



EUROPEAN CENTRAL BANK

EUROSYSTEM

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# Mitigating risks in the Eurosystem's monetary policy operations

ECB Central Banking Seminar  
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# 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

# Outline

**1** Introductory remarks

**2** Overview of risks and operations

**3** Risk reporting

**4** Outright purchases risk mitigation

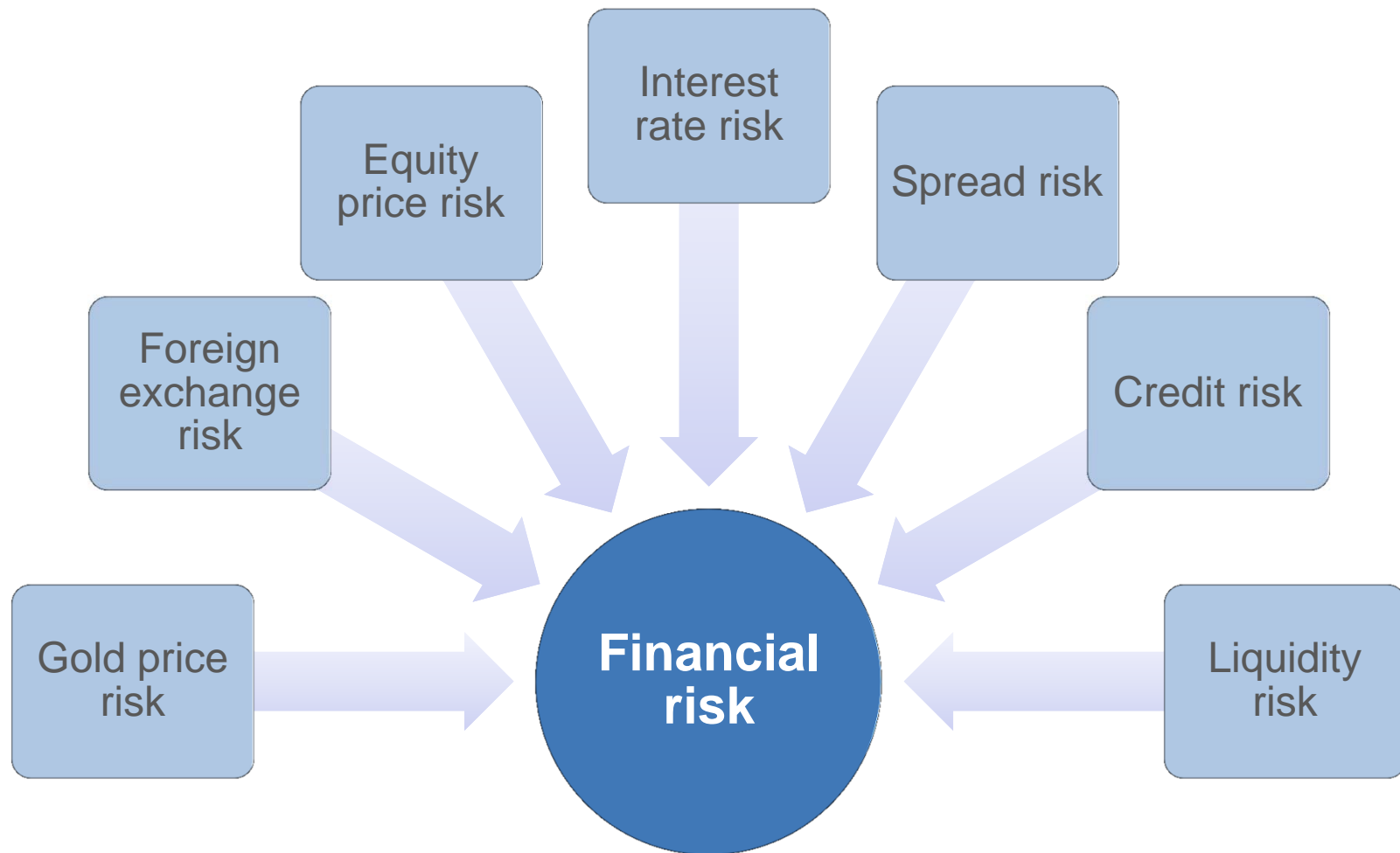
**5** Reverse transactions collateral risk framework

**i** Eurosystem Credit Assessment Framework (ECAAF)

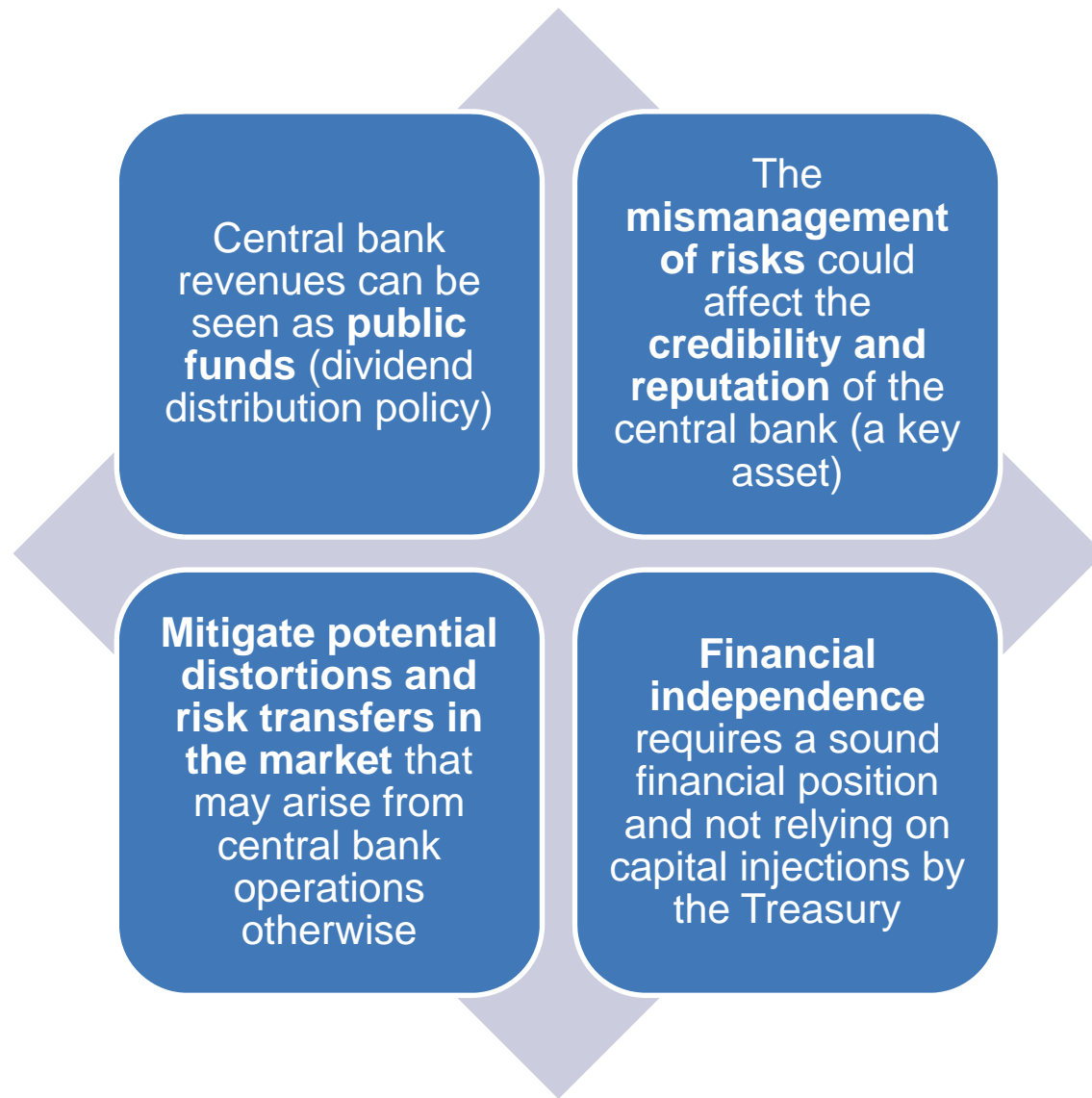
**ii** Valuation

**iii** Haircuts

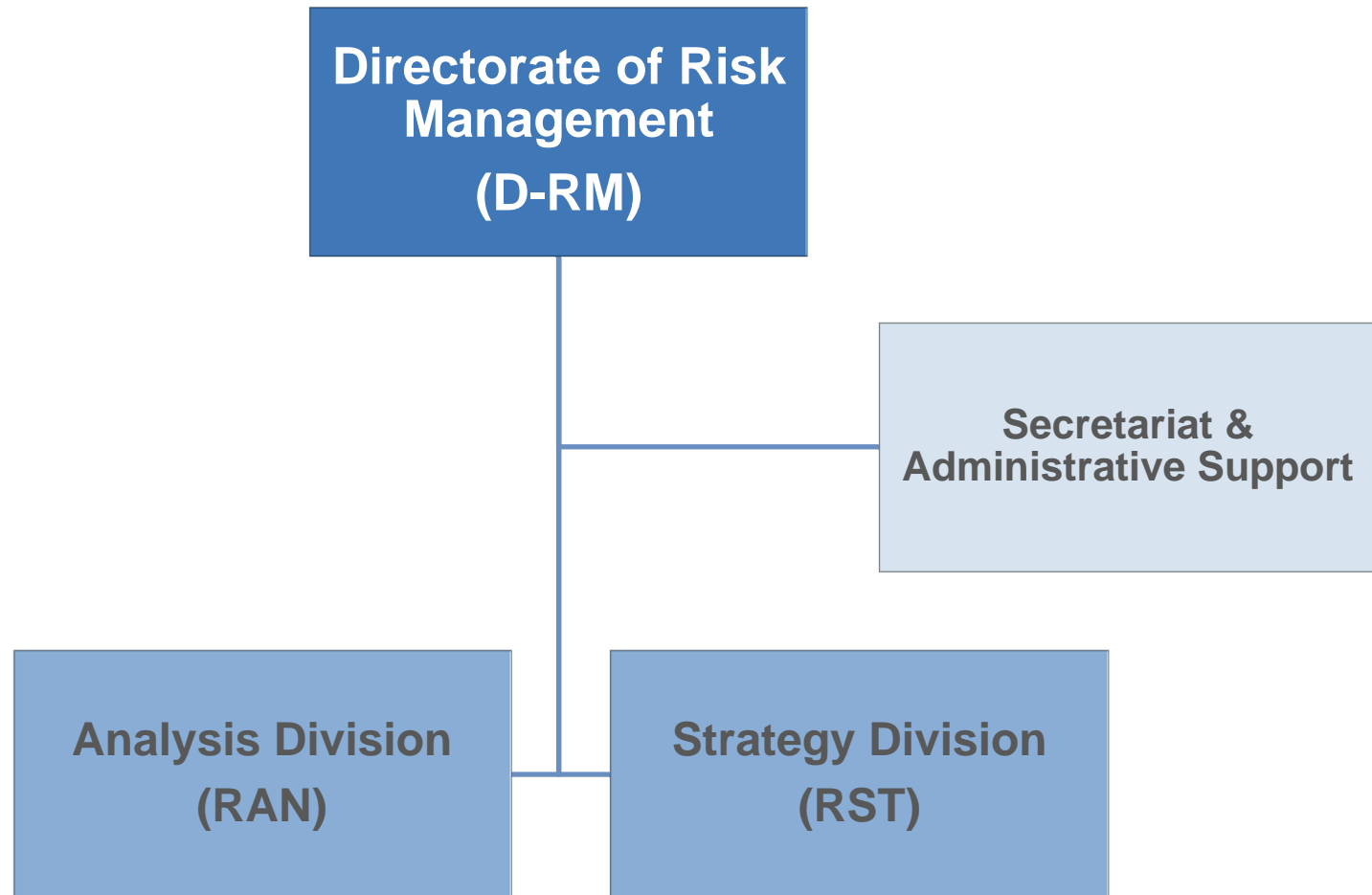
*What* are the types of financial risks and *where* do they originate?



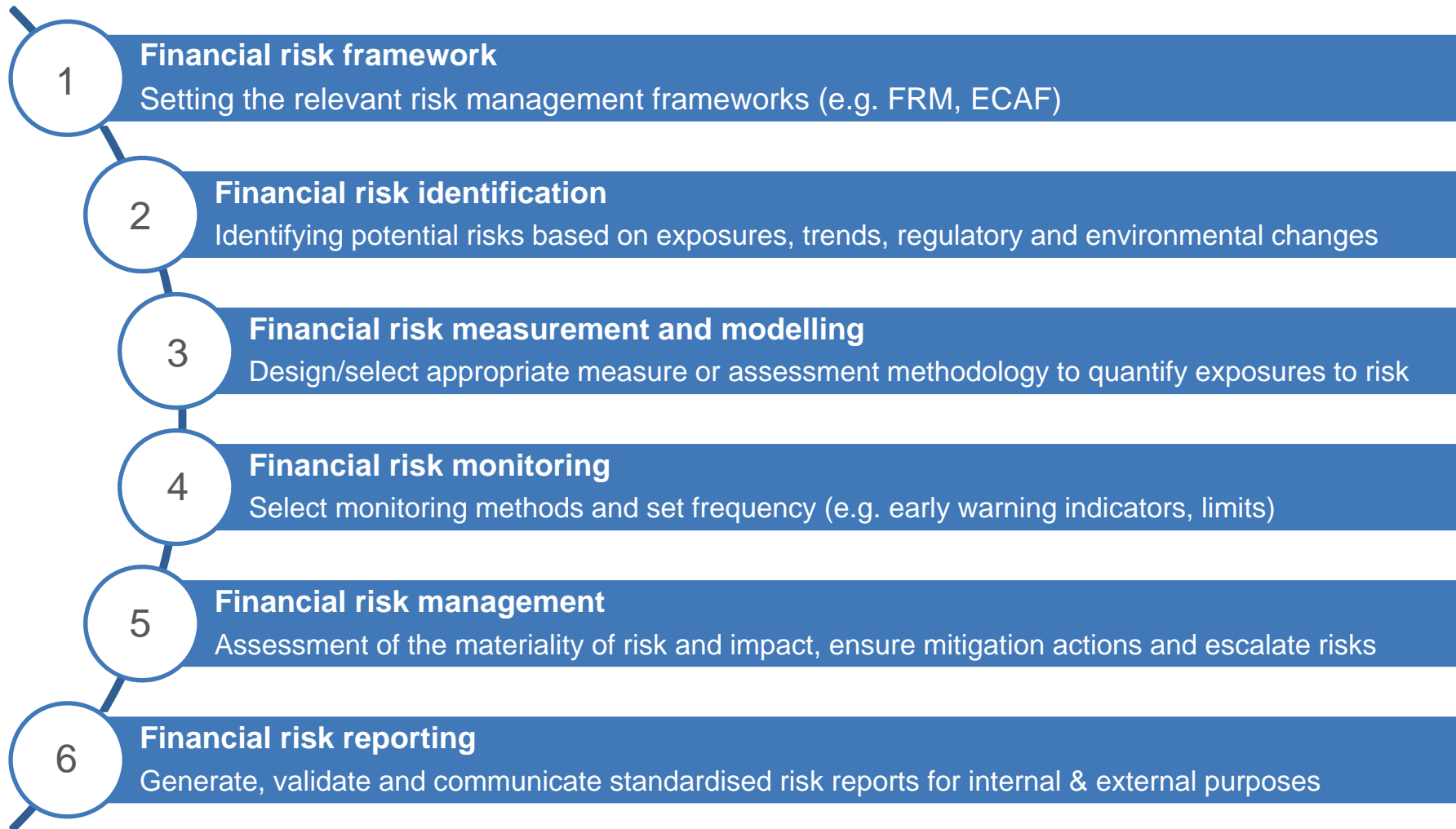
*Why* is important the management of financial risks?



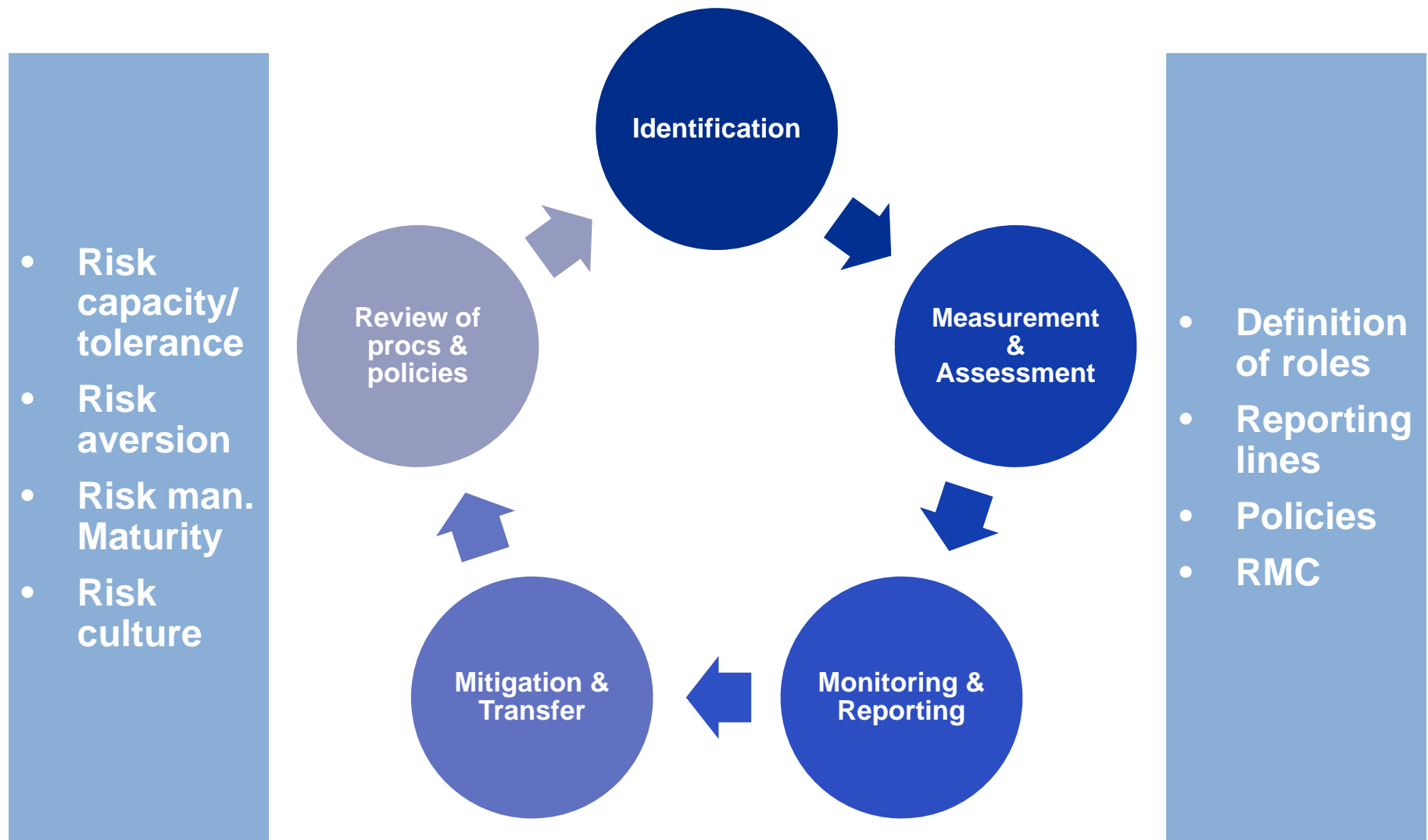
*Who* is responsible for the management of financial risks (at the ECB level)?



*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

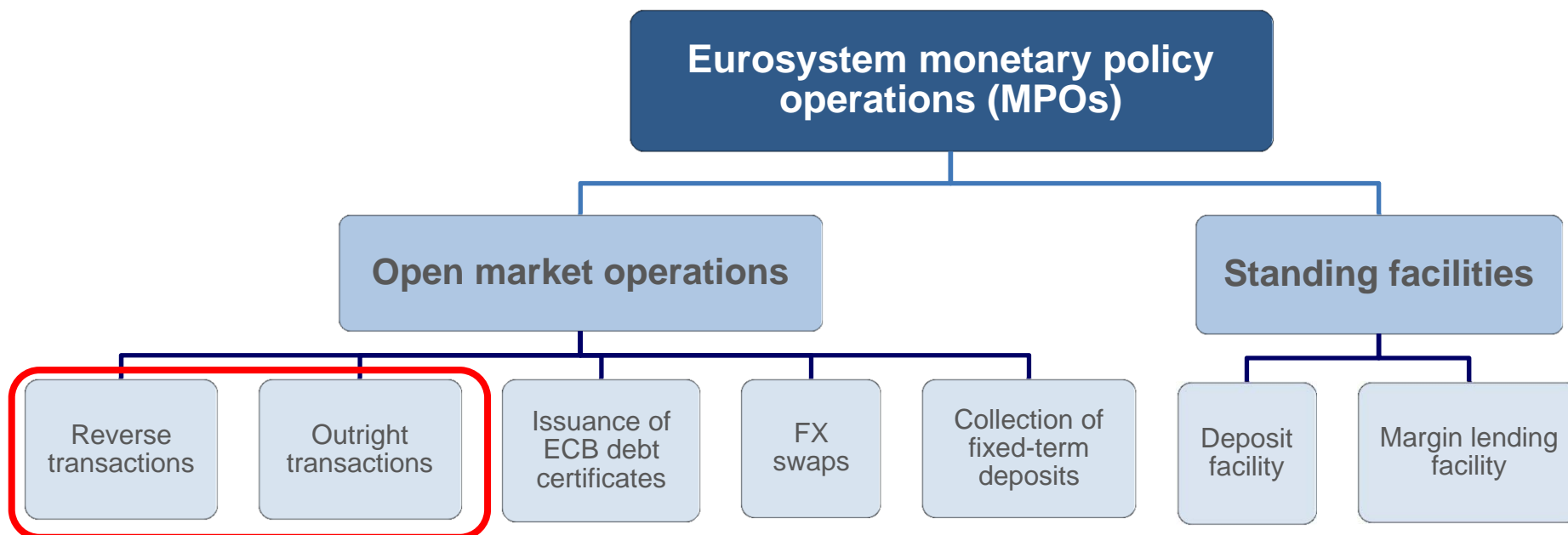
- The **financial crisis** has led to CBs **expanding MPOs** and introducing a number of **non-standards measures**
- As a consequence, the **risk has grown** on CB's balance sheet and an increased demand for analysis of the **risk implications** of policy decisions and their consistency with the risk 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'

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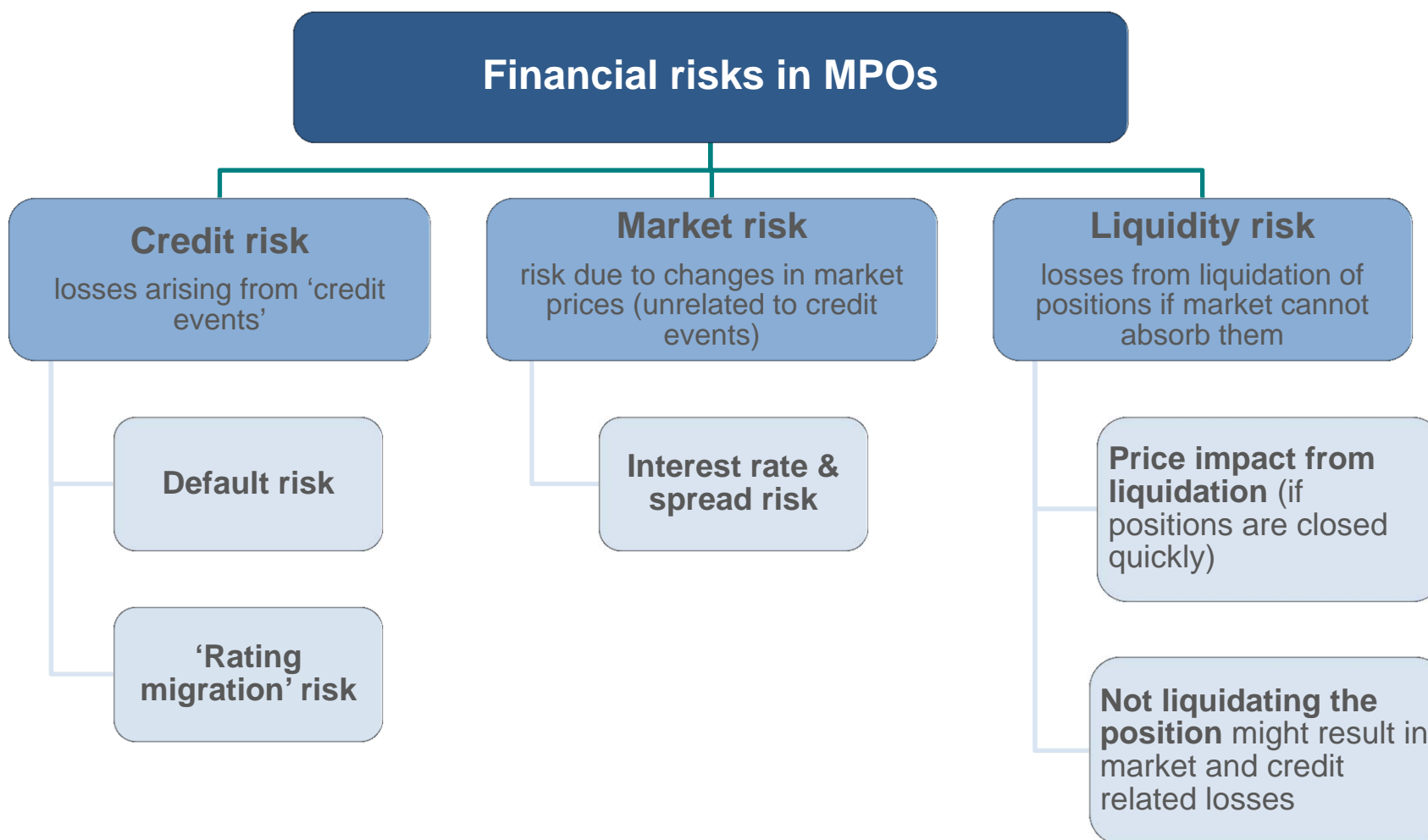
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## 2. Overview of risks and operations

### Typology of monetary policy operations



### Typology of financial risks



### Purchase programmes/outright purchases

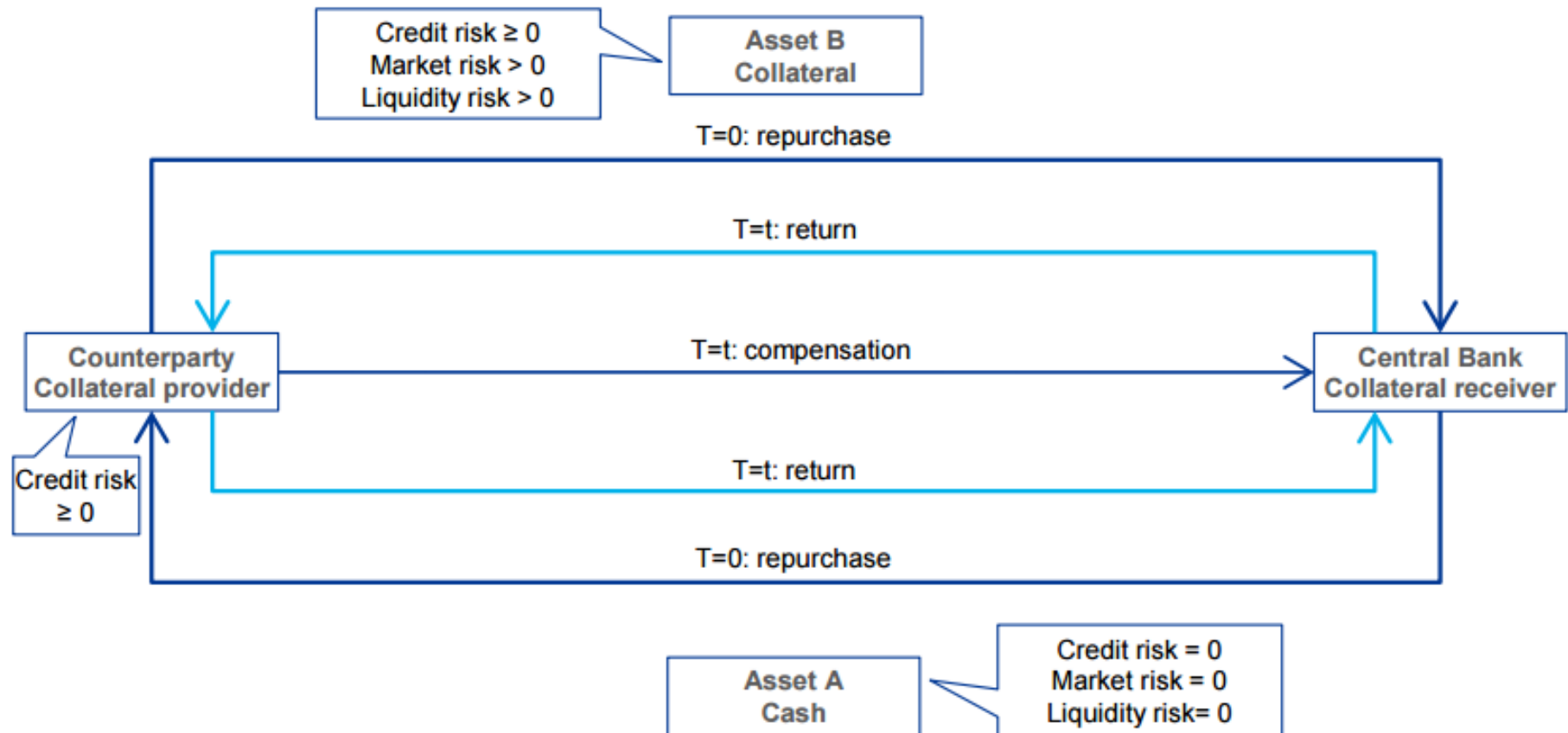
- **Outright transactions** are operations where the Eurosystem buys or sells eligible assets outright in the market
- The Eurosystem is **directly exposed** to credit, market and liquidity risks
- For each **purchase programme**, a risk control and governance framework is in place determining the asset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

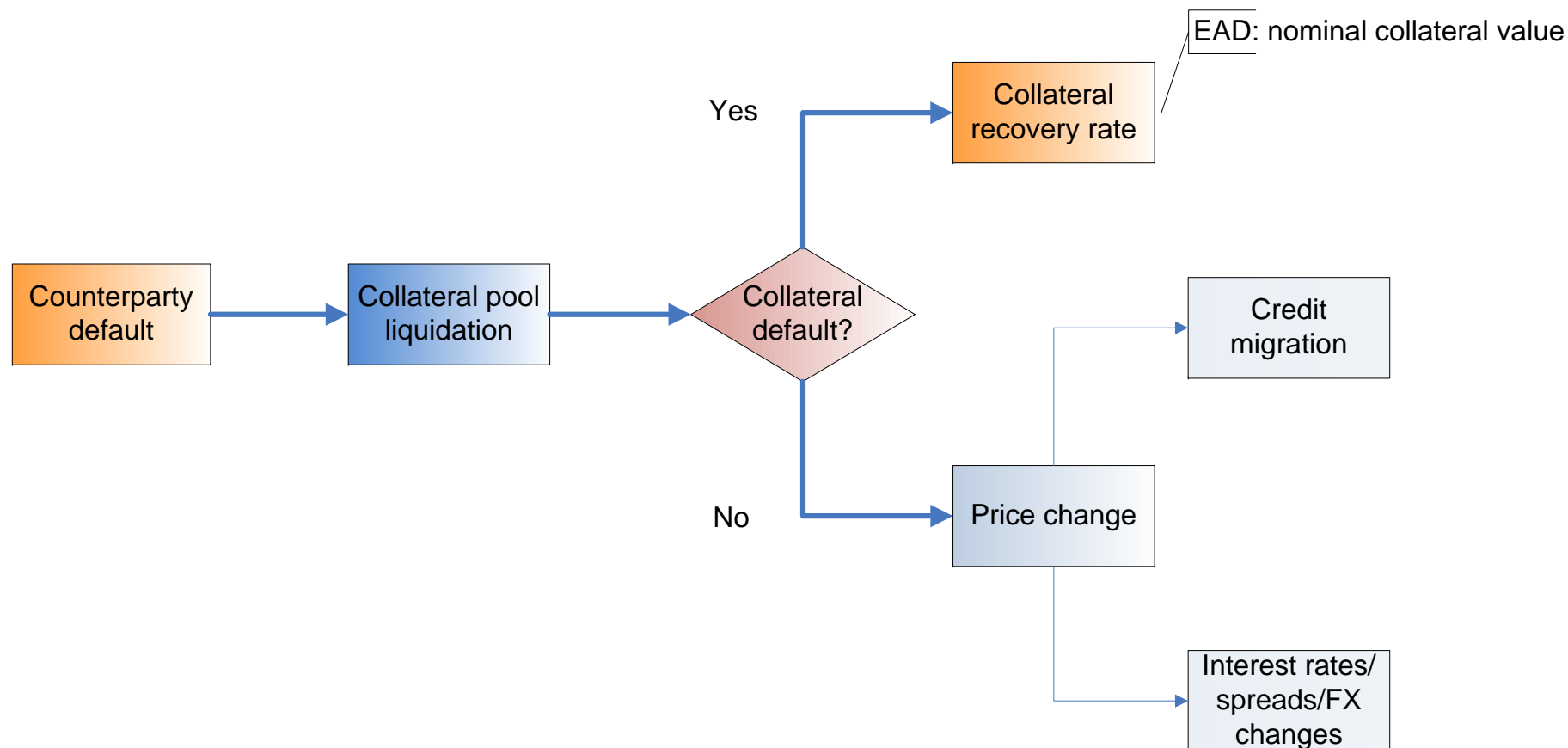


Source: ECB

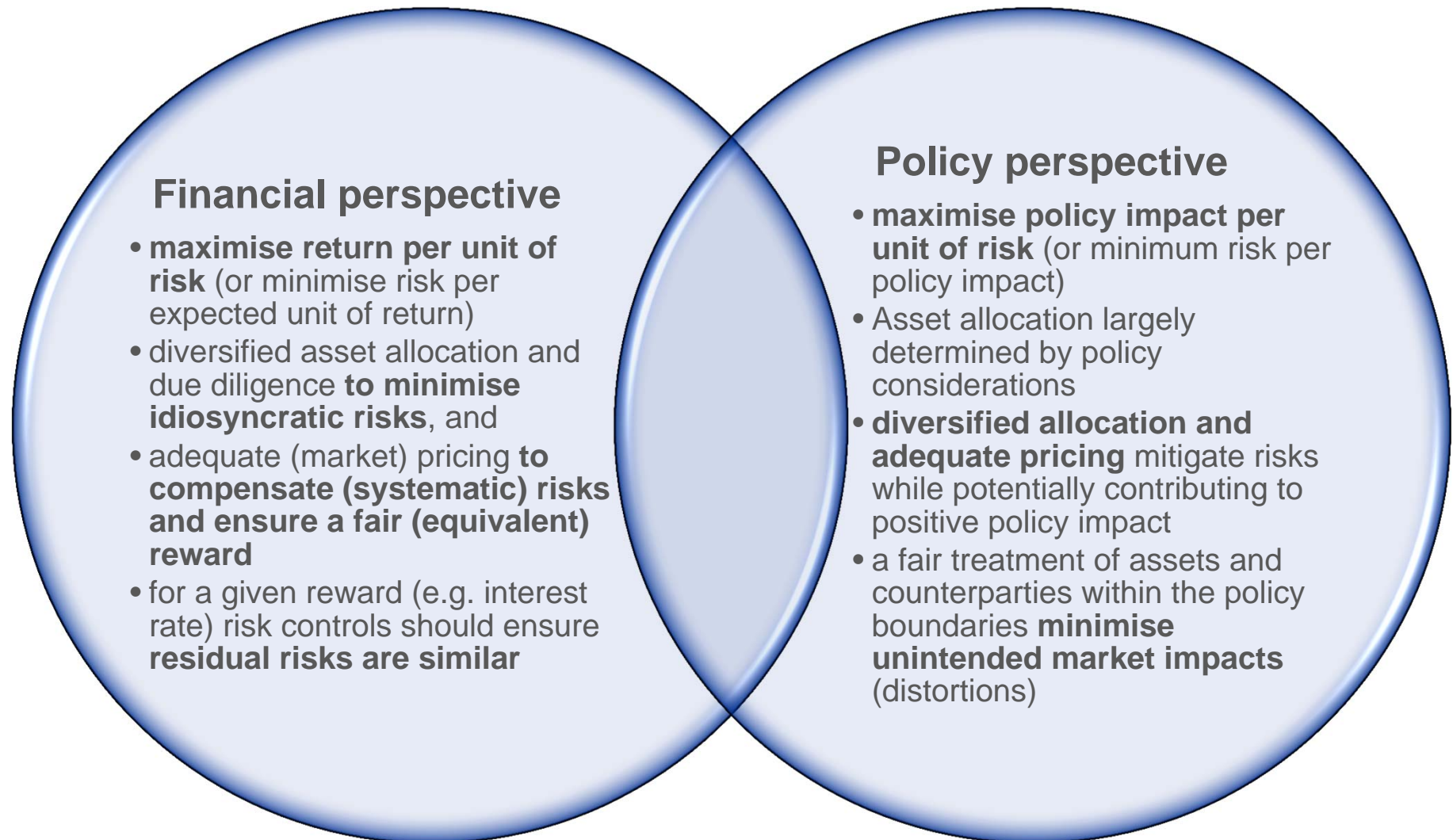


## 2. Overview of risks and operations (cont.)

### Sequence of events in case of a counterparty default



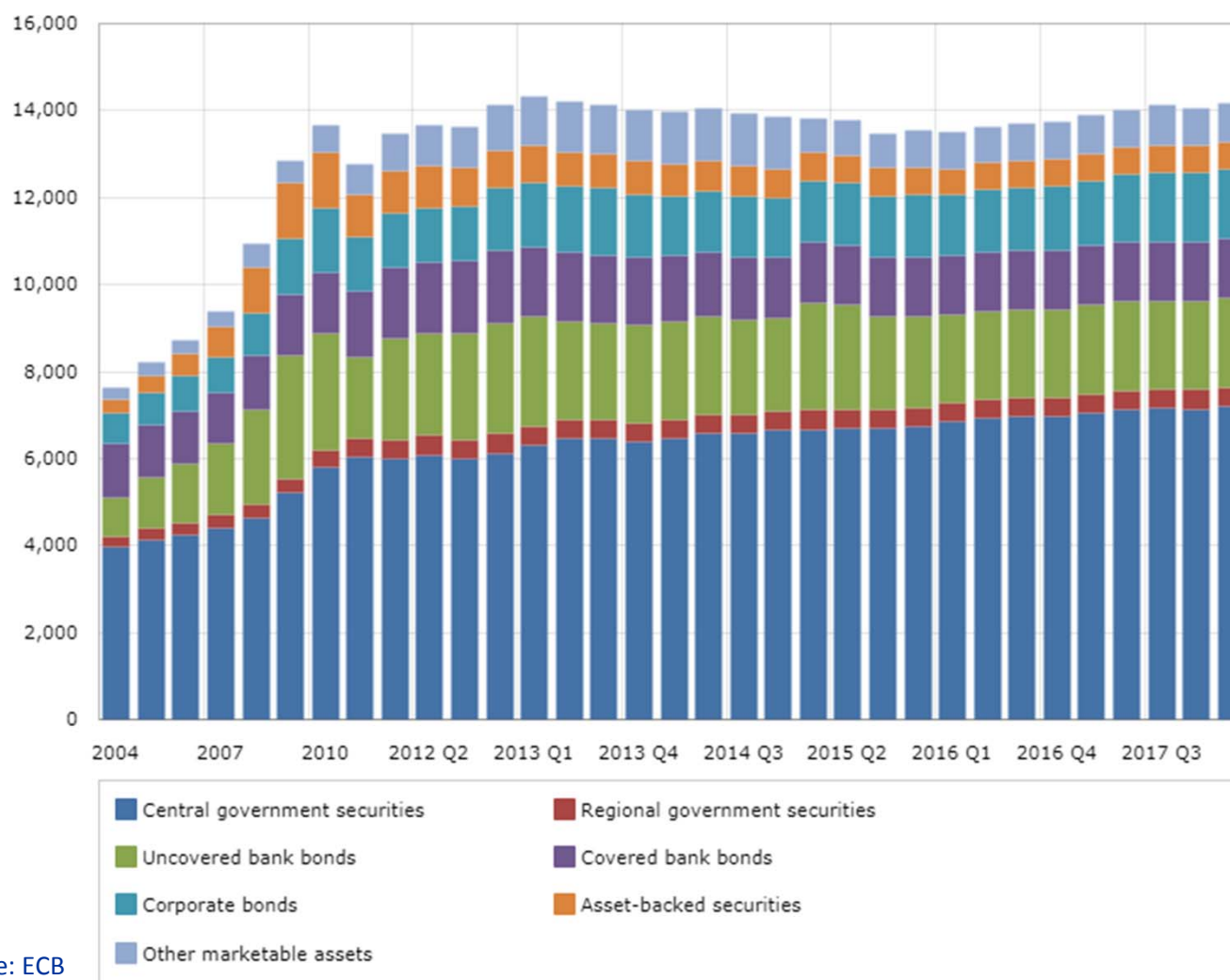
### Risk efficiency, risk equivalence and policy-making



## 2. Overview of risks and operations (cont.)

ECB-PUBLIC

### Marketable assets eligible as collateral

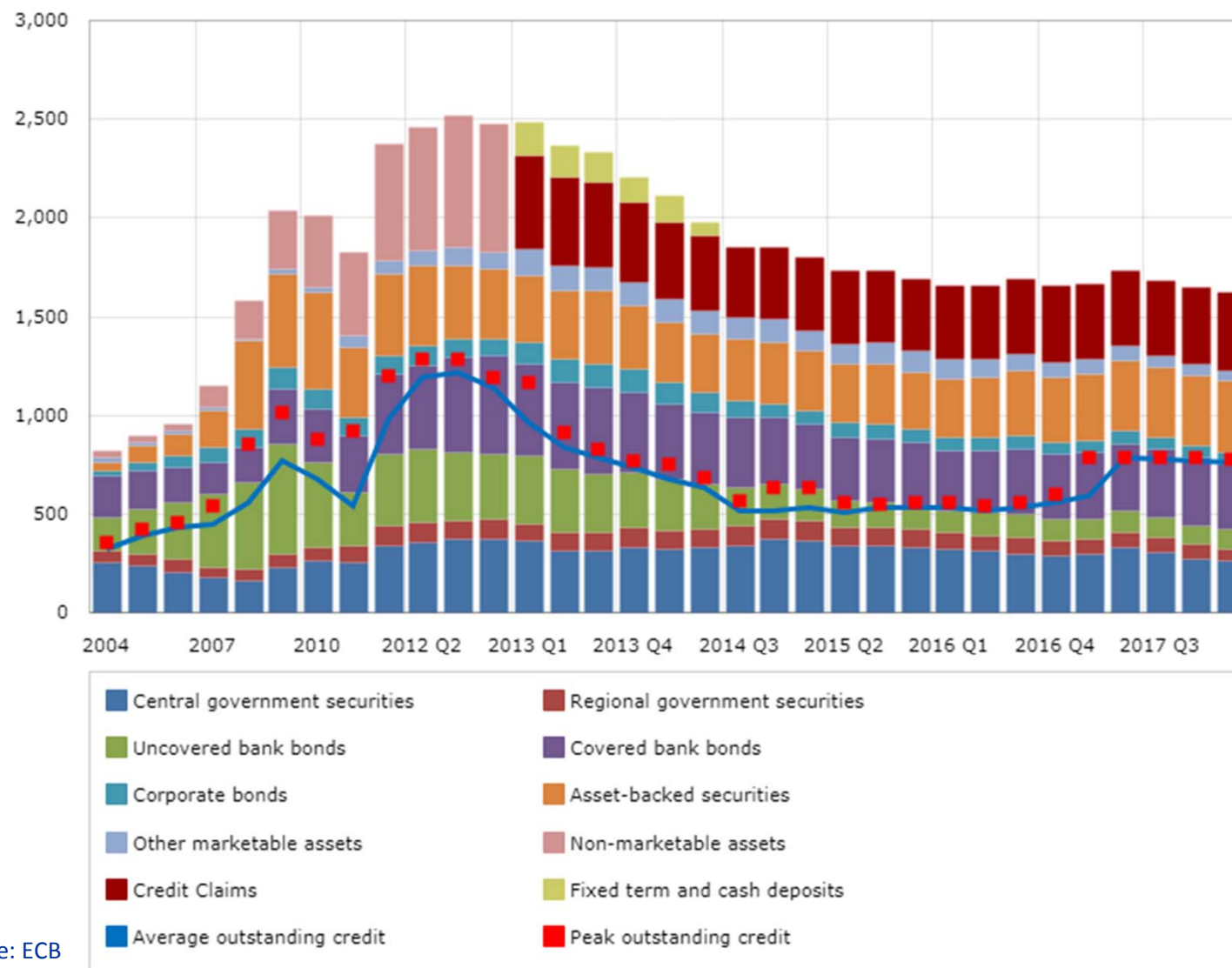


Source: ECB

## 2. Overview of risks and operations (cont.)

ECB-PUBLIC

### Use of collateral by AT and outstanding credit



Source: ECB

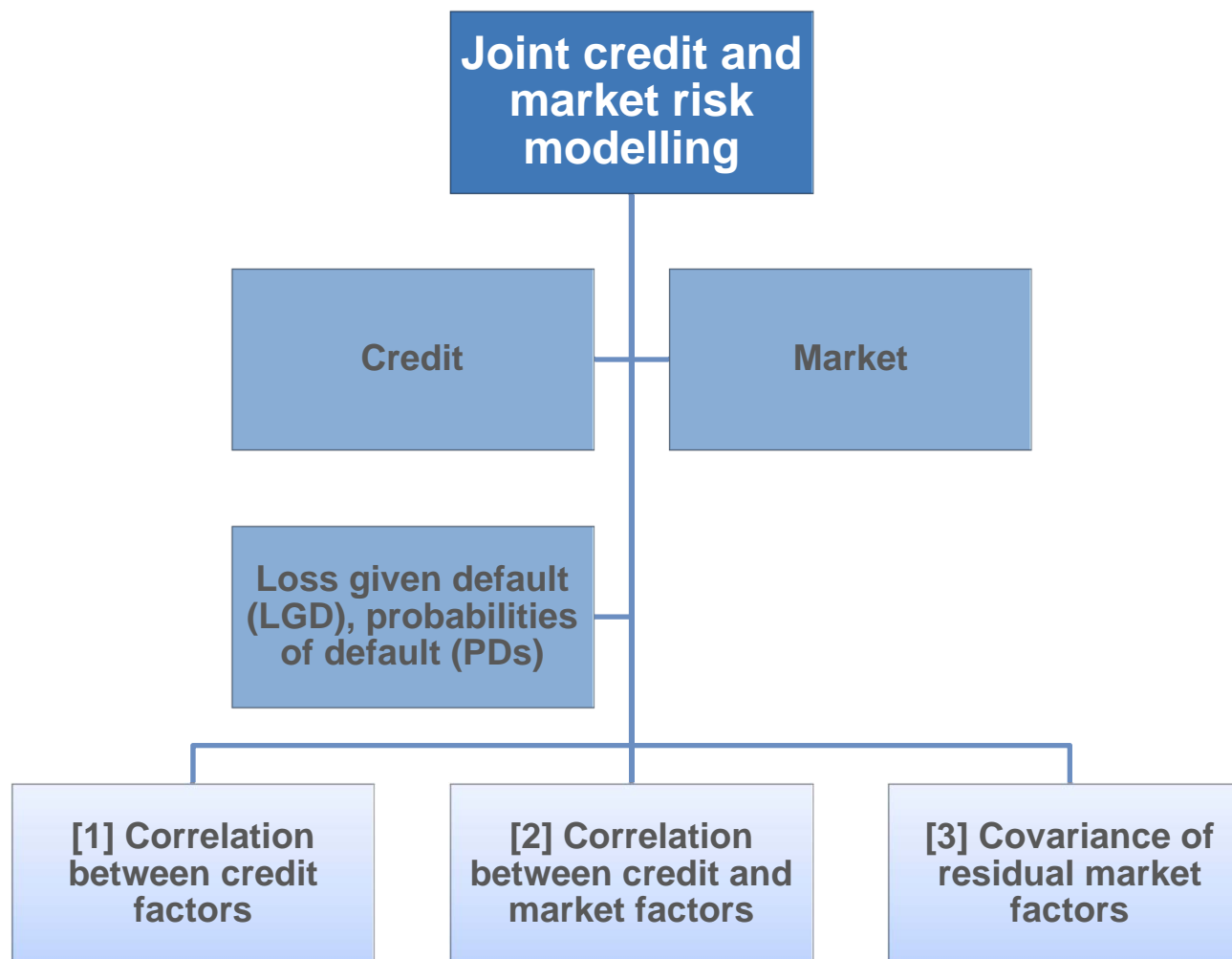
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### Overview of risk quantification approach

- **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

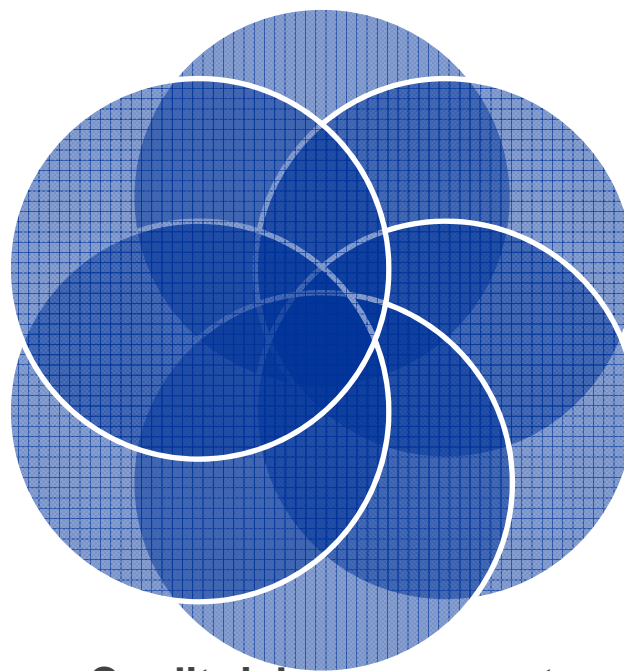
- Prior to purchases
- Ongoing monitoring
- Impairment tests

#### Asset allocation policies

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

#### Limit system

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

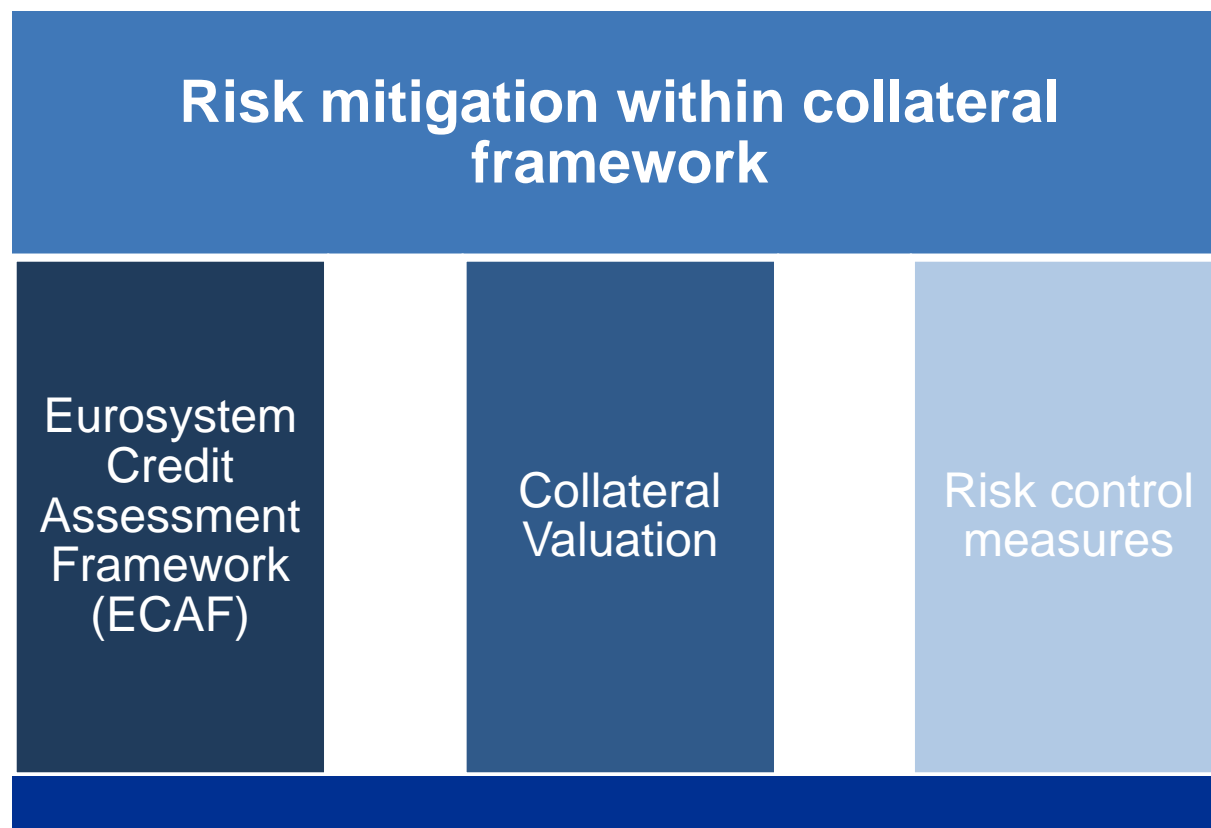


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### Three 'pillars' of the risk control framework



- 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

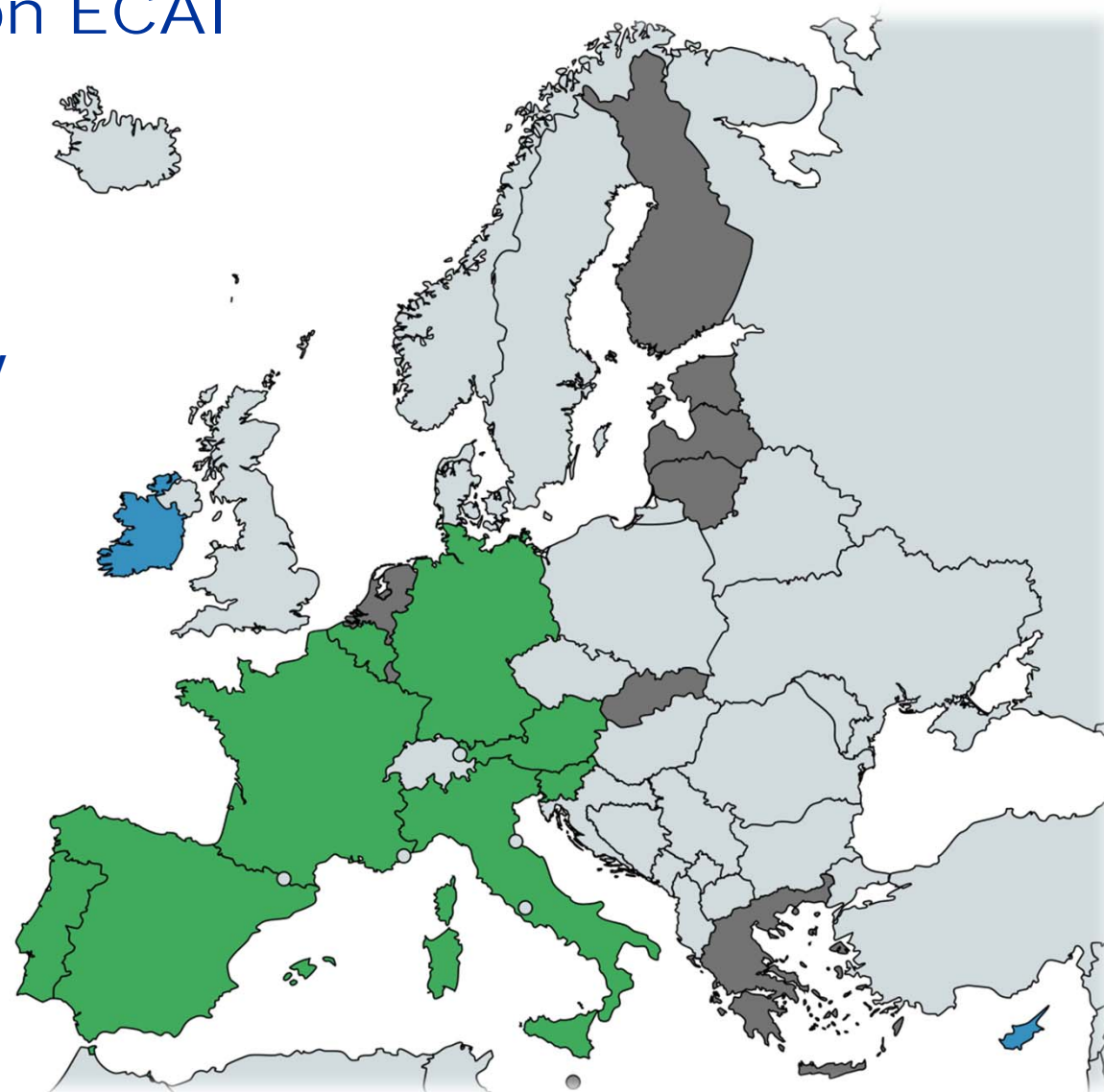
**Scope** non-financial corporations (NFCs)

**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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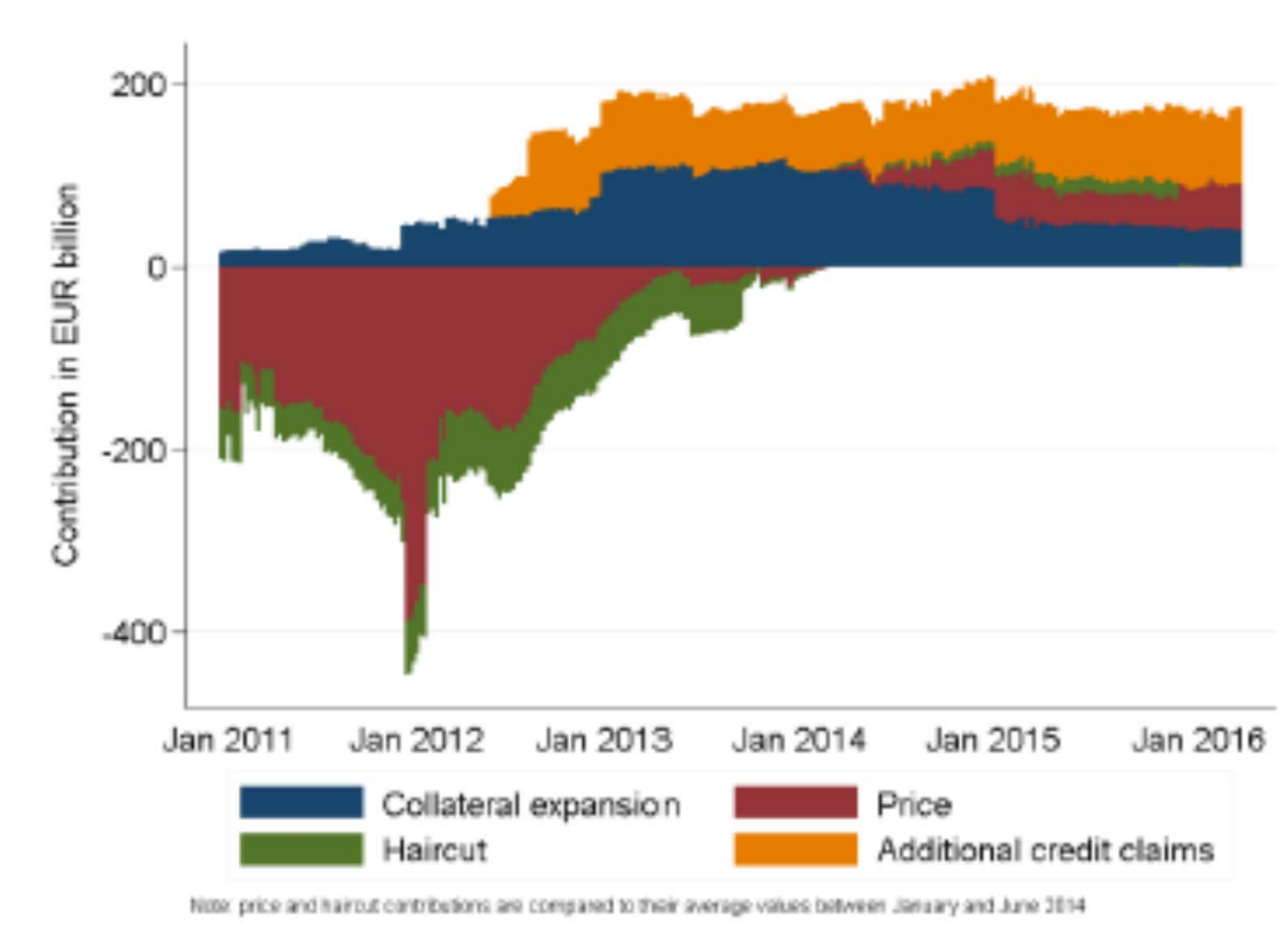
### Eurosystem valuation principles

- 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

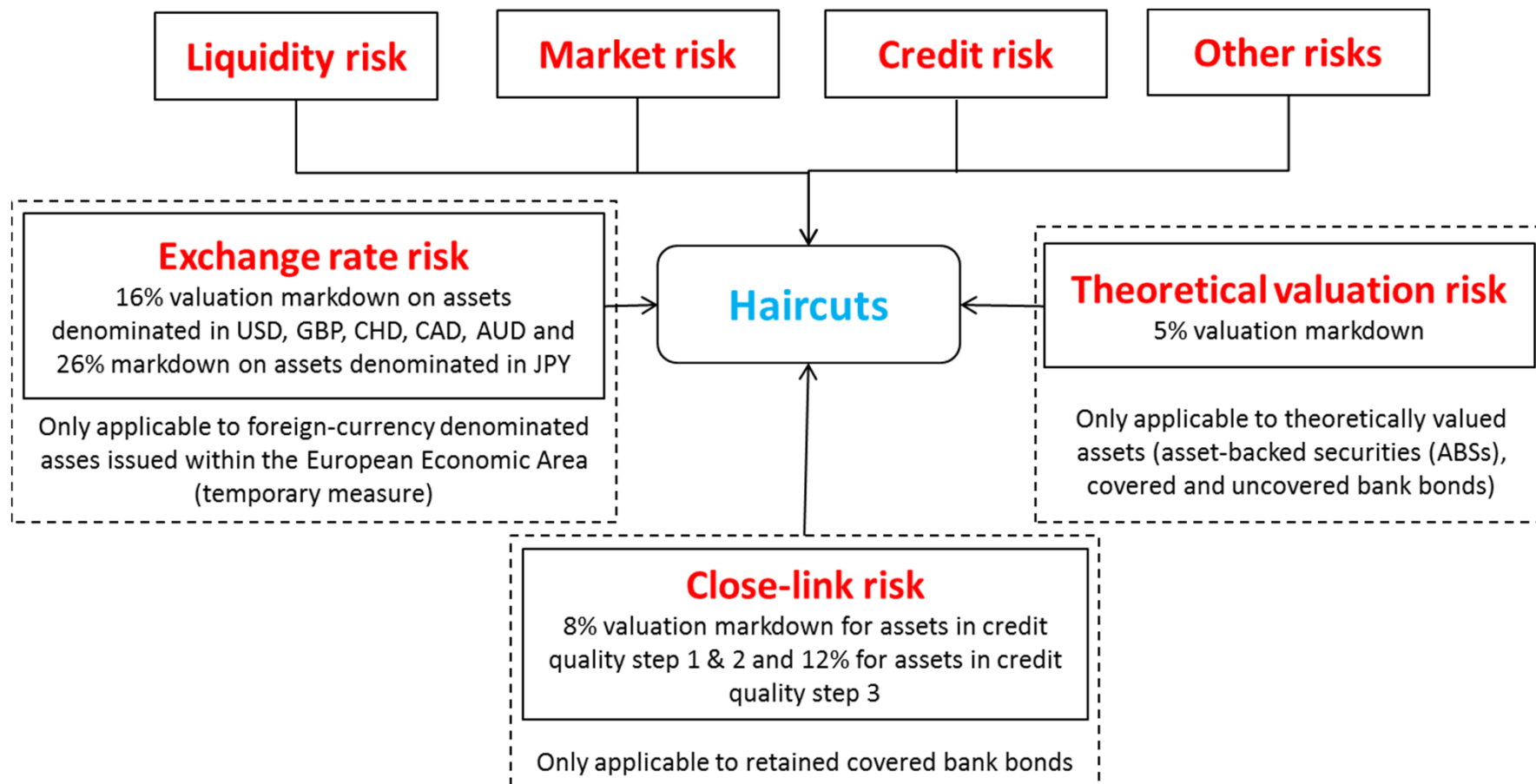
- Haircuts are **not differentiated by counterparty** to maintain a **level playing field** among market participants
- Haircuts on **an asset-by-asset basis** not adjusting to the diversification or concentration of the collateral pool
- Possibility to apply additional **discretionary haircuts**  

- 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

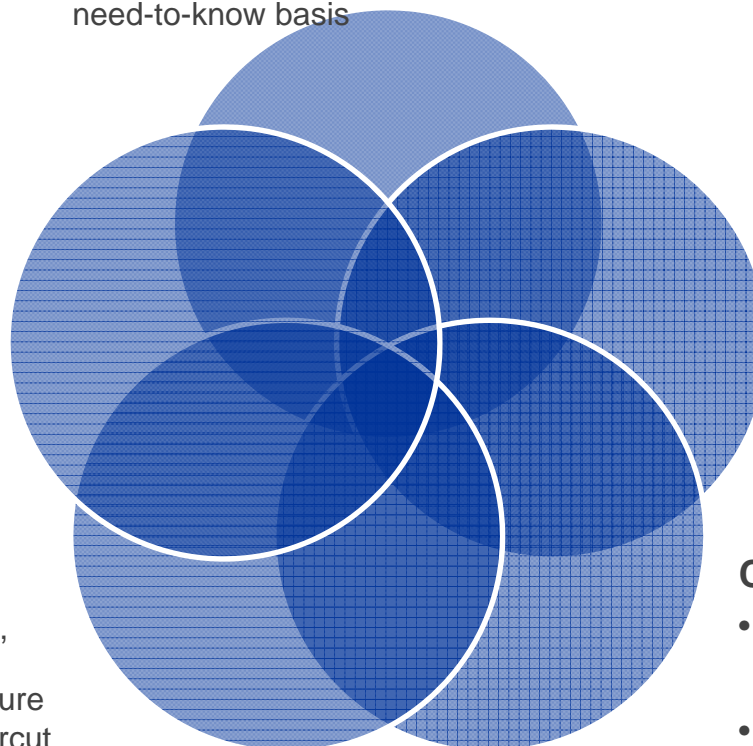
- Concentration limits (bank bonds)

### 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, 2<sup>nd</sup> 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](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](http://www.ecb.europa.eu/pub/pdf/other/financial_risk_management_of_eurosystem_monetary_policy_operations_201507.en.pdf)