EUROPEAN CENTRAL BANK

Overview of Stress Testing Methodologies: From Micro To Macro

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Stress-testing – Micro vs. Macro

- **Micro stress tests**
  - Designed to assess resilience of individual financial institutions
  - Mainly run by individual financial institutions for the purpose of institutional risk management
  - Often ignores behaviour of competitors
- **Macro stress tests**
  - Designed to assess resilience of financial system as a whole rather than individual institutions only
  - Run by central banks, IMF
  - Spurred by FSAP

Stress-testing – What is the purpose?

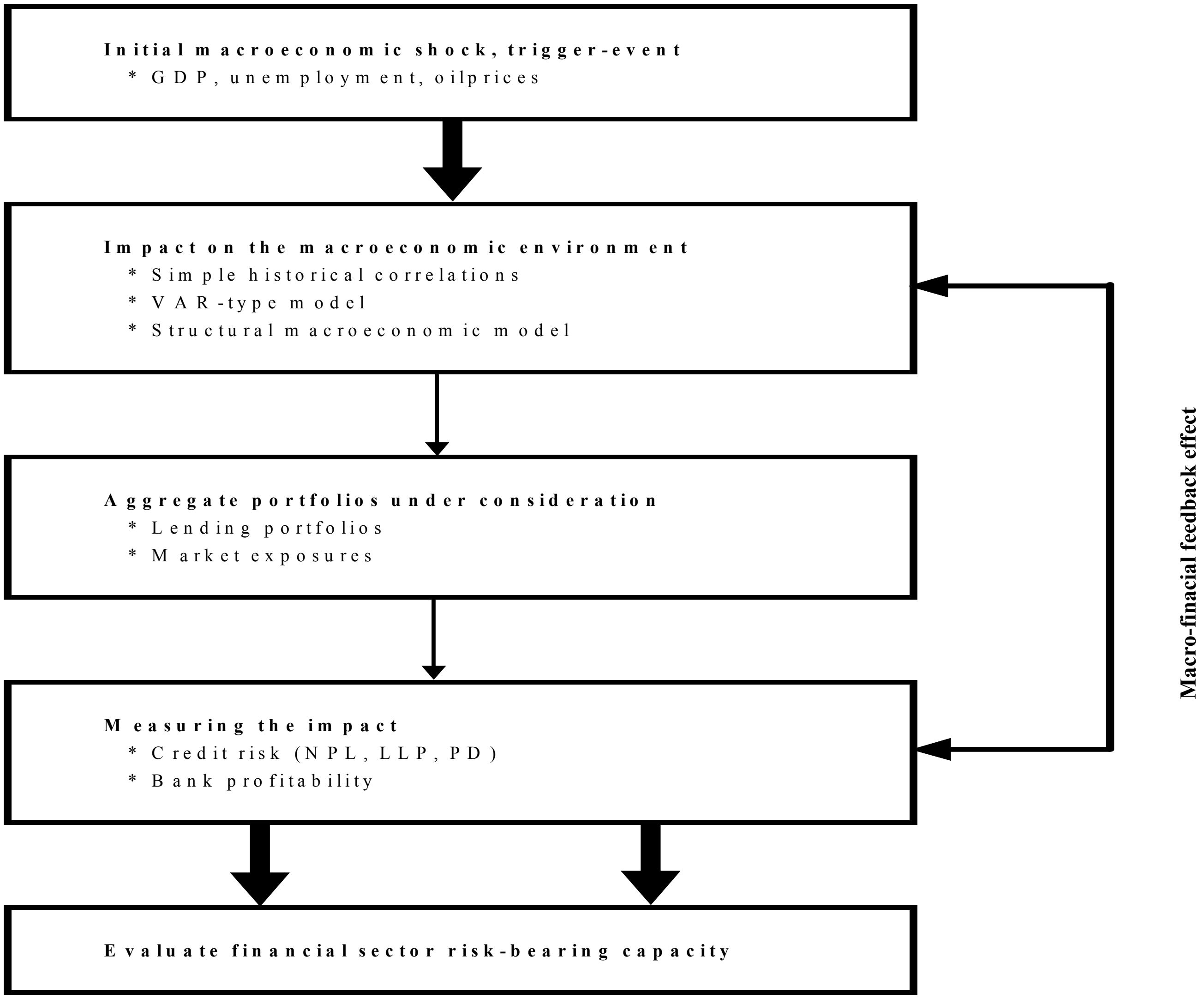
- **When will be the next crisis?**
  - Not really the purpose of stress testing
  - Empirical record of crisis prediction not convincing
  - Regular surveillance with macroprudential/financial stability indicators more appropriate
- **What if there is a crisis?**
  - Primary purpose of stress testing is to form a rough idea of possible impact of extreme (but still plausible) shocks on the financial system
  - Not an exact science (too many unknowns), can only give order of magnitude
  - Limited suitability for economic modelling

Stress-testing – What is the purpose?

- **One part of financial system stability assessment**
  - Framework for discussion about plausible risks
  - Quantifying the potential impact from adverse disturbances, allowing for possible ranking

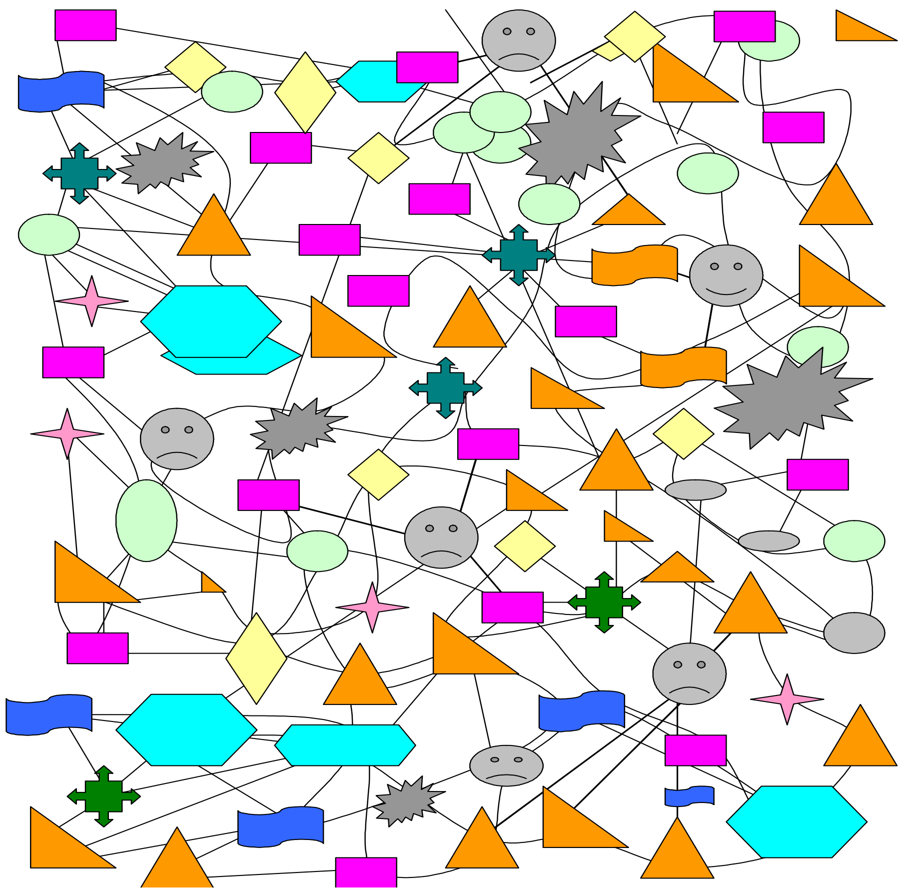
- **Why is it important for central banks?**
  - Robust financial system needed to ensure monetary policy can achieve its objectives (e.g. price stability)
  - The health of the financial system is inextricably intertwined with the performance of the economy and its resilience to shocks

What we want to do: a stylised macro stress test

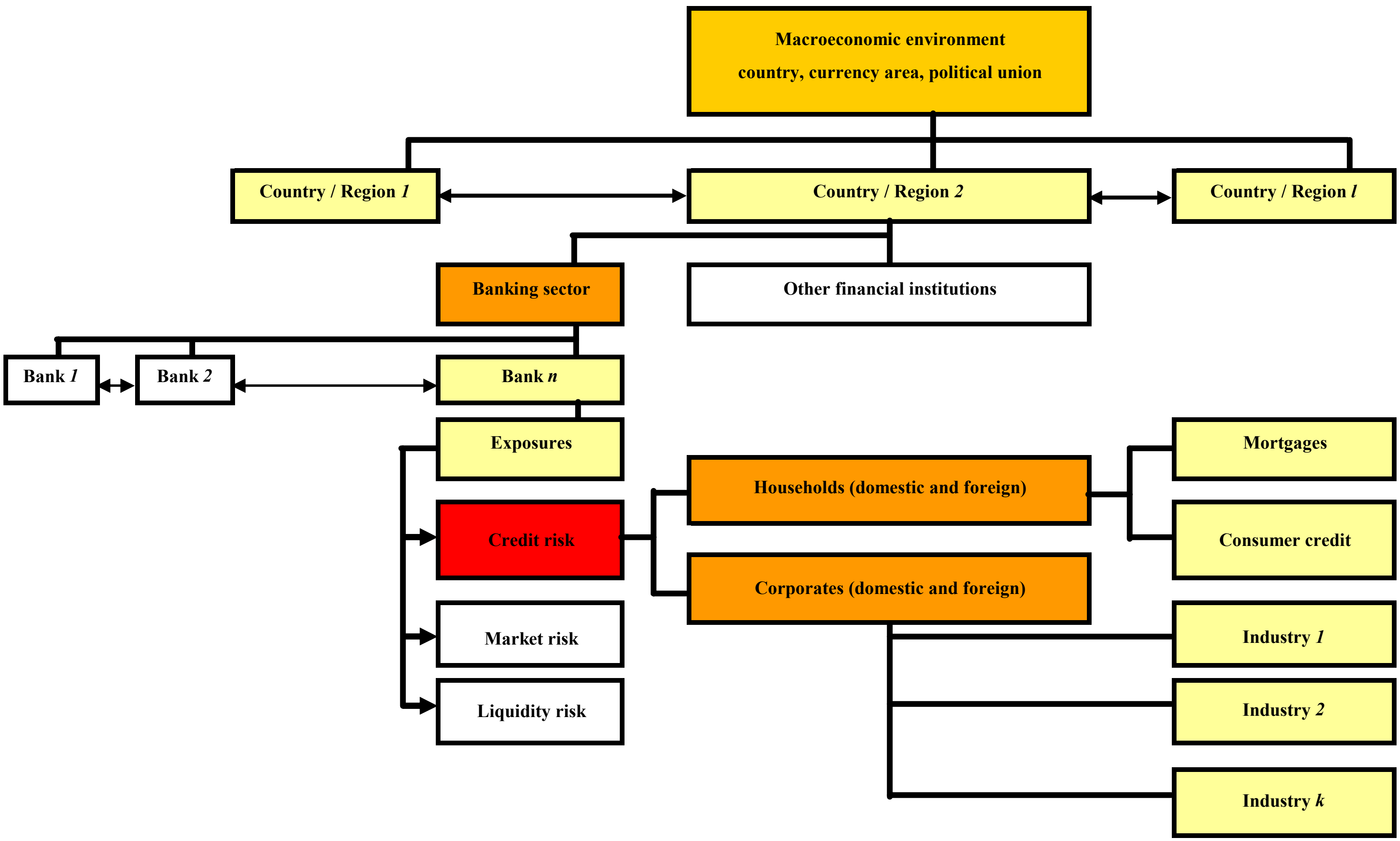


Stress-testing – Practical issues

But, the financial system is complex



Stress-testing – Practical issues: what level of simplification is desirable/feasible?



Stress-testing – Practical issues: coverage

- Indentifying the relevant institutions
  - Banking sector only?
  - Only systemically important institutions?
- Indentifying the main sources of risk
  - Which types of risk?
  - Combination of credit and market risk?
- Valuation issues
  - Ready availablity of market info from trading book
  - How to value loans?
  - Will move to IAS facilitate the pricing of loans?

Stress-testing – Practical issues: inter-linkages

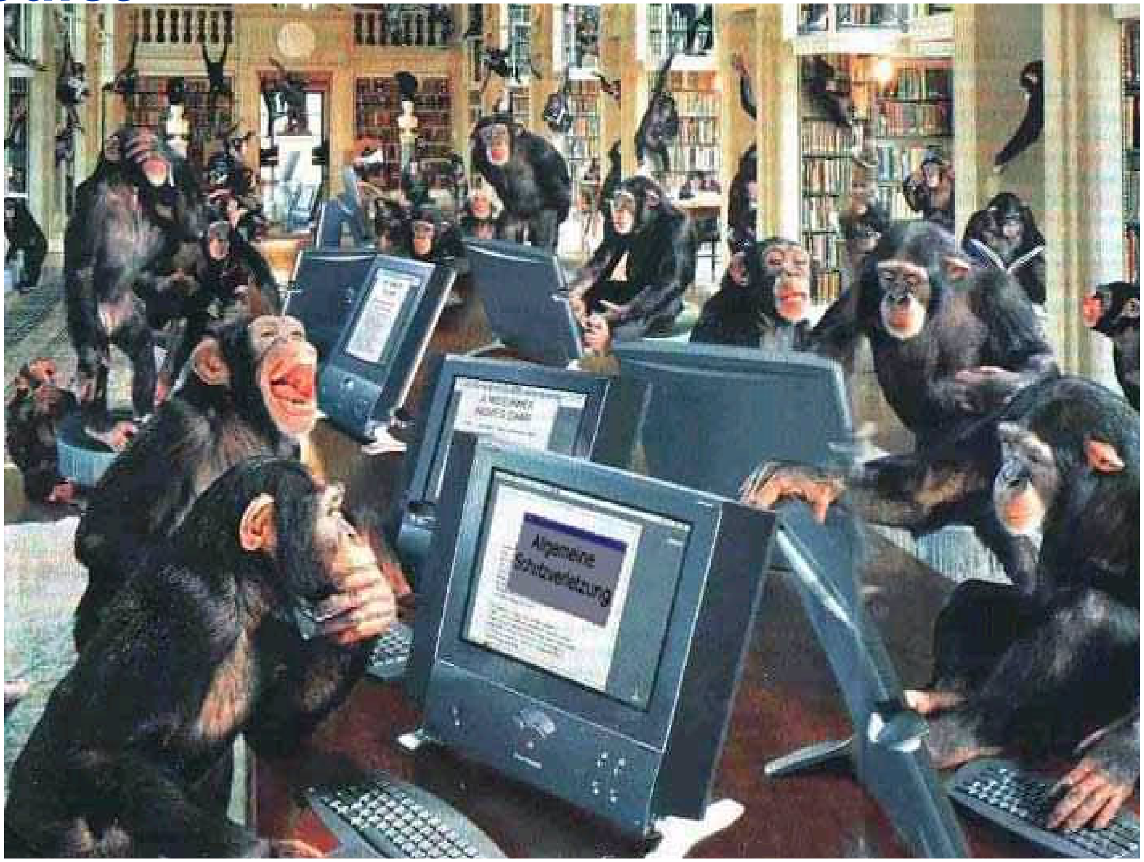
- **Financial institutions other than banks**
  - Insurance companies?
- **Aggregation between banks and non-banks**
  - Scope of consolidation?
- **Interlinkages across banks**
  - Interbank exposures, contagion (use of payments data?)
  - Other links (common exposures and funding sources)
- **International linkages**
  - Only domestic GDP or exposure-linked?

Stress-testing – Practical issues: modelling stress

- Financial crises rarely have the same characteristics
- “Econometricians among my friends tell me that rare events such as panics cannot be dealt with by the normal techniques of regression, but have to be introduced exogenously as “dummy variables” (Kindleberger, 1996)

Stress-testing – Practical issues

Behaviour under stress is not easy to predict



Stress-testing – Practical issues: scenarios & methods

- **Defining relevant scenarios: alternative approaches**
  - Historical or hypothetical?
  - How to construct scenarios? (common or individual)
  - Sensitivity analysis or full stress test?
  - Internal consistency?
- **Methodological issues**
  - Bottom-up or top-down approach?
  - Which time horizon?
  - Reduced form (satellite) models or structural models?
  - Piece-wise or integrated approach?
  - Which dependent variable to use?

Stress-testing – Practical issues: environment reactions

- **How to deal with feedback/2nd round effects?**
  - Endogenous reaction by banks that re-optimise their portfolios
  - Feedback on asset prices
  - Feedback on the real economy
- **How to account for policy reactions?**
  - Hypothetical reactions
  - Past reactions that prevented a crisis (in historical scenarios)

Stress-testing – Practical issues: techniques

- Confidence intervals around the point estimate of the dependent variable
  - How to construct confidence intervals at the tail of a distribution?
- How to deal with non-linearities?
  - Problem at times of stress
- Changes in the set and strength of correlations across financial variables at times of stress
  - Look at past stress periods?

Stress-testing – Practical issues: data

- Lack of relevant data
  - Lack of harmonised data at the micro level
  - Short historical time coverage
  - Structural breaks
- Confidentiality of data
  - Legal barriers to provision of individual data
  - Alternative data sources

Stress-testing – How to interpret the results?

- Macro stress-testing results can only give a very rough idea of potential magnitude of losses.
- Stress tests often show that "everything is fine", but sentiment can change quickly, especially in emerging markets.
- Had thorough macro-prudential analysis (including stress testing) been done prior to Asian crisis, could some problems have been avoided?

Stress-testing – Implementation issues

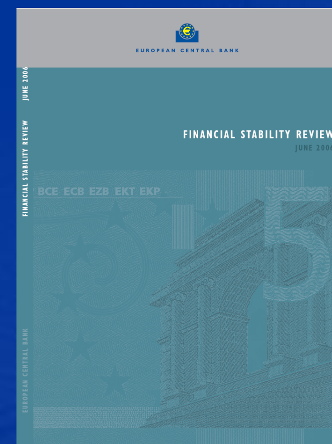
- **Should the findings be published?**
  - Partially? In aggregated form?
  - Financial stability reports?
- **How often should stress tests be run?**
  - Every few years in connection with FSAP?
  - Annually, semi-annually, quarterly?
- **Who should run them?**
  - Central bank?
  - Major banks in the country?

Concluding remarks

- A lot of progress has been made (e.g. in the context of FSAPs)
- Macro stress-testing practices are under continuous development
  - Central banks play a leading role
  - An evolutionary process
- Data is key, but often unavailable
- Several challenges lie ahead, e.g.
  - Incorporate feedback effects
  - Cross-border / cross-sector linkages

ECB Financial Stability Review

- **June 2006 Special Feature on stress testing**



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