HSBC Quants Academy

Risk Management and risk types

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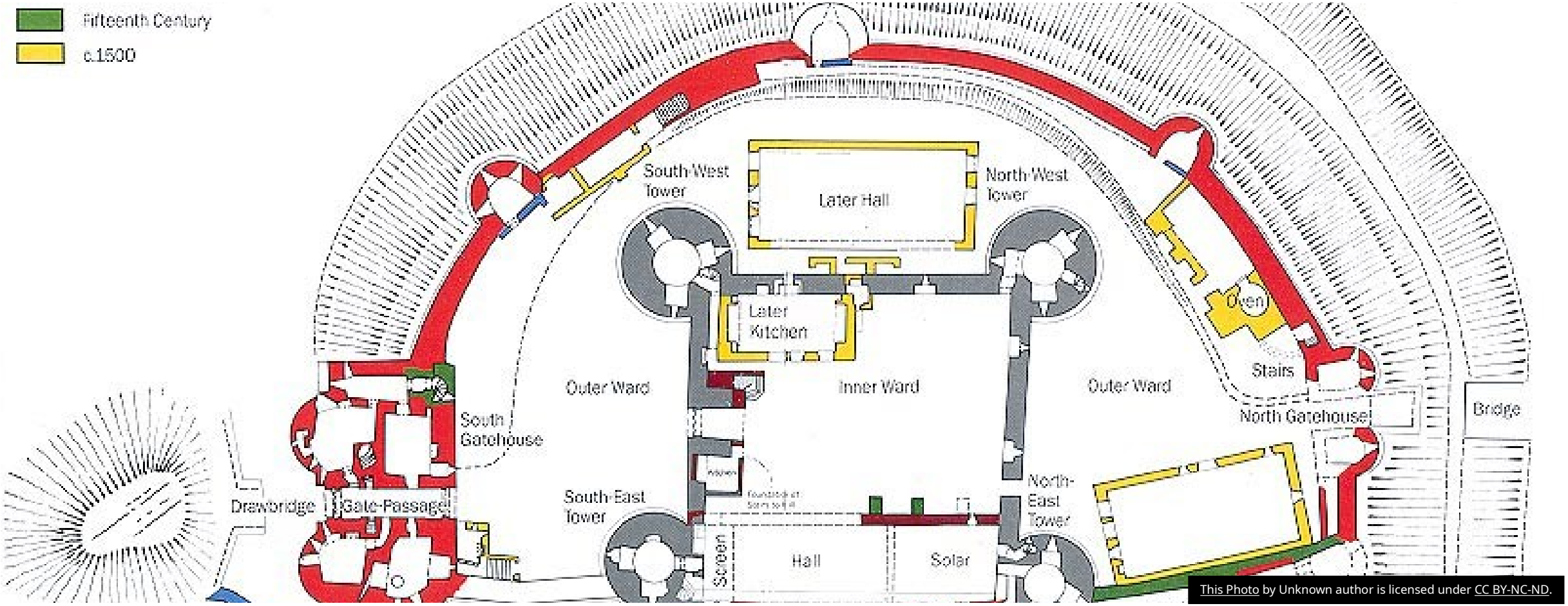


Risk Management framework – A reminder from the previous lesson

Risks are addressed through sophisticated risk management systems, internal control system and strong corporate governance.

Risk management systems include processes established to ensure that all material risks and associated risk concentrations are:

- Identified;
- Measured;
- Limited;
- Controlled;
- Mitigated;
- Reported on a timely and comprehensive basis.

Internal control system is a set of rules and controls governing the bank's organizational and operational structure, including reporting processes, and functions for:

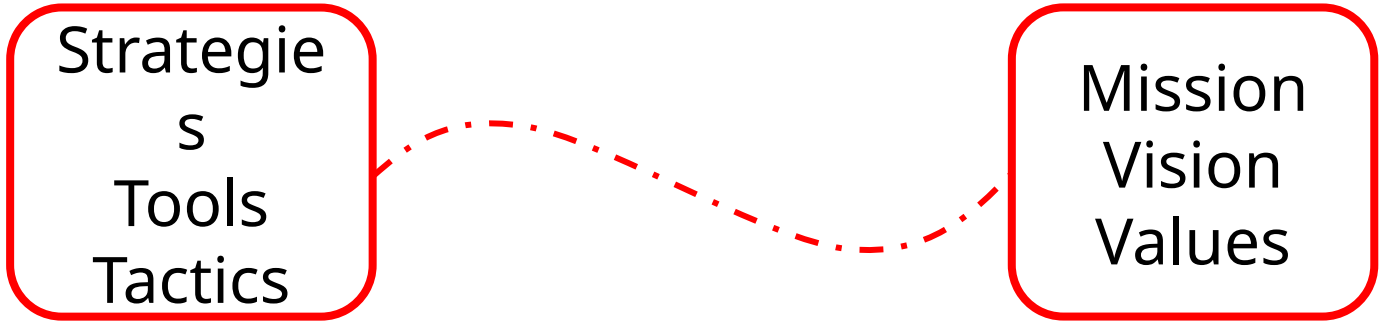
- Risk management;
- Compliance;
- Internal audit.

Corporate governance is a set of relationships between a company's management, its board, its shareholders and other stakeholders which provides the structure through which the objectives of the company are set, and the means of attaining those objectives and monitoring performance. It helps define the way authority and responsibility are allocated and how corporate decisions are made.

Risk Management framework – Parts

Governance and structure

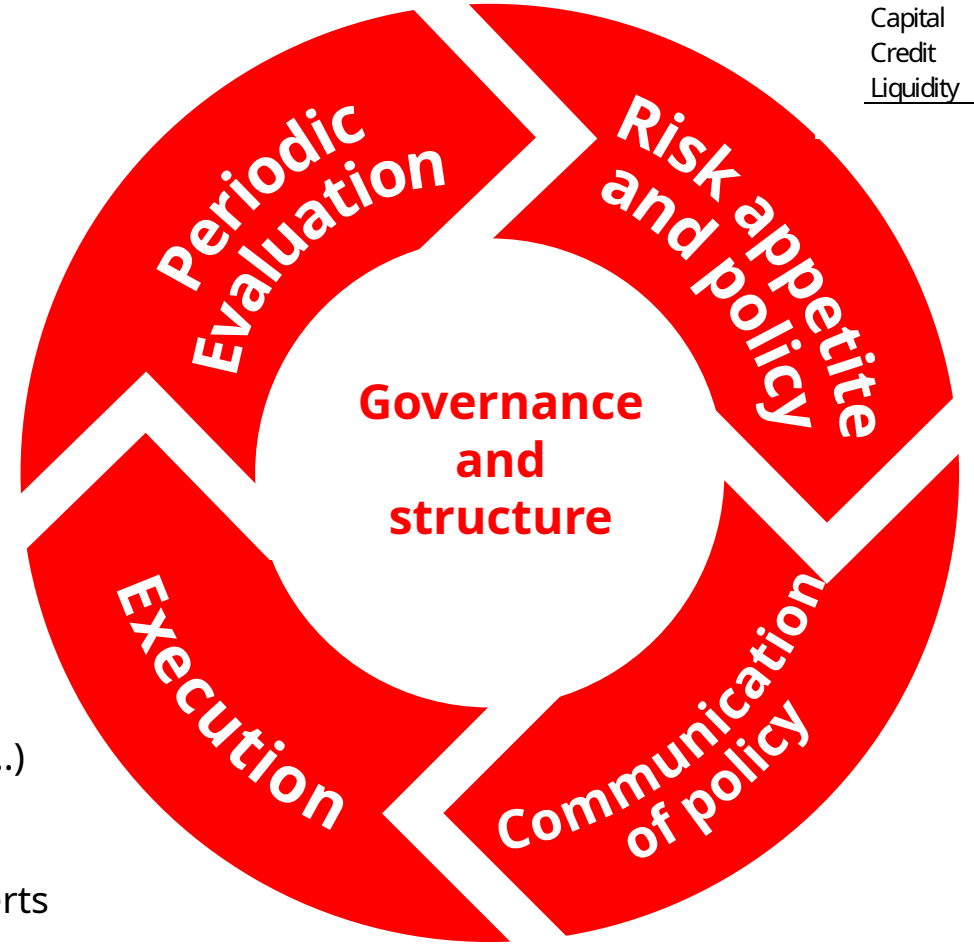
- Defines overall risk culture in the organization
- Sets the tone as how the bank implements and executes the Risk Management strategy



Risk Management framework – Parts

Two main factors:

- **External**: regulation, environment, macroeconomic and geopolitical situation
- **Internal**: focus and Strategy Plan



Put in practice to achieve metrics:

- Measures (all PDs, max exposure,…)
- Reporting system
- Thresholds to monitor and flag alerts
- Clear actions if alert is flagged

Key risk appetite metrics

Component	Measure	Risk appetite (2026)	2025	2024	2023
Capital	CET1 ratio	14-14.5%	14.90%	14.90%	14.80%
Credit	ECL	30-40 bps	39 bps	34 bps	31 bps
Liquidity	LCR	>100%	137%	138%	136%

Source of Key appetite metrics:

HSBC 2025 annual report

Risk Management framework – Features of a particular risk management

- **Identify and assess key exposures**:
  - Risk Assessment, Event Management, Key Risk Indicator;
  - Evaluate the risk controls: identify inherent risk and measure the residual risk after implementation of controls;
- **Establish clear personal accountabilities, roles and responsibilities**:
  - Streamlines the risk management process;
  - Allows risk managers to incorporate accountability into the work culture of the organization;
- **Enable an efficient allocation of risk capital**:
  - with a streamlined risk management process, efficient risk capital allocation and utilization can be ensured;
- **Establish consistent and timely risk management information and reporting capabilities**:
  - role-based dashboards, control diagrams and scorecards help to bring high-risk areas into focus;
- **Ensure a continuous risk management learning**:
  - Helps to achieve more informed and proactive decision-making and align framework to the supported businesses;
  - business units should share their experience and best risk management practices.

Risk Management framework – Example: HSBC Risk Management framework

Our risk management framework

The following diagram and descriptions summarise key aspects of the risk management framework, including governance, structure, risk management tools and our culture, which together help align employee behaviour with risk appetite.

Key components of our risk management framework

HSBC values and risk culture

Risk governance	Non-executive risk governance	The Board approves the Group's risk appetite, plans and performance targets. It sets the 'tone from the top' and is advised by the Group Risk Committee (see page 251).
	Executive risk governance	Our executive risk governance structure is responsible for the enterprise-wide management of all risks, including key policies and frameworks for the management of risk within the Group (see pages 128 and 137).
Roles and responsibilities	Three lines of defence model	Our 'three lines of defence' model defines roles and responsibilities for risk management. An independent Group Risk and Compliance function helps ensure the necessary balance in risk/return decisions (see page 128).
Processes and tools	Risk appetite	The Group has processes in place to identify, assess, monitor, manage and report risks to help ensure we remain within our risk appetite and to anticipate, prevent, respond to, and recover from, significant operational disruptions.
	Enterprise-wide risk management tools	
	Active risk management: identification/assessment, monitoring, management and reporting	
	Operational resilience	
Internal controls	Policies and procedures	Policies and procedures define the minimum requirements for the controls required to manage our risks.
	Control activities	Operational and resilience risk management defines minimum standards and processes for managing operational risks and internal controls.
	Systems and infrastructure	The Group has systems and processes that support the identification, capture and exchange of information to support risk management activities.

Source: HSBC annual report p. 127: [financial statements HSBC 2024]

Risk Management framework – Example: HSBC Risk Management framework

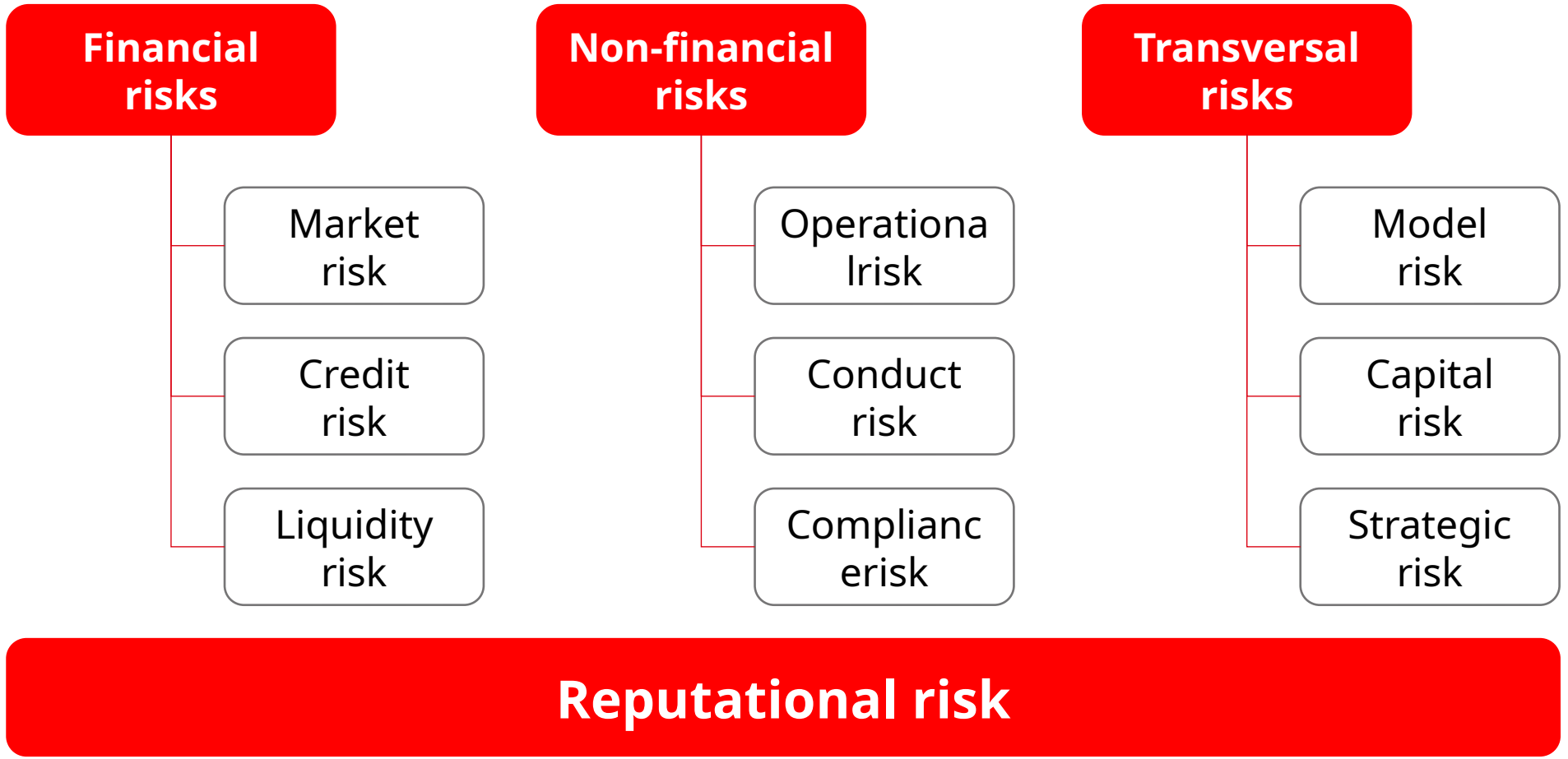
Governance structure for the management of risk and compliance

Authority	Membership	Responsibilities include:
Group Risk Management Meeting	GCRCO Group Chief Legal Officer Group CEO Group CFO All other Group Operating Committee members	– Supporting the GCRCO in exercising Board-delegated risk management authority – Overseeing the implementation of risk appetite and the risk management framework – Forward-looking assessment of the risk environment, analysing possible risk impacts and taking appropriate action – Monitoring all categories of risk and determining appropriate mitigating action – Promoting a supportive Group culture in relation to risk management and conduct
Group Risk and Compliance Leadership Meeting	GCRCO CRCOs of HSBC's business segments Regional CRCOs and CROs Heads of Global Risk and Compliance sub-functions	– Supporting the GCRCO in providing strategic direction for the Group Risk and Compliance function, setting priorities and providing oversight – Overseeing a consistent approach to accountability for, and mitigation of, risk and compliance across the Group
Global business/regional risk management meetings	Global business/regional CRCOs and CROs Global business/regional CEOs Global business/regional CFOs Global business/regional heads of global functions	– Supporting the GCRCO in exercising Board-delegated risk management authority – Forward-looking assessment of the risk environment – Implementation of risk appetite and the risk management framework – Monitoring all categories of risk and overseeing appropriate mitigating actions – Embedding a supportive culture in relation to risk management and controls

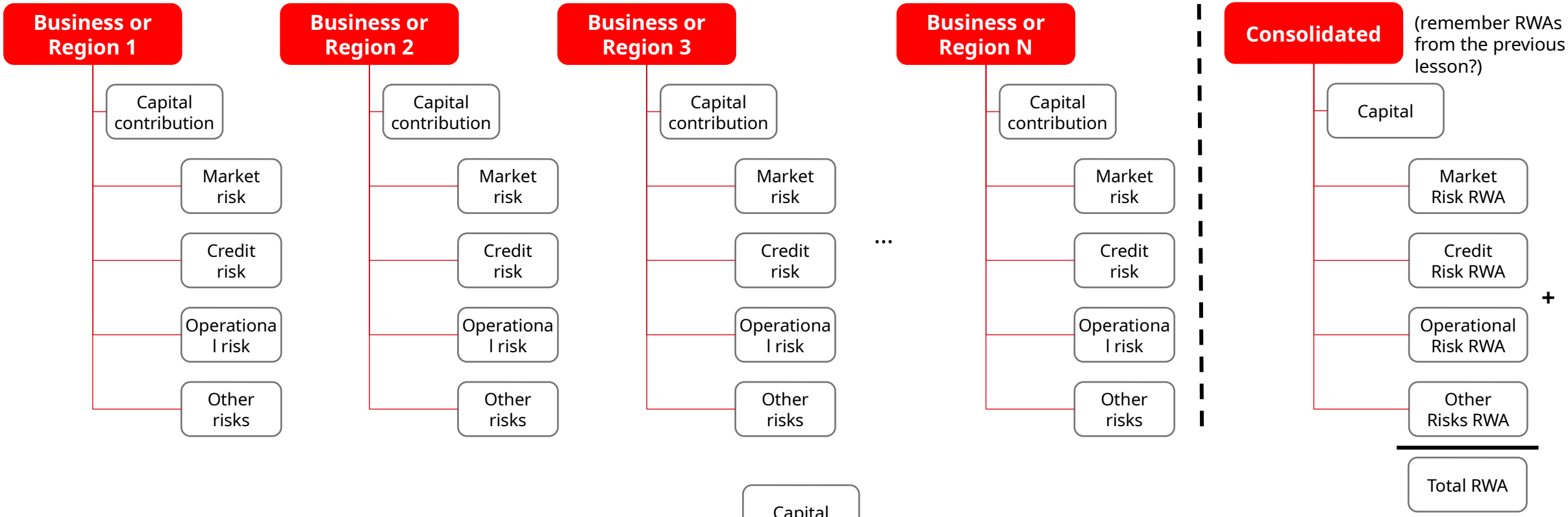
- The Board committees with responsibility for oversight of risk-related matters are set out on page 195.
- Treasury risks, excluding pension and insurance risks, are the responsibility of the Group Finance Management Meeting and the Group Risk Committee. Global Treasury actively manages these risks, supported by the Holdings Asset and Liability Management Committee ('ALCO') and local ALCOs, overseen by Treasury Risk Management and Risk Management Meetings. Further details on treasury risk management are set out on page 156.

Source: HSBC annual report 2025

Risk Management framework – Main risks associated to banking (non-exhaustive)



Risk Management framework – Regulatory Capital



Risk-weighted assets

RWAs by business segment

	Hong Kong	UK	CIB	IWPB	Corporate Centre	Total RWAs
	$bn	$bn	$bn	$bn	$bn	$bn
Credit risk	**114.5**	**130.3**	**282.3**	**71.5**	**88.4**	**687.0**
Counterparty credit risk	**0.1**	**0.1**	**40.2**	**0.8**	**1.2**	**42.4**
Market risk	**0.7**	**—**	**24.4**	**0.3**	**13.1**	**38.5**
Operational risk	**24.3**	**22.5**	**61.8**	**17.3**	**(5.2)**	**120.7**
At 31 Dec 2025	**139.6**	**152.9**	**408.7**	**89.9**	**97.5**	**888.6**
At 31 Dec 2024	143.7	133.5	388.0	85.7	87.4	838.3

CIB = Commerical and Investment Banking
IWPB = International Wealth and Premier Banking

Source: HSBC annual report 2025

RWAs by legal entities[1]

	HSBC UK Bank plc	HSBC Bank plc	The Hongkong and Shanghai Banking Corporation Limited	HSBC Bank Middle East Limited	HSBC North America Holdings Inc	Grupo Financiero HSBC, S.A. de C.V.	Other trading entities	Holding companies, shared service centres and intra-Group eliminations	Total RWAs
	$bn	$bn	$bn	$bn	$bn	$bn	$bn	$bn	$bn
Credit risk	133.5	73.8	319.1	18.8	58.6	25.1	46.9	11.2	687.0
Counterparty credit risk	0.3	23.9	10.3	0.9	4.3	0.7	2.0	—	42.4
Market risk[2]	0.1	24.9	18.9	2.4	2.8	0.6	2.1	6.7	38.5
Operational risk	24.1	23.4	63.5	5.1	8.3	6.1	6.0	(15.8)	120.7
At 31 Dec 2025	158.0	146.0	411.8	27.2	74.0	32.5	57.0	2.1	888.6
At 31 Dec 2024	138.3	137.6	402.8	26.6	74.4	29.7	50.7	(0.6)	838.3

1 Balances are on a third-party Group consolidated basis.
2 Market risk RWAs are non-additive across the legal entities due to diversification effects within the Group.

Source: HSBC annual report 2025

Capital risk in 2025

Capital overview

Capital and liquidity adequacy metrics

	At	
	31 Dec 2025	31 Dec 2024
Risk-weighted assets ('RWAs') ($bn)		
Credit risk	**687.0**	657.9
Counterparty credit risk	**42.4**	37.7
Market risk	**38.5**	36.2
Operational risk	**120.7**	106.5
Total RWAs	**888.6**	838.3
Capital on a transitional basis ($bn)		
Common equity tier 1 capital	**132.6**	124.9
Tier 1 capital	**153.4**	144.1
Total capital	**182.4**	172.4
Capital ratios on a transitional basis (%)		
Common equity tier 1 ratio	**14.9**	14.9
Tier 1 ratio	**17.3**	17.2
Total capital ratio	**20.5**	20.6
Capital on an end point basis ($bn)		
Common equity tier 1 ('CET1') capital	**132.6**	124.9
Tier 1 capital	**153.4**	144.1
Total capital	**182.4**	168.5
Capital ratios on an end point basis (%)		
Common equity tier 1 ratio	**14.9**	14.9
Tier 1 ratio	**17.3**	17.2
Total capital ratio	**20.5**	20.1
Liquidity coverage ratio ('LCR')		
Total high-quality liquid assets ($bn)	**702.1**	649.2
Total net cash outflow ($bn)	**512.1**	470.7
LCR (%)	**137**	138
Net stable funding ratio ('NSFR')		
Total available stable funding ($bn)	**1,621.0**	1,523.4
Total required stable funding ($bn)	**1,133.3**	1,064.5
NSFR (%)	**143**	143

Source: HSBC annual report 2025

Types of risk

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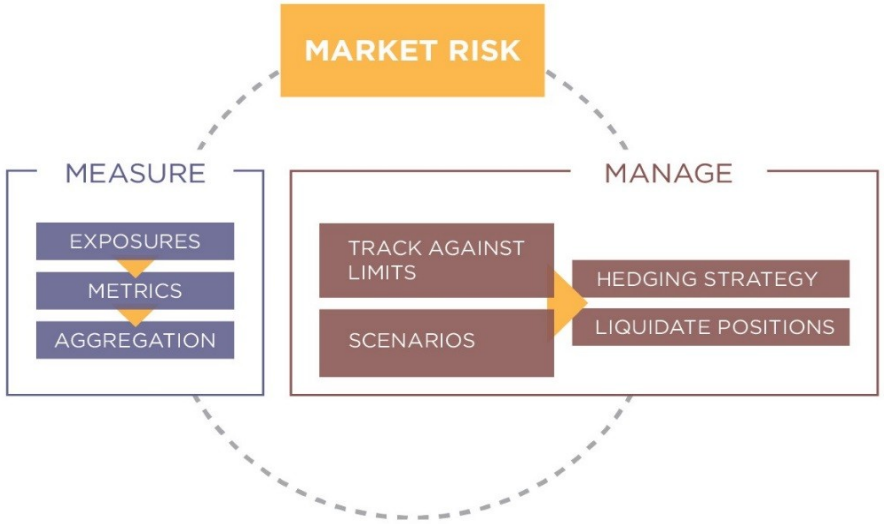
Types of Risk – Market Risk

Reminder from the previous lesson:



Examples of risks included in market risk:

- Interest rate;
- Equity;
- Foreign exchange (FX);
- Commodities.

Some important market risk management terminology:

- Standardized approach (SA);
- Internal models approach (IMA);
- Value at Risk (VaR);
- Expected Shortfall (ES);
- Monte-Carlo simulation;
- Counterparty Credit Risk (CCR);
- X-Value Adjustments (XVA).

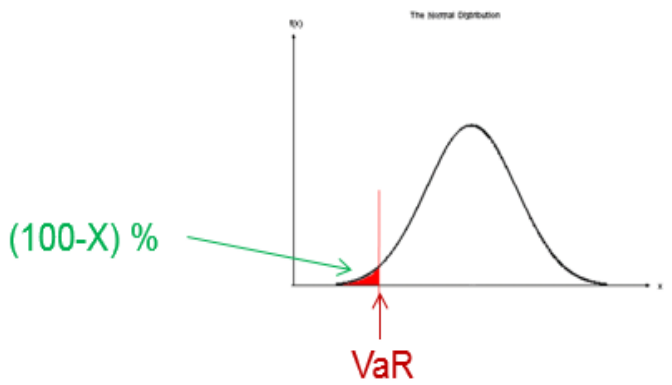
Types of Risk – Market Risk

- Main measure, **Value at Risk (VaR)**: estimation of the potential loss at a certain confidence level (X) and time horizon (e.g. N days)

- **Example**: if the VaR at 99% and 10 days is 10.000 PLN, this means that we are 99% sure that we will not lose more than 10.000 PLN in the next 10 days

When N = 10 and X = 99,

VaR is the 1 percentile of the distribution of change in portfolio value over the next 10 days.



Types of Risk – Market Risk

VaR has a number of **advantages**:

- It captures an important aspect of risk with a single number;
- It is easy to understand: the 1% VaR is the worst outcome of the 99% best outcomes
- It is easyt to calculate

VaR has a number of **disadvantages**:

- It actually doesn’t capture the key aspect of risk: what to expect when things go wrong
- It is actually extremely misleading: the 1% VaR is the *best* possible outcome of the 1% worst cases
- It is actualluly not a risk measure at all (it is not a cohearent risk measure)

There are **three main approaches to calculate VaR**:

- Parametric: the P&L is estimated by assuming that the portfolio/underlying follows a certain distribution;
- Historical: the P&L is estimated using risk factors' recent history;
- Monte Carlo: the risk factors are simulated and then the P&L is estimated.

Types of Risk – Market Risk

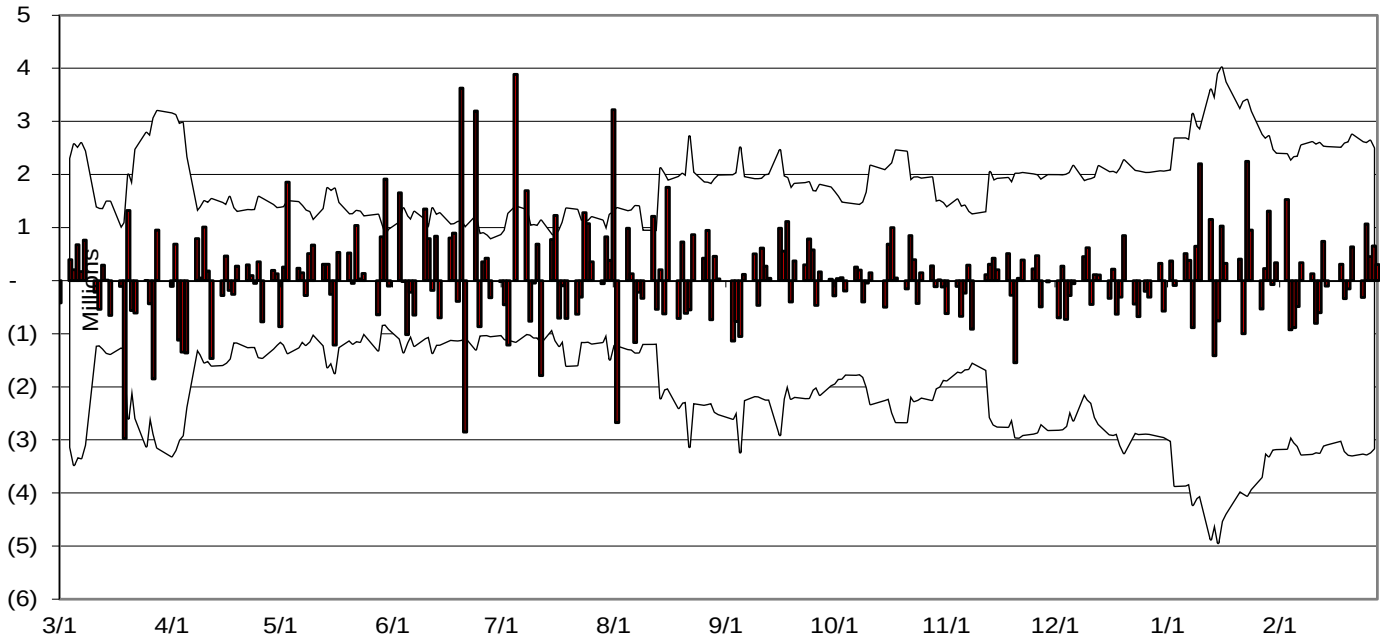
The VaR cannot cover all risk factors, it needs to be supplemented. Examples:

- **Stressed VaR**: assuming historical approach, VaR only uses the recent history of the relevant risk factors. Stressed VaR uses the history during the financial crisis;
- **Idiosyncratic Credit VaR**: many positions do not have proper market data; they must be valued using a proxy, which introduces further error in the calculation. This term estimates this error;
- **Incremental Risk Charge**: VaR does not take into account changes in credit quality of obligors (i.e. rating). This term estimates the effect of this risk factor.

Each term responds to a **regulatory requirement**

Types of Risk – Market Risk

Example of use: **VaR breaches**

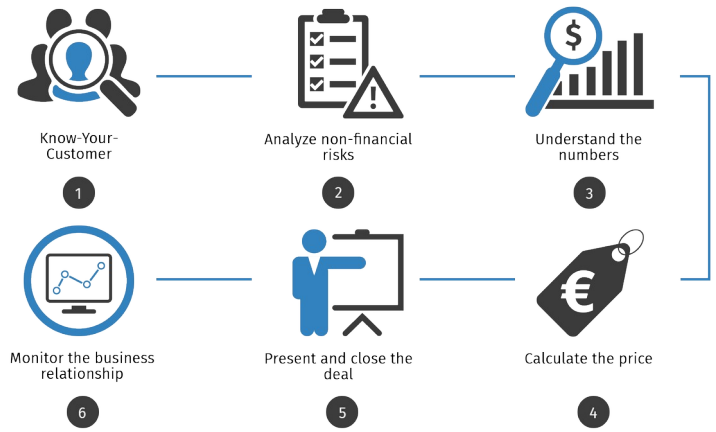


Levels for 250 observations at a 99% level

Zone	K	P(N ≤ K)
Green	4	89.22%
Amber	5	95.88%
	9	99.97%
Red	10	99.99%

Types of Risk – Credit Risk

Reminder from the previous lesson:



Some ways to mitigate credit risk:

- Risk-based pricing;
- Covenants;
- Credit insurance and credit derivatives;
- Guarantee from a third party;
- Tightening (e.g. reducing exposure amount or payment terms);
- Diversification;
- Collateral.

Some important credit risk management terminology:

- Standardized approach (SA);
- Internal Risk Based approach (IRB);
- Expected Losses (EL);
- Probability of Default (PD);
- Loss Given Default (LGD);
- Exposure at Default (EAD).

Types of Risk – Credit Risk

Two main blocks:

Retail: it involves typical day to day products

- Mortgages
- Credit cards
- Car or Student loans

And in the middle, the small & medium enterprises (SME), which have a bit of both

Wholesale: the focus is on big companies

- Project finance
- Working capital management
- Commercial real estate

Types of Risk – Credit Risk

Three main measures:

- **Default probability (PD)**: the probability of failing to honor the required payments over a particular time horizon;
- **Exposure at default (EAD)**: the total value a bank is exposed when an obligor defaults;
- **Loss given default (LGD)**: usually expressed as a percentage, the part that is expected not to be recovered in the event of default.
- These three quantities are then combined to express the **Expected Loss**: $EL = PD \cdot LGD \cdot EAD$

Individual contribution to **Risk Weighted Assets**:

- Similar to Market risk, contribution of each product is $RWA = K \cdot 12.5 \cdot EAD$
- A new term appeared. K depends on the PD and the LGD:

$$K = LGD \cdot \left[N\left(\sqrt{\frac{1}{1-R}} \cdot G(PD) + \sqrt{\frac{R}{1-R}} \cdot G(0.999) \right) - PD \right]$$

Types of Risk – Operational Risk

Reminder from the previous lesson:

Types of operational risk events:

- Internal fraud;
- External fraud;
- Employment practices and workplace safety;
- Clients, products and business practices;
- Damage to physical assets;
- Business disruption and system failures;
- Execution, delivery and process management.

Some important operational risk management terminology:

- Basic indicator approach (BIA);
- Standardized approach (SA);
- Advanced measurement approaches (AMA);
- The Business Indicator (BI);
- The Internal Loss Multiplier (ILM);
- Scenarios Analysis;
- Loss Distribution Approach (LDA).

Types of Risk – Operational Risk

Type of risk	Example
Internal fraud	Hide positions intentionally to report less exposure
External fraud	Phishing mails to steal information
Employment practices and workplace safety	Electric shock because of a non-working plug
Clients, products and business practice	Accidental leak of customer personal data
Damage to physical assets	Non-operative site because of a blackout
Business disruption and systems failures	Communication infrastructure break due to accident
Execution, delivery and process management	Fat finger trade

Types of Risk – Operational Risk

Example of use: **Expected Potential Loss**

It is easily understood with an example:

- **Frequency of an event**: throughout the previous year there were 204 attempts to steal money from case desks in its branches;
- **Severity of an event**: on average, the amount of stolen cash was 1.534 PLN;
- **Expected Potential Loss**: in this case, the annual Expected Potential Loss from this particular type of operational risk event is EPL=1.534 * 204 = 312.936 PLN.

Types of Risk – Model Risk

A large bank has a wide range of model types subject to governance and model risk management

MODELS USED FOR « REGULATORY, MANAGERIAL AND ACCOUNTING » PURPOSES

Market and Liquidity Risk Models	Credit & Counterparty Risk Models	Operational Risk Models	Compliance Models
• VaR (inc. Stressed VaR, IRC) • ALM & Liquidity Risk • Expected Shortfall	• PD, LGD and EAD • Risk rating models • Exposure and CVA • IFRS 9 Impairment	• Loss Distribution Approach Model • Integration Model	• Anti-Money Laundering (AML) • Anti Fraud • Trader surveillance
Portfolio & Financial Risk Models	**Decision Support Models**	**Valuation & Pricing Models**	**Finance Models**
• Capital forecasting • Stress testing • Econometric models	• LOB models for customer targeting-marketing • Credit underwriting • Risk based collection models	• Derivatives • Structured products • Risk based pricing tools/models	• P&L Attribution • Cash flow /NPV/Ratio Analysis

MODELS USED FOR OTHER PURPOSES

Marketing Models	Insurance Models	Investment Management	Other Models
• Marketing models • Client Targeting	• Actuarial models • Loss Forecasting • Reserving models	• Trading • Security / Asset Pricing • Portfolio Allocation	• Corporate Finance Models (e.g. M&A, LBO, MBO)

Source: Deloitte – Model Risk Management

Types of Risk – Model Risk

Setting a Model Risk Management Framework goes beyond a regulatory or administrative task:

	Stage 1	Stage 2	Stage 3
	Foundational elements	**Implementation and execution**	**Capturing value**
Objectives	• Build foundation elements for model risk management (MRM)	• Implement robust MRM	• Gain efficiencies and extract value from MRM
Key elements	• MRM policy • Model inventory • Manual work-flow tool • Model governance and standards • MRM organization —Governance team —Validation team	• MRM policy • Control and process • Training for stakeholders • Automated work-flow tool	• Center of excellence for model development • Industrialized validation • Transparency in model quality • Process-efficiency tracking • Optimized resource management

Source: McKinsey – The evolution of Model Risk Management

Types of Risk – Model Risk

A common approach is the called **Three lines of defence**:

First Line of Defence

Model Development / Use

- Complete ownership of models
- Design and implementation
- Introduce infrastructure for effective implementation
- Post implementation and testing
- Ongoing monitoring of performance

Second Line of Defence

Model Validation / Control

- Independence from First Line of Defence
- No co-development of models. If there is a case, it must be explicitly documented to avoid parciality
- Analysis of all model areas (design, implementation, documentation,...)
- Stricter controls and documentation standards

Third Line of Defence

Internal Audit

- High level of independence from First and Second line of Defence.
- Assessment of both First and Second line, including how they interact during Model Validation
- Less focus on model content and more on processes and controls
- Conclusions directly reported to Senior Management and Board

Types of Risk – Other types of Risk

- **Liquidity risk**:
  - From the Markets side, Liquidity risk arises when for a certain period of time a given financial instrument cannot be traded quickly enough in the market without impacting the market price;
  - From the Credit side, Liquidity Risk is the risk that a business will have insufficient funds to meet its financial commitments in a timely manner

- **Climate Change**

- **Reputational risk**: risk of loss resulting from damages to a firm's reputation, due to adverse or potentially criminal event, even if the company is not found guilty. It could have many consequences:
  - loss in revenue or in customers;
  - increased operating, capital or regulatory costs;
  - destruction of shareholder value.

So far, we have seen only the most important and relevant for Banking. There are many more!

Cases for study and discussion

HSBC

The CDS trader

Reading time

The CDS trader

Discussion time

The preferred stock issue

Reading time

The preferred stock issue

Discussion time

Practical case: set an approval framework

HSBC

An approval framework

Thinking time

An approval framework

Discussion time

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