EUROPEAN CENTRAL BANK

EUROSYSTEM

Mitigating risks in the Eurosystem’s monetary policy operations

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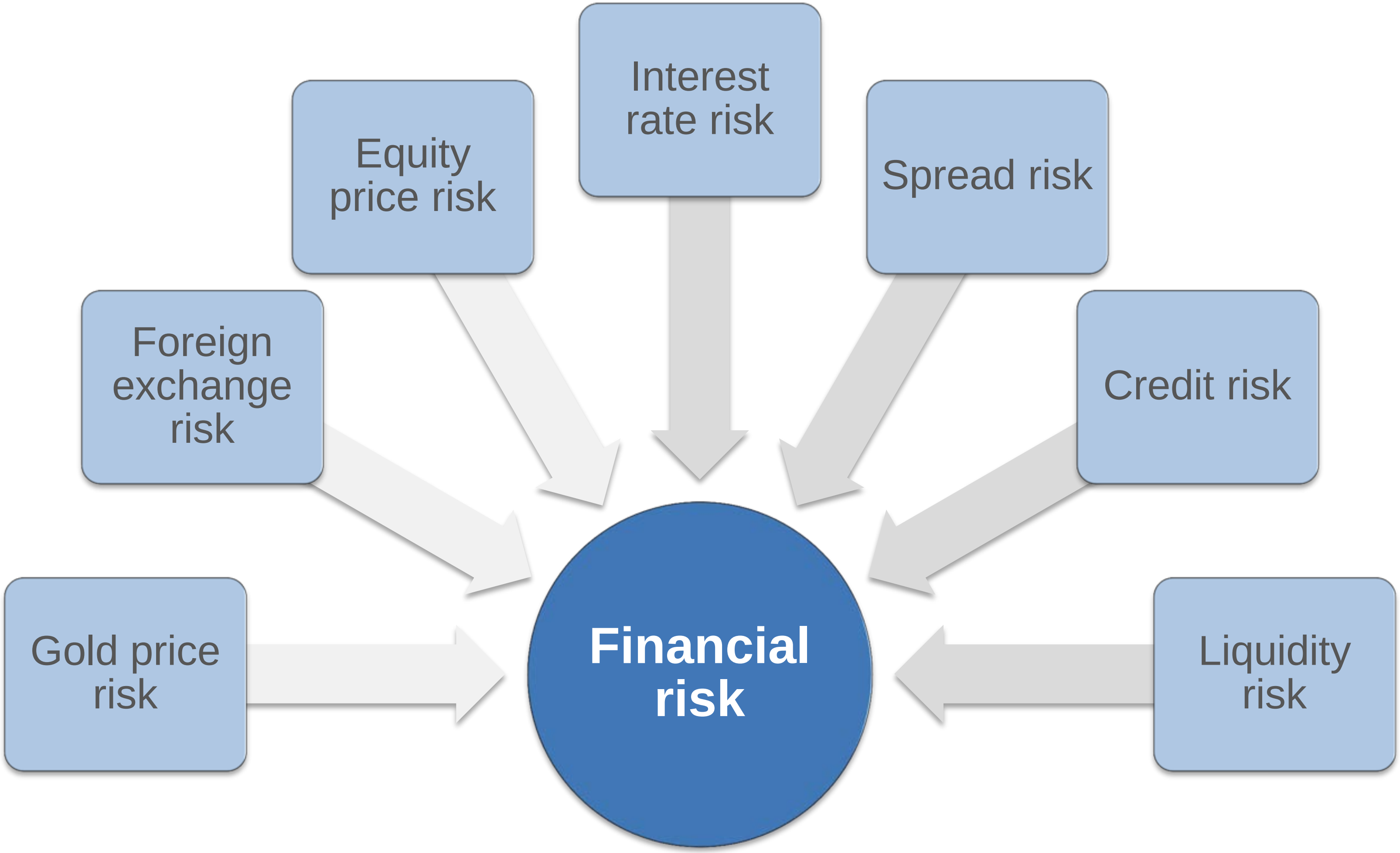
13th ECB Central Banking Seminar
Frankfurt am Main • 5 July 2019

Outline

Outline

ECB-UNRESTRICTED

What are the types of financial risks?



Why is the management of financial risks important?

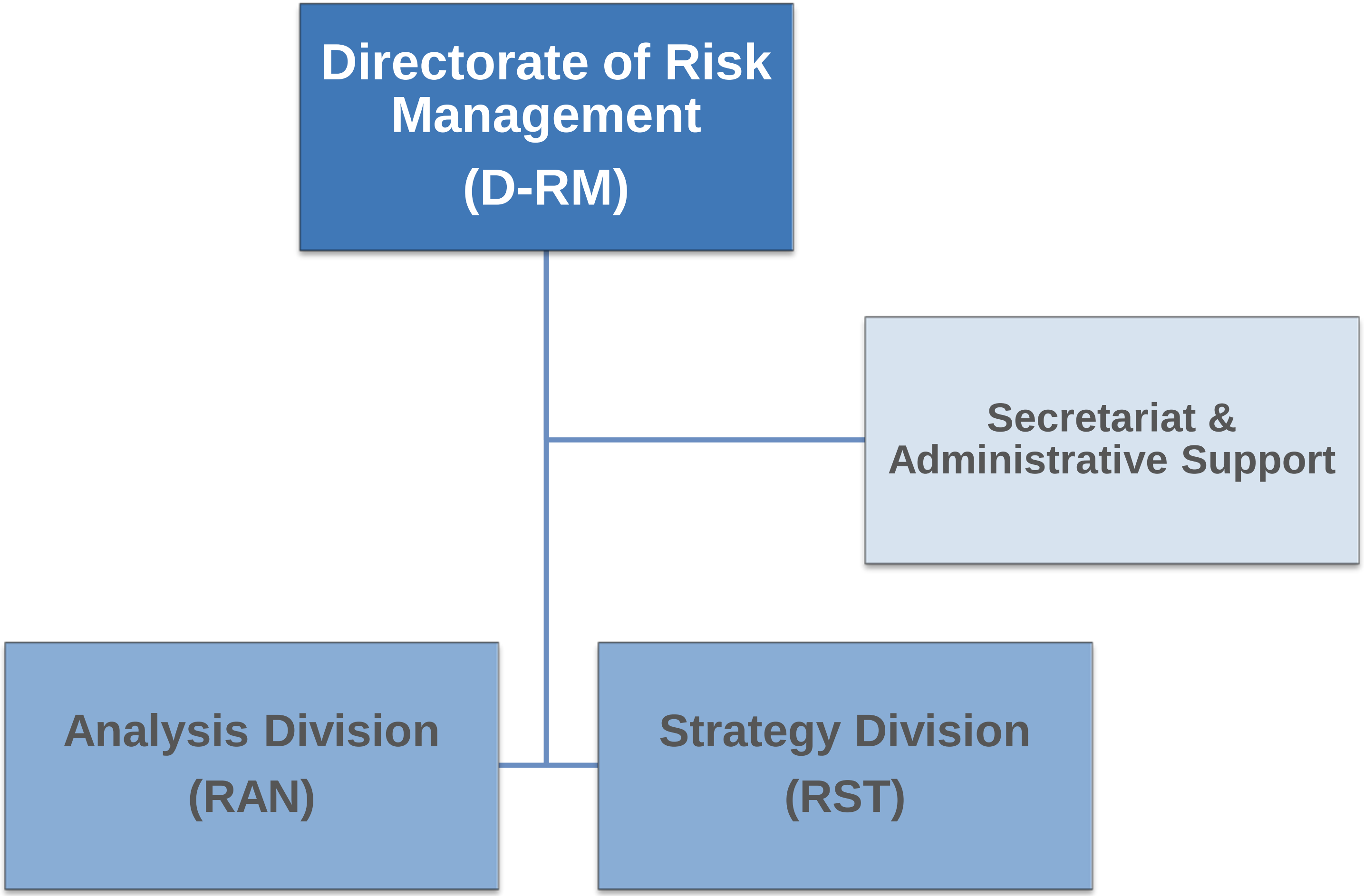
Central bank revenues can be seen as **public funds** (dividend distribution policy)

The **mismanagement of risks** could affect the **credibility and reputation** of the central bank (a key asset)

Mitigate potential distortions and risk transfers in the market that may arise from central bank operations otherwise

Financial independence requires a sound financial position and not relying on capital injections by the Treasury

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

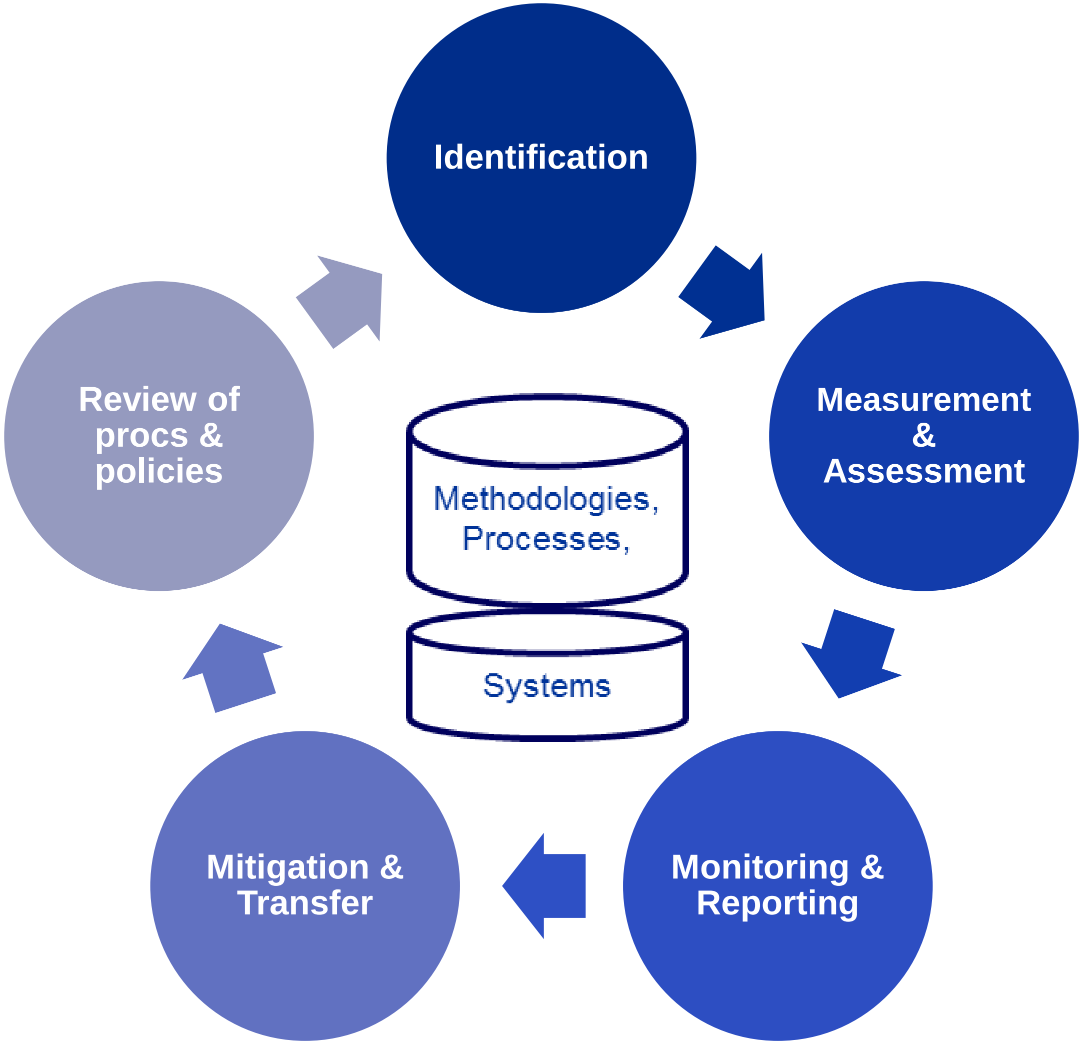


What are the major domains and tasks in financial risk management?

1. **Financial risk framework**
   Setting the relevant risk management frameworks (e.g. FRM, ECAF)
2. **Financial risk identification**
   Identifying potential risks based on exposures, trends, regulatory and environmental changes
3. **Financial risk measurement and modelling**
   Design/select appropriate measure or assessment methodology to quantify exposures to risk
4. **Financial risk monitoring**
   Select monitoring methods and set frequency (e.g. early warning indicators, limits)
5. **Financial risk management**
   Assessment of the materiality of risk and impact, ensure mitigation actions and escalate risks
6. **Financial risk reporting**
   Generate, validate and communicate standardised risk reports for internal & external purposes

Overview of a typical risk management cycle

- Risk capacity/ tolerance
- Risk aversion
- Risk man. Maturity
- Risk culture



- Definition of roles
- Reporting lines
- Policies
- RMC

Guiding 'principles' underpinning financial risk management

1. **Risk efficiency and protection**: enabling the achievement of policy objectives with the lowest possibly risk, striving to align the risk-taking and the Eurosystem's risk appetite
2. **Risk equivalence and consistency**: promoting a level playing field across assets and financial markets, and ensuring a sufficient level of consistency across central bank operations
3. **Robustness**: provide adequate protection over the economic cycle
4. **Objectivity and timeliness**: monitoring and reporting risk in an objective, consistent, reliable and timely way, based on generally recognised risk identification and estimation methods
5. **Clarity**: ensuring the necessary degree of clarity, transparency and simplicity to facilitate accountability among all stakeholders

Risk efficiency, risk equivalence and policy-making

Financial perspective

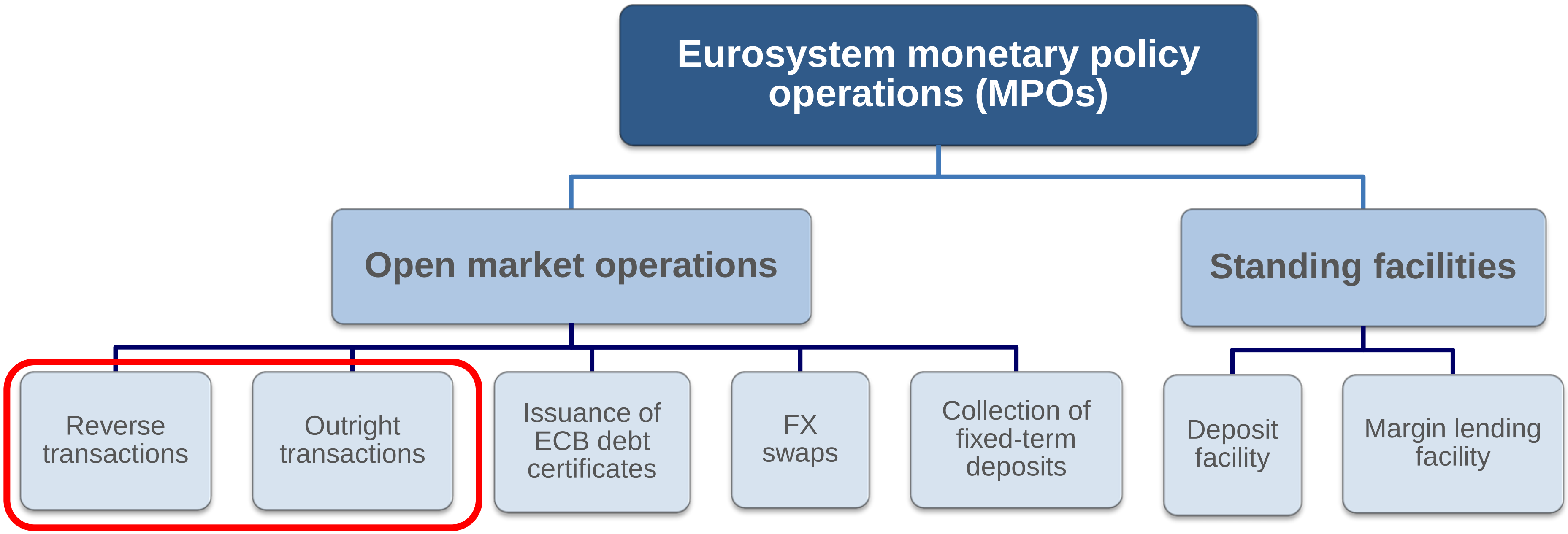
- **maximise return per unit of risk** (or minimise risk per expected unit of return)
- diversified asset allocation and due diligence **to minimise idiosyncratic risks**, and
- adequate (market) pricing **to compensate (systematic) risks** and **ensure a fair (equivalent) reward**
- for a given reward (e.g. interest rate) risk controls should ensure **residual risks are similar**

Policy perspective

- **maximise policy impact per unit of risk** (or minimum risk per policy impact)
- asset allocation largely determined by **policy considerations**
- **diversified allocation** and **adequate pricing** mitigate risks while potentially contributing to positive policy impact
- a fair treatment of assets and counterparties within the policy boundaries **minimise unintended market impacts** (distortions)

Outline

Typology of monetary policy operations



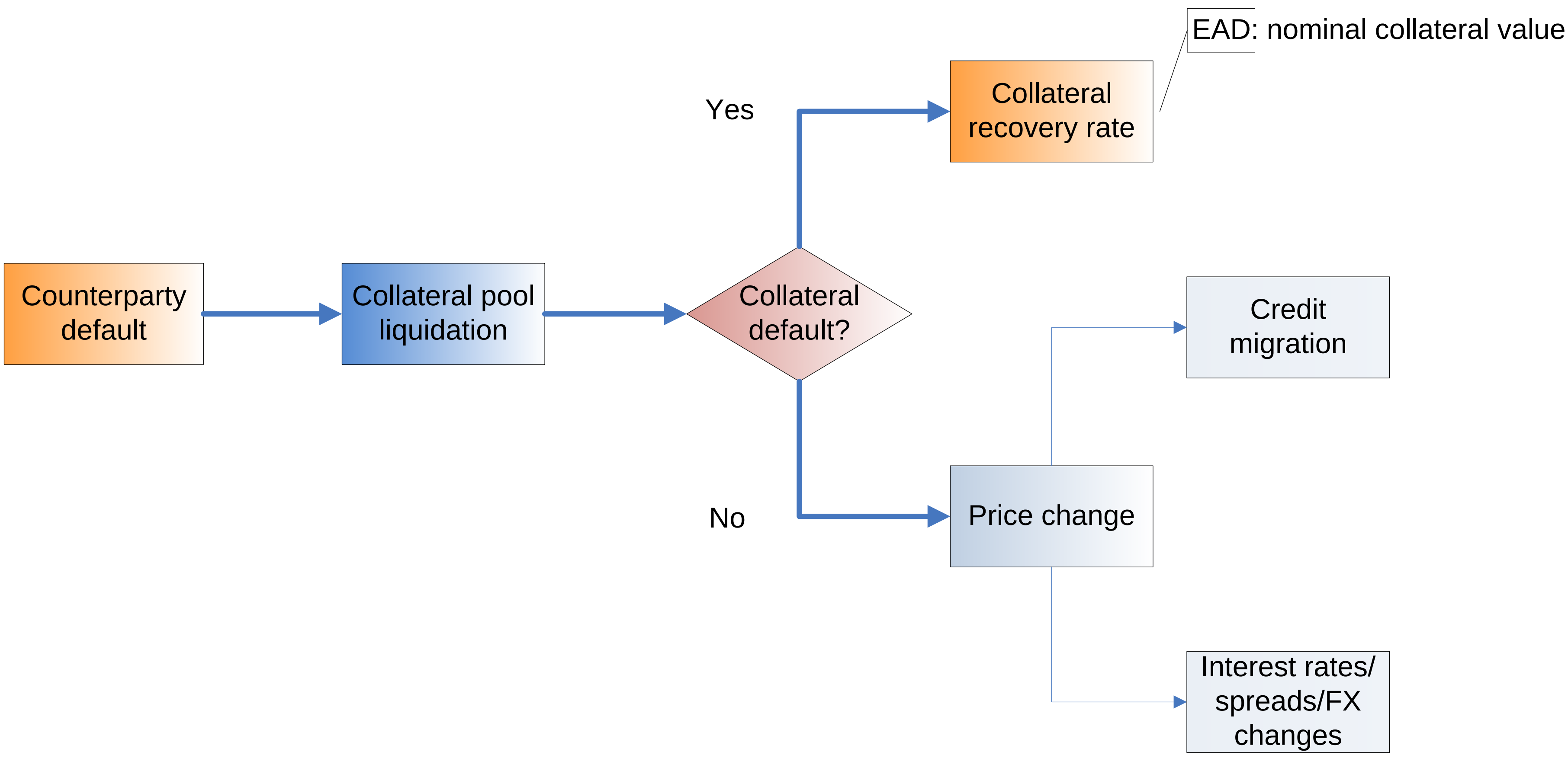
Purchase programmes/outright purchases

- **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
- During the **reinvestment phase**, the same risk management concerns keep valid

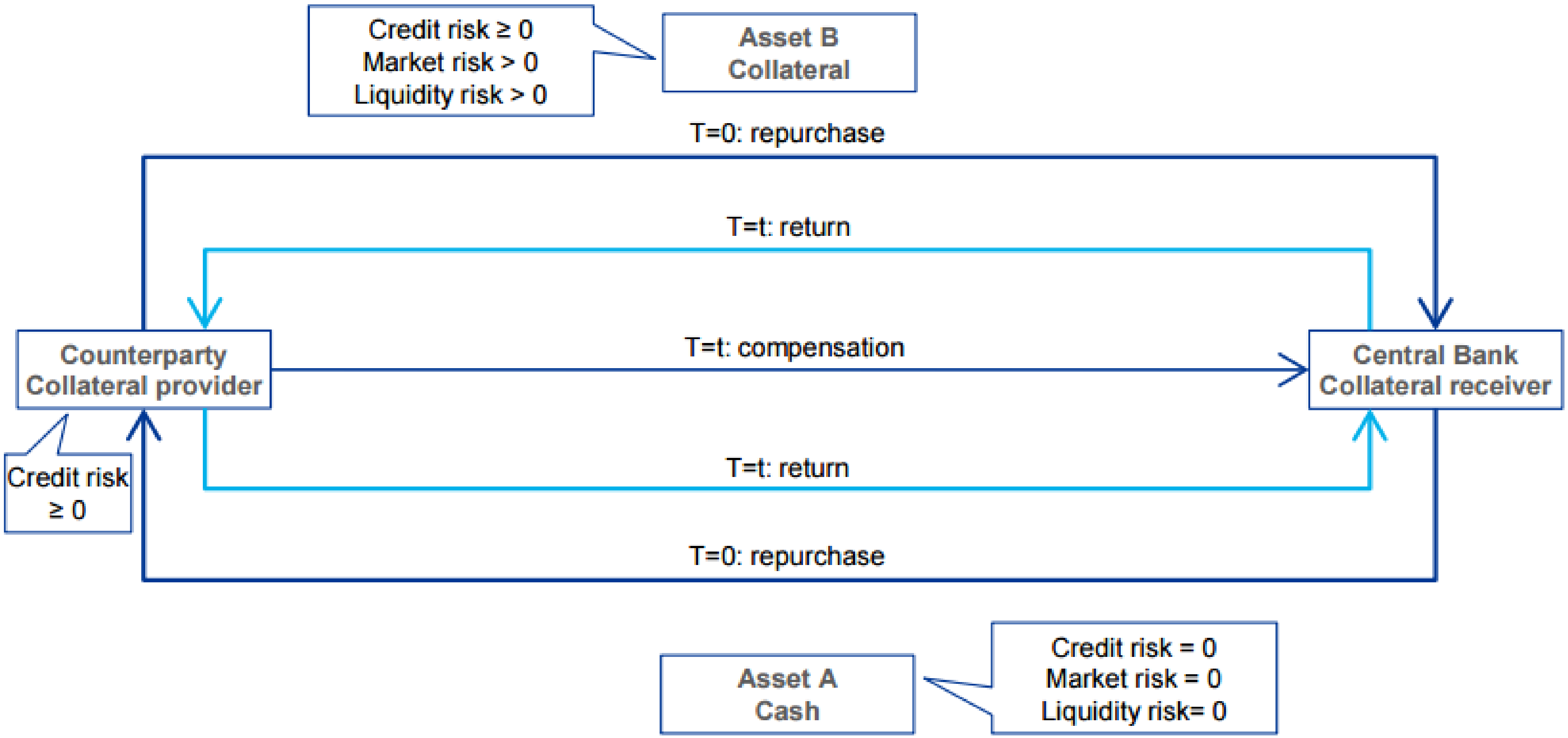
Credit operations/reverse transactions

- 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

Sequence of events in case of a counterparty default



Risks in reverse transactions illustration



Source: ECB

Typology of financial risks

Financial risks in MPOs

- **Credit risk**
  losses arising from 'credit events'
  - **Default risk**
  - **'Rating migration' risk**
- **Market risk**
  risk due to changes in market prices (unrelated to credit events)
  - **Interest rate risk**
  - **Spread risk**
- **Liquidity risk**
  losses from liquidation of positions if market cannot absorb them
  - **Price impact from liquidation** (if positions are closed quickly)
  - **Not liquidating the position** might result in market and credit related losses

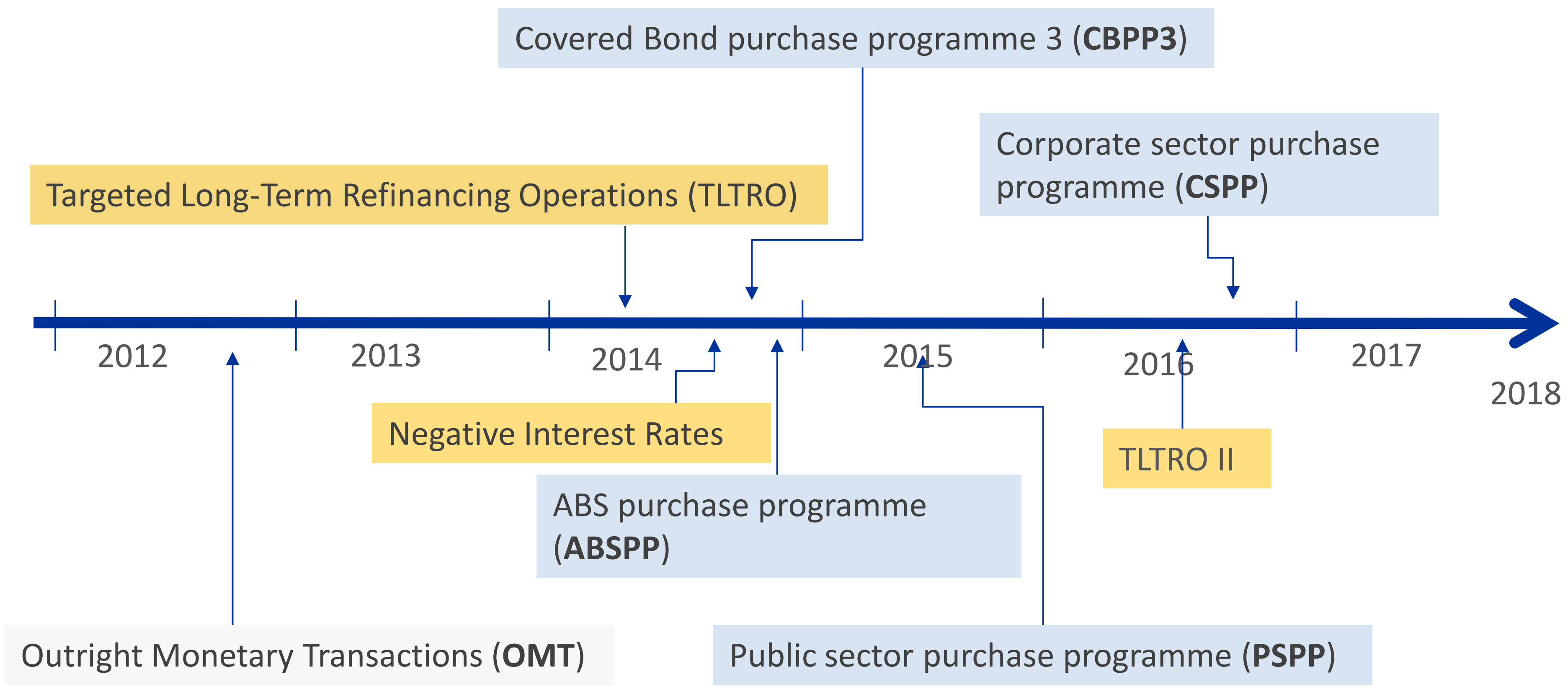
Developments in the Eurosystem's balance sheet & implications for risk management...

- The **financial crisis** has led to CBs **expanding MPOs** and introducing a number of **non-standards measures**
- As a consequence, **financial 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'

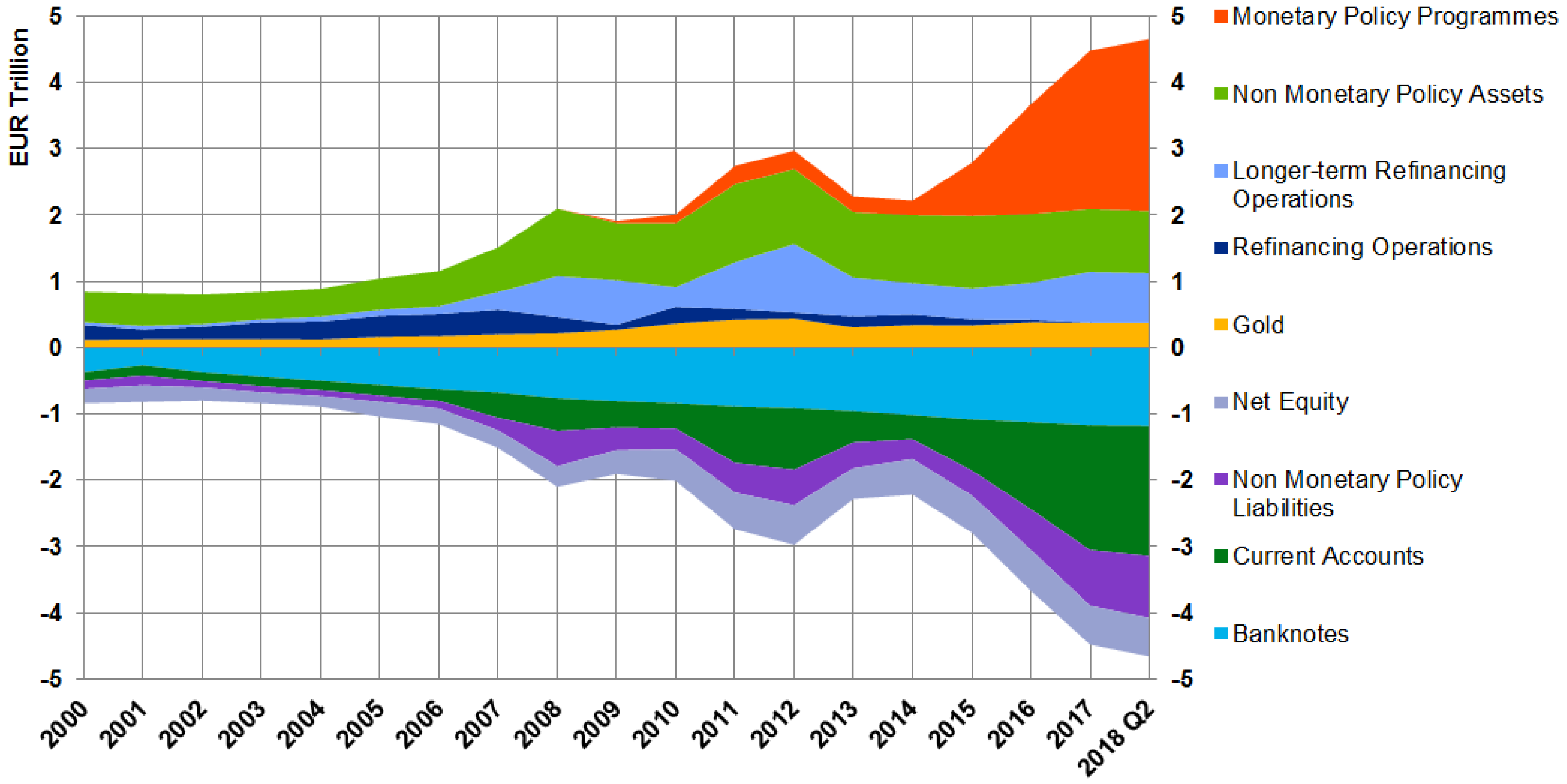
2. Overview of risks & operations (cont.)

… as a consequence of bold policy decisions

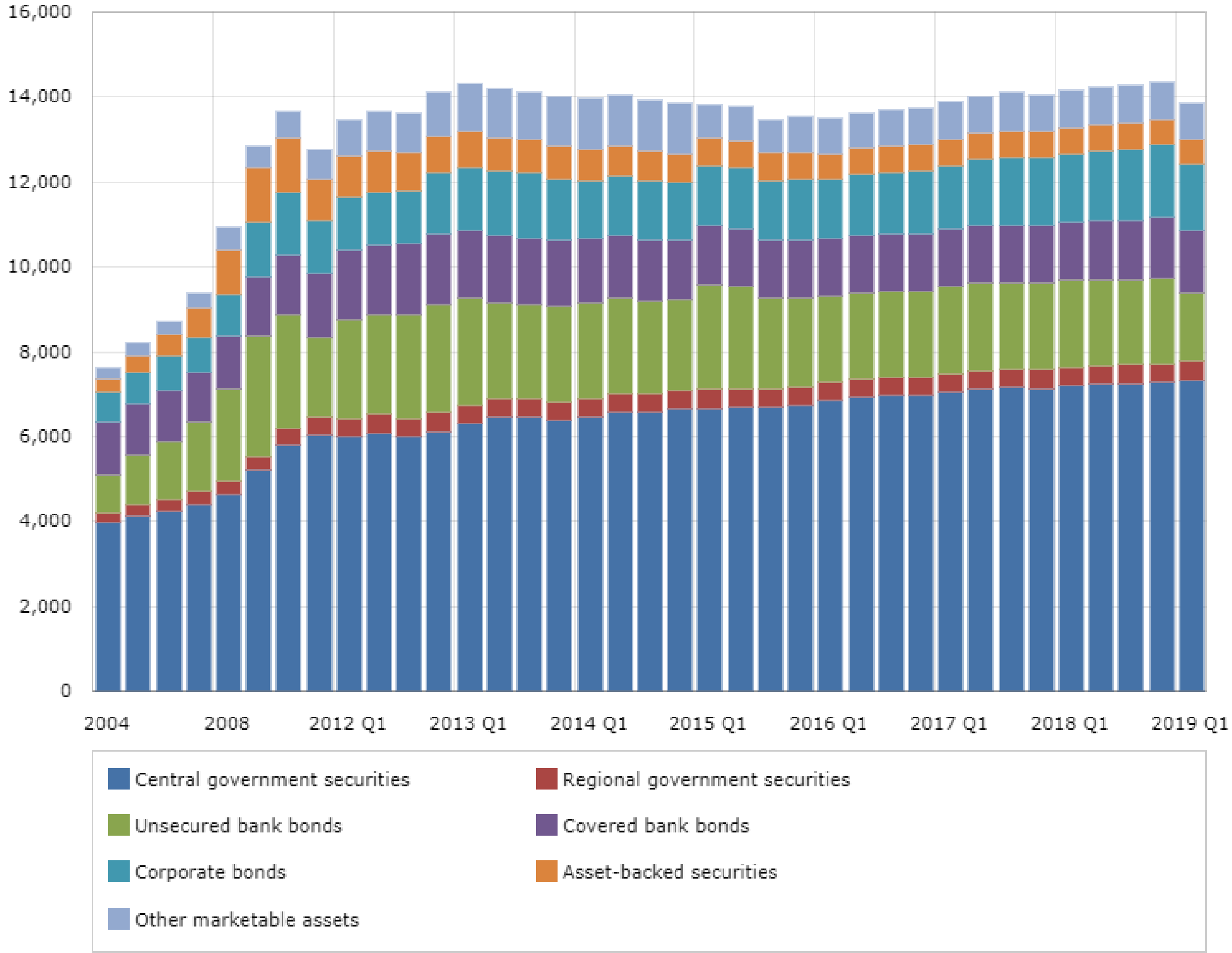
Non-standard instruments spanning the period 2012 - 2018



The Eurosystem’s balance sheet over recent years

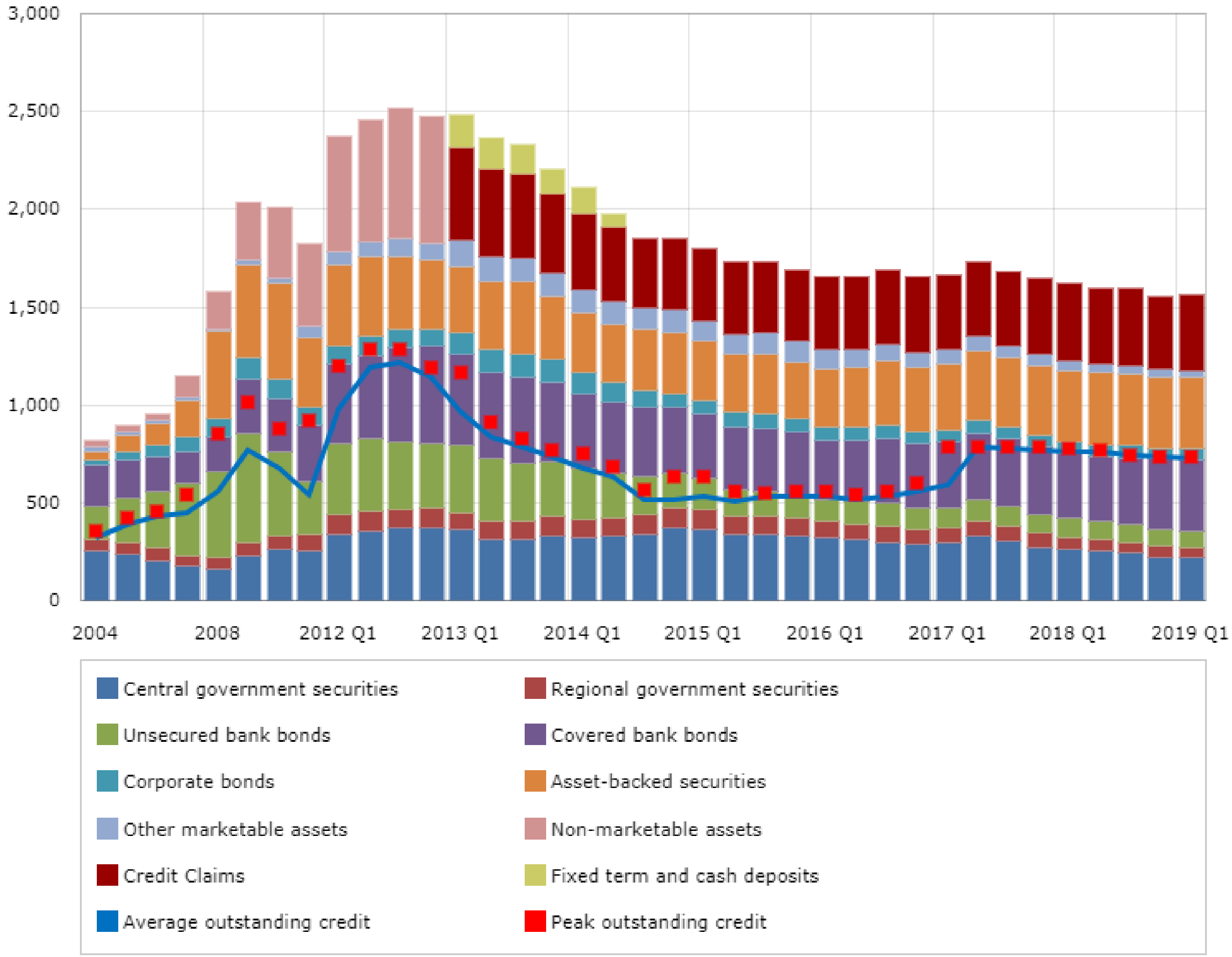


Evolution of marketable assets eligible as collateral



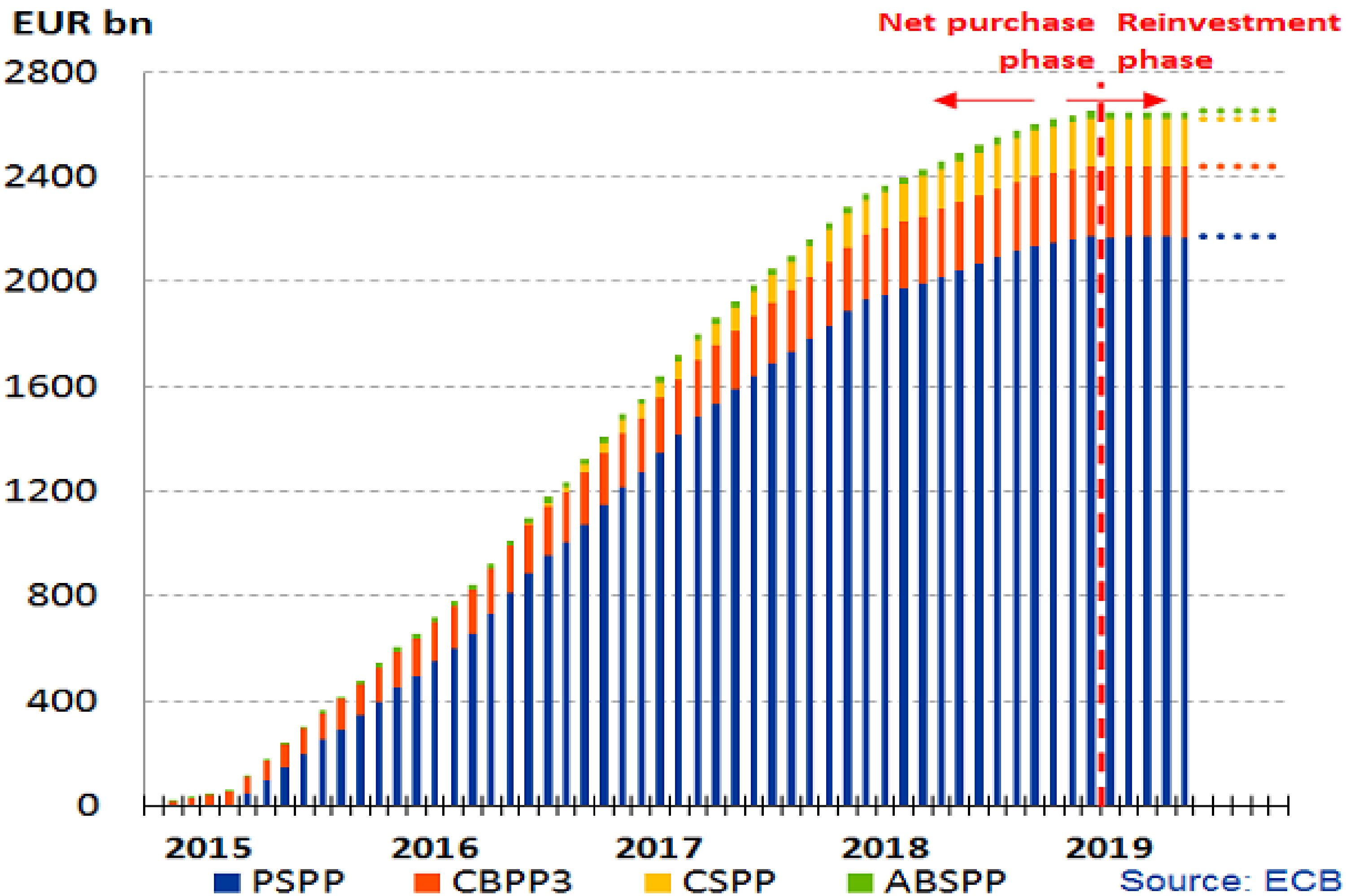
Source: ECB

Use of collateral by AT and outstanding credit



Source: ECB

Reinvestment phase purchases evolution



Outline

A joint model for market and credit risk

Integrated model comprising 3 'blocs'

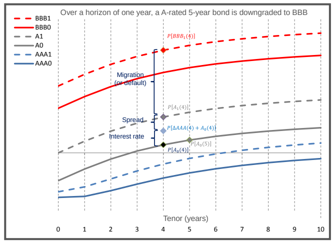
[1]	[2]	[3]
a multi-factor model for joint credit quality migrations and defaults (CreditMetrics)	a model for the dependency of changes in market variables on the credit factors in [1]	a model for the dependencies between the changes in market variables unexplained by the credit in [2]
Explained variables: log distance-to-default of each (ultimate) issuer	Explained variables: changes in yield curves and rating-specific spread curves; log-changes in the price of gold, exchange rates, securities' prices, equity indices	

Scenario generator

Forward rating states for all assets

Forward risk-free curves and rating-specific spread curves

The cash-flows of each asset are discounted in each scenario with the rating specific forward curve corresponding to the simulated rating of the asset in that scenario



Pricing

Expected shortfall at the 99% CL

Return distributions are derived as the difference between the simulated price distribution, and the deterministic beginning-of-horizon price

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

Internal & public risk disclosure

- **Timely and accurate communication** with the relevant internal stakeholders in order to better supporting decision-making regarding monetary policy implementation
- **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

Outline

1 Introductory remarks

2 Overview of risks & operations

3 Risk measurement & reporting

4 Outright purchases risk control framework

5 Reverse transactions risk control framework

i Eurosystem Credit Assessment Framework (ECAF)

ii Valuation

iii Haircuts

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 (ECAF) 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 reinvestments (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 the reinvestment phase:

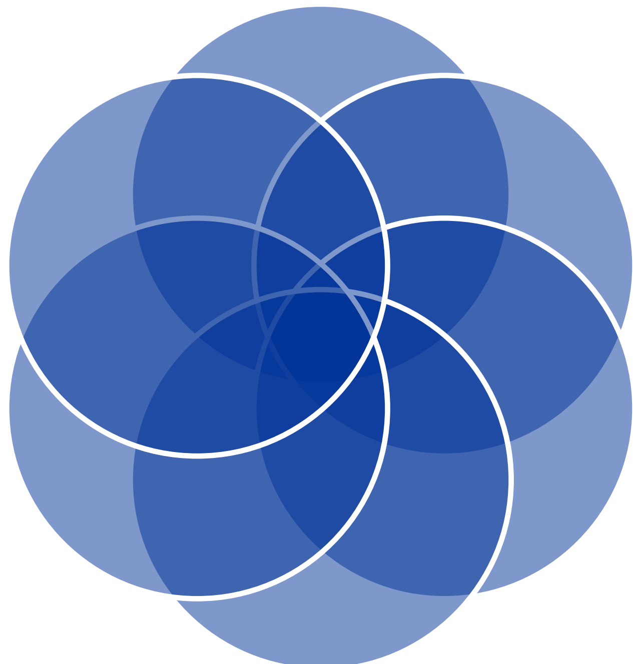
- minimum credit quality thresholds (ECAF Credit Quality Step 3 or equivalent based on exceptions)
- additional safeguards + policy constraints define programme-specific eligibility requirements

Pricing framework

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

Asset allocation policies

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



Risk analysis to ensure compliance with risk tolerance

- prior to decision
- ex-post risk monitoring

Limit system

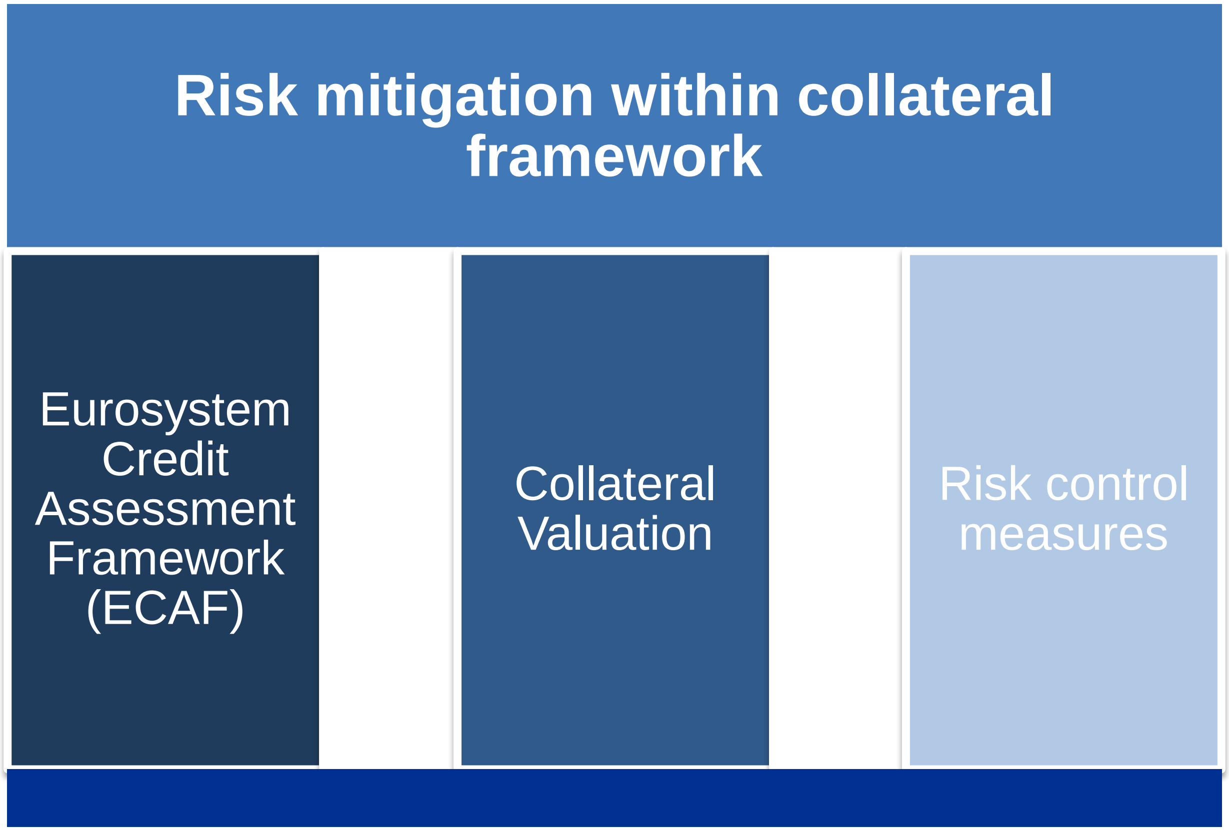
- Issue limits
- Issuer (group) limits
- *Ad-hoc* limits

Credit risk assessment and due diligence

- Prior to purchases
- Ongoing monitoring
- Impairment tests

Outline

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 (ECAF)

ECAF scope and elements

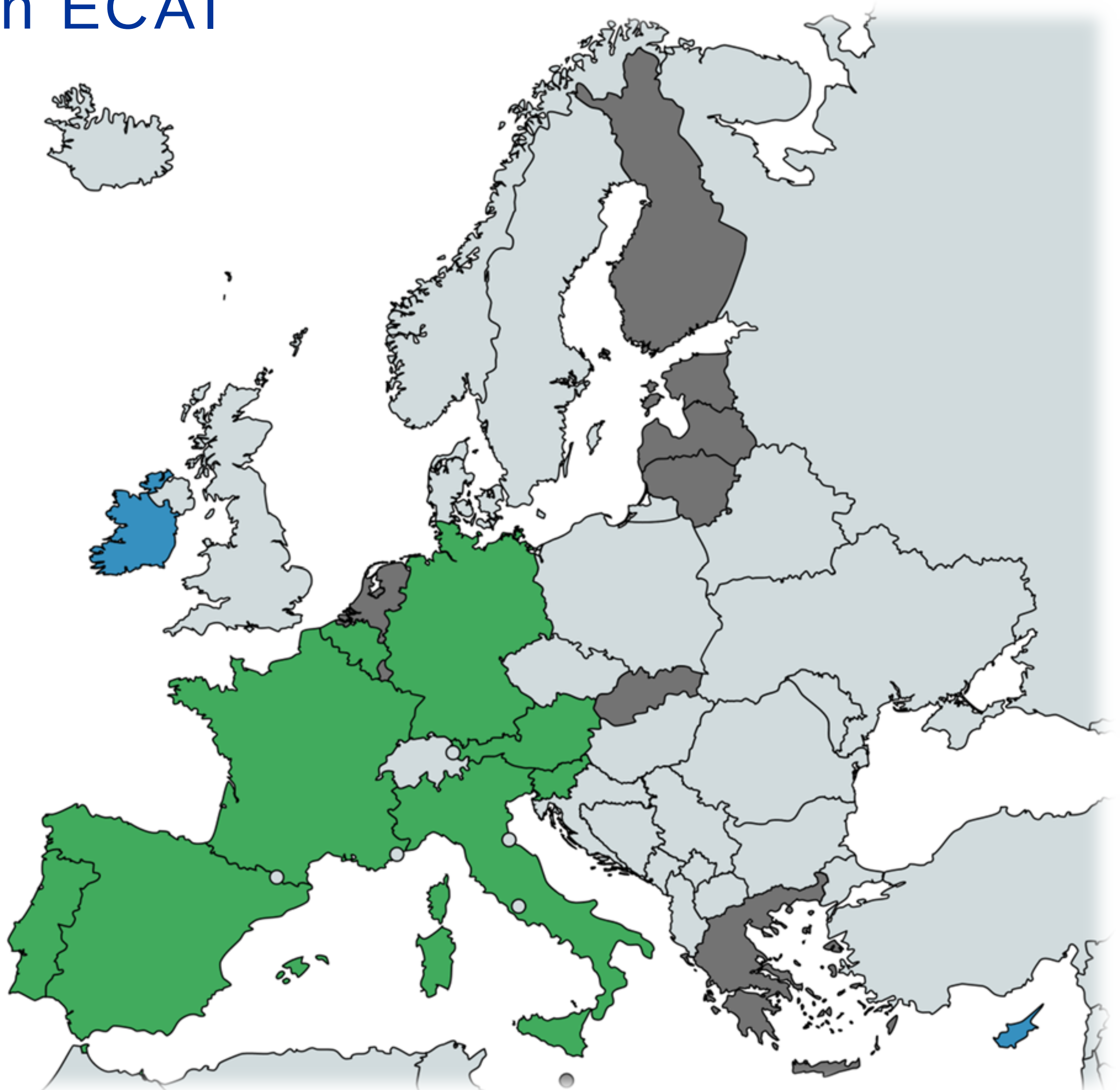
- Defines procedures, rules and techniques ensuring that the Eurosystem requirement of **high credit standards** for all eligible assets is met
- Four **credit assessment systems** (CASs) are considered in the ECAF general framework (and temporary framework):
  - External Credit Assessment Institutions (ECAIs) [4]
  - National Central Banks' in-house credit assessment systems (ICASs) [8+1]
  - Internal Ratings-based (IRB) systems [39 (15)]
  - Third-party providers' rating tools (RTs) (3)

5. Reverse transactions risk control framework (cont.)

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

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

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

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

Outline

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

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

Outline

5. Reverse transactions risk control framework (cont.)

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’

5. Reverse transactions risk control framework (cont.)

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 behaviour

5. Reverse transactions risk control framework (cont.)

Elements of the RCF for credit operations

Counterparties need to comply with regulatory ratios

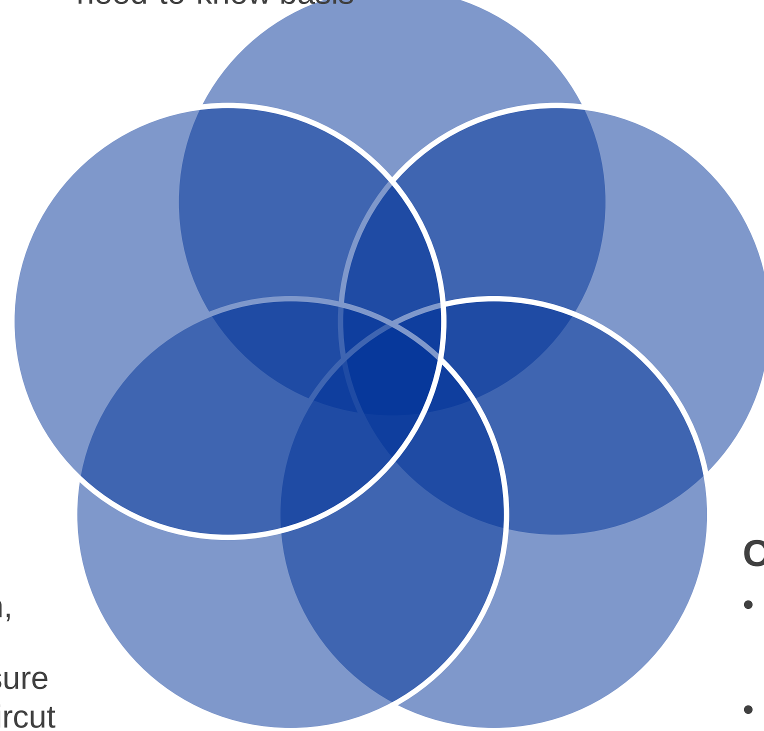
- Broad set of counterparties
- Supervised under harmonised EU/EEA standard
- Discretionary powers to suspend counterparties on grounds of prudence
- Separation of supervision of monetary policy, but still allows reaping some benefits on need-to-know basis

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

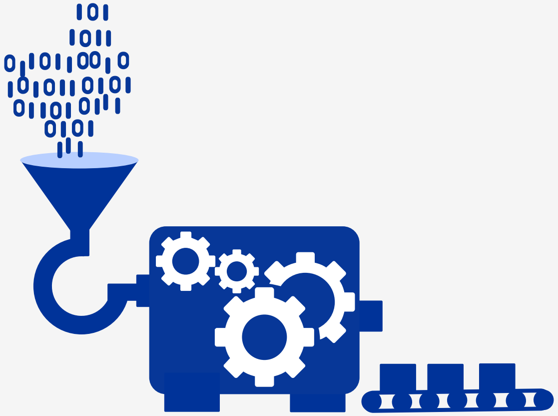
- for liquidation, valuation, market and credit risks
- based on ES99% measure
- Assets grouped into haircut categories

Collateral valuation

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

Thank you for your attention!

Appendix



Useful references and links

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- *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

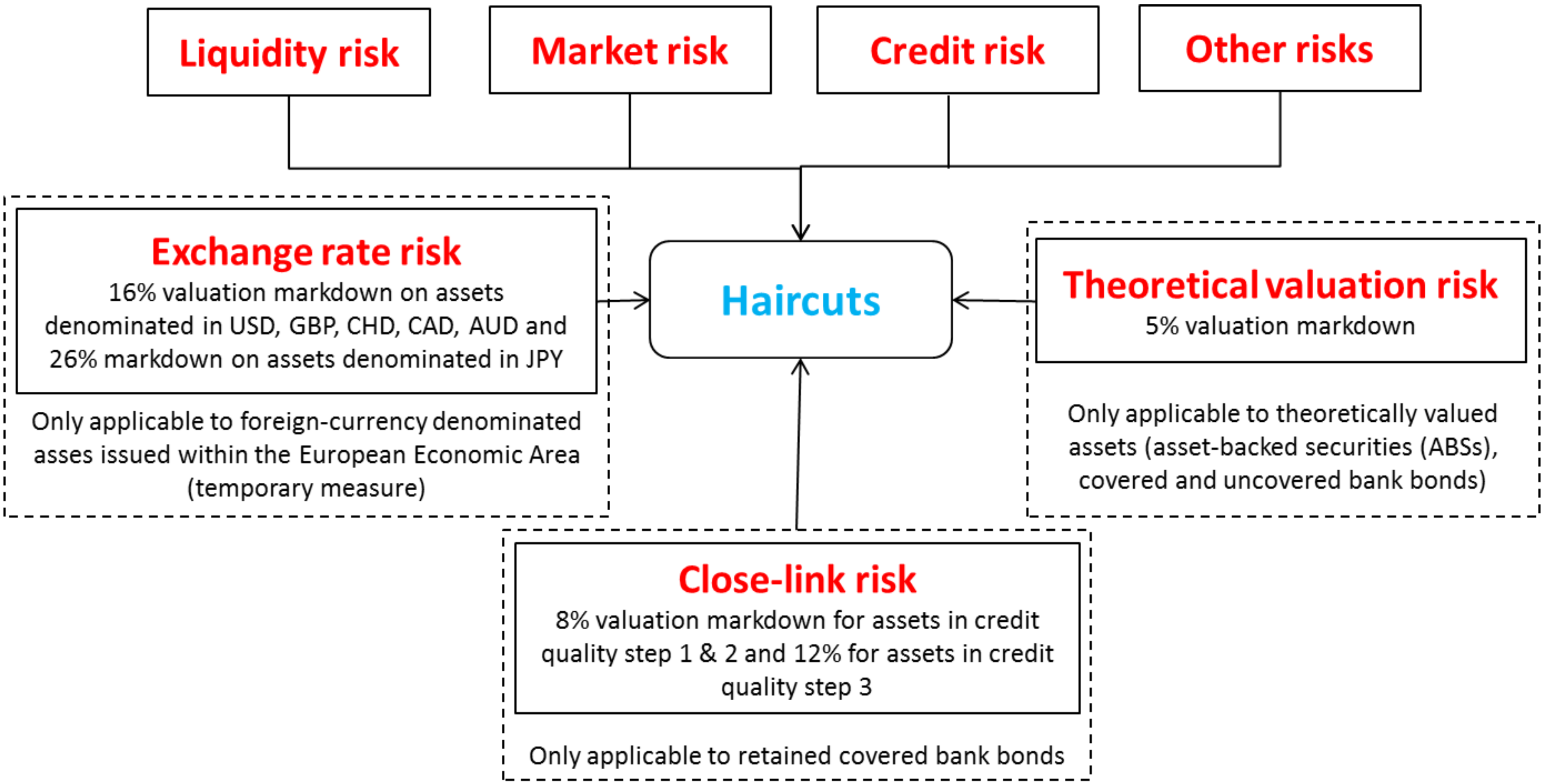
- “The financial risk management of the Eurosystem’s monetary policy operations” (brochure): http://www.ecb.europa.eu/pub/pdf/other/financial_risk_management_of_eurosystem_monetary_policy_operations_201507.en.pdf

Changes in the collateral framework since 2007

Frameworks	Major features	Regime
General credit risk (*)	Lowering of rating threshold to CQS3 without additional criteria	Temporary Non-loss shared
Loss-shared additional ABS	Lowering of rating threshold to CQS3 (second-best rating), additional criteria regarding structure and underlying pool, additional financial close link restriction	Temporary
Additional credit claims (ACCs) (*)	Individual and pools of ACCs (extended to March 2021)	Temporary Non-loss shared
Certain short-term debt instruments	Tradable, although economically equivalent to credit claims (only used in PT)	Temporary Non-loss shared
Non-euro denominated assets	Foreign currency marketable debt instruments denominated in USD, GBP & JPY from issuers established in the EEA	Temporary
Derrogations for own-use of GGBBs (*)	Bank bonds with a state guarantee	Temporary Non-loss shared
Rating waiver (*)	Certain marketable instruments in countries under assistance programmes (conditional to 'on track' assessment)	Non-loss shared

(*) Quantitatively more relevant.

Risk components and risk control measures



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 2.5% 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)