



EUROPEAN CENTRAL BANK

EUROSYSTEM

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Mitigating risks in the Eurosystem's monetary policy operations

ECB Central Banking Seminar
Frankfurt am Main, 13 July 2018

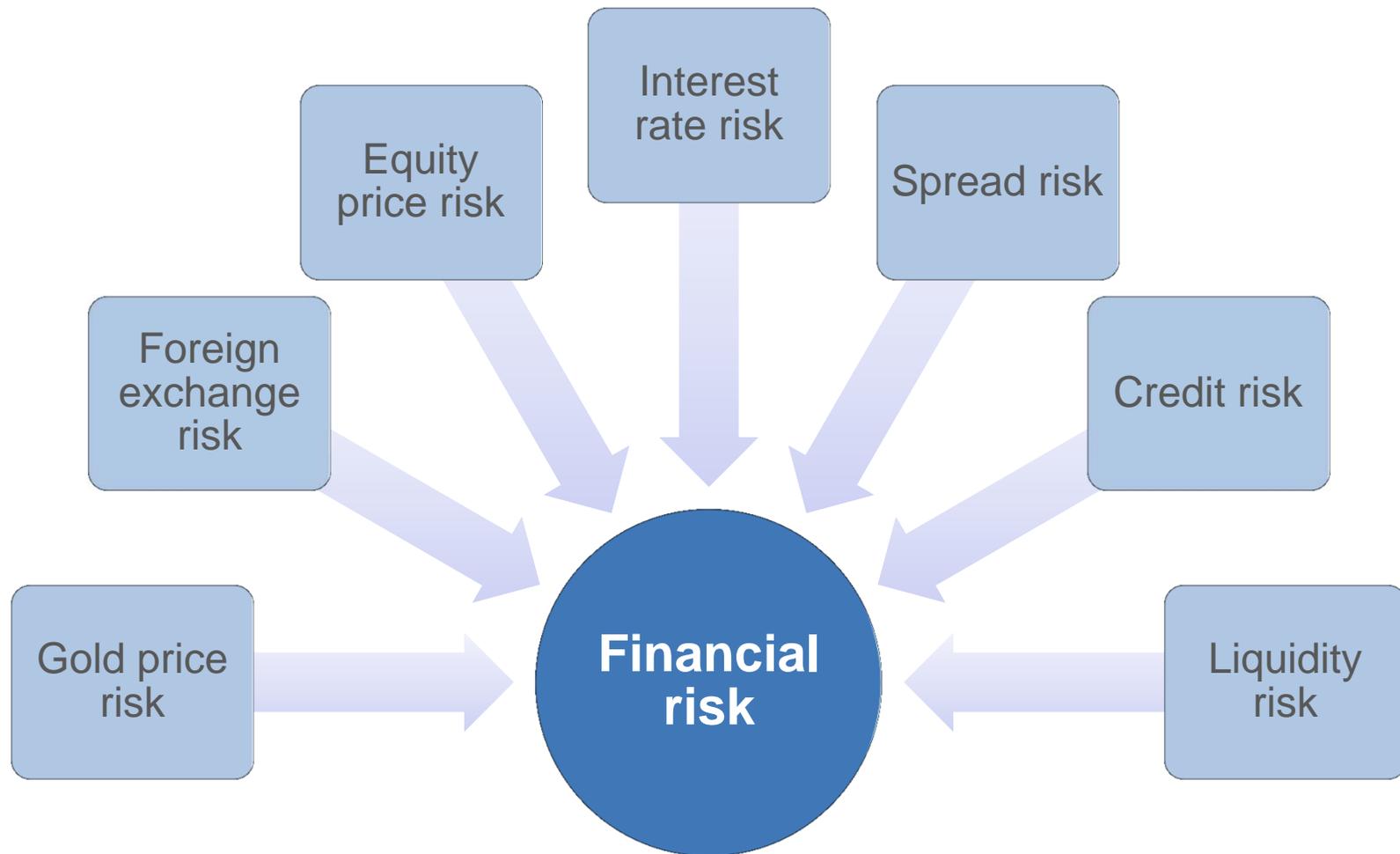
Outline

- 1** Introductory remarks
- 2** Overview of risks and operations
- 3** Risk reporting
- 4** Outright purchases risk mitigation
- 5** Reverse transactions collateral risk framework
 - i** Eurosystem Credit Assessment Framework (ECAAF)
 - ii** Valuation
 - iii** Haircuts

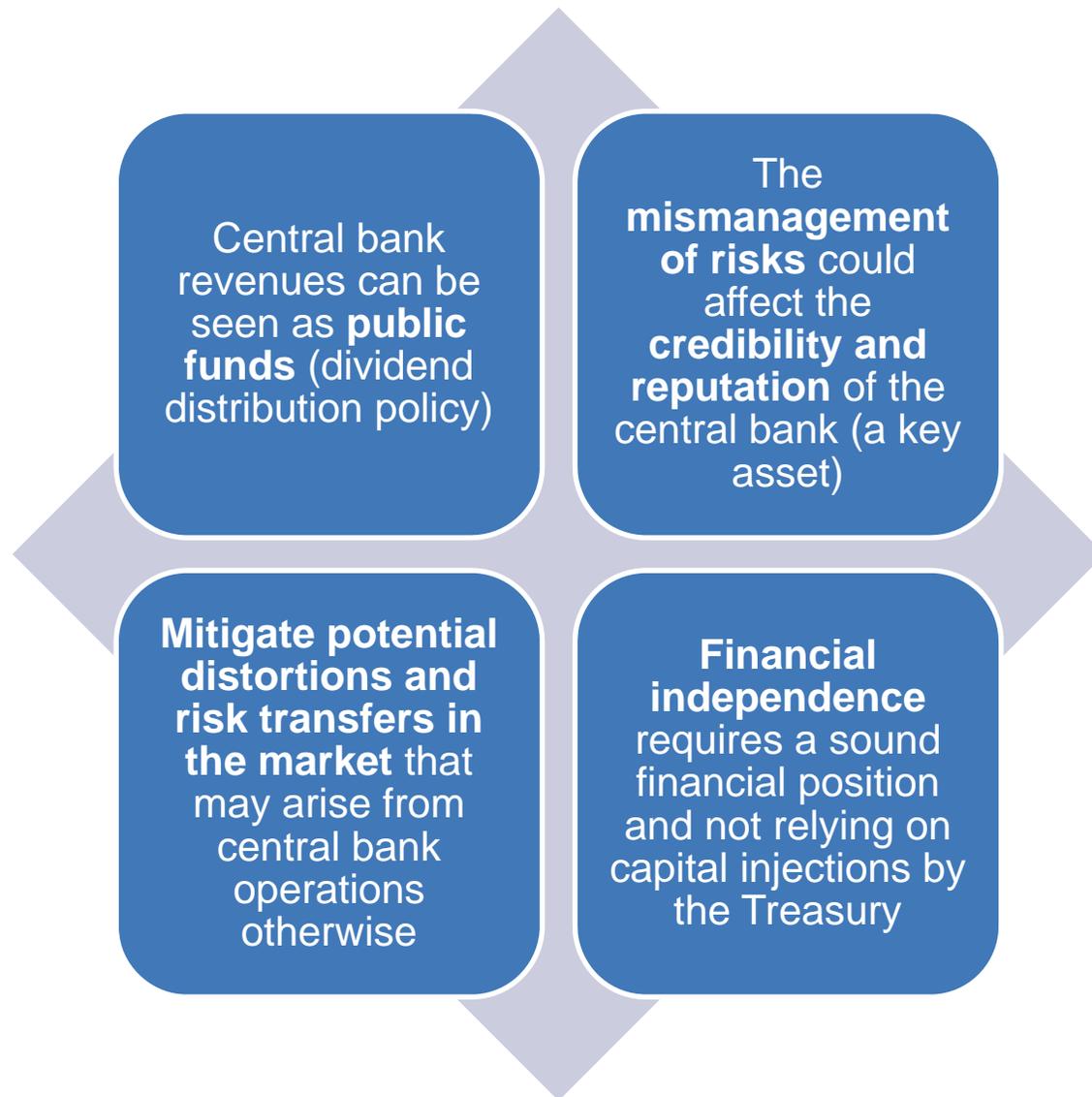
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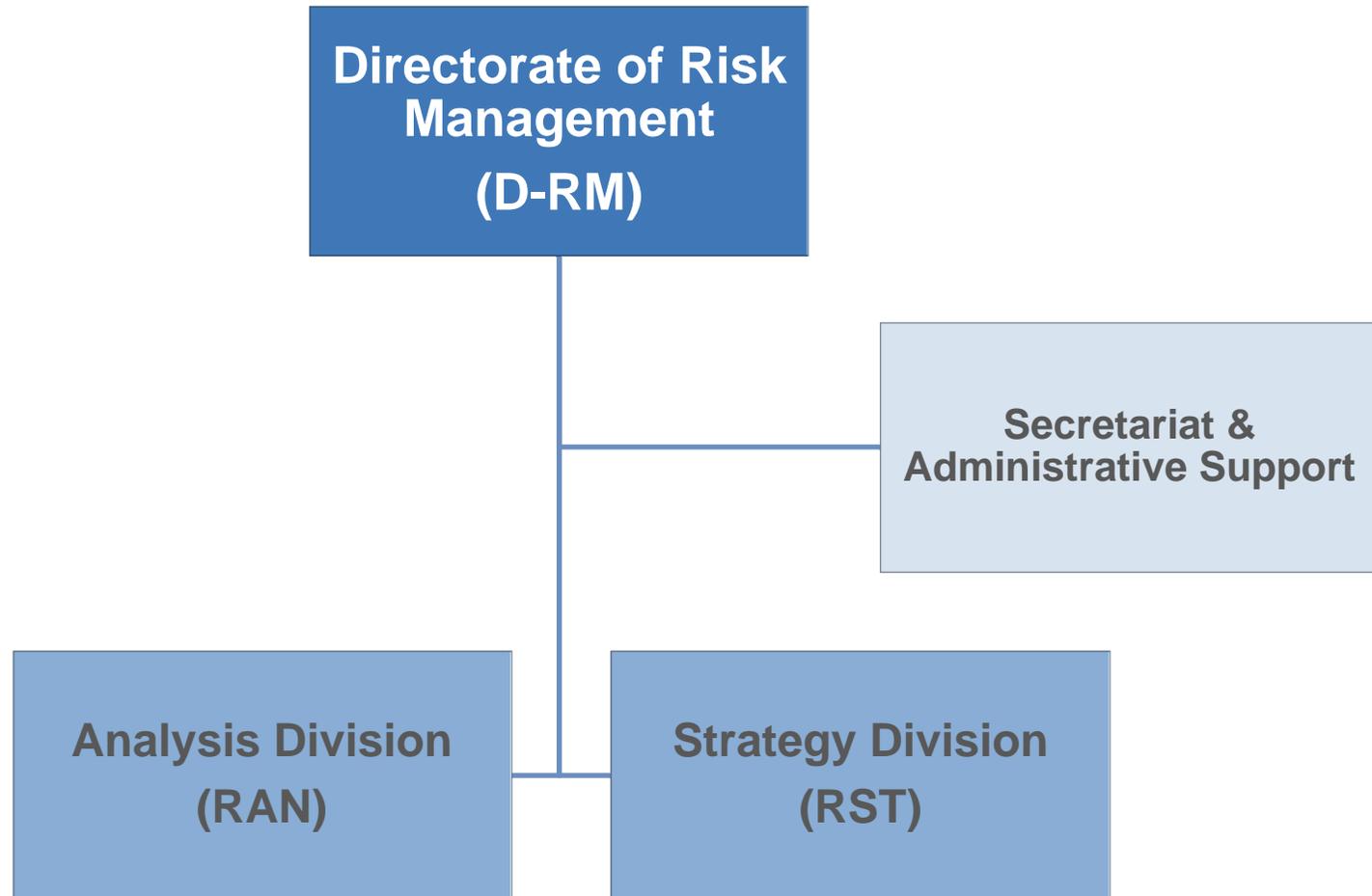
What are the types of financial risks and *where* do they originate?



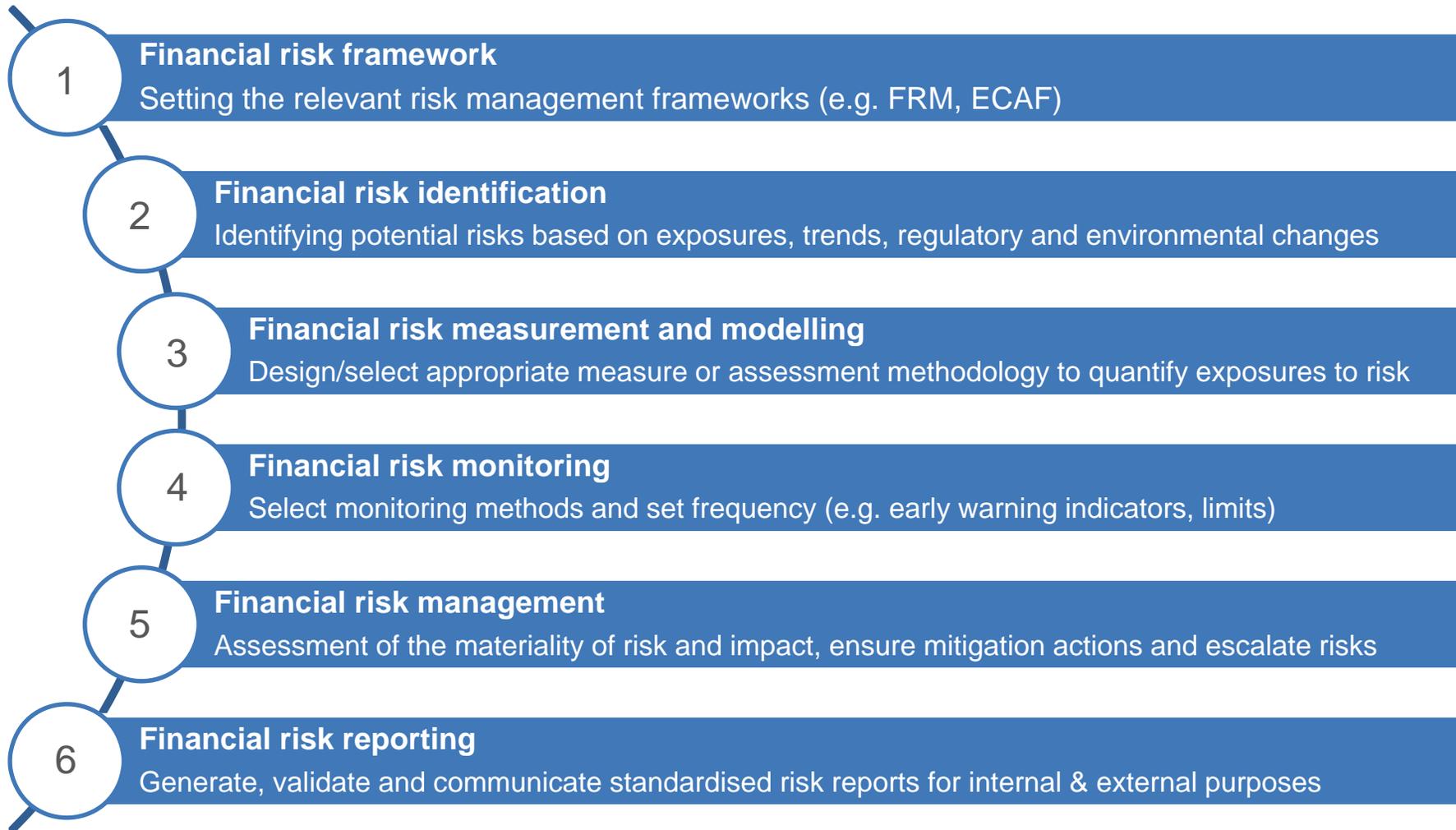
Why is important the management of financial risks?



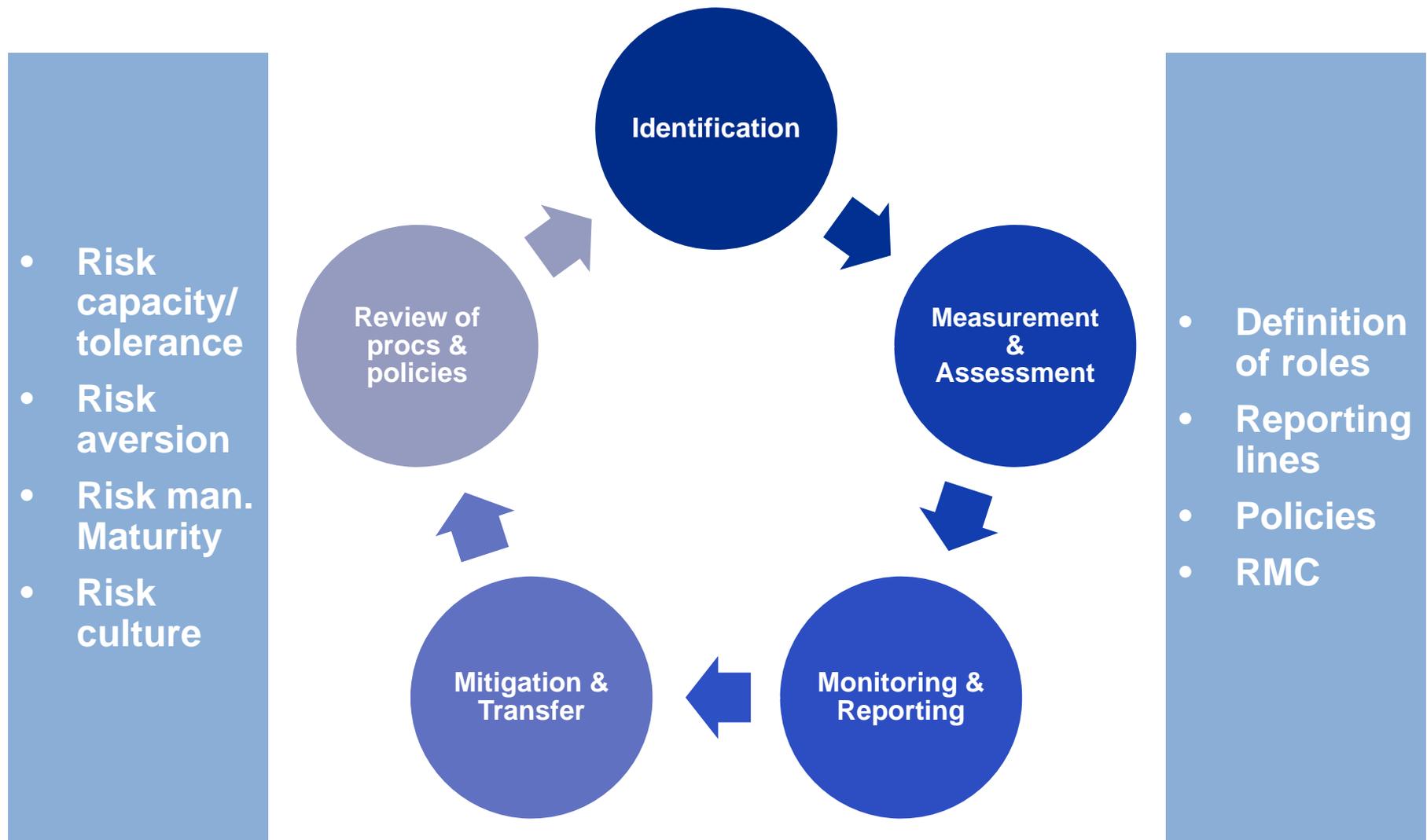
Who is responsible for the management of financial risks (at the ECB level)?



What are the major domains and tasks?



Overview of a typical risk management cycle



Guiding 'principles' that underpin the risk management function

- **Integral part of decision-making**: enabling the achievement of policy objectives with the lowest possibly risk ('risk efficiency')
- **Objectivity and consistency**: based on generally recognised estimation methods and objective assumptions which are updated when necessary
- **'State-of-the-art' risk management framework & governance**: following well-established risk management practices such as adequate risk governance and organisation
- **Transparency and simplicity**: striving to pursue an adequate disclosure of risks internally and externally in a way to minimise complexity
- **Avoid distortions of asset prices**: promoting a level playing field across assets and financial markets, and ensuring a sufficient level of consistency across central bank operations

Developments in the Eurosystem's balance sheet during the crisis & implications for risk management

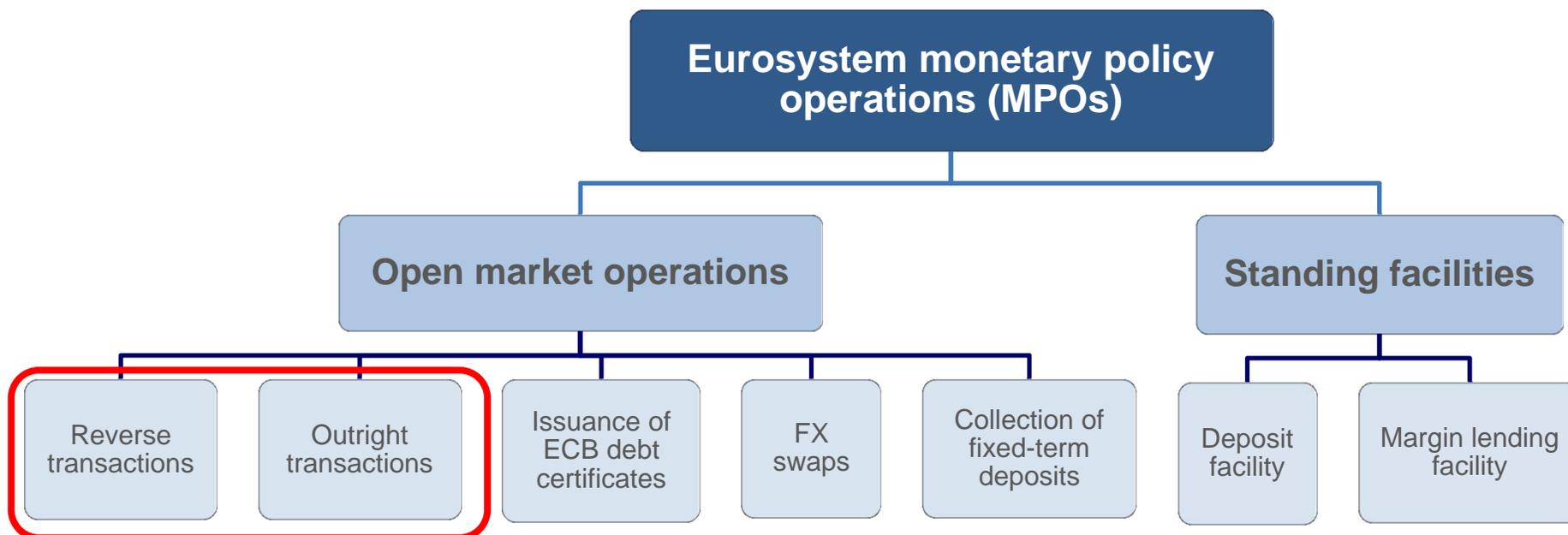
- The **financial crisis** has led to CBs **expanding MPOs** and introducing a number of **non-standards measures**
- As a consequence, the **risk has grown** on CB's balance sheet and an increased demand for analysis of the **risk implications** of policy decisions and their consistency with the risk tolerance of the decision makers
- Significant efforts have been made to define the **role and scope** of the risk management function and ensure that organisation and governance of the function are consistent with 'best practices'

Outline

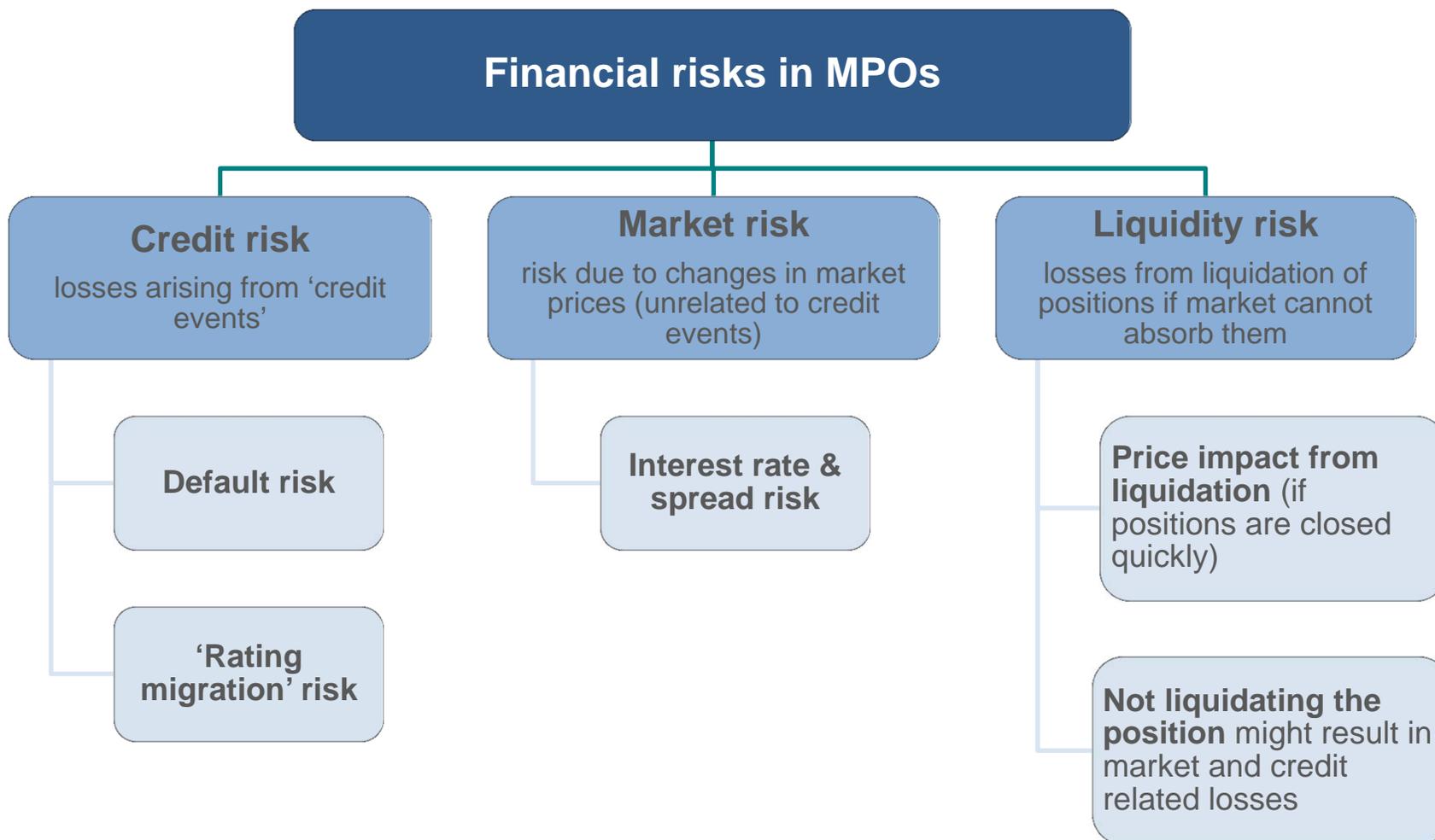
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2. Overview of risks and operations

Typology of monetary policy operations



Typology of financial risks



Purchase programmes/outright purchases

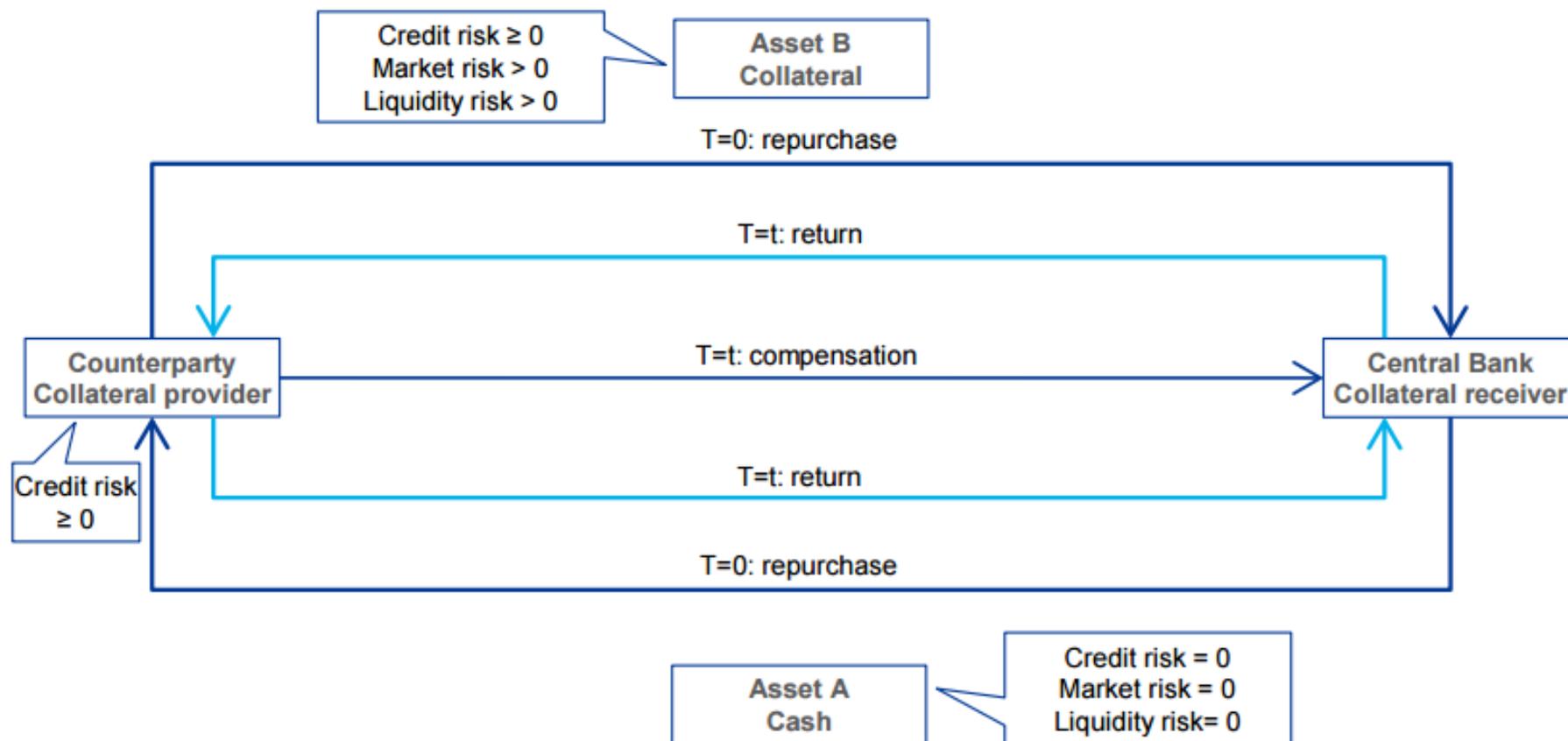
- **Outright transactions** are operations where the Eurosystem buys or sells eligible assets outright in the market
- The Eurosystem is **directly exposed** to credit, market and liquidity risks
- For each **purchase programme**, a risk control and governance framework is in place determining the asset type specific eligibility and surveillance

Credit operations/reverse transactions

- Eurosystem should provide loans to **financially sound** counterparties against **adequate collateral**
- **Counterparty credit risk**
 - Loan not redeemed at maturity due to default
- **Collateral risk** in case of counterparty default stemming from:
 - Liquidation risk
 - adverse movement in price caused by liquidation of a large position
 - Market risk
 - adverse movement in price between last valuation and realisation
 - Credit risk
 - adverse movement in price due to deterioration of credit quality
 - default of collateral

2. Overview of risks and operations (cont.)

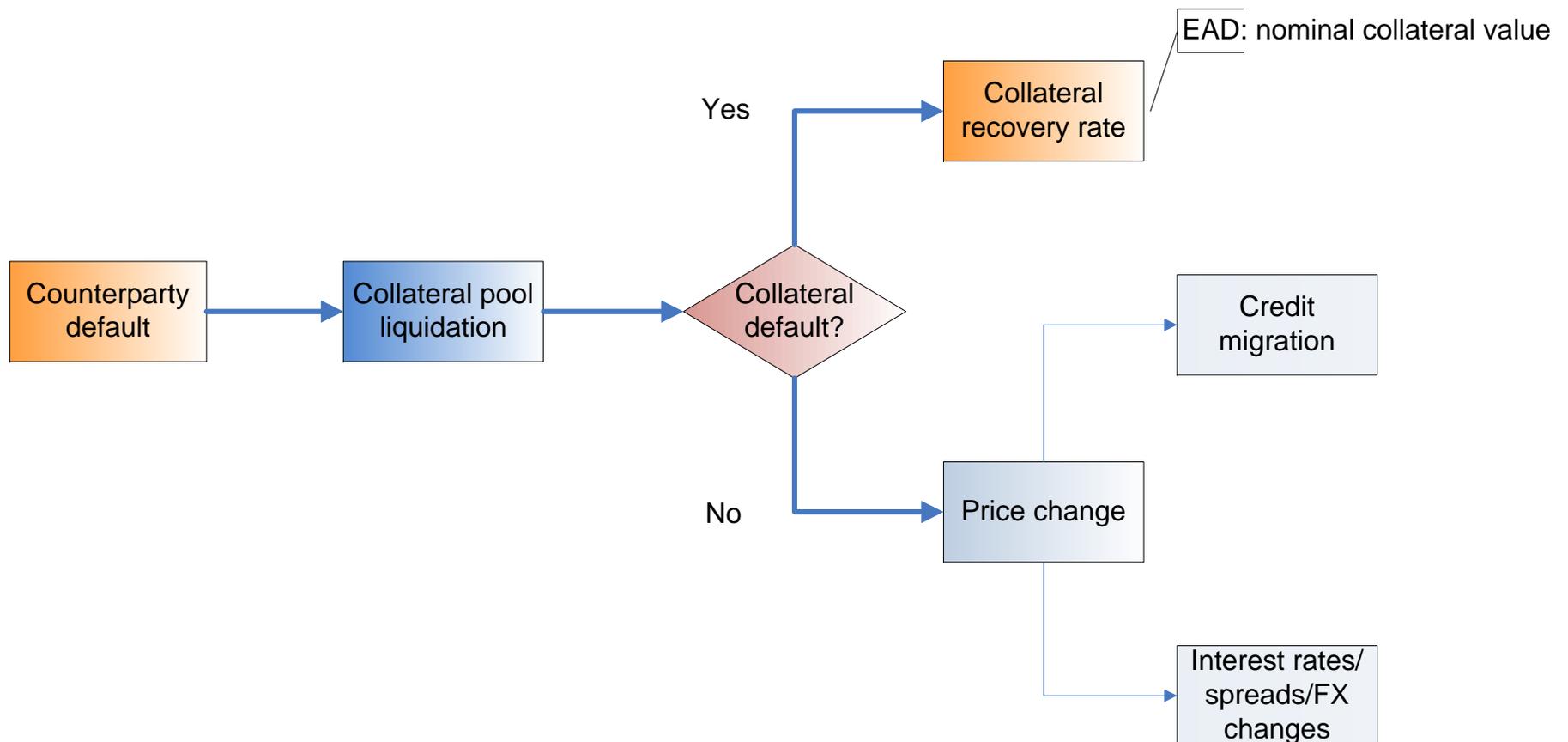
Risks in reverse transactions



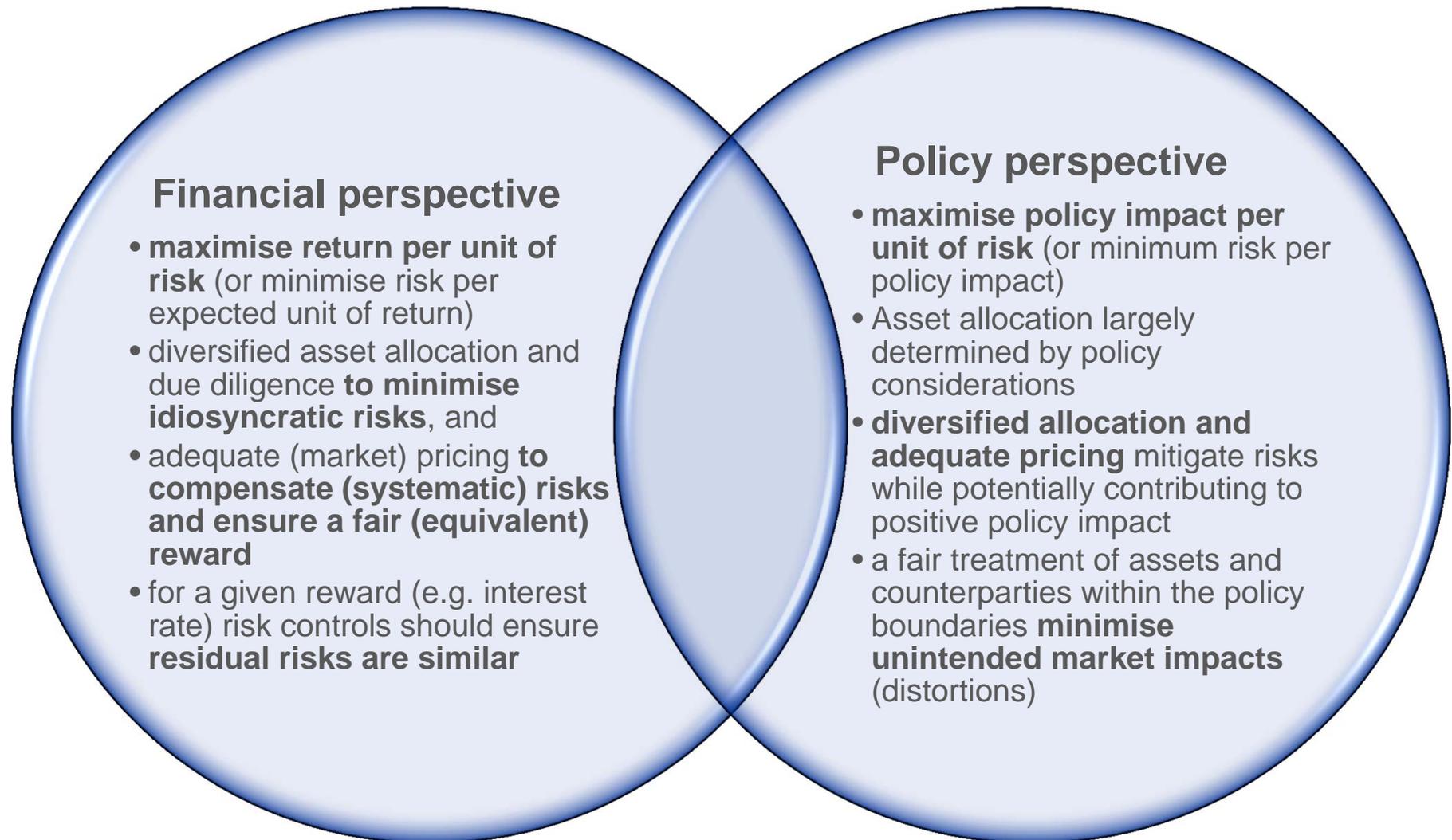
Source: ECB

2. Overview of risks and operations (cont.)

Sequence of events in case of a counterparty default



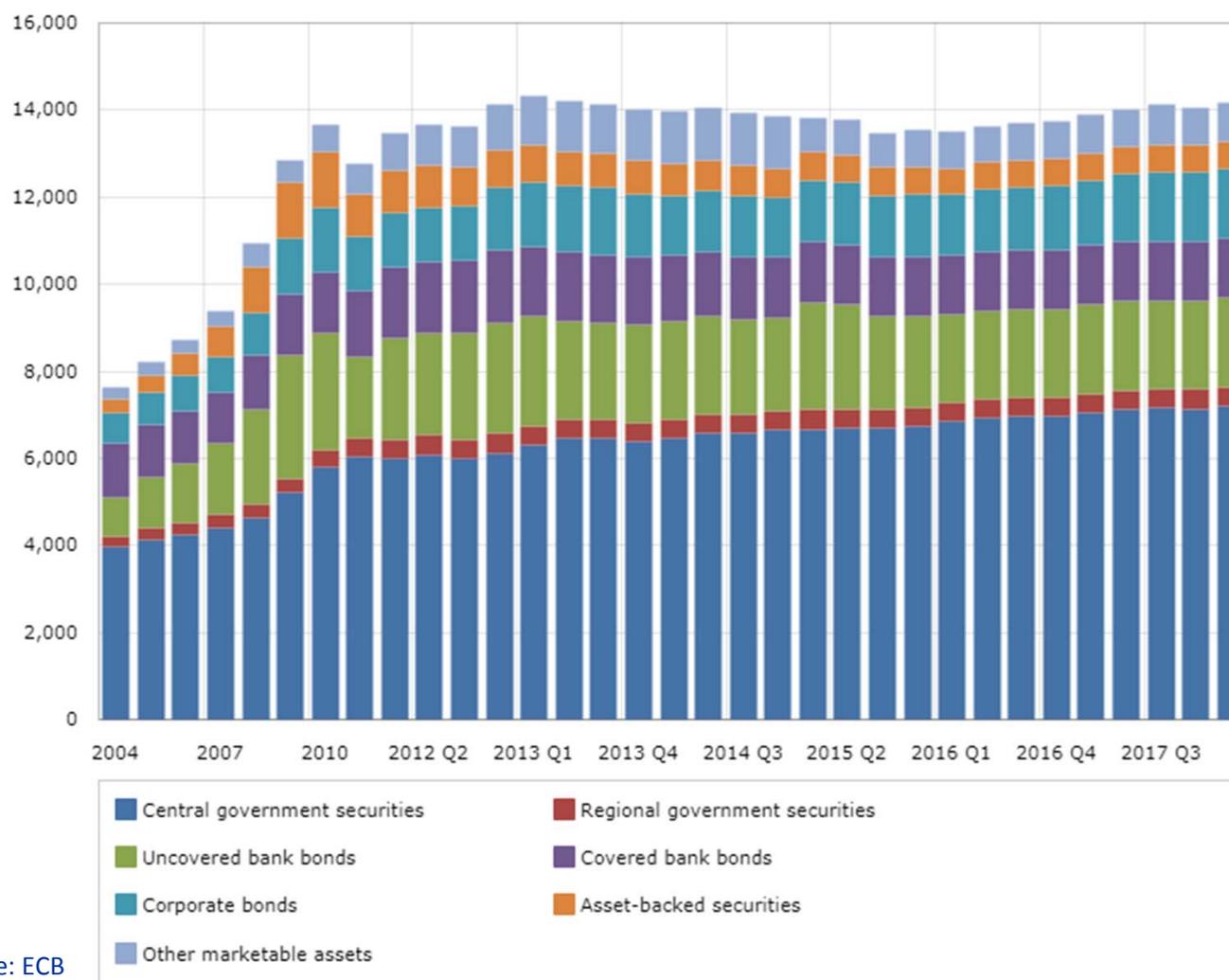
Risk efficiency, risk equivalence and policy-making



2. Overview of risks and operations (cont.)

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Marketable assets eligible as collateral

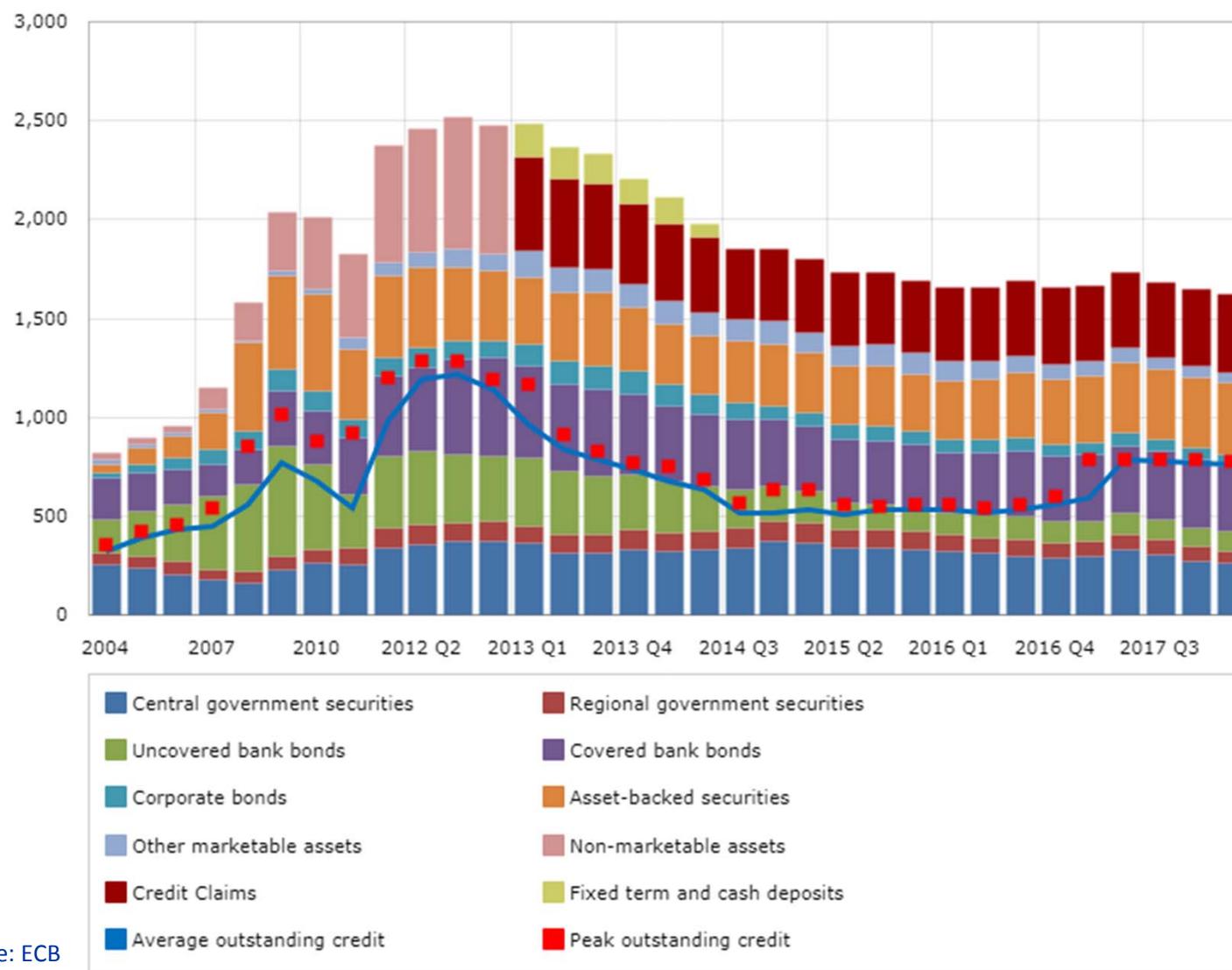


Source: ECB

2. Overview of risks and operations (cont.)

ECB-PUBLIC

Use of collateral by AT and outstanding credit



Source: ECB

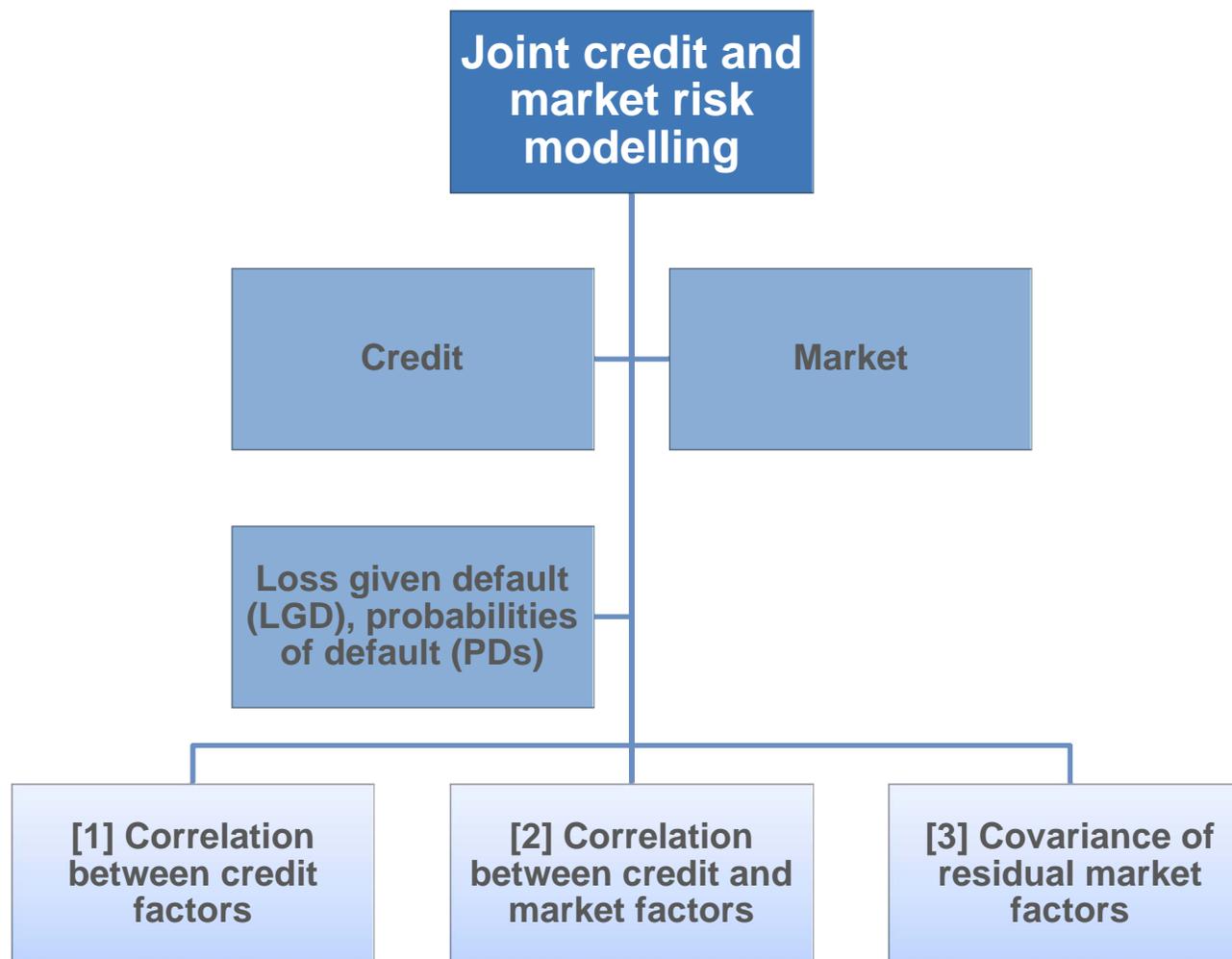
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Overview of risk quantification approach

- **Common methodology** for estimation of risks from monetary policy (and own non-monetary policy portfolios and ELA)
- **Joint market and credit risk simulation** (state space modelling framework)
 - Forward-looking bottom-up simulation-based
 - Volatilities, correlations and co-movement of credit and market risk variables modelled with multi-factor copula approach
 - Default and rating migration probabilities derived from default and rating transition studies published by major rating agencies
- **Re-pricing of instruments** based on simulated risk factors

A joint model for market and credit risk



Overview of risk quantification approach

- **Value-at-Risk** (VaR) and **Expected Shortfall** (ES) for an array of confidence levels (CL)
- **Sensitivity** and **stress scenario** analysis
- **Risk estimates** are analysed:
 - On a stand-alone basis
 - *Allows understanding the impact of the applied risk control measures and spotting potential weaknesses of the applied risk control framework*
 - With other monetary policy portfolios
 - *Diversification, concentration and substitution effects can be analysed*
 - In the aggregate balance sheet context
 - *Combined with other balance sheet risks to compare with available financial buffers*

Risk measures and scenario analysis

Value at Risk 99% 1-year horizon (VaR99%)

- What is the **maximum loss not exceeded at a 99% CL** over one year (only 1 out of 100 scenarios could be worse)
- **Percentile** of the loss distribution

Expected Shortfall 99% 1-year horizon (ES99%)

- What would be the **expected loss in the worst 1%** of the cases
- **'Average' loss beyond percentile/VaR**

Scenario analysis/
stress test

- **Conditional losses** (or risks): Losses (or risks) expected in the case a certain (adverse) scenario materialises

Public risk disclosure

- **Effective communication** with the citizens of Europe reinforces credibility, trust, transparency and accountability, hence supports monetary policy
- **Channels** used:
 - Annual Report
 - ECB annual accounts and accompanying management report
 - Annual reports and accounts of the NCBs
 - Contributions to ECB Monthly/Economic Bulletin
 - *Ad hoc* publications
 - ECB website

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Risk mitigation in outright purchases

- **Close monitoring** of risks associated with asset purchase programs (PSPP, CBPP3, ABSPP and CSPP)
- **Manage risks** to keep them at levels that do not threaten the Eurosystem capacity to fulfill its policy mandate to maintain price stability
 - **High credit quality** requirements
 - **Asset allocation** and **limit framework** ensuring some degree of diversification
 - **Due diligence** and **monitoring** processes

Risk mitigation in outright purchases

- **Asset-type specific eligibility**, analysis and surveillance
 - Specific framework for each purchase programme considers the specific features of the asset type
 - Purchase of assets of **sufficient credit quality**, i.e. eligibility as collateral according to the Eurosystem credit assessment framework (ECAAF) for monetary policy operations plus asset-class specific requirements
 - Credit risk assessment/due diligence **prior to purchase** for covered bonds and ABS
- **Pricing framework**
 - Purchase at market price / fair value
 - Pre/Post-trade checks on transaction prices

Risk mitigation in outright purchases

- **Exposure management** to ensure some degree of diversification
 - Definition of **benchmarks**, i.e. the allocation of assets to be purchased
 - Definition of **issue and issuer limits** to reduce concentration risk and avoid interference with Collective Action Clauses (CACs) in case of debt restructuring
- **Close monitoring** and **due diligence** of all active programmes (incl. news, financial developments) and possible deviation from benchmarks and in case of need implementation of additional risk control measures
- **Manage risks** to keep them at levels that do not threaten the Eurosystem capacity to fulfil its policy mandate to maintain price stability

Elements of the RCF for purchase programmes

Eligibility criteria for ongoing programs:

- minimum credit quality thresholds (ECAAF Credit Quality Step 3 or equivalent based on exceptions)
- additional safeguards + policy constraints define programme-specific eligibility requirements

Pricing framework

- Price checks and safeguards for adequate market-price formation mechanism
- Portfolio valuation

Risk analysis to ensure compliance with risk tolerance

- prior to decision
- ex-post risk monitoring

Credit risk assessment and due diligence

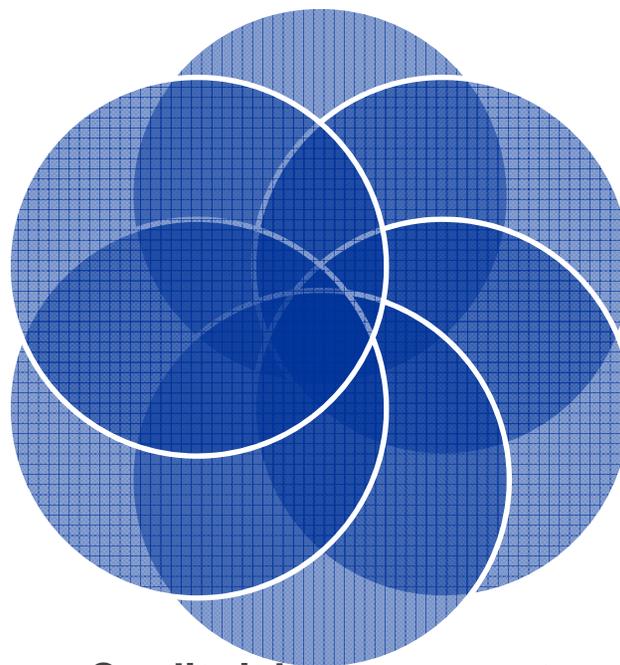
- Prior to purchases
- Ongoing monitoring
- Impairment tests

Asset allocation policies

- Diversification (market capitalisation or capital-key based) - Benchmarks

Limit system

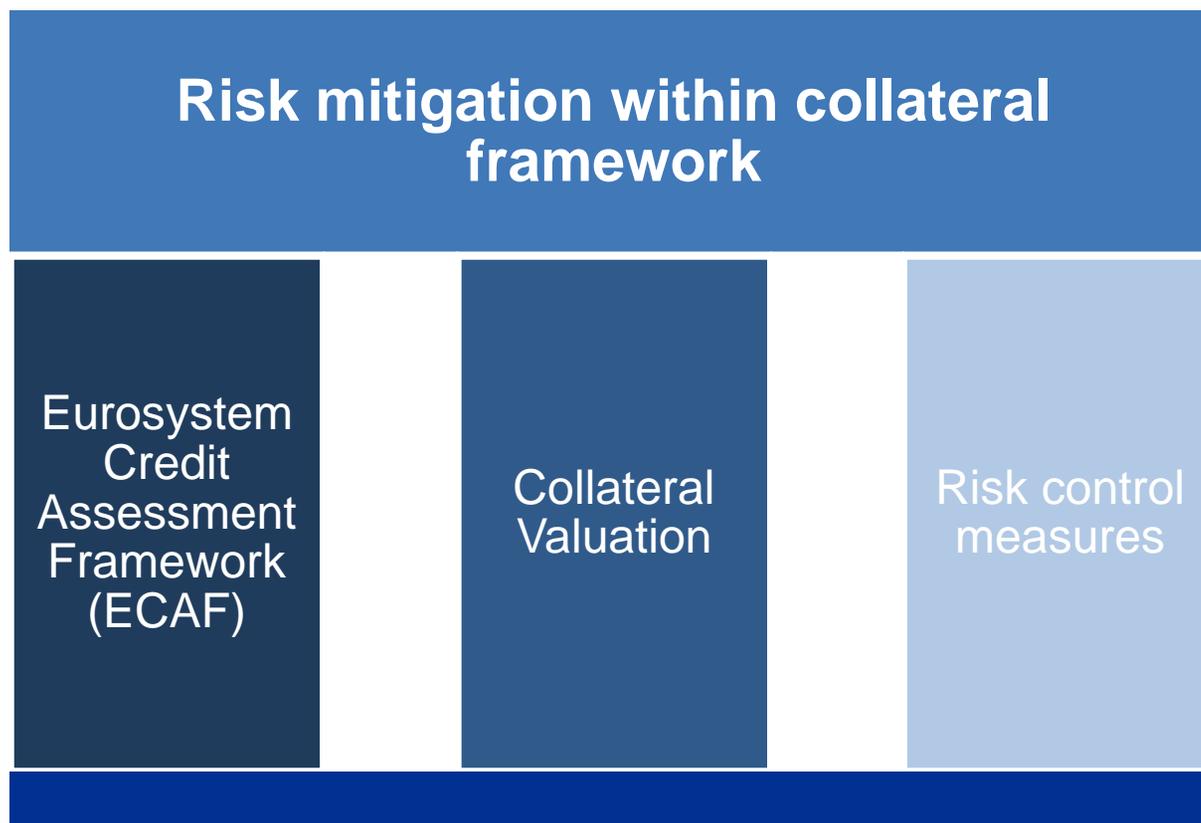
- Issue limits
- Issuer (group) limits
- *Ad-hoc* limits



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Three 'pillars' of the risk control framework



- Collateral must be of quality and quantity such that the Eurosystem claim is **recovered in full** with high probability in the event of a counterparty default

Eurosystem Credit Assessment Framework (ECAAF)

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ECAF principles and objectives

- **Consistency**
 - Wide range of equally ranked credit quality assessment systems need to be available throughout the euro area
- **Accuracy**
 - Credit assessment systems will have to estimate accurately the credit risk of issuers/debtors of collateral
- **Comparability**
 - The comparison and monitoring of the different systems that comprise the framework must be possible
- Two main technical ‘tools’ were defined to guarantee the **last two principles**
 - Minimum credit quality requirements
 - Performance monitoring framework

ECAF scope and elements

- Defines procedures, rules and techniques ensuring that the Eurosystem requirement of **high credit standards** for all eligible assets is met
- Four **credit assessment systems** (CASs) are considered in the ECAF general framework:
 - External Credit Assessment Institutions (ECAIs) [4]
 - National Central Banks' in-house credit assessment systems (ICASs) [8+1]
 - Internal Ratings-based (IRB) systems [40]
 - Third-party providers' rating tools (RTs) [1]

Minimum credit quality requirement

- Eurosystem maps rating grades of credit assessment systems onto a **harmonised credit assessment scale**
- Eurosystem minimum **credit quality requirement** is CQS3
 - One-year PD of 0.40% following Basel II default definition
 - Additional requirements for ABS
 - CQS2 required for RMBDs
- Assets in CQS1&2 benefit of **lower haircuts**

| Horizon | | Credit quality step | | |
|------------|------------------------|---------------------|------------|------------------------|
| | ECAI credit assessment | 1 | 2 | 3 |
| Long-term | DBRS | AAA/AAH/AA/AAL | AH/A/AL | BBBH/BBB/BBBL |
| | FitchRatings | AAA/AA+/AA/AA- | A+/A/A- | BBB+/BBB/BBB- |
| | Moody's | Aaa/Aa1/Aa2/Aa3 | A1/A2/A3 | Baa1/Baa2/Baa3 |
| | Standard & Poor's | AAA/AA+/AA/AA- | A+/A/A- | BBB+/BBB/BBB- |
| Short-term | DBRS | | R-1H, R-1M | R-1L, R-2H, R-2M, R2-L |
| | FitchRatings | | F1+, F1 | F2 |
| | Moody's | | P-1 | P-2 |
| | Standard & Poor's | | A-1+, A-1 | A-2 |

Source: ECB

ECAF-acceptance

- Extensive **due diligence** begins with regulatory, operational and info requirements for **ECAF-acceptance**
- The **requirements** for external rating providers aim at ascertaining
 - Sufficient **coverage**
 - market **testing**
 - adequate **performance**

Performance monitoring framework

- **Monitoring** and **regular assessment** of performance of credit assessment system with ‘traffic light approach’
 - Quantitative statistical component
 - **back-testing** procedure on **static pools** to check **appropriateness of mapping**
 - Qualitative component
 - **Processes** and **methodologies** taking also into account **supervisory information**
- Set of ‘tools’ to **prevent mechanistic reliance** on any system and to address any issue
 - Remap a system’s rating grades to the harmonised rating scale
 - Define eligibility requirements to credit assessment systems
 - Discretionary measures
 - Exclude or temporarily suspend a system

Reducing reliance on ECAI

- ECAI ratings are used significantly but work is ongoing to improve **due diligence** conducted on ECAs' ratings, processes and methodologies
 - Sovereign ratings and structured finance in particular
- During the crisis the framework uncovered areas of risk and triggered **policy actions**
 - Structured finance ratings **remapped**
 - Collateral eligibility criteria changes to deal with **perceived failings** in ECAI methodologies
 - Regular surveillance reports required for ABS eligibility
 - Tightening of close links provisions in ABS transactions and LLD initiative
 - Waiver or credit quality requirement for EU/IMF programme countries

Reducing reliance on ECAI

Overview of ICASs in the Eurosystem

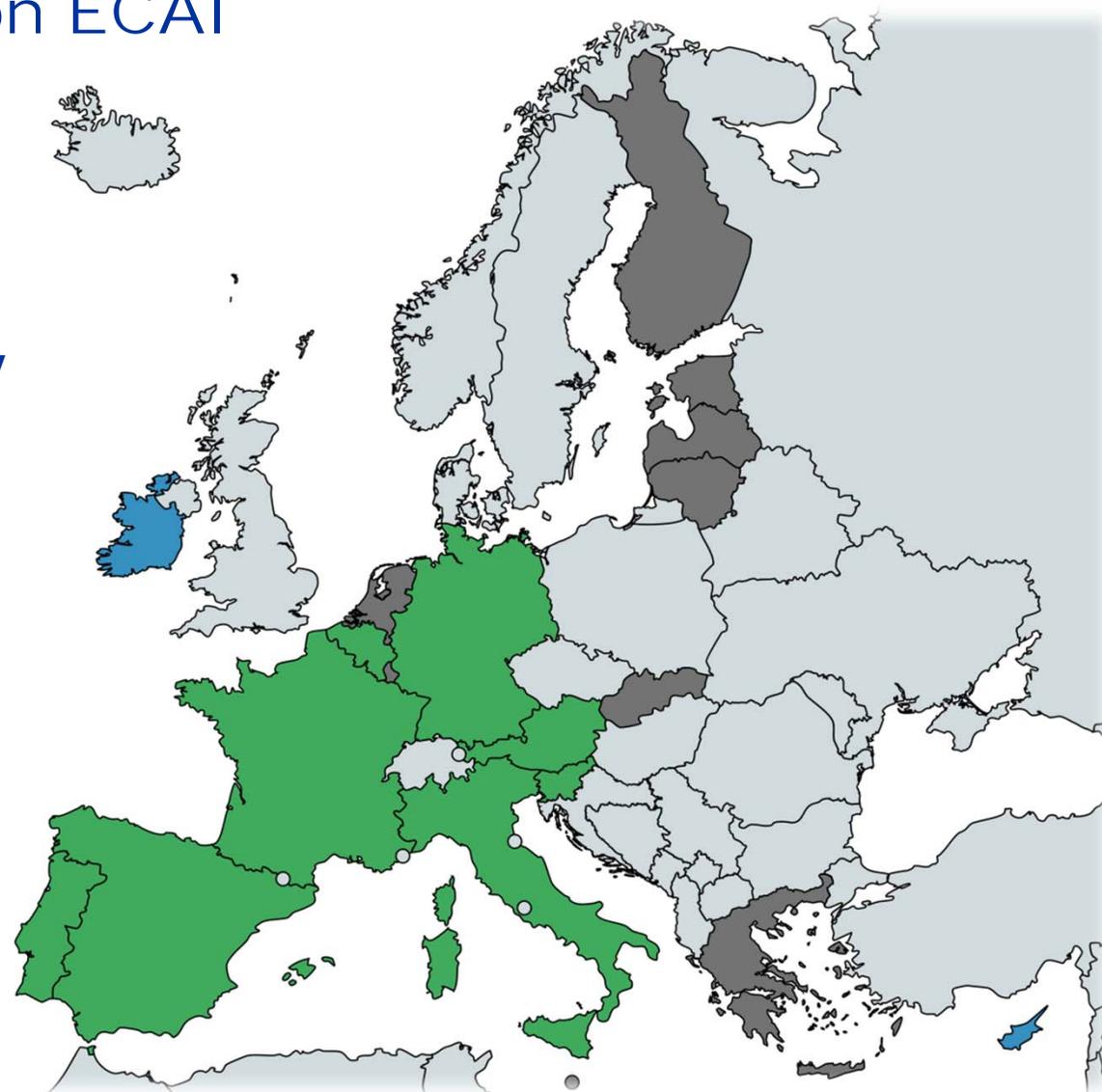
Scope non-financial corporations (NFCs)

NCB-specific PD model only
or **ICAS for MBPNs**

For the yearly ECAF
performance monitoring

ECB's D-RM assesses the system performance, methodological changes and validation performed by the NCBs for their ICASs

About **1300 FTEs** dedicated to ICASs at the NCB level



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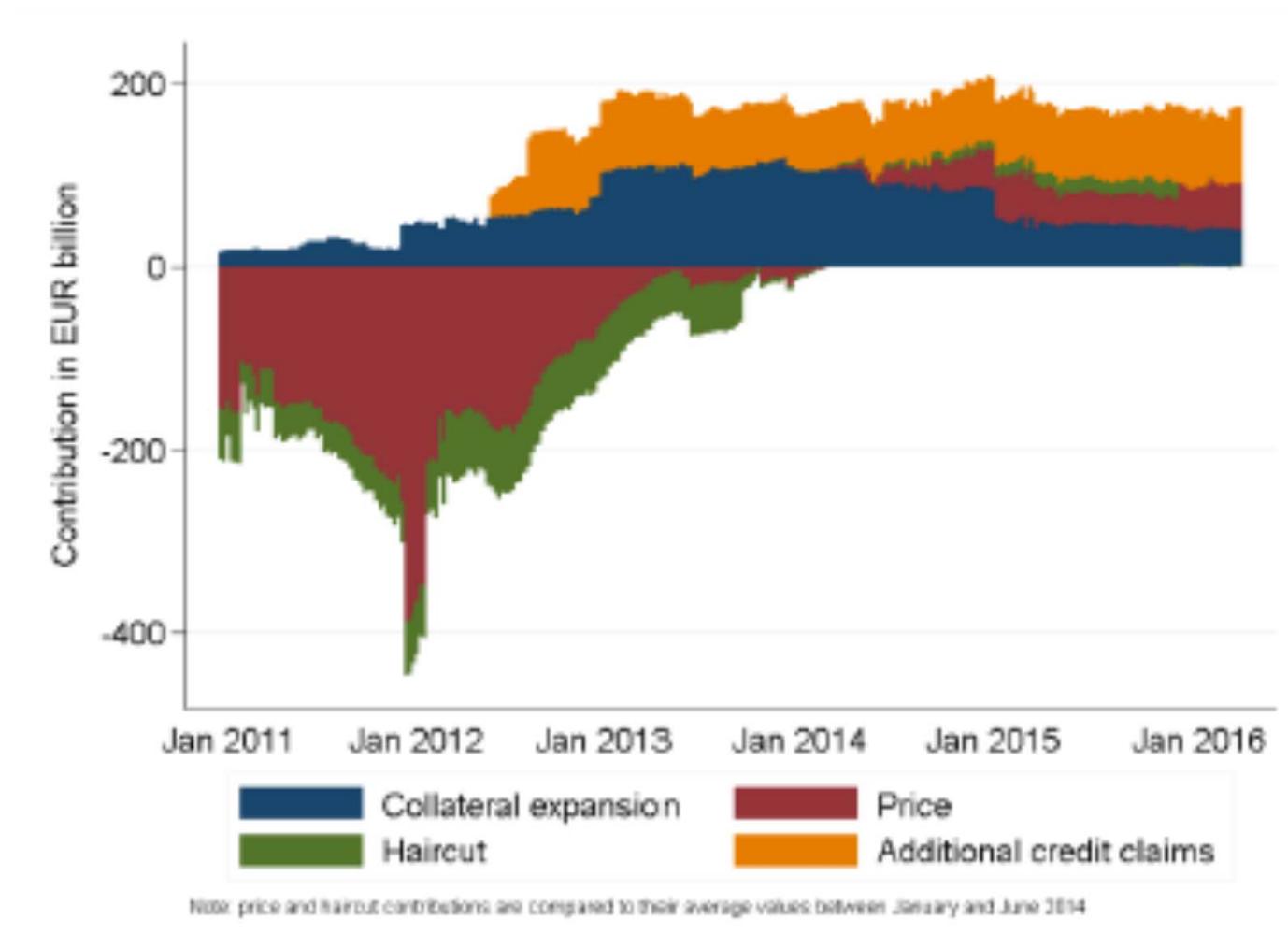
Eurosystem valuation principles

- Daily **marking-to-market** of all eligible marketable assets
- **Minimise possible interferences** with the market price formation process
 - Most representative market prices on previous business day
 - Theoretical valuation for assets without market price
- **Theoretical valuation**
 - Crucial when markets become dysfunctional because of the ‘evaporation’ of market liquidity
 - Eurosystem currently improving these capabilities in integrated valuation framework combining mark-to-market and mark-to-model approaches

5. Reverse transactions risk framework (cont.)

ECB-PUBLIC

Shocks on outstanding amount of collateral



Source: BdF

Valuation by asset type

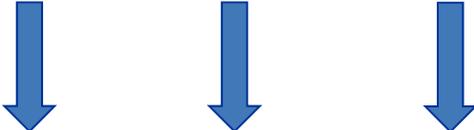
- Marketable assets
 - Implementation via **Common Eurosystem Pricing Hub** (CEPH)
 - Banque de France valuing ABS
 - Deutsche Bundesbank valuing all other assets
- Non-marketable assets
 - NCB assigns value based on theoretical price or **outstanding amount** (default approach)

Higher haircuts for valuation based on outstanding amount to take into account present value adjustment

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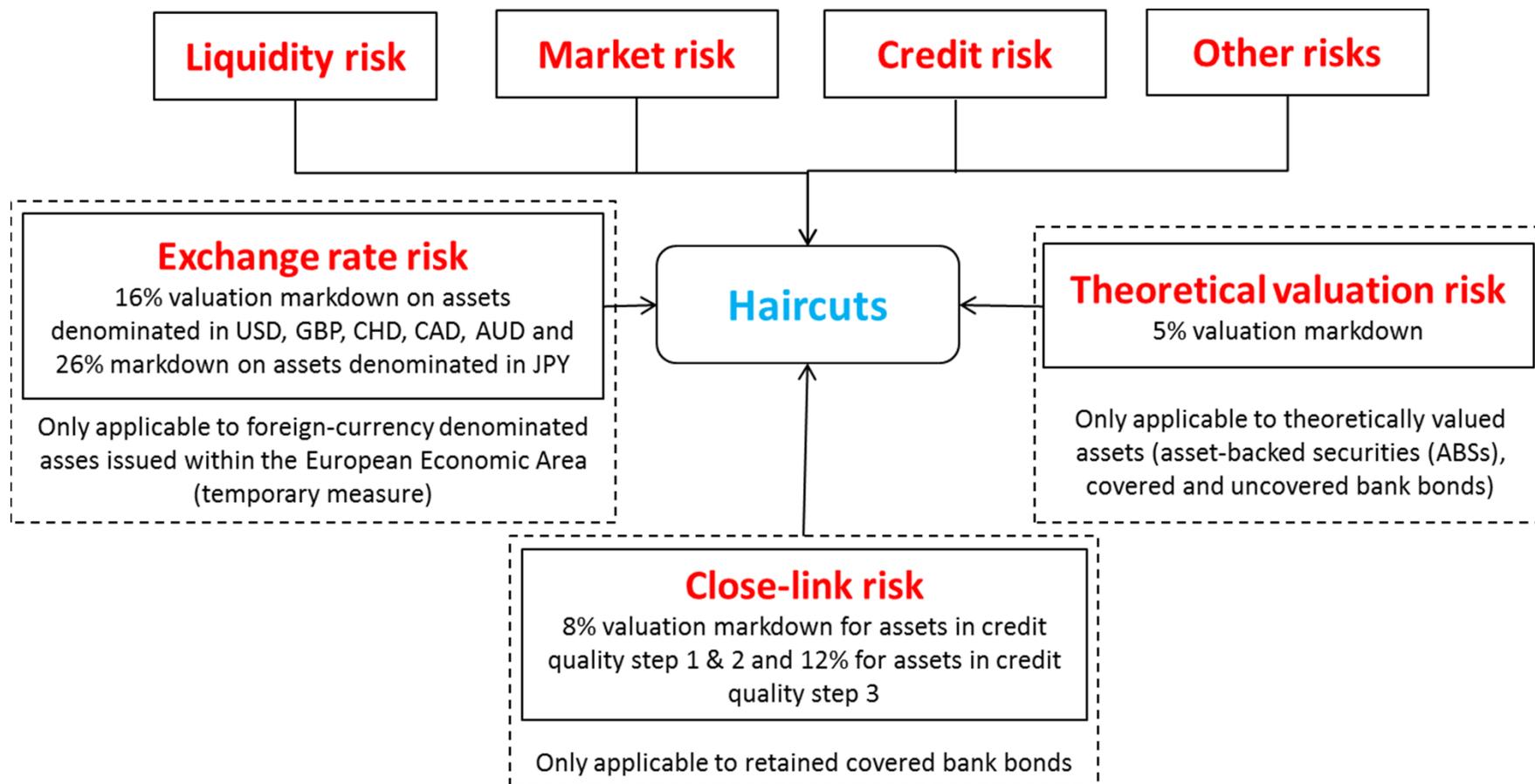
Haircuts

- Haircuts are **not differentiated by counterparty** to maintain a **level playing field** among market participants
- Haircuts on **an asset-by-asset basis** not adjusting to the diversification or concentration of the collateral pool
- Possibility to apply additional **discretionary haircuts**

- Pursue *ex ante* **risk equivalence** across all financial instruments
 - ‘Calibration’ using an ES at a 99% CL across all assets classes and ‘through the cycle’

Desirable features

- Need to cover various **sources of risk** between default of counterparty and liquidation inter alia:
 - Credit risk
 - Market risk
- **Rule-based** and **simple** approach
 - Haircuts set by asset categories, credit quality and residual maturity
- **Liquidation time**
 - Assumed to be the shortest possible but without impact on price
 - Based on observed market liquidity and historical average collateral pledging behavior

Risk components and risk control measures



Elements of the RCF for credit operations

Counterparties need to comply with regulatory ratios

- Broad set of counterparties
- Supervised under harmonised EU/EEA standard
- Discretionary powers to suspend counterparties on grounds of prudence
- Separation of supervision of monetary policy, but still allows reaping some benefits on need-to-know basis

Collateral eligibility

- Wide range of eligible collateral
- Requirements mitigate credit, legal and operational risks, and result from cost-benefit analysis (risk equivalence, risk protection, collateral availability)
- Focus on simple and transparent debt instruments
- No close-links (collateral / counterparty) with few justified exceptions (secured and guaranteed collateral)
- Minimum credit quality based on ECAF (CQS3 as a rule)
- Discretionary exclusion (on grounds of prudence)

Limits

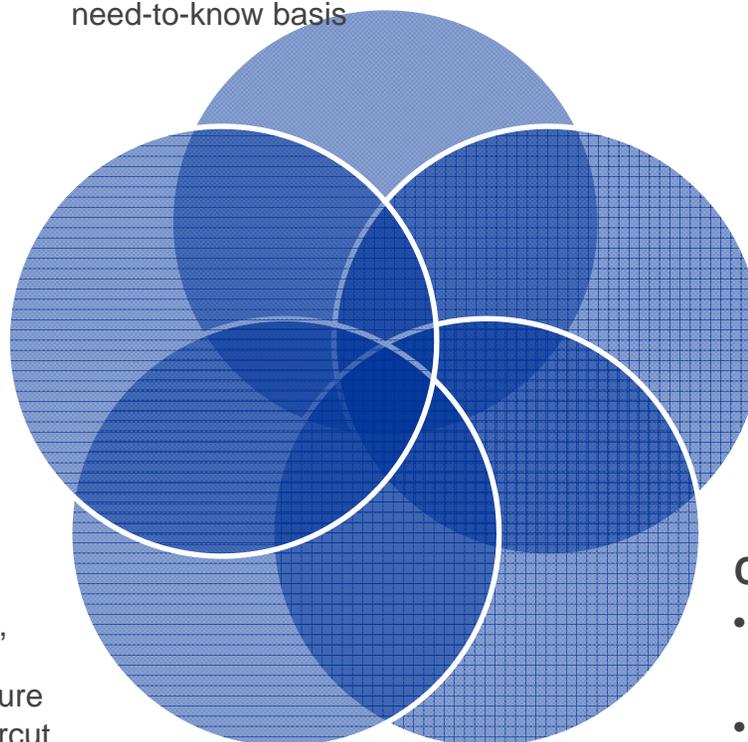
- Concentration limits (bank bonds)

Collateral valuation haircuts

- for liquidation, valuation, market and credit risks
- based on ES99% measure
- Assets grouped into haircut categories

Collateral valuation

- Mark-to-market (or model) valuation for marketable assets
- Nominal valuation for non-marketable



Other risk controls

- Additional **markdowns and limit**
 - Valuation model risk
 - FX risk
 - Close links in retained covered bonds
 - Concentration limit
 - Unsecured debt instruments issued by credit institutions and their closely linked entities limited to 5 % of total value after haircut of collateral pool
- Current **haircuts range** between 0.5% (most liquid short-term marketable asset) and 63% (most risky eligible non-marketable asset)

Haircuts for Additional Credit Claims (ACCs)

- Individual and pools of additional performing credit claims
 - Include retail mortgage loans and loans to SMEs
- Up to a **maximum PD** of 1.5% (or CQS 5)
- Framework for **minimum haircuts** to ensure *ex ante* **risk equivalence** with assets eligible under the permanent framework
 - **Diversification effects** of granular pools taken into consideration
 - **Conservative estimates** of correlation, recovery rates and default probability (higher haircuts)
- Eligible under the **non-loss sharing** regime

Thank you for your attention!



Useful references and links

-  *Risk Management for Central Banks and Other Public Investors*, by U. Bindseil, F. González and E. Tabakis (Ed.), CUP: Cambridge, 2009

-  *The Essentials of Risk Management*, by M. Crouhy, D. Galai and R. Mark, Mc-Graw-Hill: New York, 2014, 2nd Ed.

-  *Risk Management and Financial Institutions*, by J. Hull, Wiley: New York, 2018, 5th Ed.

-  *General Documentation on the implementation of the Eurosystem monetary policy framework (Guideline (EU) 2018/570 of the ECB of 7 February 2018 amending Guideline (EU) 2015/510 on the implementation of the Eurosystem monetary policy framework (ECB/2014/60), OJ L 95, 13.4.2018, p. 23):*
https://www.ecb.europa.eu/ecb/legal/pdf/celex_32018o0003_en_txt.pdf

-  Risk mitigation in monetary policy operations:
<http://www.ecb.europa.eu/mopo/assets/risk/ecaf/html/index.en.html>

-  “The financial risk management of the Eurosystem’s monetary policy operations” (brochure):
http://www.ecb.europa.eu/pub/pdf/other/financial_risk_management_of_eurosystem_monetary_policy_operations_201507.en.pdf