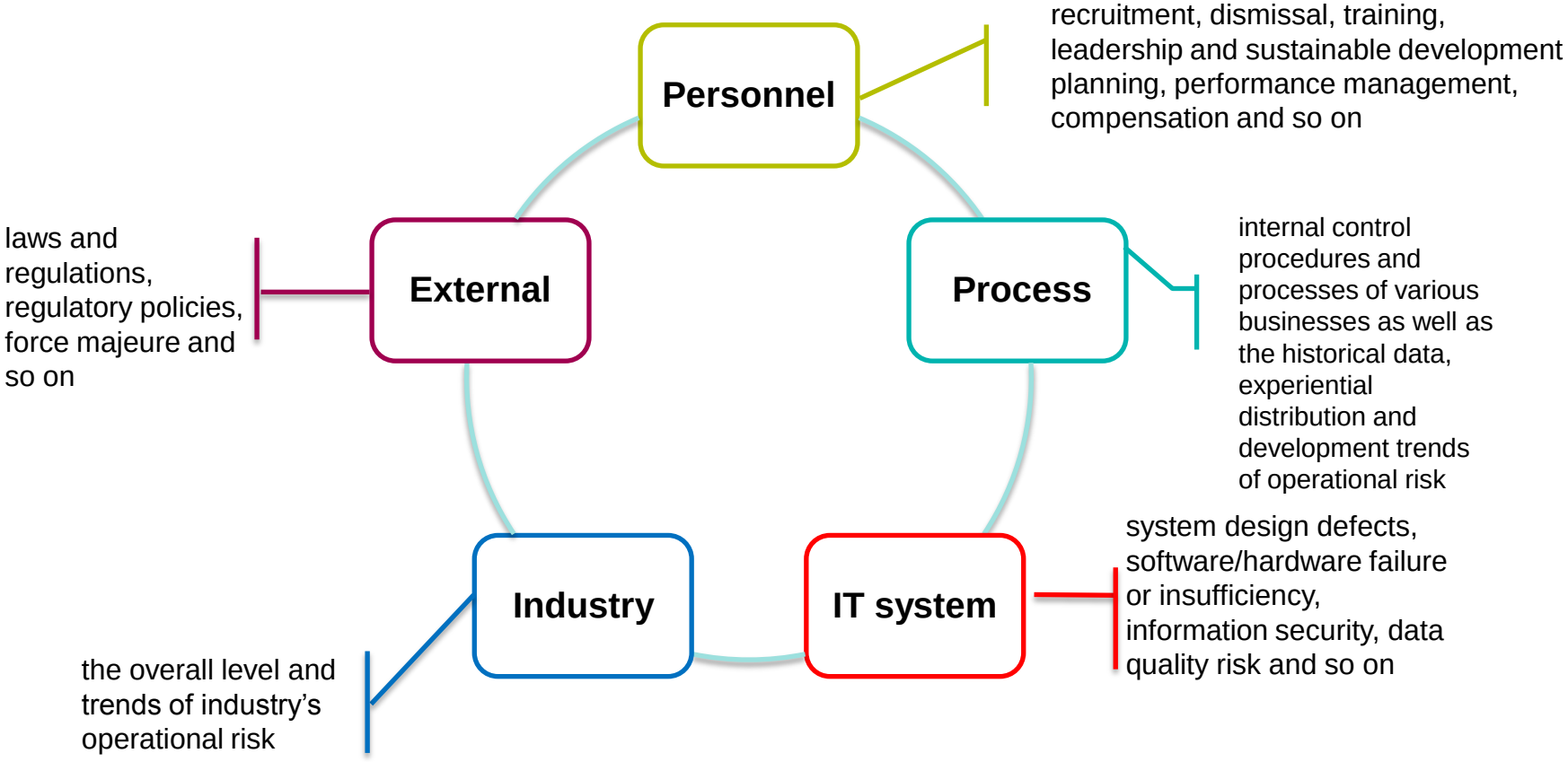
- quantitative risks**×50%**
  - **Core solvency ratio**
  - **Comprehensive solvency ratio**
- qualitative risks×50%
  - **Operational risk×50%**
  - **Strategic risk×15%**
  - **Reputation risk×10%**
  - **Liquidity risk×25%**

Influenced by risk factors such as external environment, the distribution characteristic, expected loss and historical data etc.

Pillar II – Evaluation Methodology for Operational Risk

(PIPEI Model)

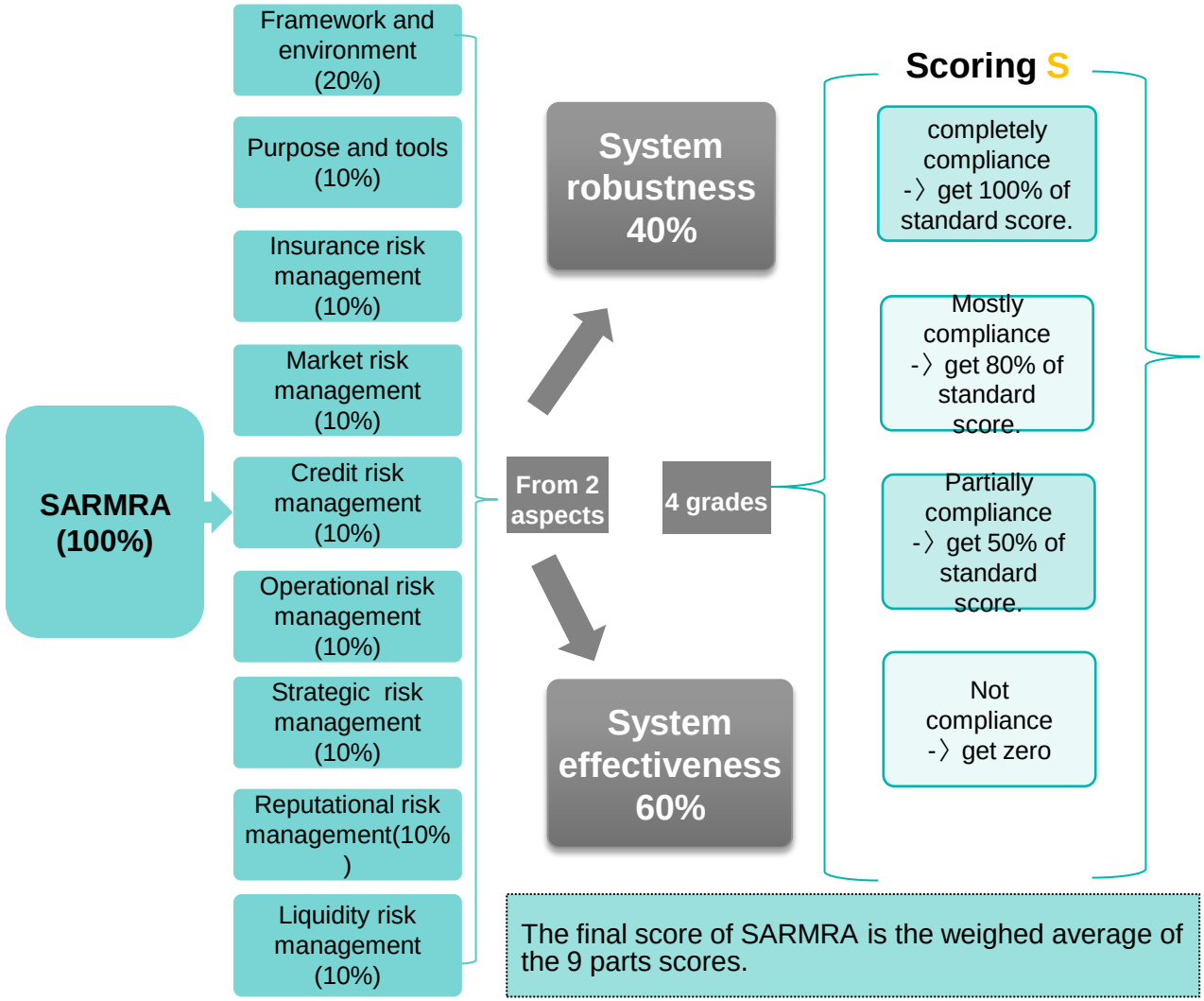
Non-quantifiable risks are assessed according to a set of standards. The following demonstrate the assessment model for operational risk under C-ROSS:



Pillar II : Solvency Aligned Risk Management Requirement and Assessment (SARMRA)

Risk Management Requirement and Regulatory Assessment

Pillar II: Control Risk Scored by SARMRA



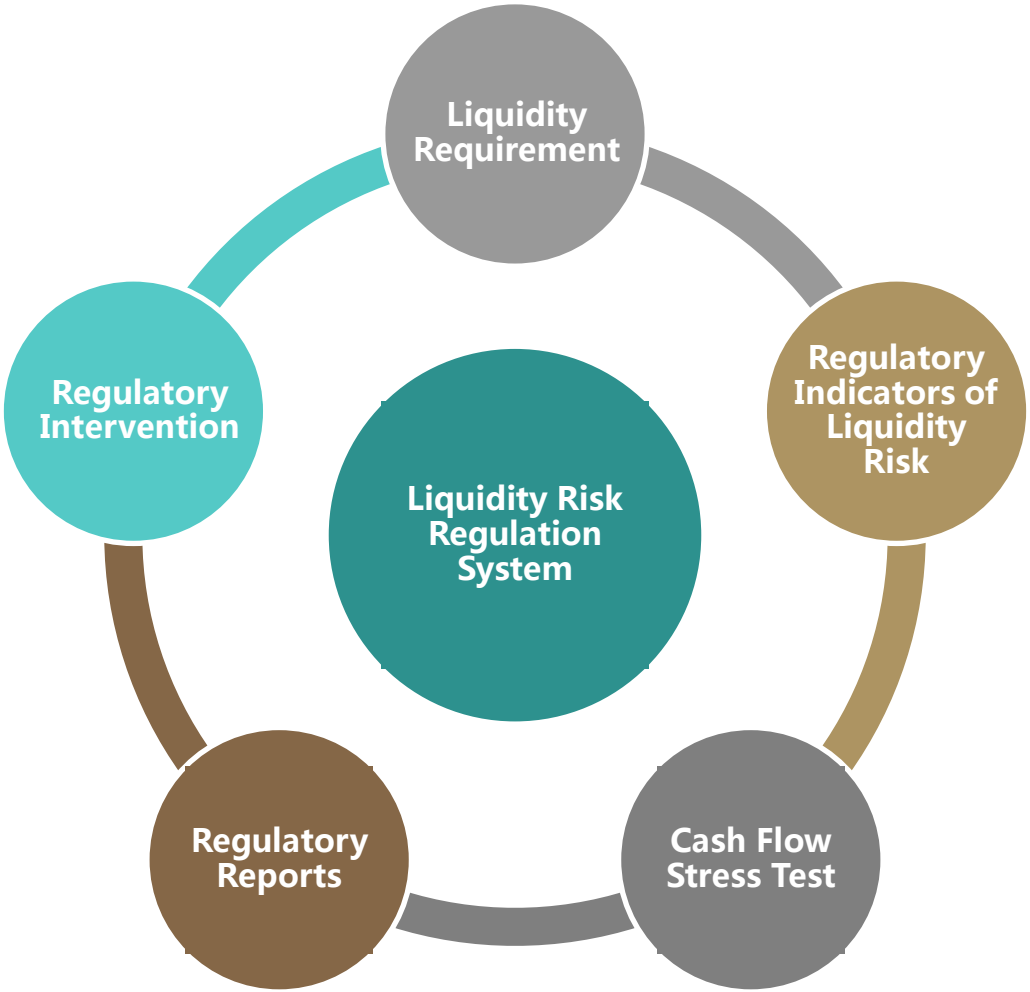
$MC_{control} = Q \times MC_{quan}$

$Q = -0.005 \times S + 0.4;$

- $S >= 80,$ $MC_{control} <= 0$
- $S < 80,$ $MC_{control} > 0$

- **A robust and effective risk management system is critical for insurers in order to decrease the capital requirement.**
- **The assessment results of SARMRA will directly affect the capital requirement of control risk**
- **The robustness and effectiveness of risk management will directly affect the capital requirement.**

Pillar II：Liquidity Risk Regulation



Pillar II：Analysis & Examination (A&E)

Three categories of Analysis & Examination:

Supporting A&E

- Data accuracy and behavior compliance
- Analysis of quantifiable regulatory indicators
- Unquantifiable risk analysis & examination

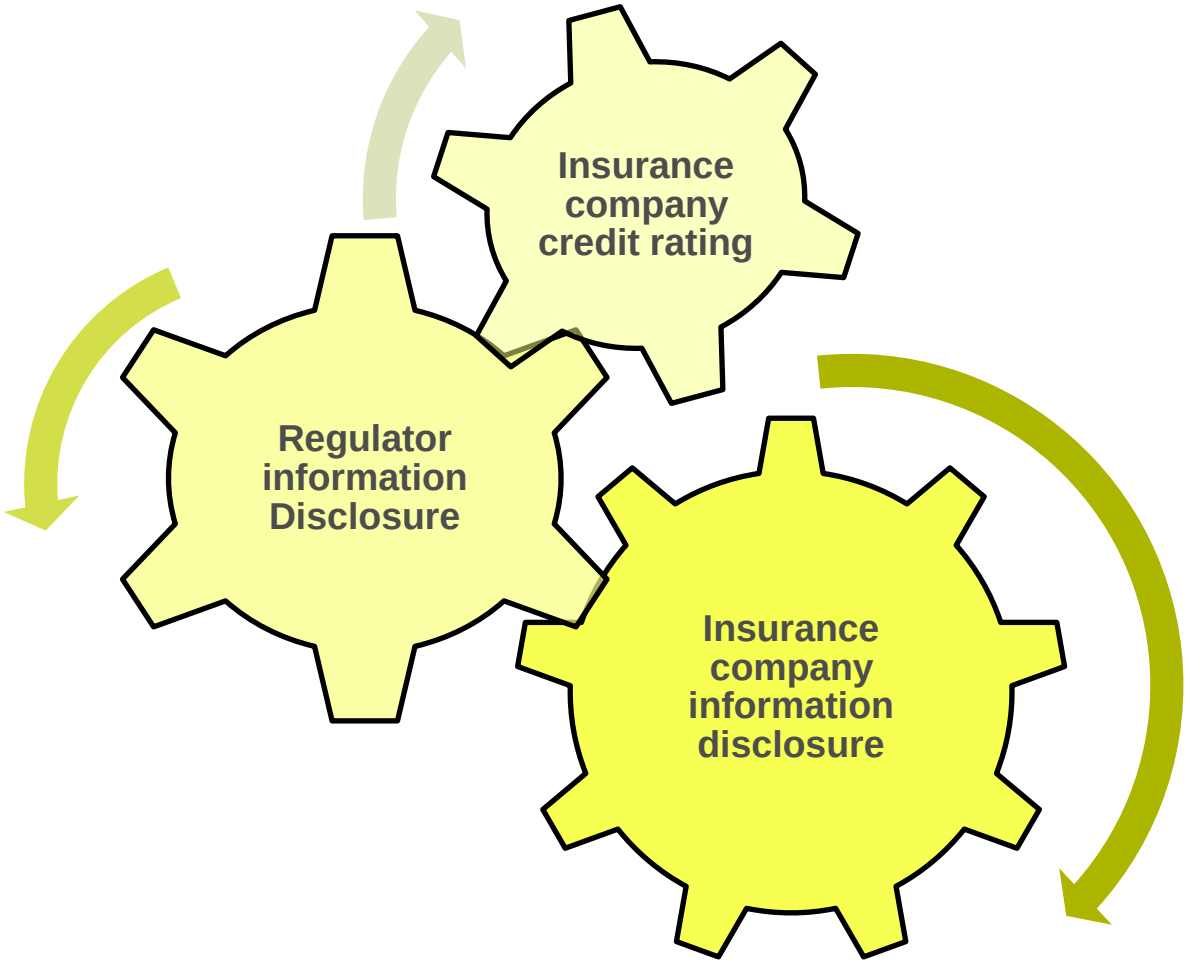
Calibration A&E

- Model mis-specification risk (both quantitative and qualitative models)
- Omitted risks

Extended A&E

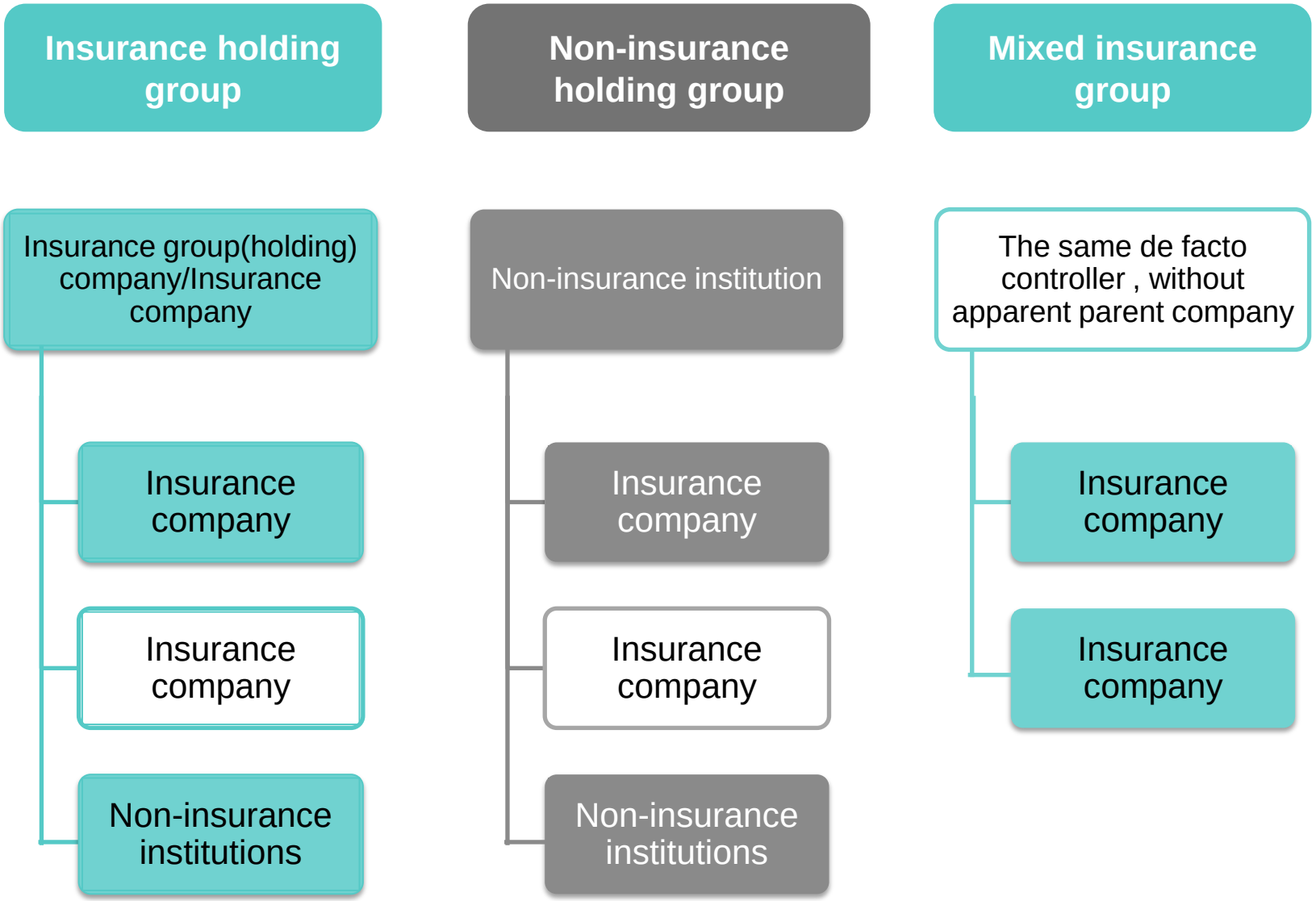
- New types of risks
- Macro prudential
- Other

Pillar III – Market Discipline



Approach to Group/Financial conglomerates

Scope of Applications



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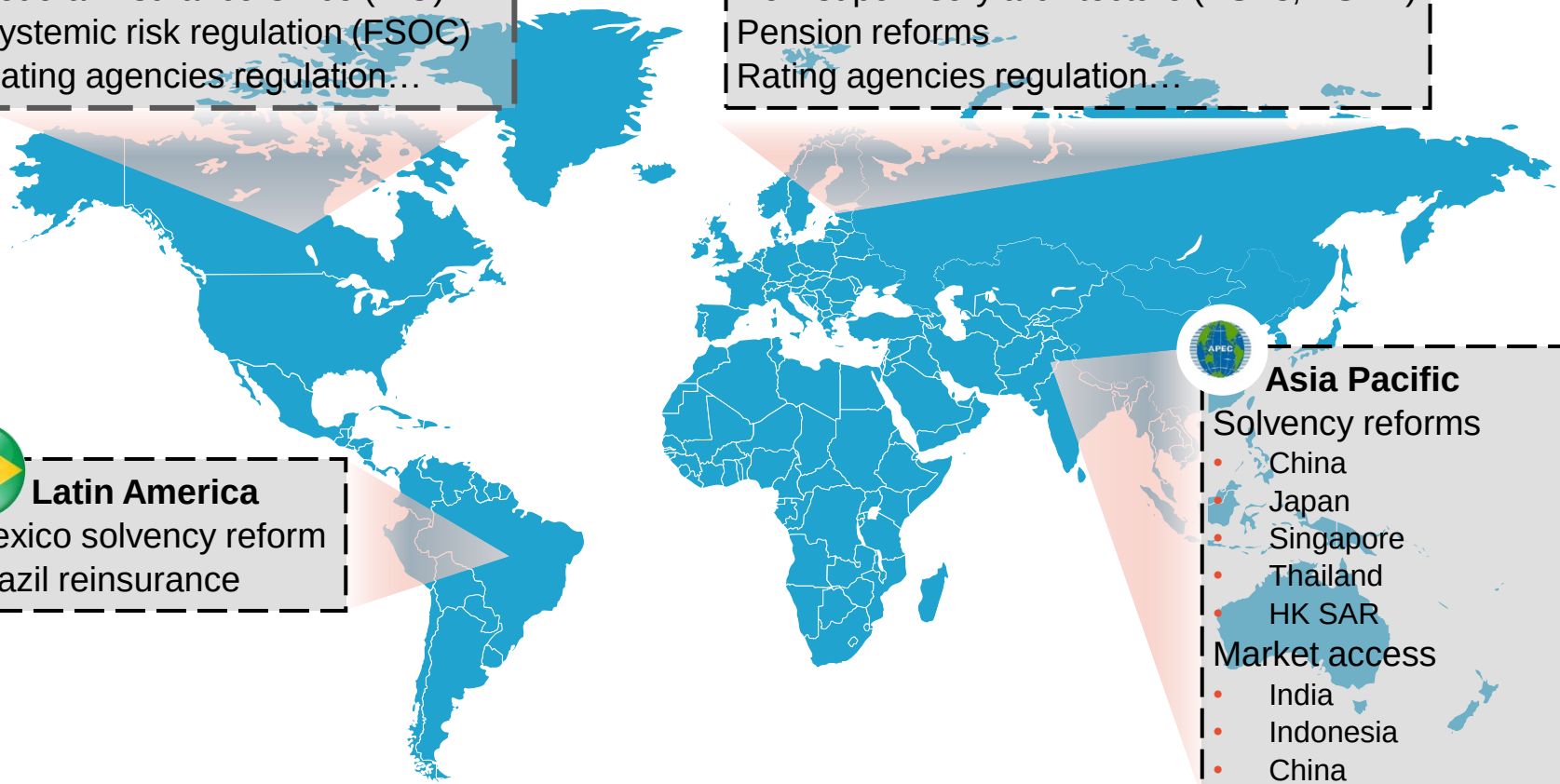
Overview Global of Solvency Regulations

United States
NAIC solvency modernization
Federal Insurance Office (FIO)
Systemic risk regulation (FSOC)
Rating agencies regulation…

Europe
Solvency II implementing measures
New supervisory architecture (ESAs, ESRB)
Pension reforms
Rating agencies regulation…



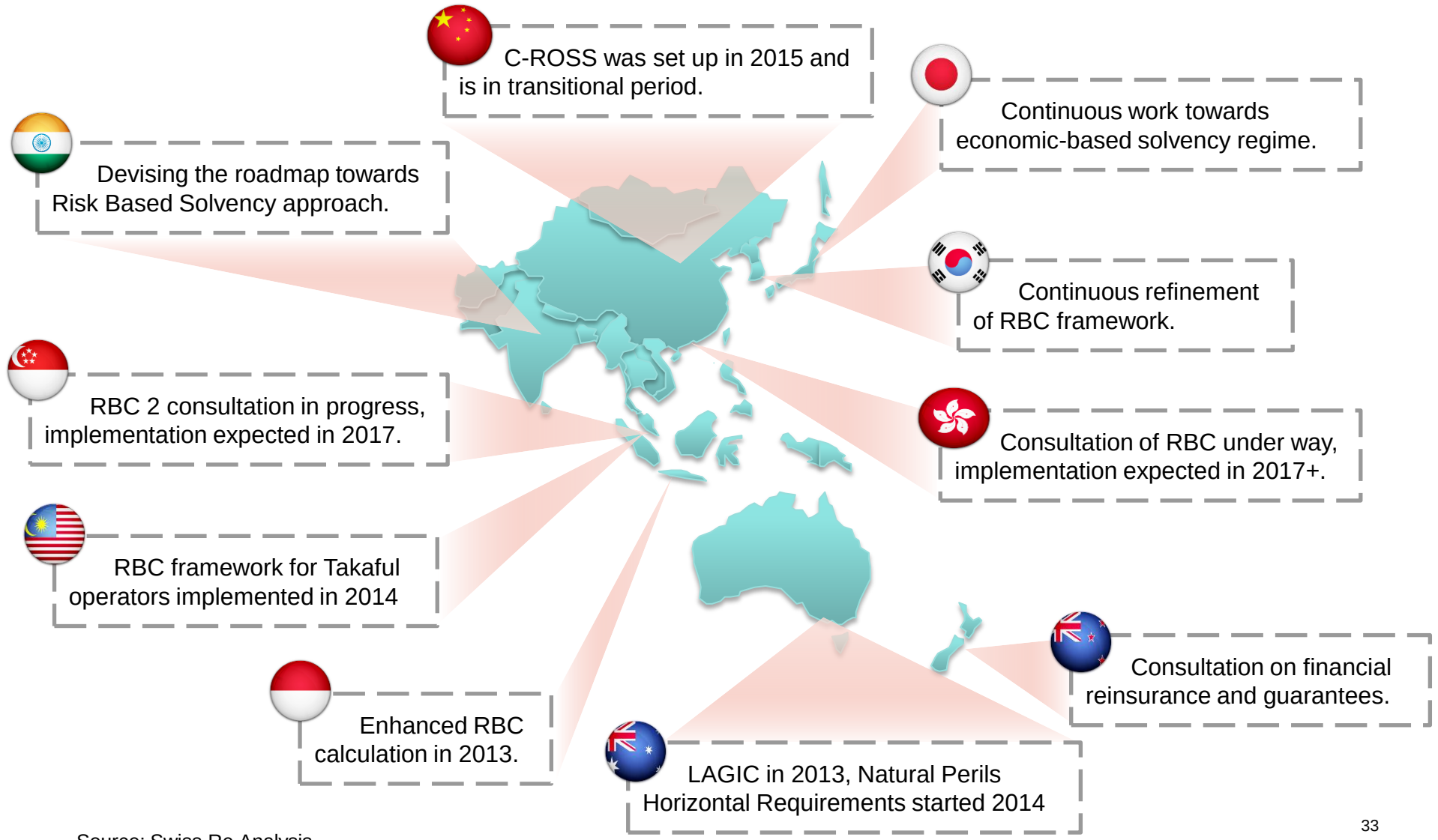
Latin America
Mexico solvency reform
Brazil reinsurance

Asia Pacific
Solvency reforms
- China
- Japan
- Singapore
- Thailand
- HK SAR

Market access
- India
- Indonesia
- China

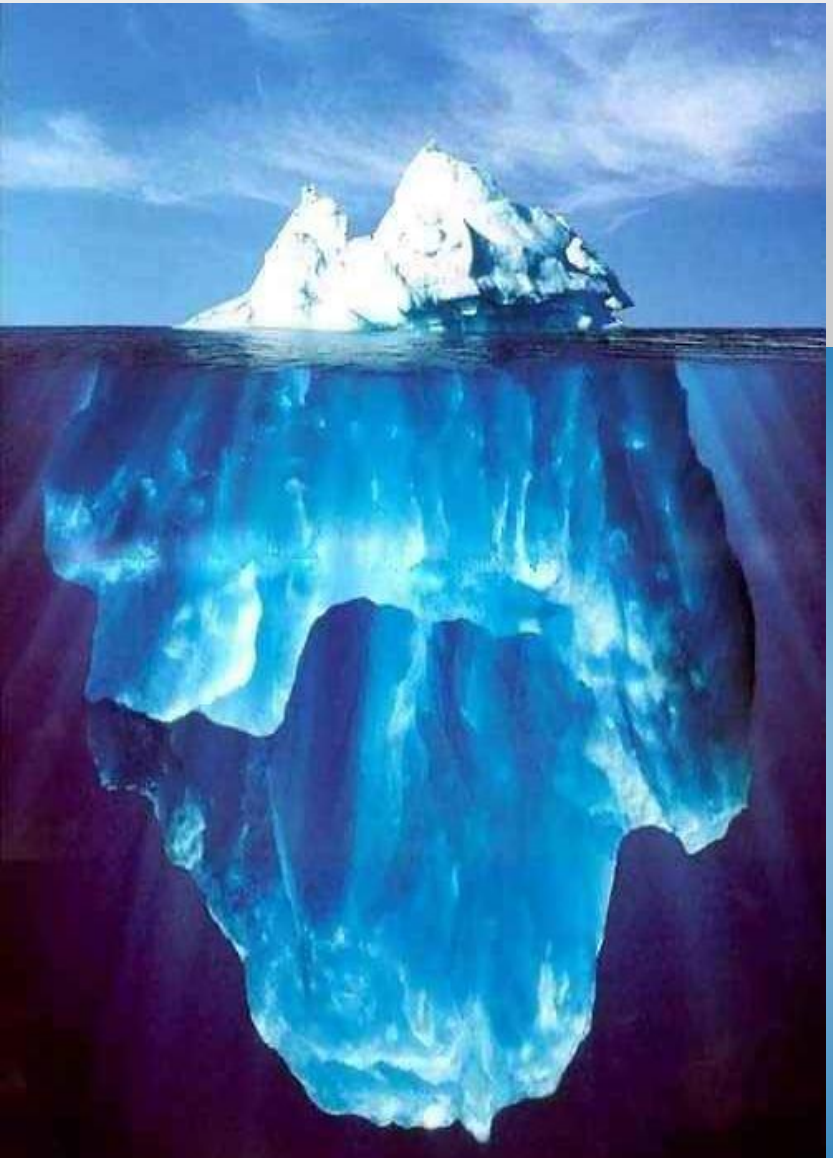
International
IAIS ComFrame and capital standards
G-SII policy measures
IASB & FASB project…

Asia Regulatory Reform



Source: Swiss Re Analysis

Considerations of a Regulation Reform



We see regulation reform are based on the following factors:

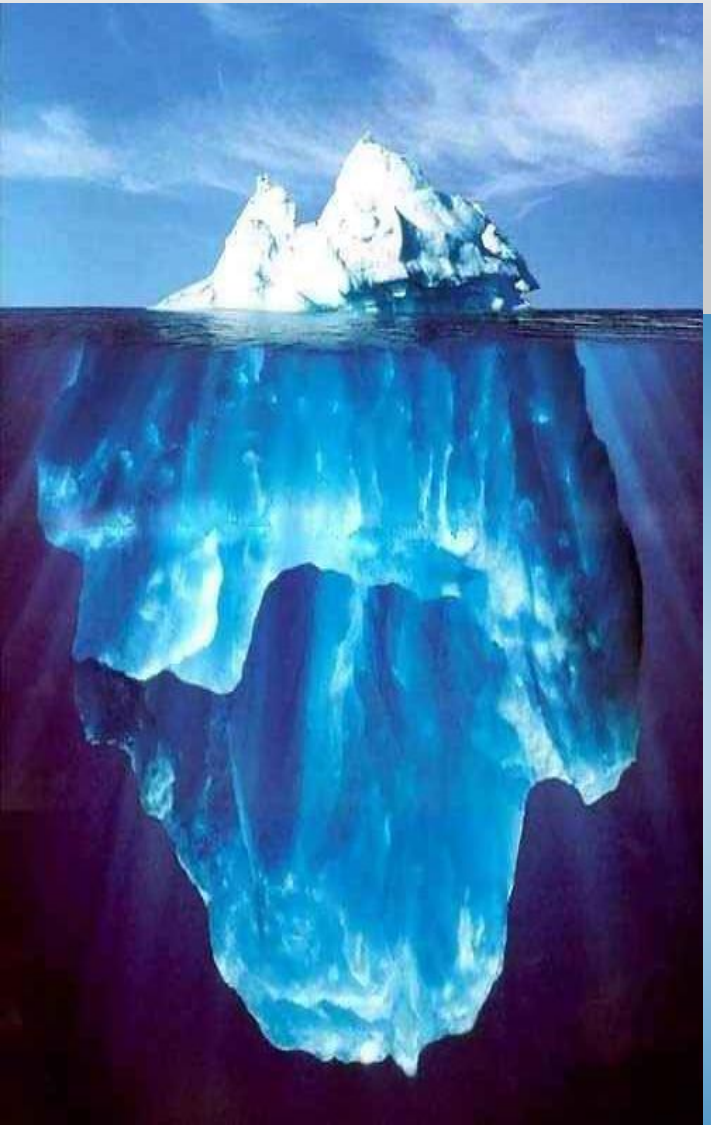
- Product mix
- Investments
- Valuation Models
- Risk Management Actions
- Supervisory Intervention

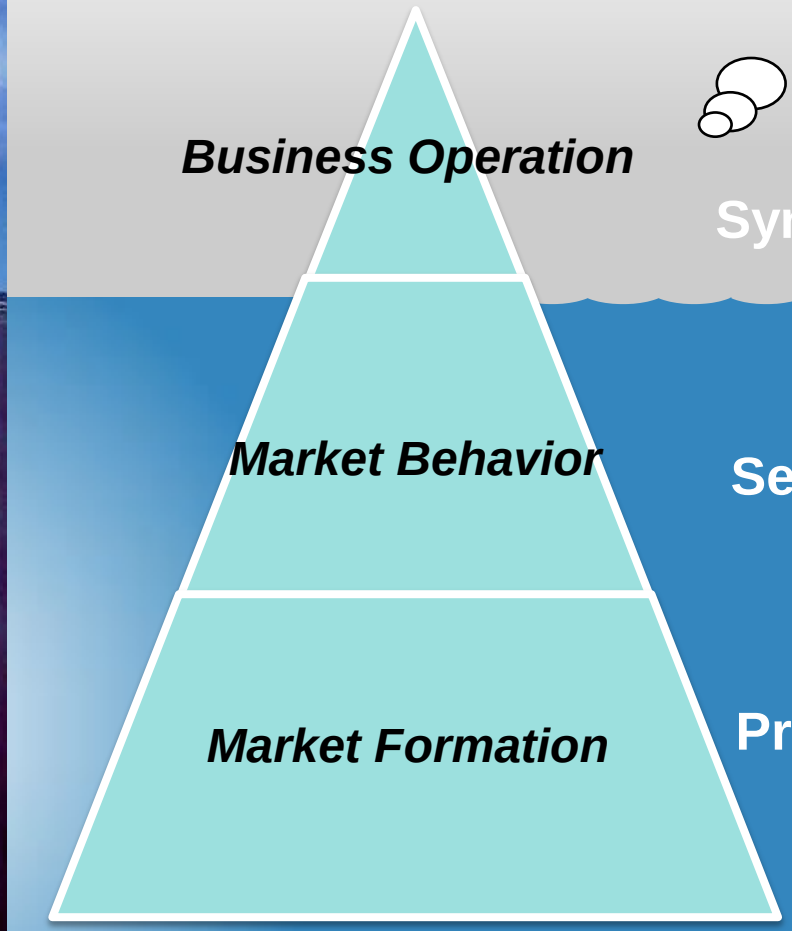
What is underneath?

?

A Thinking Model To Develop a Prudential Regulatory System

Formation – Behavior-Operation (FBO) Model





But this is where we are used to focusing on

Syntactics Layer

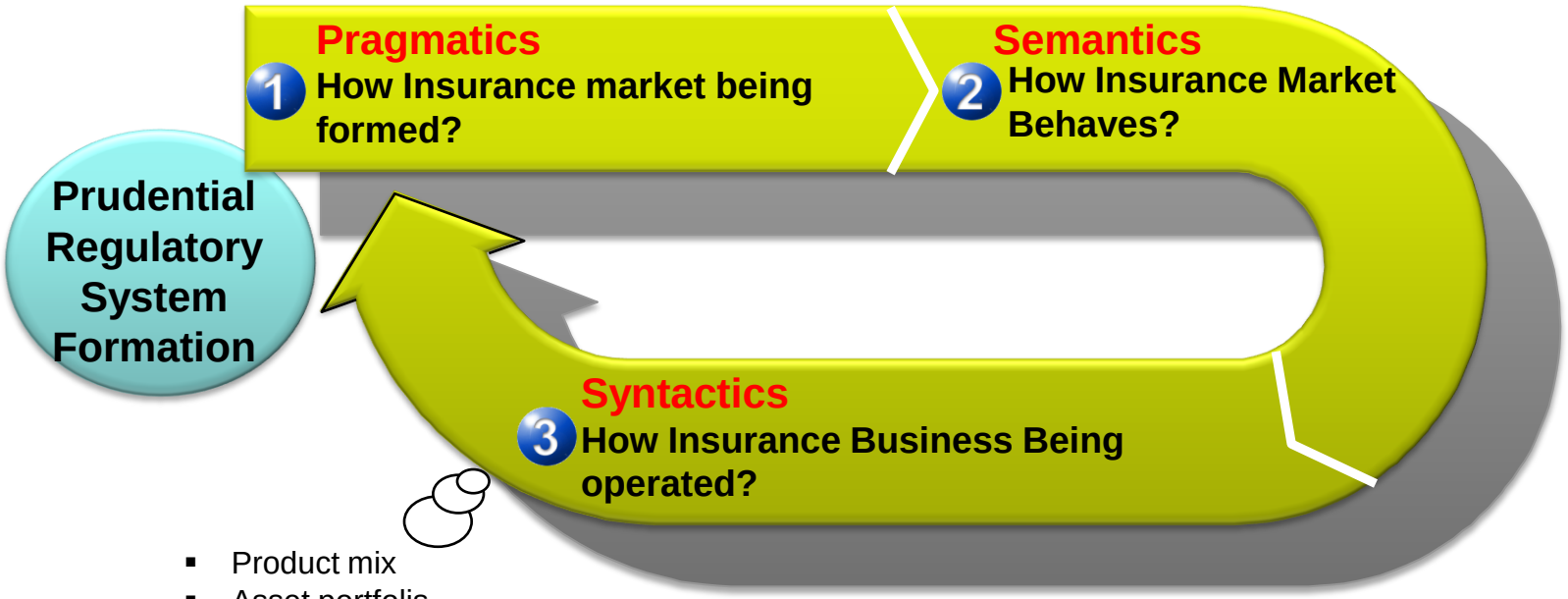
Semantics Layer

Pragmatics Layer

Regulatory Problem-Solving Process under FBO Model

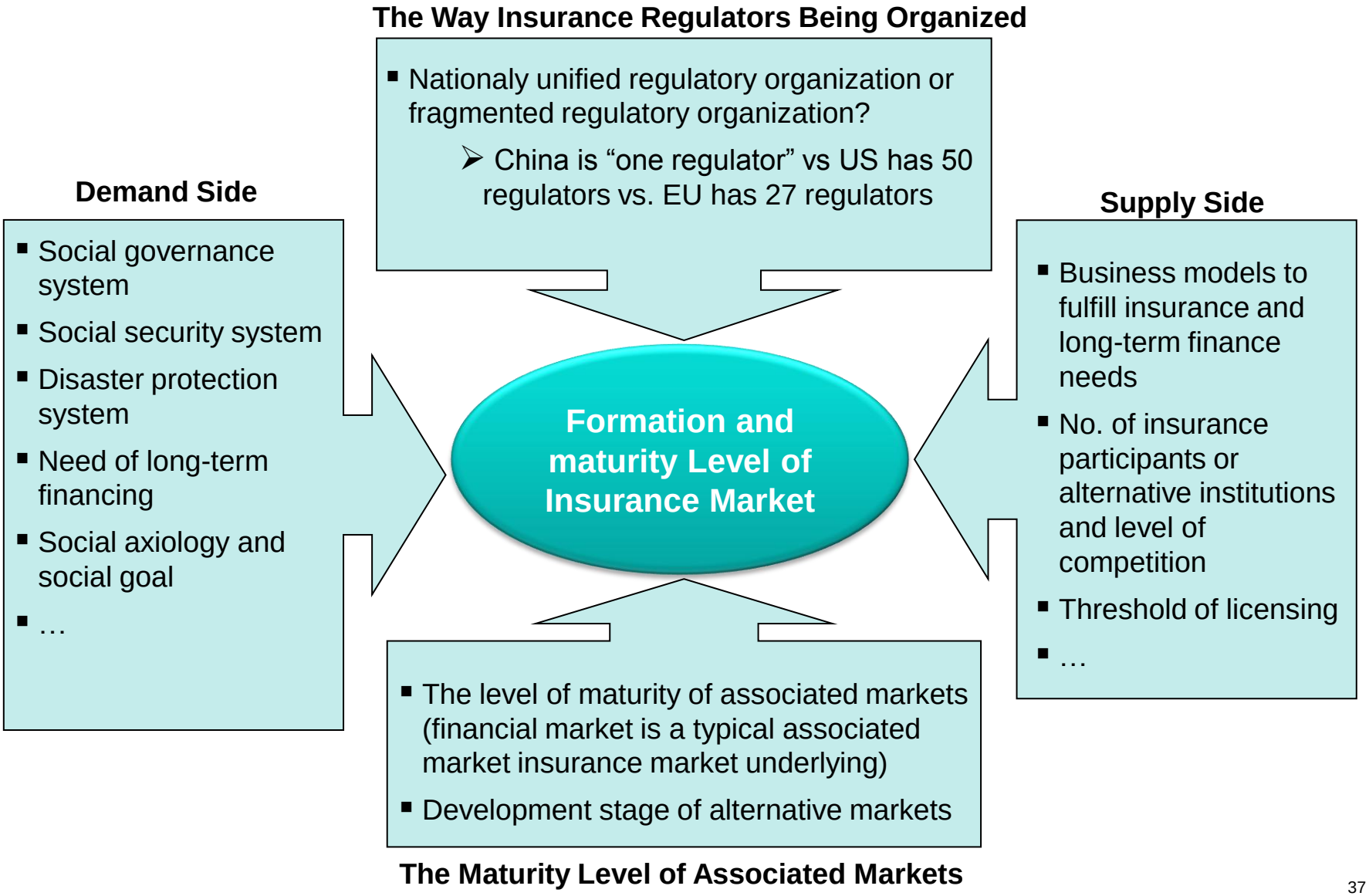
- Social governance system
- Business models
- Unified or fragmented regulatory organizations
- …

- Market structure
- Consumer behaviour
- Database / IT system
- …

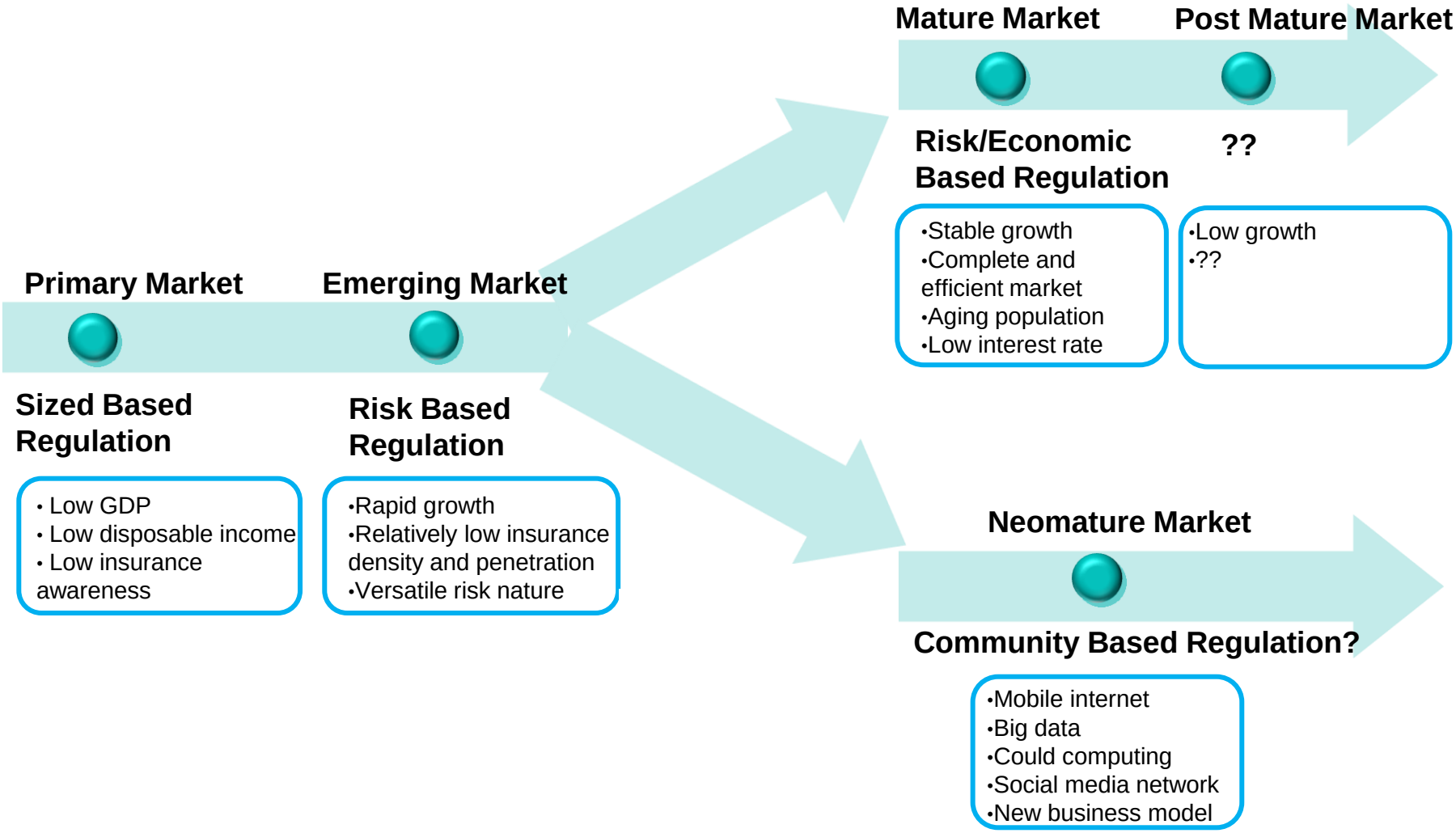


- Product mix
- Asset portfolis
- Value measurement
- Technical specification
- …

1 "Pragmatics Layer" - How Insurance Market Being Formed?



Formation and Maturity Level of Insurance Market
—— its impact on regulatory model



Demand Side

—— Social Security System (C-ROSS Case)

Social security provisions could decides the level of commercial insurance demands.

Using Pension system as an example:

China Features	C-ROSS Solution
China	
Zero — Minimum guarantee (Di Bao)	Pension companies who only offer type II business are not subject to C-ROSS capital requirements.
IA — Mandatory social pool old age pension	
IB — Mandatory Individual Account (IA) pension (urban only)	
II — Voluntary enterprise annuity (set up by eligible employers)	Pension companies and other life insurance companies who offer type III and IV business are subject to C-ROSS regulation.
III — Voluntary individual pensions e.g. insured group pension plans, individual pension	
IV — Family support; subsidised healthcare and housing	

Supply Side

—— Business Model (C-ROSS Case)

Business Models	C-ROSS Solution
Liability driven	Flexible, compatible, inclusive regulatory regime
Asset driven	
Innovative	

Maturity Level of Associated Market

—— Underlying Financial Market (C-ROSS Case)

China Financial Market	C-ROSS Solution
Incomplete Less Perfect Weak Efficient Irrational Investors	MC Valuation + Amortised Cost
	Discount yield curve (0 – 20 years): 750 days moving average of government bond yield curve
Cyclical Impact	Pro and counter cyclical capital adjustment at both balance sheet and macro-economic perspectives
…	…

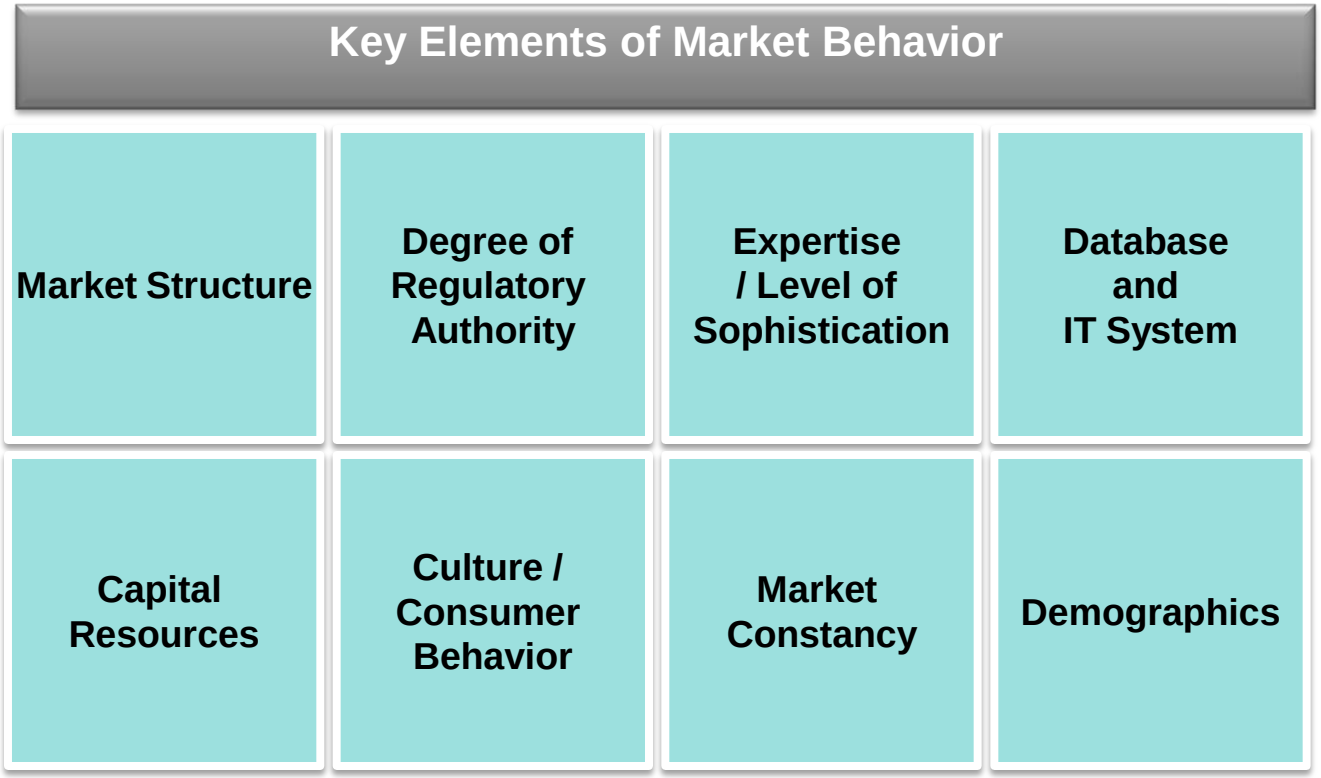
Regulatory Organisation Structure

—— One Regulator System (C-ROSS Case)

China Market	C-ROSS Solution
One Regulator One System	Supervisory based risk assessments
	Standardised risk factors Easier to promote supervisory guidelines
	Immediate and effective supervisory intervention authority

2 "Semantics Layer" - How Insurance Market Behaves?

- Market behavior largely shapes the direction and ultimate structure of regulatory system and any reform must carefully consider the following elements:



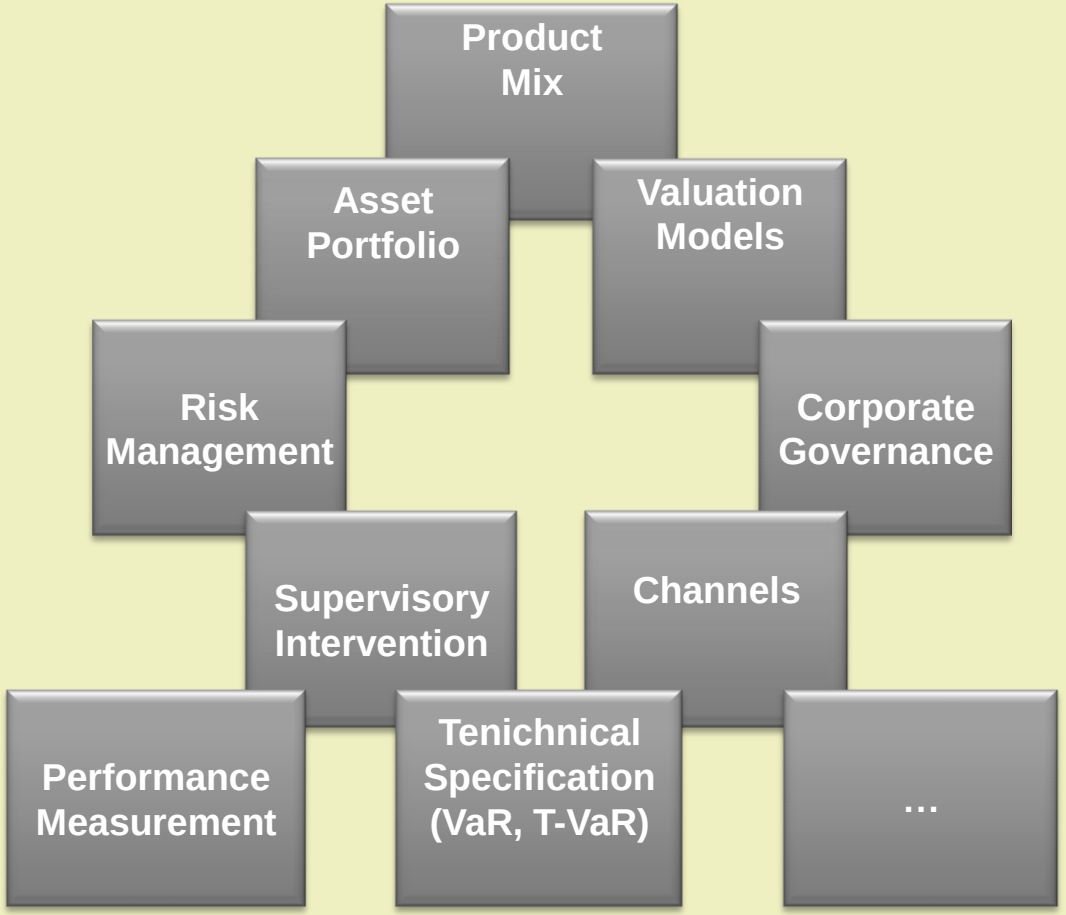
C-ROSS Case: Insurance Market Behaviour

China Market Behaviour	C-ROSS Solution
Changing and rapid growth	•Emphasis on qualitative assessment to capture the risk nature •Areas in guidelines for future changes and improvements
Big variance in company sizes	•Introducing K factors to capture different features of different companies •Regressive tiered capital charge for Auto insurance
Lack of financial resource insufficient expertise	•Composite factor method, not scenario based method •Industry standard model, no internal model

3 "Syntactics Layer" - How Insurance Business Being Operated?

Current discussions of regulatory formation are focused on business operation and technical aspect levels

Key Topics of Business Operations



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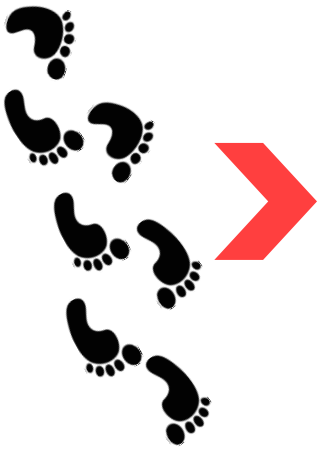
Three Changes Happened

C-SI



C-ROSS

From volume-orientation to risk-orientation

- Increase the risk-sensitivity and risk-coverage of regulatory approaches
- Create incentives of more sophisticated risk-taking and risk management
- Change the industry focus from scale to risk & value

From single approach to integrated approach

- Utilize uniform framework of financial reporting valuation, value measurement and capital management, to minimize the inconsistency of decision-making indicators
- Balance sheet, capital allocation, risk management and performance measurement within one “basket”

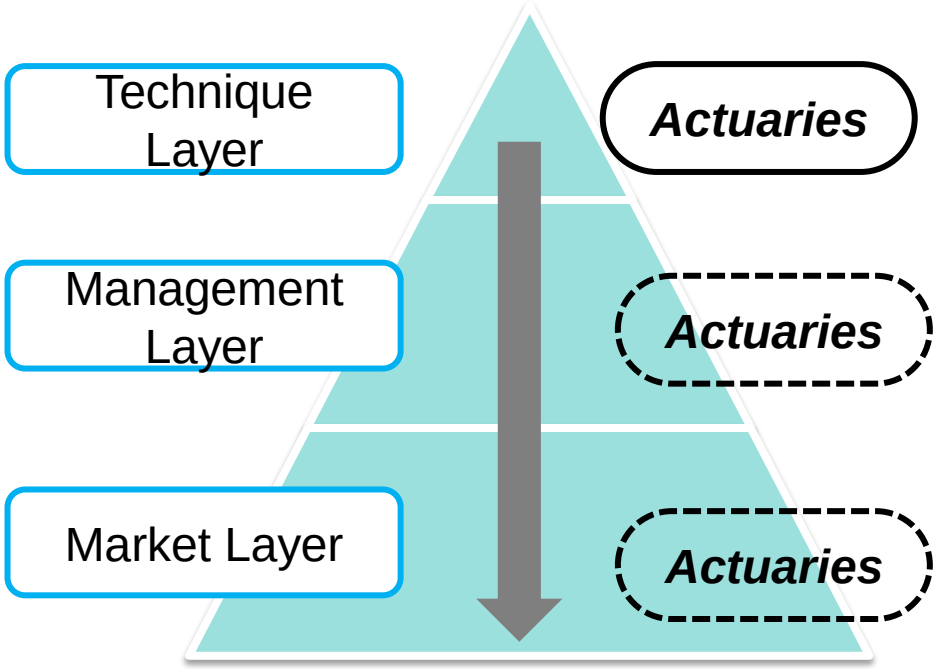
From country focus to market focus

- China is the largest emerging insurance market
- Emerging markets shared many common key features
- As compatible system, C-ROSS could provide helpful experiences to other emerging markets

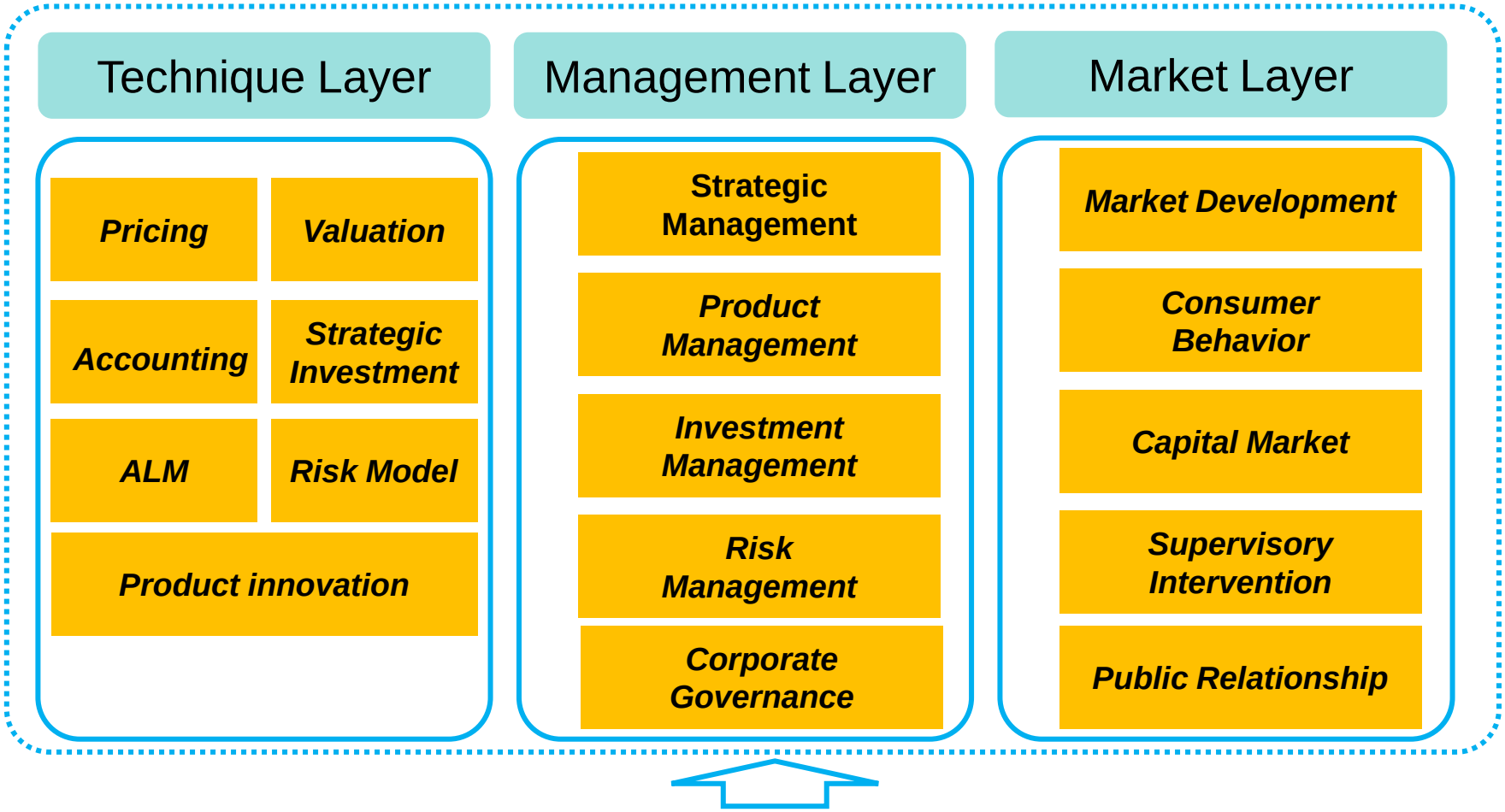
Actuaries will Build Stronger Brand

Actuaries are best positioned to play bigger roles

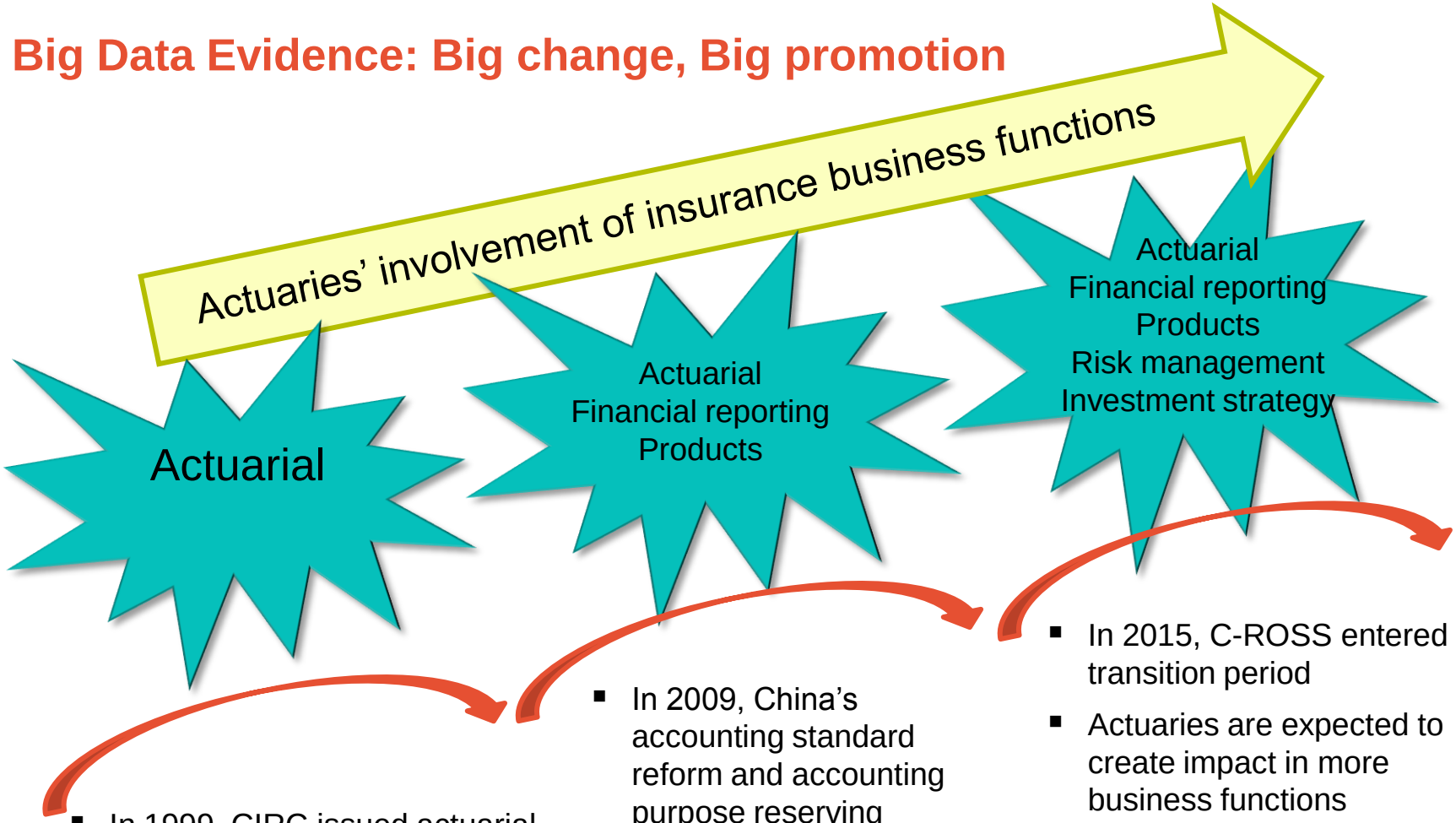
- Powerful tool-kit that is helpful across all levels of the system construction
- From technique oriented to business oriented
- From analytical to strategic



How to Adopt and Lead the Changes From C-ROSS?



Big Data Evidence: Big change, Big promotion



- In 1999, CIRC issued actuarial technical specification
- In 2004, non-life reserving standards established
- Actuaries and products engaged in actuarial departments

- In 2009, China's accounting standard reform and accounting purpose reserving standard being issued
- Actuaries being significantly involved in departments such as Financial Reporting and financial planning

- In 2015, C-ROSS entered transition period
- Actuaries are expected to create impact in more business functions including risk management, investment and strategic planning


New Change，New Promotion
GO !
Thanks