Analytical work by overseers using TARGET2 data

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DISCLAIMER

This presentation contains viewpoints of the presenter.

It does not necessarily reflect the views of the European Central Bank or the Euro system.

Motivation and definitions

What is "Analytical work" of oversight?

- **Methods for *quantitative* assessment**
- **Techniques and insights from *research***
- ***Data and model* driven work**

Analyses can serve many users: overseers, operators, …

Why special focus on TARGET2?

- **Backbone infrastructure for the euro**
- **Largest, complex and international LVPS**
- **Data is relatively little known**

Agenda

I.　**Analytical work of oversight**
- **Goals**
- **Tools**
- **Challenges**

II.　**Studies of TARGET2**
- **Organisation of the work in the Eurosystem**
- **Focus of current work**
- **Next steps**

III.　**Summary**

I. Analytical work: Goals

- ## Quantitative oversight of TARGET2

  - ### Identify sources of risk and quantify its magnitude
    - Operational risk, liquidity risk, contagion risk,…
    - …systemic risk?

  - ### Identify sources of inefficiencies

  - ### Obtain information on EU financial system
    (for financial stability & other purposes)

I. Analytical work: Tools

- ## Tools and approaches

  - » **Simulations**
  - » **Econometrics or statistics**
  - » **Network analysis**
  - » **Game theory**
  - » **Agent based models**
  - » **Literature from Economics, Finance, Operation research, …**

Use feasible (combination of) approaches with understanding of their strengths and weaknesses!

I.   Tools: Simulations

Simulations:

- **Replication of real world in a model**
- **Allow tests which are otherwise unfeasible**
- **Well suited to study FMIs**
  - **IT systems**
  - **Clear logical rules**
  - **Data available**

Example:

- **Liquidity effect of participants operational failures**

Benefits

Challenges

- Valuable as a learning exercise
- Good for communicating possible outcomes
- Running of large number of scenarios or severe what if – cases is possible
- Replication of the complex mechanics
- Real and massive data can be used
- Model risk
- Data excludes behavioral reactions – Lucas critique
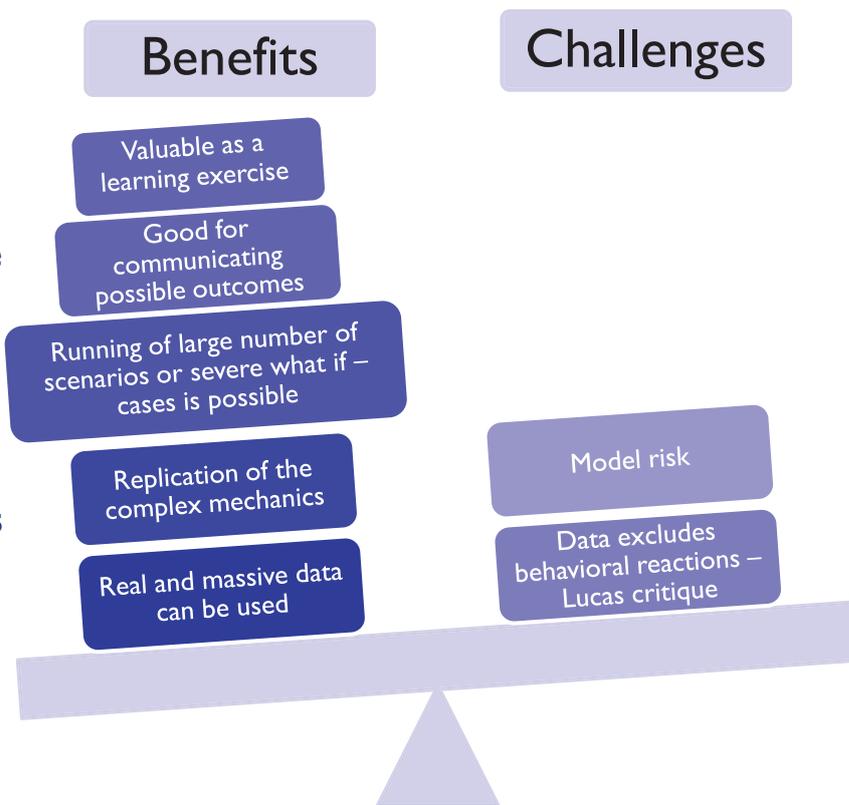
I.   Tools: Network models

Network models

- **Statistics which describe the "landscape" or "topology" of data**
- **Nodes, links and structure based indicators**
- **Example: Communities in TARGET2 data**

Benefits

Challenges

- Also the analysed systems are networks
- Can capture the structure and significance of relationships and interconnectedness
- Strong visualisation tool
- May provides only a static view
- Gap from pictures to policy conclusions
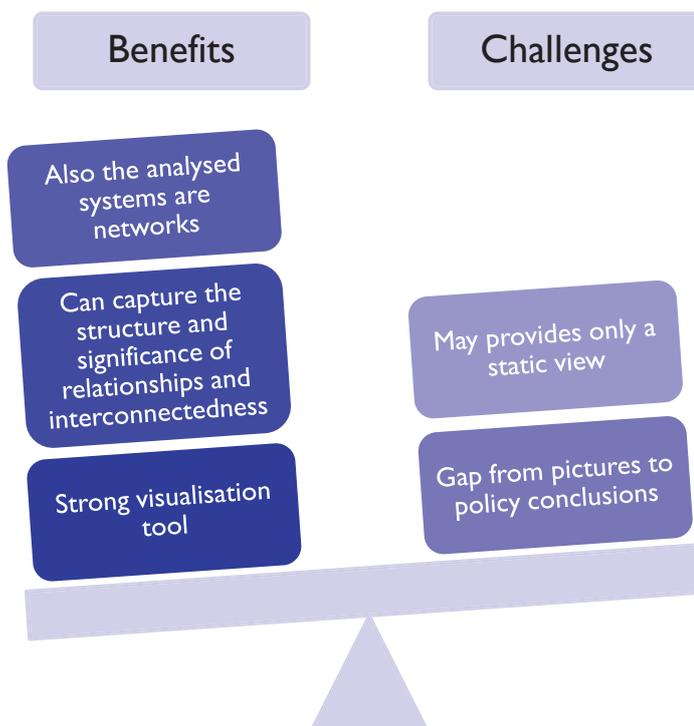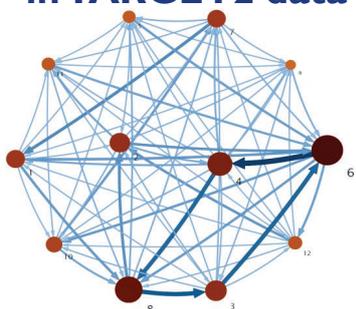
I.   Tools: Agent based models

Agent based models

- **Decision makers described as agents**
- **Interaction with each other and with environment**
- **Simplified rules in agents describe complex dynamics**

Example:

- **Liquidity management in LVPS - ABM for treasurer's activity in money market**
(see Arciero & al 2012)

Benefits

Challenges

Validation

Calibration

Truly dynamic approach

Includes the strategic behavioral effects

(High) complexity and model risk
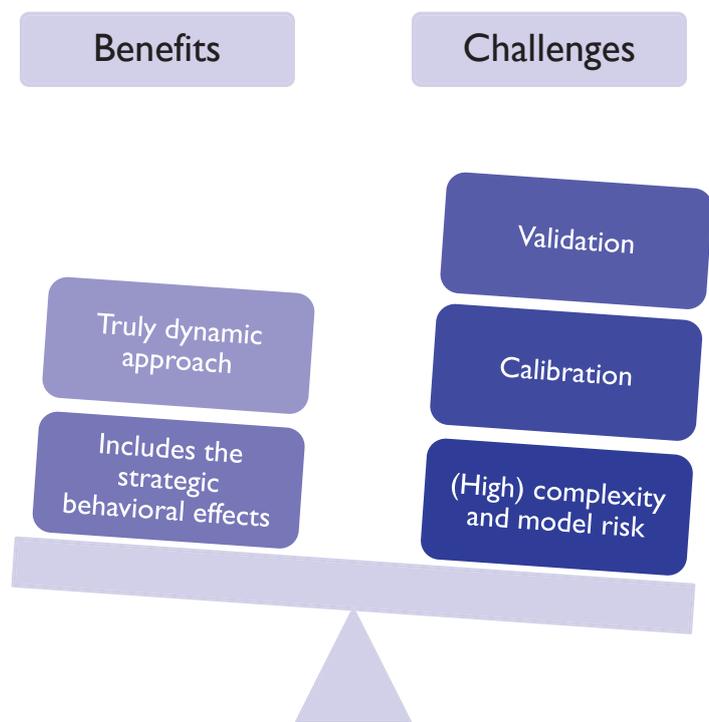
II.   Organisation, TARGET2 simulator?

The TARGET2 simulator service is based on three components:

1. a granular high-quality dataset of entire TARGET2
2. a simulator software that can closely approximate the TARGET2 settlement processes
3. an infrastructure that allows for secure remote access to the data and analysis software to authorized users

- Available since 2010, fully operational since 2012
- Analysis environment, not live monitoring
- Used by Eurosystem overseers and operators
(now also for macro prudential research) See ECB 2010

target2
Simulator

II.   Focus points of current work

- **Drivers and priorities**
    1. **Oversight relevance** e.g. based on the (new) requirements of the CPSS-IOSCO Principles for FMI's
    2. **Support for other Eurosystem tasks**
    3. **New approaches or development of oversight**

- **Work in four categories**
    - **Stress testing of TARGET2**
    - **Payment patterns and behavioural indicators**
    - **Tiering and links**
    - **Money market database based studies**

II.   Focus point: Stress testing

- **Joint work by operators and overseers**
- **Replication of TARGET2 setup with simulations**
- **Multiple scenarios based on**
    - **Data from different periods**
    - **Various scenarios for source or type of initial shock**
    - **Various levels of initial shock**
- **Indicators for system wide impacts**
    - **Number and value of unsettled payments, queues, additional liquidity needs**
    - **Ability of TARGET2 to operate in stress.**

- **See e.g. IMF (2012) or BoF (2009) for methods or tools**

II. Focus point: Indicators and patterns

- **Indicators for**
  - volume and value of payments
  - timing of payments
  - liquidity efficiency
  - usage of institutional features
- **Spotting the patterns and changes in behaviour of participants**
- **Goal in improved monitoring tools or early warning indicators**
- **Example: Is there window dressing in the use of intraday liquidity as a result of the forthcoming BCBS monitoring?**
- **See e.g. R. Heijmans & al (2011), M. Diehl (2013)**

II. Focus point: Tiering and links

Data in TARGET2 simulator shows indirect participants

1. **Descriptive statistics and time series of tiering in T2 according to minimum monitoring requirements (PFMI 3.19.5)**
   a) Proportion of indirect activity
   b) Direct participants with many 2nd tier clients
   c) Indirect participants with big value or volume
   d) Indirect participants which are large compared to their access point

2. **Scenarios or research questions to analyse risks (future work)**

II.   Focus point: Money market

- **Database of Money market transactions allows answers on many (research) questions**
  - **What happened during the financial crisis in the money market?**
  - **Structure of interbank lending? How did that change?**
  - **What determines the price?**
  - **How is the liquidity from (non standard) monetary policy operations distributed?**
- **Strong interest and linkages e.g. to**
  - **financial stability and analysis of contagion**
  - **market operations**

  …but not so direct and strong *oversight relevance*

Next steps and the (ever)lasting challenges

1. **From pioneering into operational tools**
   - **Signal quality of indicators**
   - **Confidentiality barriers**

2. **Balance of model details**

3. **Inclusion of relevant (!) dynamic behavioral elements**

4. **Mismatch of available data and real risks?**

III. Summary

- **Analytical work provides**
  - **In depth risk analyses and quantitative results**
  - **Cross system comparisons**
  - **Deepening and value added for the oversight**
- **..but it requires**
  - **Good data sources**
  - **Resources with strong data management and IT skills**
  - **Understanding of the systems and market
    – what stories are there in the data**

- **Lots of interesting work based on TARGET2 is in the pipeline – stay tuned!**

References

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- IMF, Macrofinancial Stress Testing—Principles and Practices (2012)
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- ECB public decision from July 2010 on T2-simulator: "Access to and use of certain TARGET2 data"