

Understanding Contagious Bank Runs

Martin Brown (University of St.Gallen)

Stefan Trautmann (CentER, Tilburg University)

Razvan Vlahu (De Nederlandsche Bank)

VIII Seminar on Risk, Financial Stability and Banking

8 - 9 August, 2013

Sao Paulo

The usual disclaimer applies. The views expressed in this paper are those of the authors and do not necessarily represent those of DNB.



Bank runs



- Other examples from the recent crisis
 - Fortis Bank, WaMu, Country Wide, IndyMac, Icesave
 - DSB (NL), Parex (Latvia), ICICI Bank (India)

Contagious bank runs: Recent events

Santander insists Brits should not fear Spanish banks panic



Rating cut ... Santander suffered mass downgrade

By **STEVE HAWKES** Last Updated: 19th May 2012
Business Editor



BANKING giant Santander UK insisted it was safe yesterday as the eurozone crisis hit the high street.

12 December 2011 Last updated at 12:11 GMT



Panic fuels Latvian run on bank

More than 10,000 Latvians have withdrawn deposits from Swedish-owned Swedbank after rumours the firm was in financial difficulty.

The run on the bank started on Sunday, because of rumours that the bank was facing liquidity and legal problems in Estonia and Sweden.

The bank's chief executive in Latvia, Maris Mancinskis, has called the rumours "absurd".



Some customers have rushed to take their money out of the bank

Related literature: Contagion in banking

- Common asset exposure (Acharya, 2009; Ibragimov *et al.*, 2011; Wagner, 2010)
- Interbanks exposures and domino effects through the payment system (Allen and Gale, 2000; Dasgupta, 2004; Freixas and Parigi, 1998; Freixas *et al.*, 2000; Rochet and Tirole, 1996)
- Price declines and resulting margin requirements (Brunnermeier and Pedersen, 2009)
- Contagion of deposit withdrawals across banks (Ahnert and Georg, 2012; Chen, 1999)

Contagious bank runs: Evidence

- US 1929-1932: Solvent banks also experienced deposit withdrawals
Calomiris and Mason, AER 1997; Saunders and Wilson, JFI 1996
- Russia 2002-2007: Contagion partly due to panic effect
De Graeve and Karas, 2010
- Interbank market in India: Role of interbank linkages, relationships
Iyer and Peydro Alcalde, RFS 2011; Iyer and Puri, AER 2012

Research question

- Under which circumstances can the observation of a run on one bank trigger a run at another bank ?
 - Can contagion happen if banks are (known to be) economically unrelated ?
 - panic effect: Diamond and Dybvig, JPE 1983
 - Are (perceived) economic linkages between banks a necessary condition for contagion ?
 - information effect: Chari and Jagannathan, JF 1988

Why an experiment ?

- Studies based on field data can hardly identify the drivers behind correlated bank runs
 - correlated liquidity shocks across households
 - beliefs about economic linkages between banks
 - beliefs about behavior of other depositors
- In the lab we can
 - shut-down correlated liquidity shocks across households
 - manipulate economic linkages between banks
 - measure beliefs about bank fundamentals
 - measure beliefs about behavior of other depositors

Design: Two-person coordination game

Strong Bank

<i>Depositor B</i>	Keep deposit	Withdraw
<i>Depositor A</i>		
Keep deposit	60, 60	0, 40
Withdraw	40, 0	20, 20

or

Weak Bank

<i>Depositor B</i>	Keep deposit	Withdraw
<i>Depositor A</i>		
Keep deposit	50, 50	0, 40
Withdraw	40, 0	20, 20

Key features of the game

- Sequential service constraint
- No deposit insurance
 - low awareness among depositors (Bartiloro, 2011; Strater *et al.*, 2008)
 - uninsured retail funds or wholesale funds
- Return to depositors depends on whether bank is weak or strong (if bank is not liquidated)
 - weak bank has lower expected return on deposits (positive probability of insolvency even if not liquidated)

Two pure equilibria for each bank type

<i>Depositor B</i>	Keep deposit	Withdraw
<i>Depositor A</i>		
Keep deposit	60, 60	0, 40
Withdraw	40, 0	20, 20

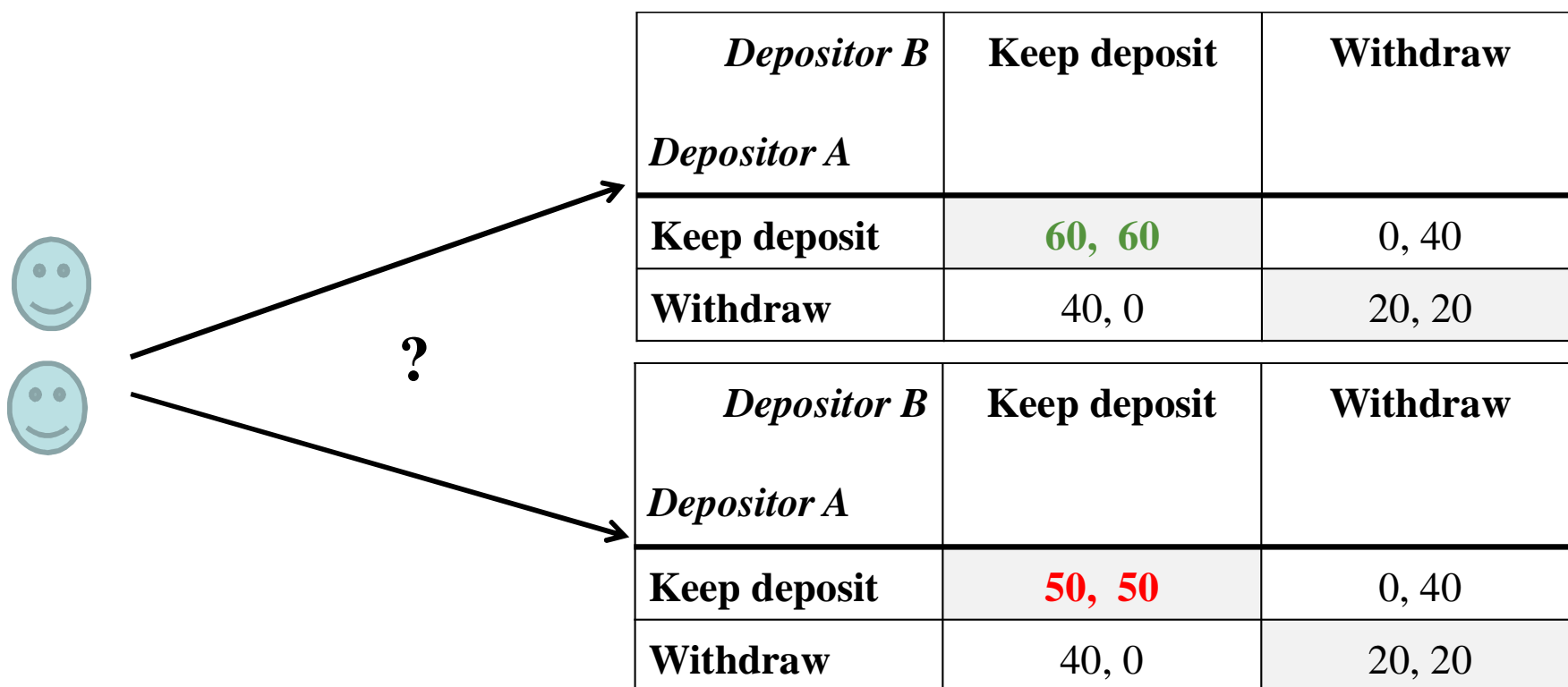
Payoff dominance of [Kd,Kd] is weaker and risk dominance of [W,W] is stronger at the **weak** bank

<i>Depositor B</i>	Keep deposit	Withdraw
<i>Depositor A</i>		
Keep deposit	50, 50	0, 40
Withdraw	40, 0	20, 20

→ We would expect more withdrawals at **weak** banks

Baseline treatment

- 2 subjects play the coordination game
- do not know whether bank is weak or strong
- know that 50% chance of being in weak / strong bank



The diagram illustrates the baseline treatment of a coordination game. Two subjects, represented by smiley faces, are shown on the left. Two arrows point from them to two identical payoff matrices, with a question mark between the arrows indicating uncertainty about which bank they are in. The top matrix represents a strong bank, and the bottom matrix represents a weak bank. In both matrices, the top row is for Depositor A and the bottom row is for Depositor B. The columns are for 'Keep deposit' and 'Withdraw'.

<i>Depositor B</i>	Keep deposit	Withdraw
<i>Depositor A</i>		
Keep deposit	60, 60	0, 40
Withdraw	40, 0	20, 20

<i>Depositor B</i>	Keep deposit	Withdraw
<i>Depositor A</i>		
Keep deposit	50, 50	0, 40
Withdraw	40, 0	20, 20

No-Linkages treatment

Leaders:



<i>Depositor B</i>	Keep deposit	Withdraw
<i>Depositor A</i>		
Keep deposit	60, 60	0, 40
Withdraw	40, 0	20, 20

0, 1 or 2 withdrawals
Bank type is independent

<i>Depositor B</i>	Keep deposit	Withdraw
<i>Depositor A</i>		
Keep deposit	60, 60	0, 40
Withdraw	40, 0	20, 20

Followers



?

<i>Depositor B</i>	Keep deposit	Withdraw
<i>Depositor A</i>		
Keep deposit	50, 50	0, 40
Withdraw	40, 0	20, 20

Linkages treatment

Leaders:



<i>Depositor B</i>	Keep deposit	Withdraw
<i>Depositor A</i>		
Keep deposit	60, 60	0, 40
Withdraw	40, 0	20, 20

0, 1 or 2 withdrawals
Bank type is the same

<i>Depositor B</i>	Keep deposit	Withdraw
<i>Depositor A</i>		
Keep deposit	60, 60	0, 40
Withdraw	40, 0	20, 20

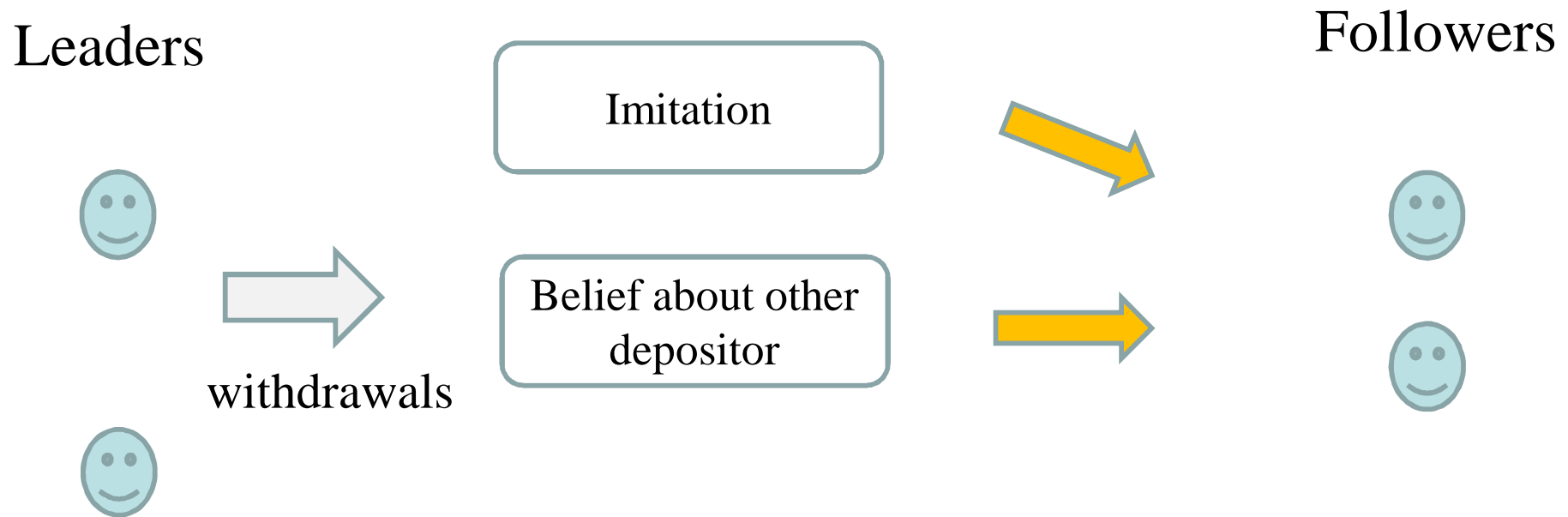
Followers



?

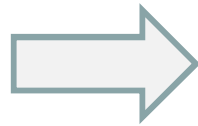
<i>Depositor B</i>	Keep deposit	Withdraw
<i>Depositor A</i>		
Keep deposit	50, 50	0, 40
Withdraw	40, 0	20, 20

Channels of contagion: No-Linkages



Channels of contagion: Linkages

Leaders



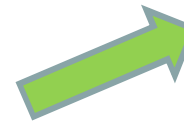
withdrawals



Imitation

Belief about other depositor

Belief about bank



Followers



Predictions

- **Leaders:** are more likely to withdraw when bank is weak
- **Followers in Linkages treatment:**
 - number of observed withdrawals increases propensity to withdraw
- **Followers in No-Linkages treatment:**
 - number of observed withdrawals increases propensity to withdraw
... but less than in Linkages treatment

Procedures

- Subjects were students at University of Amsterdam
 - 16-20 subjects per session
- 1 group of 4 leaders per session
 - play coordination game twice with different partner within group
 - implies 4 leaders outcomes per session
 - not aware that their outcome shown to followers
- 3-4 groups of 4 followers per session
 - each group of followers sees a different leaders outcome
 - play coordination game twice with different partner within group

Procedures (cont'd)

- Before each withdrawal decision we measured beliefs about
 - strength of the bank
 - whether other player withdraws
- After all withdrawal decisions were made
 - we measured risk attitudes of each subject
 - we elicited socioeconomic characteristics of subjects

Procedures (cont'd)

- 13 sessions = 244 subjects
 - 3 Baseline (60 subjects = 15 groups)
 - 5 Linkages (92 subjects: 20 leaders, 72 followers)
 - 5 No-Linkages (92 subjects: 20 leaders, 72 followers)

- On average subjects earned 12.50 euros

Results - Leaders

1 observation = 1 leaders game

Withdrawals	Strong bank (n=20)	Weak bank (n=20)
0	12	7
1	7	11
2	1	2

- Less withdrawals when bank is strong (22.5% vs. 37.5%)
- Leaders withdrawals is an imperfect signal in the Linkages treatment

Followers in the Linkages treatment

	<u>Baseline</u>	<u>No-Linkages (n=72)</u>		<u>Linkages (n=72)</u>	
	(n=60)	No (n=44)	Yes (n=28)	No (n=24)	Yes (n=48)
Observed leaders withdrawal					
Withdrawal frequency (R1)	23%			13%	52%
				(p < 0.01)	

Linkages

- Strong effect of observed withdrawals

Followers in the No-Linkages treatment

	<u>Baseline</u>	<u>No-Linkages (n=72)</u>		<u>Linkages (n=72)</u>	
	(n=60)	No (n=44)	Yes (n=28)	No (n=24)	Yes (n=48)
Observed leaders withdrawal					
Withdrawal frequency (R1)	23%	16%	21%	13%	52%
		(p = 0.559)		(p < 0.01)	

No-Linkages

- No significant effect of observed withdrawals
- No significant difference to Baseline

Our main result

Observed leaders withdrawal	<u>No-Linkages (n=72)</u>		<u>Linkages (n=72)</u>	
	No (n=44)	Yes (n=28)	No (n=24)	Yes (n=48)
Withdrawal frequency (R1)	16%	21%	13%	52%

We do find contagion of withdrawals between leaders and followers banks

... but only when followers know that there is an economic linkage between banks

Beliefs: Linkages

Observed withdrawal	<u>Baseline</u>	<u>No-Linkages (n=72)</u>		<u>Linkages (n=72)</u>	
	(n=60)	No (n=44)	Yes (n=28)	No (n=24)	Yes (n=48)
Belief other withdraw	.31			.31	.52
				(p < 0.01)	
Belief bank strong	.55			.60	.50
				(p = 0.03)	

- Observed withdrawals **affect** beliefs about bank type and beliefs about behavior of other depositor

Beliefs: No-Linkages

Observed withdrawal	<u>Baseline</u>	<u>No-Linkages (n=72)</u>		<u>Linkages (n=72)</u>	
	(n=60)	No (n=44)	Yes (n=28)	No (n=24)	Yes (n=48)
Belief other withdraw	.31	.38	.43	.31	.52
		(p = 0.41)		(p < 0.01)	
Belief bank strong	.55	.56	.56	.60	.50
		(p = 0.95)		(p = 0.03)	

- Observed withdrawals **do not affect** beliefs

Beliefs, imitation and withdrawals

Treatment:	Linkages			No Linkages		
Dependent variable:						
Withdraw	[1]	[2]	[3]	[4]	[5]	[6]
Observed withdrawal	0.396***		0.340***	0.0552		0.0332
	[0.0995]		[0.108]	[0.0958]		[0.0833]
Belief bank strong		0.118	0.4		0.0251	0.0224
		[0.348]	[0.333]		[0.263]	[0.259]
Belief other withdraw		1.427***	1.441***		0.599***	0.592***
		[0.322]	[0.371]		[0.159]	[0.160]
Observations	72	72	72	72	72	72
Pseudo R2	0.121	0.375	0.443	0.241	0.244	0.244

The role of personal experience

- In our experiment each follower played the coordination game twice
- Does personal experience strengthen / mitigate impact of observed withdrawals at other banks ?

Personal Experience: Linkages Treatment

Observed withdrawal by leaders	<u>Linkages</u>			
	No		Yes	
Observed withdrawal in round 1	No (n=21)	Yes (n=3)	No (n=23)	Yes (n=25)
Withdrawal frequency in round 2	5%	0%	22%	68%
	(p = 0.71)		(p < 0.01)	

Positive personal experience mitigates contagion from
withdrawals at leaders bank

Personal Experience: No-Linkages Treatment

Observed withdrawal by leaders	<u>No-Linkages</u>			
	No		Yes	
Observed withdrawal in round 1	No (n=37)	Yes (n=7)	No (n=22)	Yes (n=6)
Withdrawal frequency in round 2	16%	14%	18%	33%
	(p = 0.90)		(p = 0.44)	

No significant effect of personal experience

Summary & conclusions

- Deposit withdrawals can be contagious across banks ...
... but only when there are (perceived) linkages between banks
 - potential for contagion of deposit withdrawals is higher among banks which are perceived to be similar
 - contagion is triggered by updated beliefs about bank fundamentals and about the behavior of depositors
 - transparency about economic linkages between banks can mitigate / aggravate contagion
- But our results also suggest that the initial potential for contagion may be contained by reassuring signals from other depositors at own bank
 - Positive personal experience at own bank can mitigate contagion