BANQUE CENTRALE DU LUXEMBOURG

EUROSYSTÈME

Market and Funding Liquidity Stress Testing of the Luxembourg Banking Sector

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Outline

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II. The modeling framework

III. Data, haircuts and run-off rates

IV. Simulation results

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I - Motivation

A major policy message from the crisis is the need to develop the macro-prudential element of financial stability policy

- Quantitative operating targets to measure and monitor the determinants of systemic risk
- Macro-prudential instruments

Macro stress tests belong to the set of operating instruments that have been used to trace the response of the financial system to large but plausible exogenous shocks (Drehmann, 2009)

Only in 2007, it became clear that preserving financial stability required strengthening the understanding of the role:

- Interconnectedness among financial institutions
- Common exposures to risks
- Endogeneity of agents' responses
- Conditionality of parameters on stress events
- Feedback effects of banks' actions of asset prices and reputation

The seizing up of the interbank market dramatically revealed the endogeneity of liquidity, and the ensuing need to consider liquidity risk in stress testing exercises of the banking system.

Market liquidity and funding liquidity had not been taken into account by banks, central banks and supervisors in ways that make clear the systemic implications of liquidity shocks (IMF, 2008).

Most available stress testing exercises and CFP do not consider the feedback effects of banks' actions on asset prices (ECB, 2008).

Following the Law of 24/10/08 making the BCL responsible for markets' and operators' liquidity surveillance, tools are being developed:

- Rychtarik (2009) studies the impact of four liquidity shocks on banks' liquidity ratios
- Rychtarik an Stragiotti (2009) describe the liquidity position of banks across peer banks and over time using 21 risk factors
- This study is an operational follow up (based on van den End, 2008, De Nederlandsche Bank)

II - The Modeling Framework

The model is set up to measure the impact of market and liquidity shocks on banks' liquidity buffers

- Approach is top-down but bottom-up compatible
- Framework is stochastic to incorporate the possibility of rapid changes in asset values, the short supply of stress situations data, and to proxy for uncertainty in parameters and banks' reactions
- Studies market and funding liquidity shocks
- Incorporates cross-jurisdictional issues:
  - the possibility of parent-bank's funding drying up
  - currency risk
- Has second round effects, and can include reputation effects

III - Data, haircuts and run-off rates

- The liquidity buffer is a portfolio of high quality, highly liquid unencumbered securities as defined in the BIS 2009 guidelines; those guidelines are also followed for the definition of the haircuts and run-off rates.
- The quarterly database covers 52 banks for the period 2006Q1-2009Q3; as of 2009Q3, the sample represents nearly 90 percent of total bank assets.
- The most significant off-balance sheet items included are committed credit lines.
- Each item is evaluated according to a homogeneous set of haircuts, applicable to each financial instrument of the same type (e.g., shares, debt instrument, fund) and featuring the same economic characteristics (i.e., currency, country of origin, type of counterparty).

The reporting database used for this study encompasses several dimensions:

- Type of balance sheet item
- Type of counterparty
- Country of origin of the counterparty
- Currency of issuance of each type of financial instrument

Haircuts are based on banks' practice in Luxembourg, Standard & Poor's (2007), ECB requirements and also judgement

Table 1- Liquidity buffer: haircuts applied to selected balance sheet items

				RESIDUAL MATURITY - HAIRCUTS			
TYPE OF BS ITEM	TYPE OF ISSUER	CURRENCY OF ISSUANCE	COUNTRY OF ISSUANCE	<1 year	1<year< 2	year>2	unspecified
listed stocks		EUR	EURO AREA	n/a	n/a	n/a	50%
		USD	US	n/a	n/a	n/a	50%
		JPY	JAPAN	n/a	n/a	n/a	50%
		AAA FOREIGN CCY RATING	AAA FOREIGN CCY RATING	n/a	n/a	n/a	50%
		EUR	EURO AREA	n/a	n/a	n/a	50%
		USD	US	n/a	n/a	n/a	50%
		JPY	JAPAN	n/a	n/a	n/a	50%
		AAA FOREIGN CCY RATING	AAA FOREIGN CCY RATING	n/a	n/a	n/a	50%
Debt financial instruments	credit institution	EUR	EURO AREA	20%	30%	40%	50%
			G10 (NON EEA)	30%	40%	50%	60%
			EEA (NO EURO AREA)	40%	50%	60%	70%
		USD	EURO AREA	30%	40%	50%	60%
			G10 (NON EEA)	40%	50%	60%	70%
			EEA (NO EURO AREA)	50%	60%	70%	80%
		JPY	EURO AREA	30%	40%	50%	60%
			G10 (NON EEA)	40%	50%	60%	70%
			EEA (NO EURO AREA)	50%	60%	70%	80%
		AAA FOREIGN CCY RATING	EURO AREA	50%	60%	70%	80%
			G10 (NON EEA)	60%	70%	80%	90%
Debt financial instruments	non financial institutions	EUR	EURO AREA	40%	50%	60%	70%
			G10 (NON EEA)	50%	60%	70%	80%
			EEA (NO EURO AREA)	60%	70%	80%	90%
		USD	EURO AREA	50%	60%	70%	80%
			G10 (NON EEA)	60%	70%	80%	90%
			EEA (NO EURO AREA)	70%	80%	90%	100%
		JPY	EURO AREA	50%	60%	70%	80%
			G10 (NON EEA)	60%	70%	80%	90%
			EEA (NO EURO AREA)	70%	80%	90%	100%
		AAA FOREIGN CCY RATING	EURO AREA	70%	80%	90%	100%
			G10 (NON EEA)	80%	90%	100%	100%
Debt financial instruments	Government	EUR	EURO AREA	2,5%	5,0%	7,5%	10,0%
			G10 (NON EEA)	5,0%	7,5%	10,0%	12,5%
			EEA (NO EURO AREA)	7,5%	10,0%	12,5%	15,0%
			X1	70,0%	80,0%	90,0%	100,0%
		USD	EURO AREA	5,0%	7,5%	10,0%	12,5%
			G10 (NON EEA)	7,5%	10,0%	12,5%	15,0%
			EEA (NO EURO AREA)	10,0%	12,5%	15,0%	17,5%
			X1	80,0%	90,0%	100,0%	100,0%
		JPY	EURO AREA	5,0%	7,5%	10,0%	12,5%
			G10 (NON EEA)	7,5%	10,0%	12,5%	15,0%
			EEA (NO EURO AREA)	10,0%	12,5%	15,0%	17,5%
			X1	80,0%	90,0%	100,0%	100,0%
		AAA FOREIGN CCY RATING	EURO AREA	7,5%	10,0%	12,5%	15,0%
			G10 (NON EEA)	10,0%	12,5%	15,0%	17,5%
			EEA (NO EURO AREA)	12,5%	15,0%	17,5%	20,0%
			X1	90,0%	100,0%	100,0%	100,0%
Money market funds	Credit institution	EUR	EURO AREA	n/a	n/a	n/a	50%
		USD	US	n/a	n/a	n/a	60%
		JPY	JAPAN	n/a	n/a	n/a	60%
		AAA FOREIGN CCY RATING	AAA FOREIGN CCY RATING	n/a	n/a	n/a	70%
Cash	All sectors	All currencies	All countries	0%	0%	0%	0%

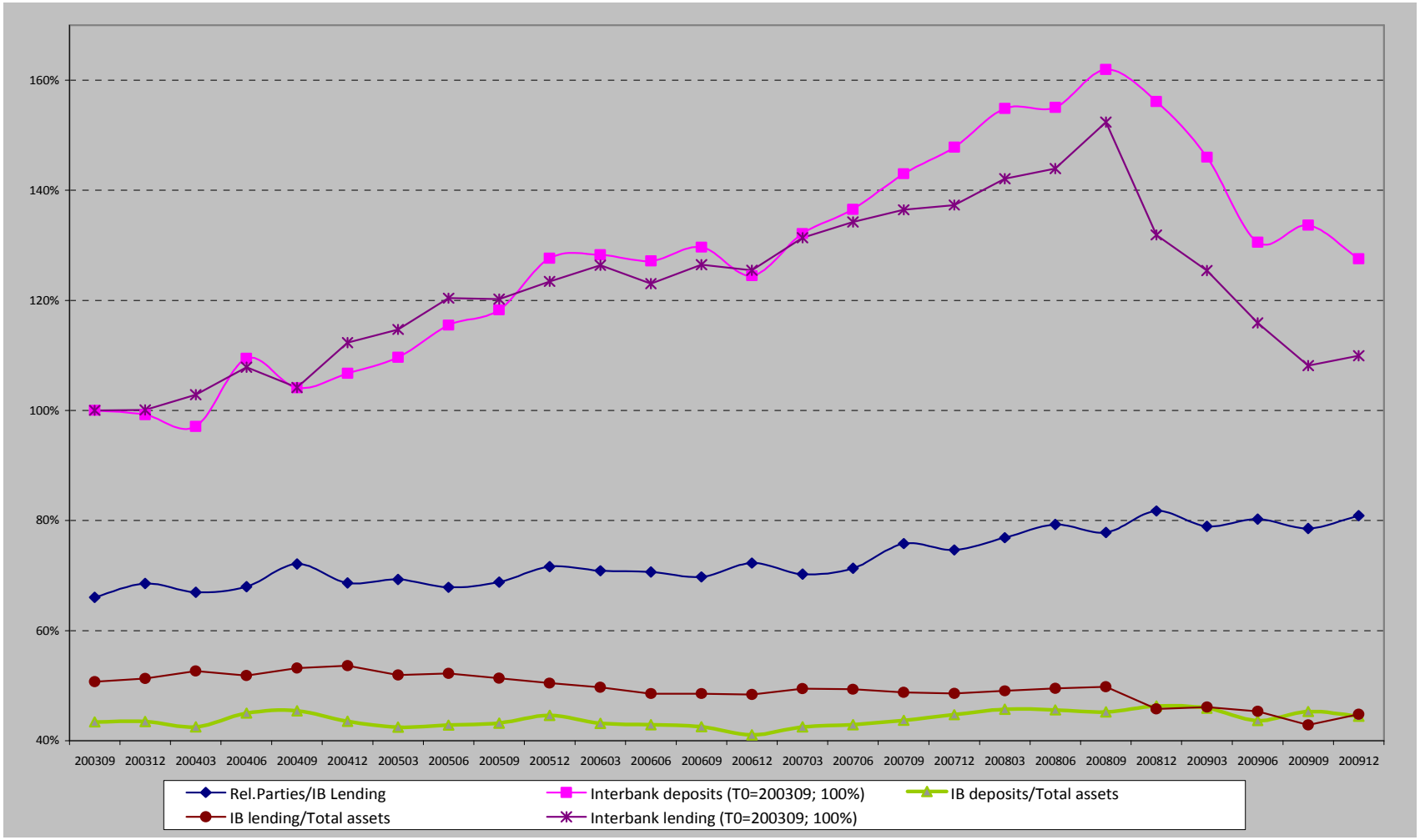
Table 2 - Run-off rates applied to selected stressed balance sheet items

				RESIDUAL MATURITY - RUN-OFF RATES			
TYPE OF BS ITEM	TYPE OF ISSUER	CURRENCY OF ISSUANCE	COUNTRY OF ISSUANCE	<1 year	1<year<2	year>2	unspecified
Liabilities							
Deposits - retail - Luxembourg		all currencies	all geopolitical areas		Not / applied		20%
Deposits - retail - non Luxembourg		all currencies	all geopolitical areas		Not / applied		20%
Deposits - corporate - all		all currencies	all geopolitical areas		Not / applied		50%
Deposits - banks - non Related Parties		all currencies	all geopolitical areas		Not / applied		65%
Fiduciary deposits - banks 1Y		all currencies	all geopolitical areas		Not / applied		90%
				RESIDUAL MATURITY - HAIRCUTS			
TYPE OF BS ITEM	TYPE OF ISSUER	CURRENCY OF ISSUANCE	COUNTRY OF ISSUANCE	<1 year	1<year<2	year>2	unspecified
Assets							
Interbank deposits	Credit institution	all currencies	EUROAREA	10%	30%	50%	70%
			G10 (NON EEA)	20%	40%	60%	80%
			EEA (NO EUROAREA)	20%	40%	60%	80%

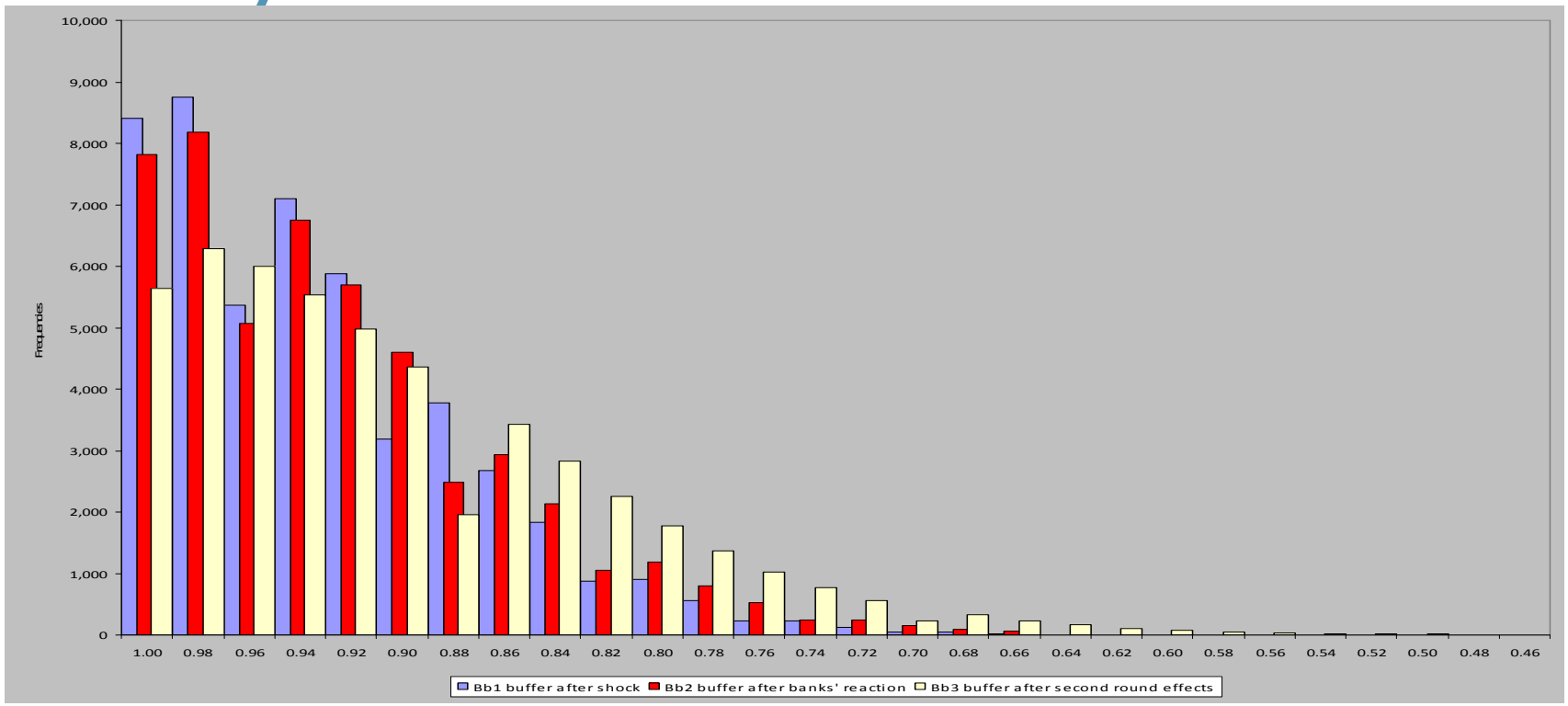
IV. Simulation results

- Systemic shock to interbank loans granted by the Luxembourg banking sector
- Idiosyncratic shock to interbank loans granted by individual Luxembourg banks
- Shock to related-party deposits
- Run-on-deposits shock

Relevance of the interbank market in Luxembourg

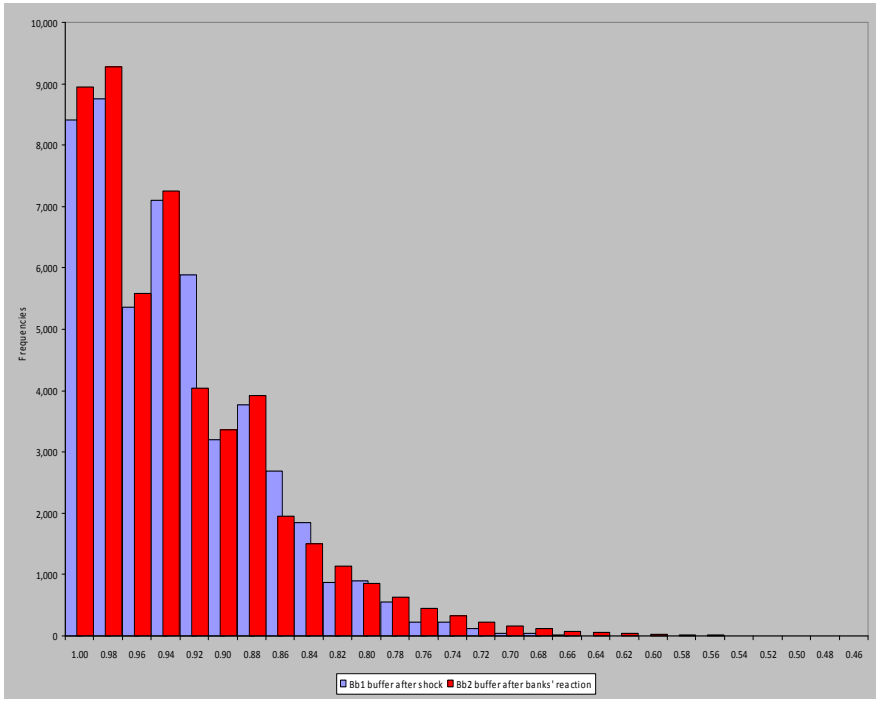


Systemic shock to the interbank market



SYSTEMIC SHOCK TO INTERBANK MARKET	Worst case scenarios (in repeated sampling)	
	Largest potential loss	Lowest potential share of Initial Buffer
Shock impact on the initial buffer (Bb1)	36%	64%
Buffer after reaction (Bb2)	34%	66%
Shock impact after second round effects (Bb3)	48%	52%

Systemic shock to the interbank market (excluding related parties)



SYSTEMIC SHOCK TO INTERBANK MARKET *(EXCLUDING RELATED PARTIES)*	Worst case scenarios (in repeated sampling)	
	Largest potential loss	Lowest potential share of Initial Buffer
Shock impact on the initial buffer (Bb1)	46%	54%
Buffer after reaction (Bb2)	44%	56%
Shock impact after second round effects (Bb3)	n/a	n/a

Highlights of the results of the systemic interbank shock:

- The likelihood of the banking sector incurring a severe loss increases
- The critical role of related parties in the local banking sector evinces itself
- Second round effects do not play a role in the context of shocks affecting or originating from related parties transactions

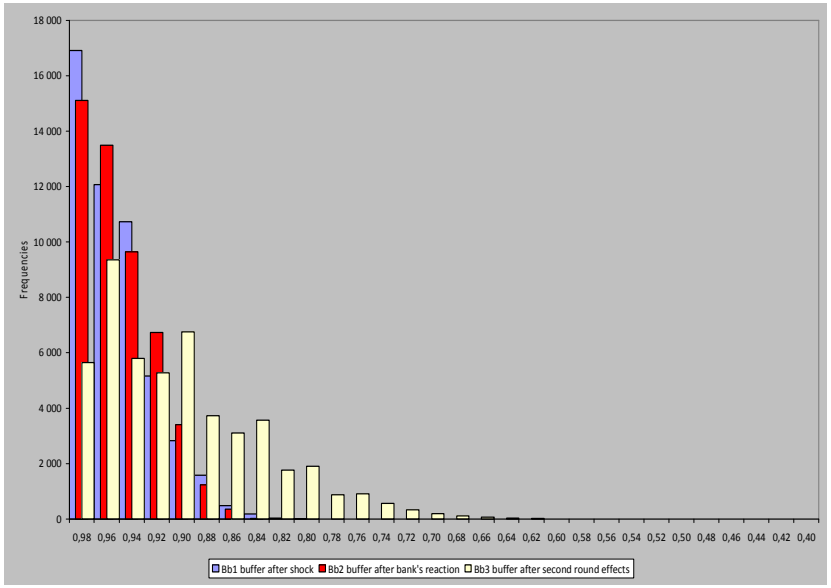
Summary of banking system results for the interbank shock

(Million euros unless stated otherwise)

Total number of banks = 52	Number of reacting banks = 37	
	s=1,1	s=1,5
Initial buffer	15 016	--
Buffer after shock	12 250	--
Buffer after mitigating actions	12 284	--
Buffer after second round effects	11 074	5 781
Percent loss wrt initial buffer	-26	-61
Buffer @ 5 percent tail	10 828	4 800
Percent loss wrt initial buffer	-28	-68
Buffer @ 1 percent tail	9 563	3 864
Percent loss wrt initial buffer	-36	-74
Number of banks with negative buffer	1	14

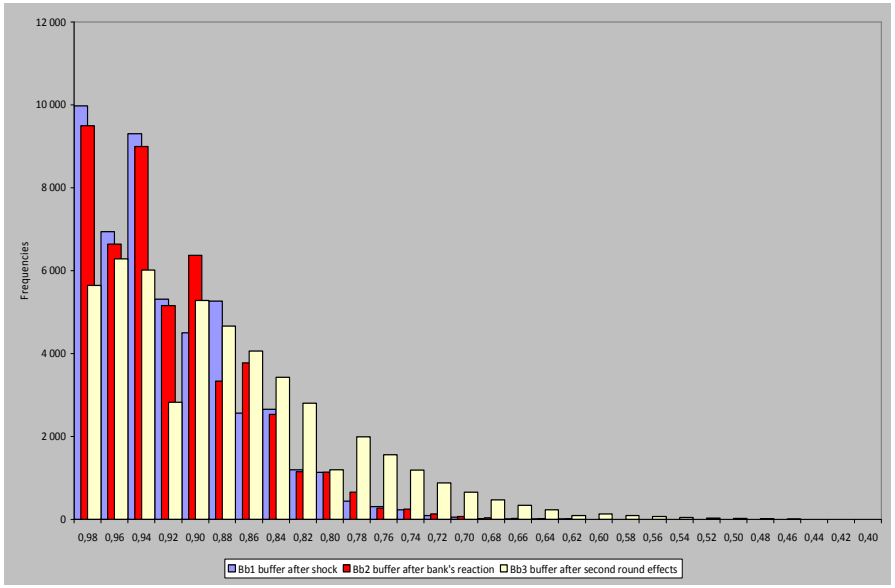
Shock to related-party deposits

Bank D



BANK D - SHOCK TO RELATED PARTIES DEPOSITS	Worst case scenarios (in repeated sampling)	
MULTI-LINE BANK (Main business act.)	Largest potential loss	Lowest potential share of Initial Buffer
Shock impact on the initial buffer (Bb1)	22%	78%
Buffer after reaction (Bb2)	14%	86%
Shock impact after second round effects (Bb3)	38%	62%

Bank E



BANK E - SHOCK TO RELATED PARTIES DEPOSITS	Worst case scenarios (in repeated sampling)	
MULTI-LINE BANK (Main business act.)	Largest potential loss	Lowest potential share of Initial Buffer
Shock impact on the initial buffer (Bb1)	41%	59%
Buffer after reaction (Bb2)	37%	63%
Shock impact after second round effects (Bb3)	52%	48%

V. Conclusions

1. Banks' business lines shape the net effect of the shocks on banks' stochastic liquidity buffers.

2. Related parties play a fundamental role in banks' reactions to shocks.

3. Second-round effects seem to play an important role on Luxembourg banks' buffers.

4. Results indicate the significance of system-wide measures to minimize the systemic effects of liquidity shocks, both ex-ante and ex-post, such as sound liquidity management frameworks and contingency plans, and robust liquidity buffers.

5. The study provides a framework to produce quantitative judgments on systemic risk, and it is an important macro-prudential tool to incorporate financial stability considerations into monetary policy decision-making.

6. Given the large number of subsidiaries of complex banking groups in Luxembourg, the results suggest the importance of monitoring the liquidity of parent groups, especially when liquidity management is centralized and funding decentralized.

7. Results are consistent with a clear lesson from the recent financial crisis: understanding financial stability is impossible without a proper understanding of international banking activities.

8. However……