

Oversight approaches and simulation techniques for modeling liquidity needs in the payments system

Financial Infrastructure Week - Rio de Janeiro, March 2011

Joaquín Bernal R.

*Chief Payment Systems and Banking Operation Officer
Banco de la República (Colombia)*

jbernara@banrep.gov.co



Disclaimer: The opinions expressed in this presentation are the sole responsibility of the presenter. Comments by Bruce Summers on a preliminary version are appreciated. Valuable contributions by Clara Machado and Carlos León are also acknowledged and appreciated.

Agenda

- Lessons from recent developments and their implications for the oversight framework
- Assessing systemic risk within the payments system
- Main results and analysis
- Concluding remarks



Lessons from recent developments

Too-connected-to-fail (TCTF) institutions were key in recent episodes...

Before...

Big banks were considered...

- the most connected.
- the institutions that most concentrated liquidity and payments
- the main source of systemic risk.
- the only capable of affecting “widows or orphans” (i.e. the public)
- the most regulated and supervised.
- the target of the tools for crisis prevention and management (lender of last resort, deposit insurance)
- Banking systemic risk was the key.
- “Funding liquidity” crisis approach

Why?*

- Deregulation
- Disintermediation
- Pursuit of Returns
- Uniform risk management
- Financial innovation

Now...

Non-bank institutions (securities and insurance firms, mutual and pension funds, others) are also considered...

- heavily connected.
- hubs of liquidity and payments.
- an important source of systemic risk.
- capable of affecting “widows or orphans” via market prices
- More (but still insufficiently?) regulated and supervised.

But tools for crisis prevention and management were not designed for these institutions.

- “Connectedness” is as important as size
- “Market liquidity crisis”

Lessons from recent developments

... strengthening emphasis on macro-prudential approach.

Consequences

Regulation and supervision were too institution-centric to see through to the systemic risk (IMF, 2009)

Micro-prudential approach [...] to systemic risk [...] is insufficient

The connections between components are as important as the components themselves. (León et al., 2011)

[...] preventing failure of an institution is a necessary but not sufficient condition for effective and efficient clearing and settlement where connectedness matters

It is reasonable to put more emphasis on macro-prudential regulation and supervision

From micro to macro-prudential

Micro-prudential approach

Focus: financial institutions

Metrics: financial statements and solvency ratios

Scope: individually analyzing and inspecting financial institutions → default risk

Macro-prudential approach

Focus: financial infrastructures

Metrics: liquidity and connectedness (centrality).

Scope: system –wide perspective on the systemic risk

[...] the use of prudential tools with the explicit objective of promoting the stability of the financial system as a whole, not necessarily of the individual institutions within it.
BIS (2010)

Agenda

- Oversight: from micro-prudential to macro-prudential
- Assessing systemic risk within the payments system
- Main results and analysis
- Concluding remarks



Assessing systemic risk within the payments system

How to identify and assess systemic risk?

TCTF Systemically important institutions

The financial system is *robust-yet-fragile-and-uncertain* due to its complexity, homogeneity and opaqueness. (León et al., 2011)

Metrics: centrality, connectedness.

Advantages:

- able to capture the complexity of the financial system.
- able to identify concealed sources of systemic risk.
- able to recognize the increasing role of the non-bank financial institutions

Disadvantages:

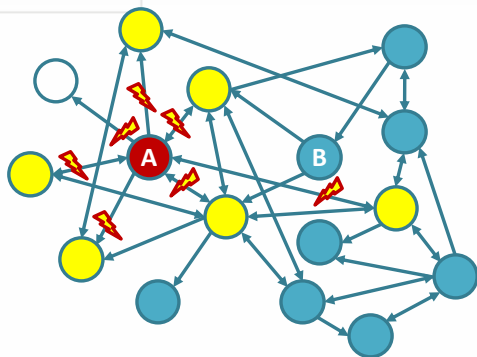
- requires models able to capture context-dependency, non-linearity, complexity
- using accounting data is insufficient
- requires identifying the source of connections → payments
- simulation's assumptions (also referred to as model risk)



Assessing systemic risk within the payments system

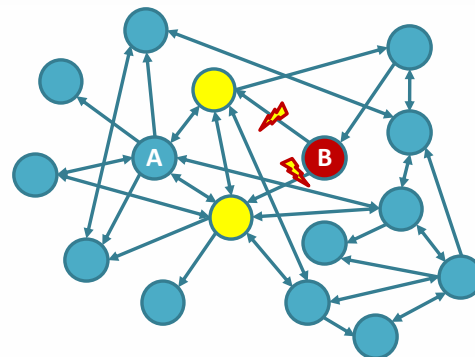
Centrality: A key concept from Network Topology

If A fails...



- Node A...**
- Maintains direct links with 7 nodes
 - Sends payments to 7 nodes
 - Receives payments from 4 nodes

If B fails...



- Node B...**
- Maintains direct links with 3 nodes
 - Sends payments to 2 nodes
 - Receives payments from 1 node

Network Topology allows for identifying central institutions
[centrality: the importance of the participant in the payments system]

Simulation techniques allows for assessing the direct and indirect outcomes of “attacks” on central institutions

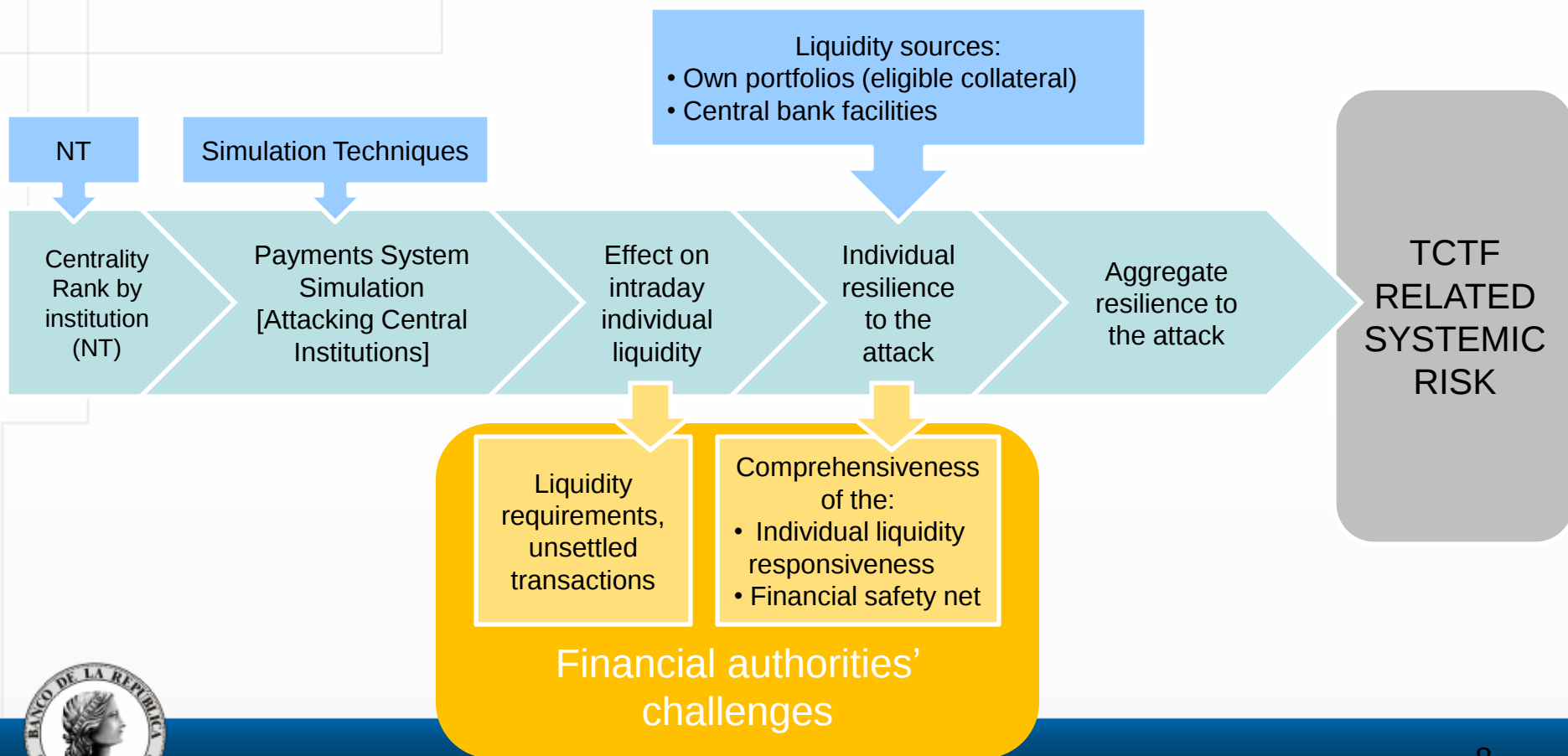
BR Colombia approach:

Network Topology +
Simulation techniques



Assessing systemic risk within the payments system

Banco de la República approach: NT + Simulation Techniques



Agenda

- Lessons from recent developments and their implications for the oversight framework
- Assessing systemic risk within the payments system
- **Main results and analysis**
- Concluding remarks



Main results and analysis

Banco de la República liquidity facilities

	Objective	Scope	Limit	Eligible Collateral	Term
Macro Liquidity [OMO]	Implementing monetary policy	OMO agents (not limited by type of institution)	Linked to reservable liabilities or capital.	Sovereign securities (Central government debt)	1 day
Payments System Liquidity	Intraday Repo	OMO agents (not limited by type of institution)	Linked to reservable liabilities or capital.	Sovereign securities (Central government debt)	< 1 day
	Overnight Repo	OMO agents (not limited by type of institution)	Linked to reservable liabilities or capital.	Sovereign securities (Central government debt)	1 day
Lender of Last Resort [Transitory Liquidity Facility]	Tackling liquidity problems	Credit Institutions Only (Banking)	15% of liabilities with the public	Sovereign securities + financial investment + credit loans	30-180 days

Our concerns regarding central bank's role within the payments system.



Are the liquidity facilities'...

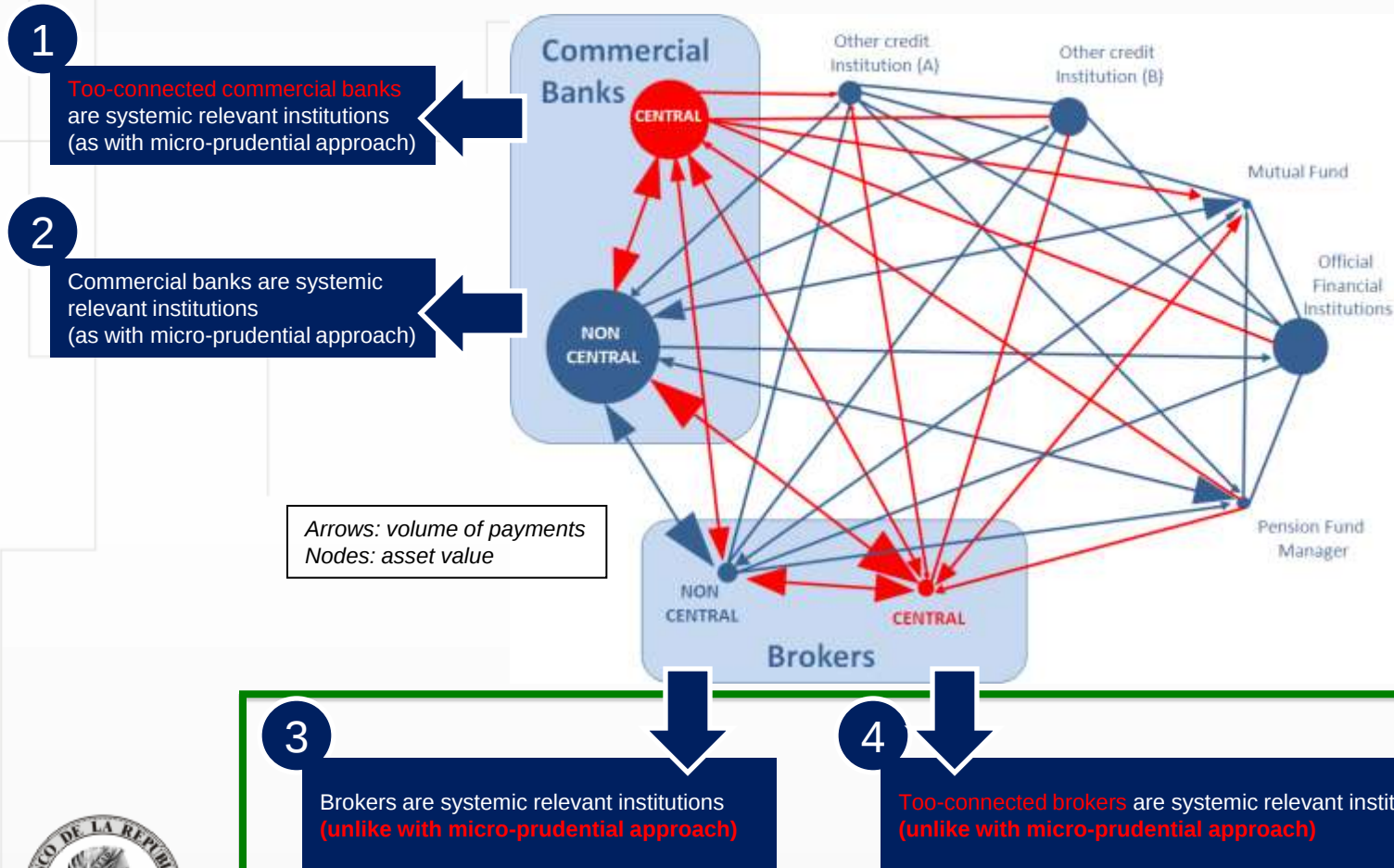
- Scope
- Limits
- Eligible collateral

adequate to cope with systemic shocks?



Main results and analysis

Network topology allowed for **identifying central participants**



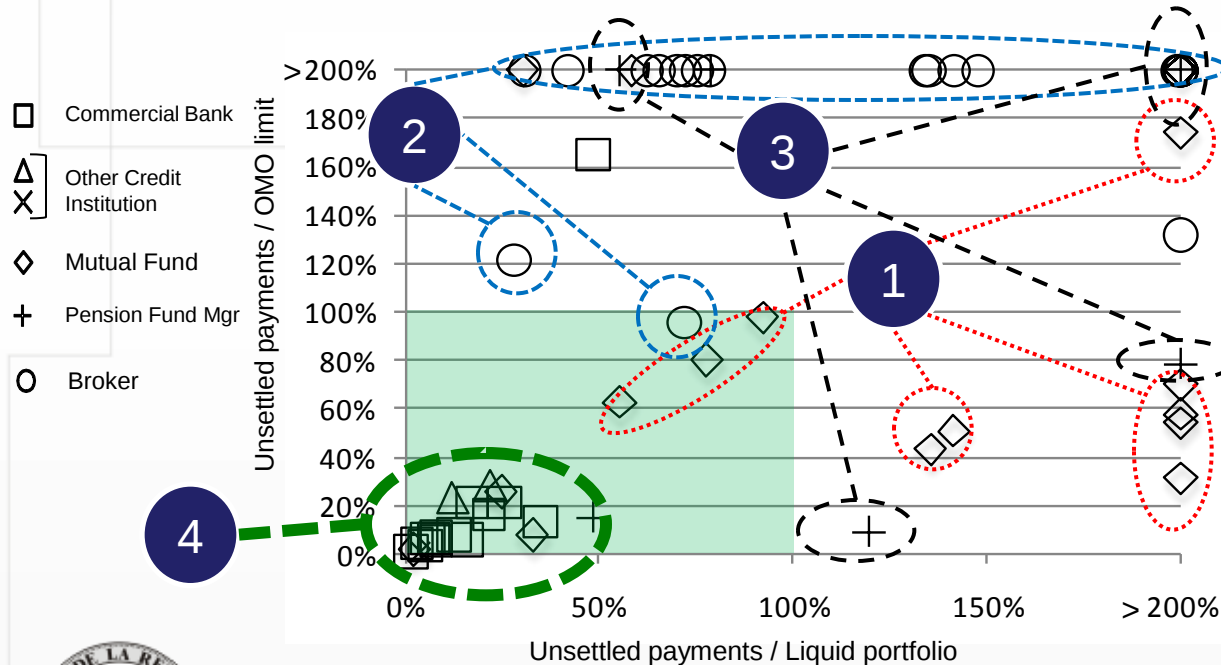
New Info!



Main results and analysis

Simulation techniques allowed for **assessing the outcomes of attacks on (i.e. failure of selected) central institutions**

Attack on foremost central institution



1

On average, Mutual Funds have no liquid portfolio to withstand an attack to a systemic relevant institution

2

On average, Brokers have insufficient access to OMO liquidity to withstand an attack to a systemic relevant institution

3

Some pension fund managers have insufficient access to OMO liquidity and portfolio liquidity to withstand an attack to a systemic relevant institution

4

Banking and credit institutions have enough access to liquidity via OMO and liquid portfolios (+ LLR) to withstand an attack to a systemic relevant institution

New Info!



Main results and analysis

Banco de la República liquidity facilities

	Objective	Scope	Limit	Eligible Collateral	Term
Macro Liquidity [OMO]	Implementing monetary policy	OMO agents (not limited by type of institution)	Linked to reservable liabilities or capital.	Sovereign securities (Central government debt)	1 day
Payments System Liquidity	Intraday Repo	OMO agents (not limited by type of institution)	Linked to reservable liabilities or capital.	Sovereign securities (Central government debt)	< 1 day
	Overnight Repo	OMO agents (not limited by type of institution)	Linked to reservable liabilities or capital.	Sovereign securities (Central government debt)	1 day
Lender of Last Resort [Transitory Liquidity Facility]	Tackling liquidity problems	Credit Institutions Only (Banking)	15% of liabilities with the public	Sovereign securities + financial investment + credit loans	30-180 days

Challenges

It is important to revise...

- OMO limits for Brokers
- Sufficiency of own eligible portfolio of Brokers and Mutual Funds.
- Access to additional liquidity facilities by Brokers → TCTF

... in order to be able to supply liquidity to preserve the payments system's integrity.



Agenda

- Lessons from recent developments and their implications for the oversight framework
- Assessing systemic risk within the payments system
- Main results and analysis
- Concluding remarks



Concluding remarks

- Recent (subprime crisis) and non-recent (1987 crash, LTCM) episodes of turmoil provide evidence of the deficiency emerging from traditional micro-prudential approaches; a macro-prudential approach to systemic risk (oversight) is necessary.
- To be able to oversee financial systems as a whole it is necessary to acquire an comprehensive vision of the payments system, where connections between participants are as important as the participants themselves.
- Banco de la República, pursuant of its oversight and financial stability duties, established in 2010 the Financial Infrastructure Oversight Department...



Concluding remarks

- First results (Machado et al., 2010 & León et al., 2011) are the mainstay of current regulatory challenges and tasks:
 - Limits on ordinary liquidity facilities for non-banking institutions and prudential requirements on own eligible portfolio for Brokers and Mutual Funds
 - Non-ordinary liquidity facilities for too-connected non-banking institutions (i.e. Brokers)
- Results will provide valuable information for financial stability purposes:
 - Assessing liquidity management by non-banking institutions
 - Supporting the Financial Authorities macro-prudential regulatory and supervisory tasks.
 - Promoting a convenient cooperation between the supervision (by the Financial Superintendence) and the oversight (by the central bank)



References

- Arjani, N. and Engert, W., “The Large-Value Payments System: insights from selected Bank of Canada research”, *Bank of Canada Review*, Bank of Canada, Spring, 2007.
- Haldane, A.G., “Rethinking the financial network”, *Speech delivered at the Financial Student Association* (Amsterdam, Netherlands), April, 2009.
- Heffernan, S., *Modern banking*, John Wiley & Sons, 2005.
- International Monetary Fund (IMF), “Initial lessons of the crisis”, February 6th, 2009.
- Landau, J-P, “Complexity and the financial crisis”, *Introductory remarks at the Conference on The Macroeconomy and Financial Systems in Normal Times and in Times of Stress*, Banque de France and Bundesbank, June 8th, 2009.
- León, C.; Machado, C.L.; Cepeda, F.; Sarmiento, M., “*Too-connected-to-fail* Institutions and Payment System’s Stability: Assessing Challenges for Financial Authorities”, *Borradores de Economía*, (Forthcoming), Banco de la República, 2011.
- Leinonen, H. and Soramäki, K., “Simulation: a powerful research tool in payment and settlement systems”, *Journal of Financial Transformation*, Vol.12, 2004.
- Machado, C.L.; León, C.; Sarmiento, M.; Cepeda, F.; Chipatecua, O.; Cely, J., “Riesgo sistémico y estabilidad del sistema de pagos de alto valor en Colombia: análisis bajo topología de redes y simulación de pagos”, *borradores de Economía*, No. 627, Banco de la República, 2010.
- Rebonato, R., *Plight of the Fortune Tellers*, Princeton University Press, 2007.



Thank you very much

Financial Infrastructure Week - Rio de Janeiro, March 2011

Joaquín Bernal R.

Chief Payment Systems and Banking Operation Officer

Banco de la República (Colombia)

jbernara@banrep.gov.co

