Mitigating risks in the Eurosystem’s monetary policy operations

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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 (ECAF)
   - ii. Valuation
   - iii. Haircuts
# Outline

1. **Introductory remarks**
2. Overview of risks and operations
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1. Introductory remarks

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

- Equity price risk
- Foreign exchange risk
- Interest rate risk
- Spread risk
- Credit risk
- Gold price risk
- Liquidity risk

Financial risk
1. Introductory remarks

**Why is important the management of financial risks?**

- 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
1. Introductory remarks (cont.)

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

- **Directorate of Risk Management (D-RM)**
  - **Analysis Division (RAN)**
  - **Strategy Division (RST)**
- **Secretariat & Administrative Support**
1. Introductory remarks (cont.)

**What are the major domains and tasks?**

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
1. Introductory remarks

Overview of a typical risk management cycle

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

Identification

Review of procs & policies

Measurement & Assessment

Mitigation & Transfer

Monitoring & Reporting

- Definition of roles
- Reporting lines
- Policies
- RMC
1. Introductory remarks

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
1. Introductory remarks (cont.)

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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Typology of monetary policy operations

- Open market operations
  - Reverse transactions
  - Outright transactions
  - Issuance of ECB debt certificates
  - FX swaps
  - Collection of fixed-term deposits

- Standing facilities
  - Deposit facility
  - Margin lending facility
2. Overview of risks and operations (cont.)

Typology of financial risks

- **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 & 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
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

- Eurosystém 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
Sequence of events in case of a counterparty default

Counterparty default → Collateral pool liquidation → Collateral default?

- Yes → Collateral recovery rate
- No → Price change → Credit migration

EAD: nominal collateral value

Interest rates/spreads/FX changes
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)
2. Overview of risks and operations (cont.)

Marketable assets eligible as collateral

Source: ECB
2. Overview of risks and operations (cont.)

Use of collateral by AT and outstanding credit

Source: ECB
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3. Risk reporting

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
3. Risk reporting (cont.)

A joint model for market and credit risk

Joint credit and market risk modelling

- Credit
- Market

Loss given default (LGD), probabilities of default (PDs)

[1] Correlation between credit factors
[2] Correlation between credit and market factors
[3] Covariance of residual market factors
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*
3. Risk reporting (cont.)

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
3. Risk reporting (cont.)

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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4. Outright purchases risk mitigation

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 no 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
4. Outright purchases risk mitigation (cont.)

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
4. Outright purchases risk mitigation (cont.)

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
4. Outright purchases risk mitigation (cont.)

Elements of the RCF for purchase programmes

Eligibility criteria for ongoing programs:
- 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

Credit risk assessment and due diligence
- Prior to purchases
- Ongoing monitoring
- Impairment tests

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
# Outline

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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 (ECAF)

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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

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<td>Moody’s</td>
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<td>Standard &amp; Poor’s</td>
<td>AAA/AA+/AA/AA-A</td>
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<tr>
<td>Short-term</td>
<td>DBRS</td>
<td>R-1H, R-1M</td>
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<td>Standard &amp; Poor’s</td>
<td>A-1+, A-1</td>
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Source: ECB
5. Reverse transactions risk framework (cont.)

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 ECAIs’ 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
5. Reverse transactions risk 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

About 1300 FTEs dedicated to ICASs at the NCB level
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5. Reverse transactions risk framework (cont.)

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.)

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

Liquidity risk

Market risk

Credit risk

Other risks

Exchange rate risk
16% valuation markdown on assets denominated in USD, GBP, CHF, CAD, AUD and 26% markdown on assets denominated in JPY

Only applicable to foreign-currency denominated assets issued within the European Economic Area (temporary measure)

Haircuts

Theoretical valuation risk
5% valuation markdown

Only applicable to theoretically valued assets (asset-backed securities (ABSs), covered and uncovered bank bonds)

Close-link risk
8% valuation markdown for assets in credit quality step 1 & 2 and 12% for assets in credit quality step 3

Only applicable to retained covered bank bonds
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

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

Collateral valuation haircuts

- 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


- Risk mitigation in monetary policy operations:

- “The financial risk management of the Eurosystem’s monetary policy operations” (brochure):