TWO MAIN PRODUCTS OF COLOMBIA

A Dynamic Approach to Intraday Liquidity Needs

The Payment and Settlement System Simulation Seminar and Workshop
Bank of Finland, Helsinki
August 28-29, 2014

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Outline

- Intraday liquidity definitions
- Motivation and purpose of

  '*Dynamic Approach to Intraday Liquidity Needs*'
- Methodology
- Results and conclusions

Definitions

- Intraday Liquidity:

  Funds which can be accessed during the business day, usually to enable banks to make payments in real time.

- Intraday Liquidity Risk:

  The risk of a bank failing to manage its intraday liquidity, leading it to fail to meet an expected payment obligation, thereby affecting its own liquidity and that of other parties.

Source: CPSS *A glossary of terms used in payments and settlements systems*, March 2003.

Motivation

Significant changes in international regulations in response to the growing importance of intraday liquidity risk management.

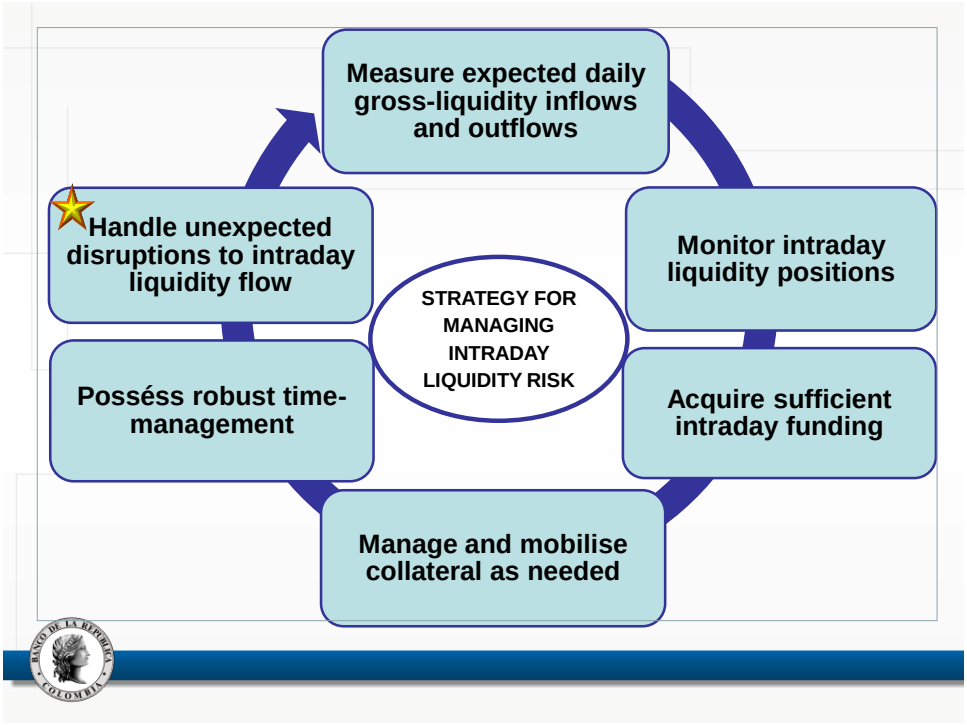
Basel Committee on Banking Supervision (BCBS) supports intraday liquidity risk management as a mechanism for mitigating systemic risk.

Motivation

2008

The 8th principle for
intraday liquidity risk management
was introduced in

'*Principles for Sound Liquidity Risk Management and Supervision*'



Motivation

2013

The BCBS formulated monitoring tools for intraday liquidity management

4 possible intraday liquidity stress scenarios were suggested:

to quantify the availability and use of intraday liquidity under conditions of non-normality, one of which is - **counterparty stress**

Purpose

Designed and developed a hands-on methodology on "how" to implement counterparty-stress scenarios…

…to reliably quantify impact and systemic effects of liquidity risk

…to formulate effective policy recommendations that could mitigate potential impact.

Purpose

And then to present a dynamic hands-on approach that uses:

– Fund transfer data from Colombian Large Value Payment System (know as “CUD”)

– The Bank of Finland’s simulator, Version 2

Purpose

And finally, to estimate intraday liquidity needs for each selected financial institution after a failure-to-pay by its main **discretionary payer**.

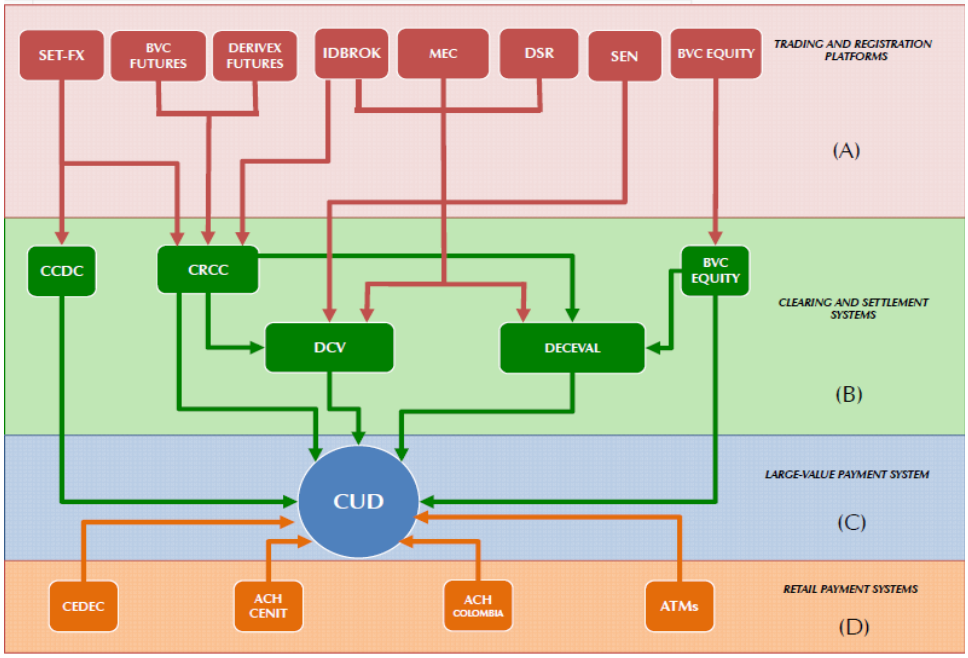
Explanation of Discretionary Payments

Payment made **solely** from the willingness of the originating entity

… and ***not*** …

from any clearing or settlement infrastructure.

Colombian FMIs



Source: Banco de la República (2012).

Discretionary Payments

Include uncollateralized interbank loans

Proven … in times of crisis to vanish!

Lenders implement precautionary measures to reduce, retain or ... ***halt*** … this kind of liquidity.

Network Topology

Network topology
is used to pinpoint
major systemic financial institutions

This **pinpointing** serves to
measure the effect of simulation attacks

Link:
http://www.banrep.gov.co/en/borrador-754

Institution type	Number of selected entities	% share in outgoing payments		Number of selected entities	% share in outgoing payments	
		By type	Total System *		By type	Total System *
	April 2012			April 2013		
Commercial Banks	10	85,22%	45,4%	9	81,72%	47,6%
Financial Corporations	2	96,41%	8,7%	2	87,05%	6,4%
Trust Companies	11	82,73%	5,6%	9	83,27%	6,3%
Brokerage Firms	8	82,59%	15,4%	7	81,58%	12,6%
Selected entities	31		75,2%	27		72,9%

* This does not include outcoming paymets from DGCPTN neither BR

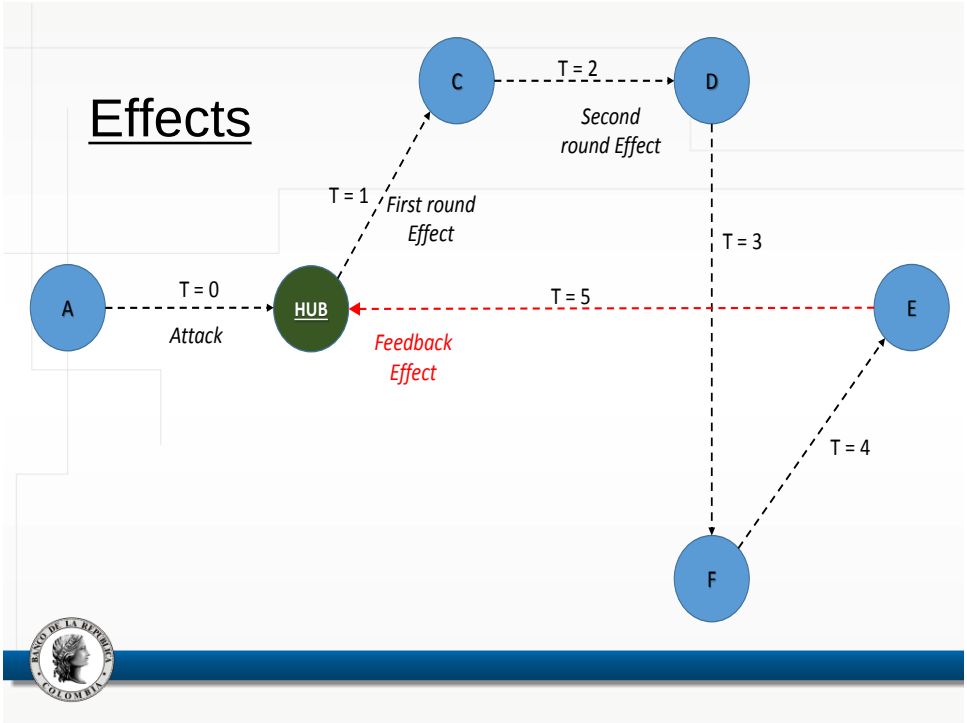
Source: Authors with information of CUD-RTGS

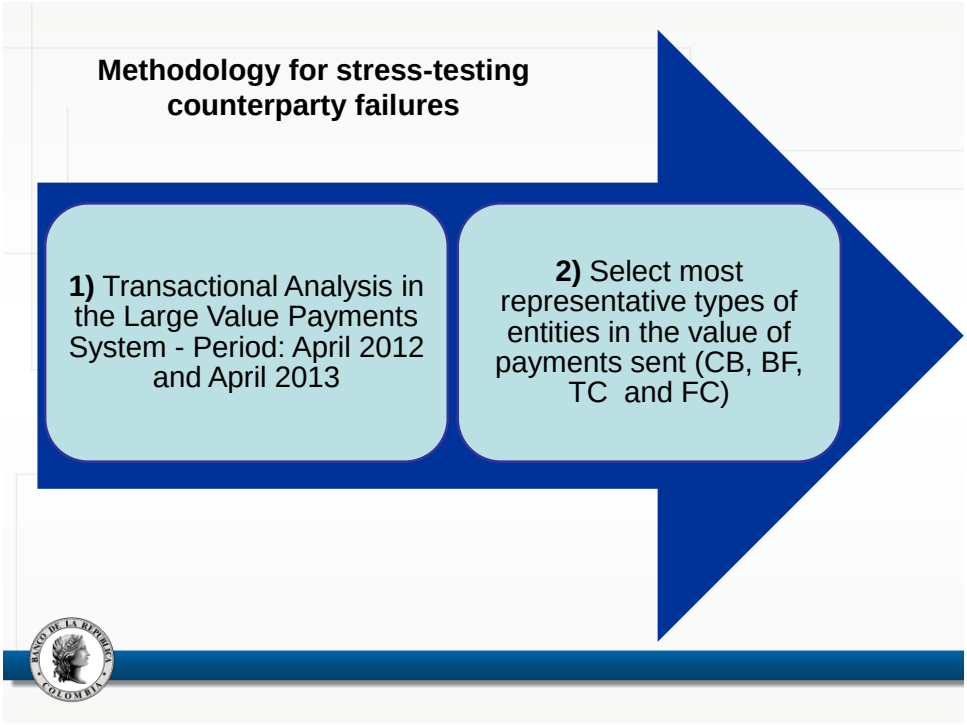
Effects

The dynamic outcome of this simulation quantifies 3 different effects that arise from the failure-to-pay

Effects

1. **Direct counterparty effect**
   Non-payments from originally attacked entity
2. **Second-round effect**
   Non-payments in the rest of the system entities
3. **Feedback effect**
   From system sub-parties generated from point 2. failing to pay the institution that originally caused the event


Effects
C
T = 2
D
Second
round Effect
T = 1
First round
Effect
T = 3
A
T = 0
Attack
HUB
T = 5
E
Feedback
Effect
T = 4
F


Methodology for stress-testing counterparty failures
1) Transactional Analysis in the Large Value Payments System - Period: April 2012 and April 2013
2) Select most representative types of entities in the value of payments sent (CB, BF, TC and FC)

…Methodology

3) Select the entities to attack within each type. Top Systematically Important under topology networks metric: HUBS

4) Daily identification of each entity to attack of its main counterparty as provider of liquidity by discretionary funds concepts and remove…

…Methodology

5) Perform approx. 1200 BOF-PSS2 scenario simulations, using the sequence of transactions resulting from the previous point, in order to estimate:

…For attacked entity: Additional amount of intra-day liquidity to face failures of its main counterparty

…For other entities: Needs of intraday liquidity effect resulting as second-round effect

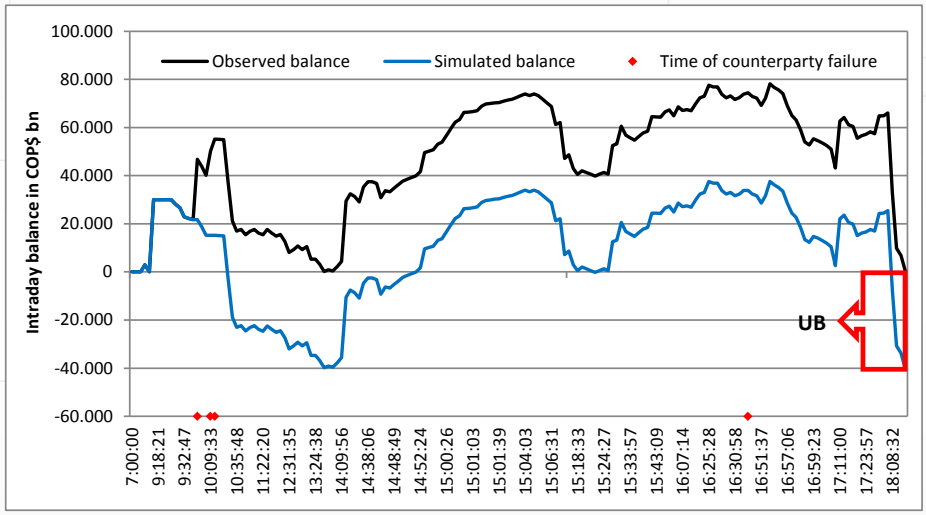
…Methodology

6) To evaluate how well prepared, in terms of intraday liquidity, the entities would be to face failures of its main counterparty for the above-mentioned concepts…

To determine the optimal level of liquidity each entity should have in order to mitigate systemic effects in LVPS…

Periodically dynamically evaluate liquidity needs taking...

Intraday Balance and Upper Bound



Intraday Liquidity Sufficiency Index

Entities	Number of days simulated	ILSI estimated for original observed payments	Simulated attack of counterpartie's failure with observed opening balance			Simulated attack of counterpartie's failure with increased opening balance		
			Number of days	ILSI estimated	Additional required liquidity (as % of payment sent)	Number of days	ILSI estimated	Additional required liquidity (as % of payment sent)
Brokerage Firms								
L.a	22	1,14	22	0,083	4,9%	0	>1	0,0%
L.b	22	2,00	22	0,019	12,4%	20	0,095	10,4%
L.c	22	2,84	22	0,022	10,5%	16	0,295	6,3%
L.d	22	1,11	22	0,069	23,9%	9	0,637	4,8%
L.e	22	6,09	22	0,002	19,6%	22	0,267	14,4%
L.f	22	1,00	22	0,466	3,0%	13	0,671	1,2%
L.g	22	1,07	22	0,000	59,0%	22	0,038	56,8%
Weighted average by submitted payments					13,7%			8,4%

Results - with opening balance observed - April 2013

Entities	Number of days simulations were done	Amount of liquidity attacked entity did not receive from its main counterpart		Payments not settled by entity attacked (Direct effect)			Payments not settled by remaining affected entities in the system (Second-round effect)			Payments not received by entity attacked (Feedback effect)			Total average of unsettled payments as % of total payments sent for settlement
		Average daily value (*in thousands of millions of COP$*)	as % of average total value settled in the system	Number of days	Average daily value (*in thousands of millions of COP$*)	as % of average total value settled in the system	Number of entities affected	Average daily value (*in thousands of millions of COP$*)	as % of average total value settled in the system	Number of days	Average daily value (*in thousands of millions of COP$*)	as % of total value settled in the system	
Brokerage Firms													
La	22	57,6	0,15%	22	960,7	2,51%	60	5.114,9	13,38%	22	245,4	0,64%	16,54%
Lb	22	61,5	0,16%	22	415,9	1,09%	58	5.095,1	13,33%	22	90,3	0,24%	14,66%
Lc	22	41,0	0,11%	22	139,1	0,36%	14	960,6	2,51%	7	22,6	0,06%	2,94%
Ld	22	75,0	0,20%	22	202,3	0,53%	25	1.480,1	3,87%	15	14,9	0,04%	4,44%
Le	22	40,9	0,11%	22	173,0	0,45%	56	4.549,8	11,91%	22	47,0	0,12%	12,48%
Lf	22	7,5	0,02%	22	231,6	0,61%	63	6.401,4	16,75%	22	73,1	0,19%	17,55%
Lg	22	136,2	0,36%	22	229,2	0,60%	59	5.671,4	14,84%	21	37,9	0,10%	15,54%

Results - With opening balance observed + TES April 2013

Entities	Number of days simulations were done	Amount of liquidity attacked entity did not receive from its main counterpart		Payments not settled by entity attacked (Direct effect)			Payments not settled by remaining affected entities in the system (Second-round effect)			Payments not received by entity attacked (Feedback effect)			Total average of unsettled payments as % of total payments sent for settlement
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Brokerage Firms													
La	22	57,6	0,15%	0	0,0	0,00%	0	0,0	0,00%	0	0,0	0,00%	0,00%
Lb	22	61,5	0,16%	20	406,0	1,06%	7	215,4	0,56%	9	5,6	0,01%	1,64%
Lc	22	41,0	0,11%	16	81,7	0,21%	2	45,2	0,12%	2	1,0	0,00%	0,33%
Ld	22	75,0	0,20%	9	91,7	0,24%	1	12,5	0,03%	0	0,0	0,00%	0,27%
Le	22	40,9	0,11%	22	143,8	0,38%	4	140,3	0,37%	7	1,0	0,00%	0,75%
Lf	22	7,5	0,02%	13	225,5	0,59%	16	670,0	1,75%	13	19,1	0,05%	2,39%
Lg	22	136,2	0,36%	22	225,6	0,59%	7	318,3	0,83%	11	7,9	0,02%	1,44%

Conclusions

Non-linear relationship

between the initial failure-to-pay by a specific institution and the failure-to-pay by the rest of the system.

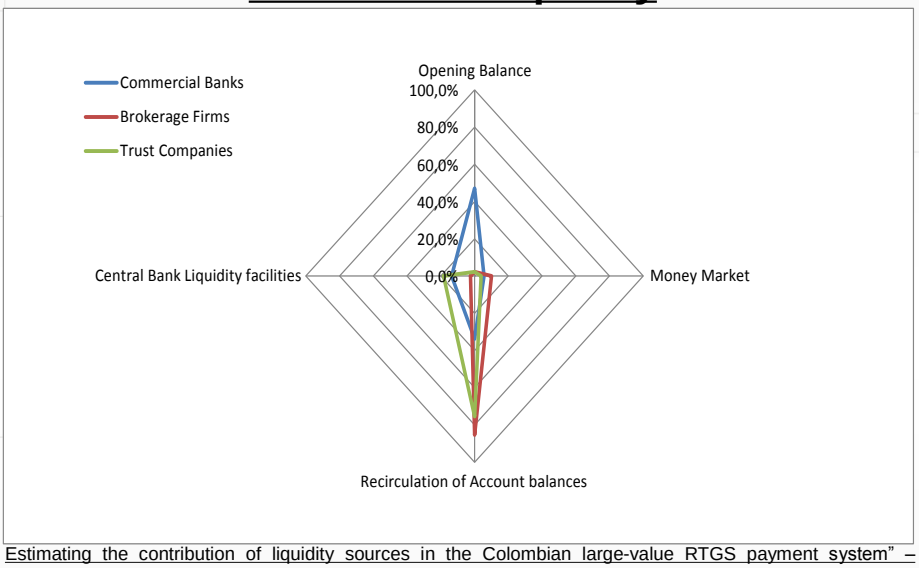
These non-linearities are result of

(i) Payment synchronization

(ii) Network structure of fund transfers and

(iii) The importance of recirculation of balances resulting from coordinated payments between participants in the system as a source of liquidity.

Sources of Liquidity



Estimating the contribution of liquidity sources in the Colombian large-value RTGS payment system" – Volume 6 Number 2- Journal of Payments Strategy & Systems - Summer 2012

Conclusions

Pinpointing major systemic entities is useful, because if their major counterparties fail to send discretionary payments, this default could magnify the impact on the liquidity of the rest of the system.

Our simulation of counterparty stress scenarios, identifies and quantifies the value of defaults.

Conclusions

- Recognizing the potential effects of network externalities in these systems is useful, because that creates awareness of how an entity's individual actions may cause problems for other participants in the system and … in the end … affect itself.

Conclusions

- Setting the level of liquidity required to deal with these kinds of default situations should, among other considerations, take into account both the cost of liquidity the participants must incur, as well as the degree of coverage desired to protect the system.

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