3rd BIS-CGFS Workshop

DEPOSIT INSURANCE IN TIMES OF CRISES: SAFE HAVEN OR REGULATORY ARBITRAGE?

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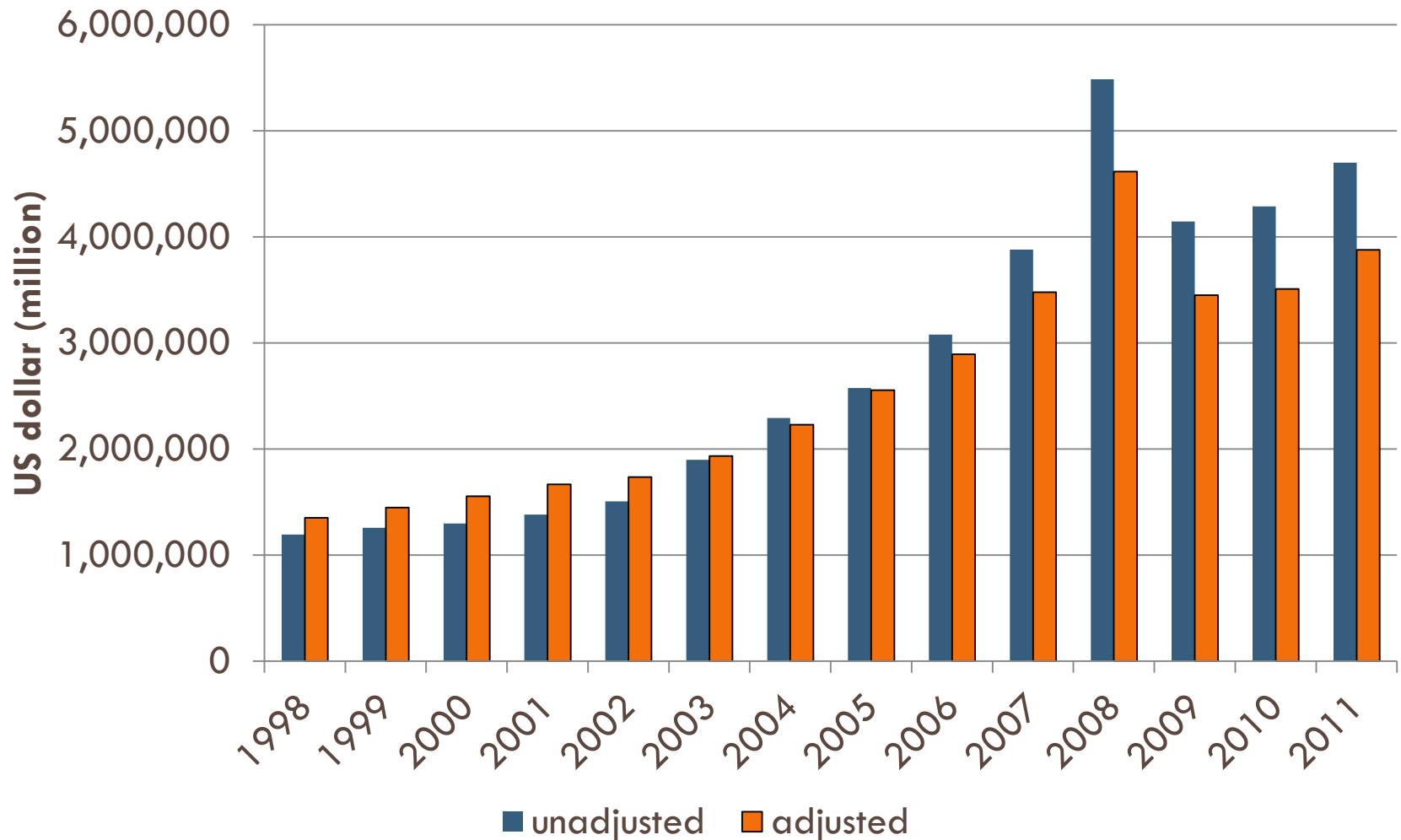UNIVERSITY OF STELLENBOSCH BUSINESS SCHOOL

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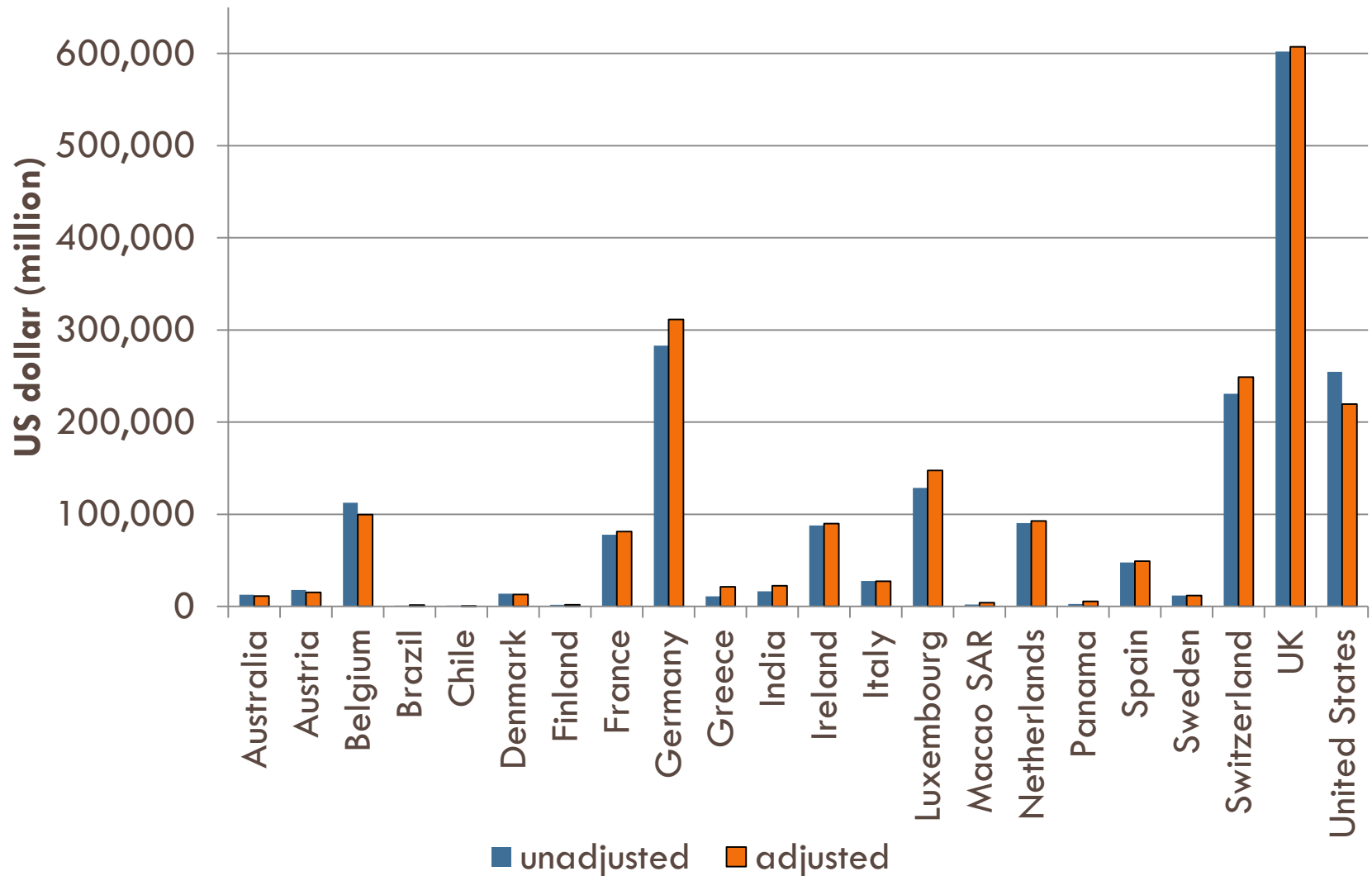
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The Rise and Retrenchment of Cross-Border Deposit Holdings

The Uneven Geography of Cross-Border Deposits

Research Questions

- Does deposit insurance matter to cross-border depositors?
  - Explicit DI and DI features
- Are cross-border depositors attracted by safe havens and/or do they engage in regulatory arbitrage?
- Does this behaviour change between stable and crisis times?
- What effects did emergency actions of 2008/09 crisis have on cross-border depositors?

Background

- Deposit insurance influences attractiveness of national banking market
  - DI directly protects depositor $\Rightarrow$ DI reduces bank runs and increases banking stability (Diamond & Dybvig, 1983)
  - DI introduces bank moral hazard and decreases banking stability (Demirgüç-Kunt & Detragiache, 1997, 2002; Rossi, 1999)
- Limited empirical evidence
  - Lane & Sarisoy (2000): private capital inflows to developing countries are unrelated to explicit DI
  - Huizinga & Nicodème (2006): non-bank external liabilities increase after introduction of an explicit DI, specific DI features do not matter
    - Both include uninsured funds, no focus on crisis vs stable times

Methodology – Gravity Model

$$Dep_{ijt} = \alpha_{ij} + \alpha_i + \alpha_j + \alpha_t + \beta_2 Size_{ijt} + \delta X_{ijt} + \varepsilon_{ijt}$$

- Dep_{ijt}
  - Ln of exchange rate adjusted stocks of cross-border deposits from depositors in country j to banks in country i in year t
- $Size_{ijt}$
  - Ln of economic masses of bank country i and depositor country j in year t
- X_{ijt}
  - Information and transaction costs
- Fixed effects
  - country pair (α_{ij}), bank country (α_i), depositor country (α_j), year (α_t)

Basic Hypotheses

- **Save Haven Hypothesis**
  - Compared to bank countries without an explicit DI, the existence of an explicit DI makes a bank country more attractive for CBD.
  - In addition, the attractiveness of a bank country for CBD increases with the strength of its DI scheme **relative to the strength of other bank countries' DI schemes**.
- **Regulatory Arbitrage Hypothesis**
  - The existence of an explicit DI makes a bank country attractive for cross-border depositors from countries that lack an explicit DI.
  - In addition, the attractiveness of a bank country for cross-border depositors increases with the strength of bank country's DI scheme relative to the strength of depositor country's DI scheme.

Bringing our Basic Hypotheses into the Gravity Model

☐ Save Haven Hypothesis

$$Dep_{ijt} = \alpha_{ij} + \alpha_i + \alpha_j + \alpha_t + \boldsymbol{\beta_1 DI_{it}} + \beta_2 size_{ijt} + \delta X_{ijt} + \varepsilon_{ijt}$$

☐ Regulatory Arbitrage Hypothesis

$$Dep_{ijt} = \alpha_{ij} + \alpha_i + \alpha_j + \alpha_t + \boldsymbol{\beta_1 DI_{ijt}} + \beta_2 size_{ijt} + \delta X_{ijt} + \varepsilon_{ijt}$$

Crisis Hypotheses

Safe Haven in Crisis Hypothesis

☐ The importance attributed by cross-border depositors to the existence and strength of the bank country's DI increases when depositors experience a banking crisis at home.

$$Dep_{ijt} = \alpha_{ij} + \alpha_i + \alpha_j + \alpha_t + \beta_1 DI_{it} * stable_{jt} + \beta_2 DI_{it} * crisis_{jt} + \beta_3 size_{ijt} + \delta X_{ijt} + \varepsilon_{ijt}$$

Regulatory Arbitrage in Crisis Hypothesis

☐ The importance attributed by cross-border depositors to the existence and strength of the bank country's DI relative to the depositor country's DI increases when depositors experience a banking crisis at home.

$$Dep_{ijt} = \alpha_{ij} + \alpha_i + \alpha_j + \alpha_t + \beta_1 DI_{ijt} * stable_{jt} + \beta_2 DI_{ijt} * crisis_{jt} + \beta_3 size_{ijt} + \delta X_{ijt} + \varepsilon_{ijt}$$

Emergency Actions Hypothesis

□ The emergency actions taken by the bank country regarding its explicit DI ensure that the bank country remains an attractive safe haven for cross-border depositors.

$$Dep_{ijt} = \alpha_{ij} + \alpha_i + \alpha_j + \alpha_t$$
$$+ \beta_1(emergency\ action * 2008/09\ crisis\ period)_{it} + \beta_2 size_{ijt}$$
$$+ \delta X_{ijt} + \varepsilon_{ijt}$$

Cross-Border Deposit Data

- BIS locational banking statistics
  - 22 bank countries, 131 customer countries
    - Bilateral
    - Principle of residence
  - Cross-border deposits from non-bank customers
    - Outstanding volumes adjusted for exchange rate changes
  - Annual data 1998-2011
    - Testing Safe Haven, Regulatory Arbitrage and Crisis hypothesis: 1998-2007
    - Testing Emergency Action Hypothesis: 1998-2011

Deposit Insurance

exlicit DI   (1) Does explicit deposit insurance exist?

Systemic Banking Crises

- Laeven & Valencia (2008, 2010, 2012), Systemic Banking Crises Database
  - Countries, start/end of crises
- Systemic banking crises
  - "a country's corporate and financial sectors experience a large number of defaults and financial institutions and corporations face great difficulties repaying contracts on time."
- Crises from 1998-2005
  - Only in customer countries
- Crisis of 2007/08
  - Bank and customer countries

Year	Number of countries in crisis
1998	16
1999	11
2000	9
2001	7
2002	3
2003	3
2004	2
2005	1
2006	0
2007	2
2008	22
2009	23
2010	23
2011	23

Note: Borderline systemic banking crises are included.

Controls X_{ijt}

- Country-pair control variables
  - Size (GDP)
  - Credit (domestic credit to private sector in % GDP)
  - Trade (exports + imports)
  - Globalization (KOF index)
  - Free trade agreement
  - Currency union
  - Deposit interest rate
  - Internet (% of population with access)
  - Governance (Voice and accountability, Political stability, Government effectiveness, Regulatory quality, Rule of law, Control of corruption)

- Gravity country-pair control variables
  - Distance
  - Common border
  - Common language
  - Colony
  - Common legal system

Safe Haven Hypothesis

	(1)	(2)	(3)	(4)	(5)	(6)
Explicit DI	0.58 ***					
DI power		0.04 ***				
DI moral hazard mitigation			0.06 ***			
DI repayment history				0.02 *		
DI coverage intensity					0.03 *	
DI coverage limit						0.55 ***
Size	0.24 ***	0.10 ***	0.10 ***	0.10 ***	0.10 ***	0.12 ***
Credit	1.27 ***	-0.01	-0.01	-0.01	-0.00	-0.01
Trade	0.17 ***	0.02 **	0.02 **	0.02 **	0.02 **	0.05 ***
Globalisation	-1.63 ***	-0.09	-0.08	-0.13	-0.12	-0.07
FTA	-0.01	0.02	0.02	0.02	0.02	0.03
Currency union	-0.02	0.17 ***	0.16 ***	0.17 ***	0.17 ***	0.15 ***
Deposit rate	0.00	0.00 **	0.00 ***	0.00 ***	0.00 ***	0.00 *
Internet	-1.19 ***	1.01 ***	1.03 ***	1.02 ***	1.01 ***	1.04 ***
Governance	0.56 ***	-0.09 **	-0.06	-0.07 *	-0.07 *	0.07 *
Gravity country-pair controls	Yes	No	No	No	No	No
Country-pair fixed effect	No	Yes	Yes	Yes	Yes	Yes
Bank country fixed effect	No	Yes	Yes	Yes	Yes	Yes
Depositor country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.583	0.946	0.946	0.946	0.946	0.952
Observations	20,820	18,870	18,870	18,870	18,870	16,460

Safe Haven Hypothesis

	(1)	(2)	(3)	(4)	(5)	(6)
Explicit DI	0.58***					
DI power		0.04***				
DI moral hazard mitigation			0.06***			
DI repayment history				0.02*		
DI coverage intensity					0.03*	
DI coverage limit						0.55***
Size, …, Governance						
Gravity country-pair ctrls						
Country-pair FE						
Bank country FE						
Depositor country FE						
Year FE						
Adjusted R-squared						
Observations						

Introduction of explicit DI ⇒ 78% increase in cross-border deposits (CBD)

Safe Haven Hypothesis

	(1)	(2)	(3)	(4)	(5)	(6)
Explicit DI	0.58***					
DI power		0.04***				
DI moral hazard mitigation			0.06***			
DI repayment history				0.02*		
DI coverage intensity					0.03*	
DI coverage limit						0.55***
Size, …, Governance						
Gravity country-pair ctrls						
Country-pair FE						
Bank country FE						
Depositor country FE						
Year FE						
Adjusted R-squared						
Observations						

+1 unit DI power ⇒ +4.1% CBD
+1 unit DI moral hazard mitigation ⇒ +6.2% CBD
+1 unit DI repay history ⇒ +2.0% CBD
+1 unit DI coverage intensity ⇒ +3.0% CBD

Safe Haven Hypothesis

	(1)	(2)	(3)	(4)	(5)	(6)
Explicit DI	0.58***					
DI power		0.04***				
DI moral hazard mitigation			0.06***			
DI repayment history				0.02*		
DI coverage intensity					0.03*	
DI coverage limit						0.55***

Size, …, Governance
Gravity country-pair ctrls
Country-pair FE
Bank country FE
Depositor country FE
Year FE

Adjusted R-squared
Observations

+1% DI coverage limit ⇒ +0.55% CBD
or
+1 standard deviation DI coverage limit ⇒ +6.2% CBD

Regulatory Arbitrage Hypothesis

	(1)	(2)	(3)	(4)	(5)	(6)
Explicit DI	0.38***					
DI power		0.03***				
DI moral hazard mitigation			0.05***			
DI repayment history				-0.01		
DI coverage intensity					0.00	
DI coverage limit						0.01
Size, …, Governance	Yes	Yes	Yes	Yes	Yes	Yes
Gravity country-pair ctrls	Yes	No	No	No	No	No
Country-pair FE	No	Yes	Yes	Yes	Yes	Yes
Bank country FE	No	Yes	Yes	Yes	Yes	Yes
Depositor country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.582	0.946	0.946	0.946	0.946	0.950
Observations	20,820	10,763	10,763	10,763	10,763	7,694

Safe Haven in Crisis Hypothesis

	(1)	(2)	(3)	(4)	(5)	(6)
Explicit DI * Stable	0.59***					
Explicit DI * Crisis	0.48***					
DI power * Stable		0.03***				
DI power * Crisis		0.08***				
DI moral hazard mitigation * Stable			0.06***			
DI moral hazard mitigation * Crisis			0.10***			
DI repayment history * Stable				0.02		
DI repayment history * Crisis				0.08***		
DI coverage intensity * Stable					0.03	
DI coverage intensity * Crisis					0.08***	
DI coverage limit * Stable						0.55***
DI coverage limit * Crisis						0.55***
Size, …, Governance	Yes	Yes	Yes	Yes	Yes	Yes
Gravity country-pair ctrls	Yes	No	No	No	No	No
Country-pair FE	No	Yes	Yes	Yes	Yes	Yes
Bank country FE	No	Yes	Yes	Yes	Yes	Yes
Depositor country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.583	0.946	0.946	0.946	0.946	0.952
Observations	20,820	18,870	18,870	18,870	18,870	16,460

Regulatory Arbitrage in Crisis Hypothesis

	(1)	(2)	(3)	(4)	(5)	(6)
Explicit DI * Stable	0.37***					
Explicit DI * Crisis	0.43***					
DI power * Stable		0.03***				
DI power * Crisis		0.01				
DI moral hazard mitigation * Stable			0.05***			
DI moral hazard mitigation * Crisis			0.06			
DI repayment history * Stable				-0.01		
DI repayment history * Crisis				-0.06		
DI coverage intensity * Stable					0.00	
DI coverage intensity * Crisis					0.06	
DI coverage limit * Stable						0.01
DI coverage limit * Crisis						0.02
Size, …, Governance	Yes	Yes	Yes	Yes	Yes	Yes
Gravity country-pair ctrls	Yes	No	No	No	No	No
Country-pair FE	No	Yes	Yes	Yes	Yes	Yes
Bank country FE	No	Yes	Yes	Yes	Yes	Yes
Depositor country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.582	0.946	0.946	0.946	0.946	0.950
Observations	20,820	10,763	10,763	10,763	10,763	7,694

Emergency Action Hypothesis

	Sample period 1998-2011			
	All bank countries			
	(1)	(2)	(3)	(4)
Explicit DI Introduction * 2008/09 Crisis Period	0.65***			
Official government guarantee * 2008/09 Crisis Period		0.23***		
Limited government guarantee * 2008/09 Crisis Period			0.24***	
Unlimited government guarantee * 2008/09 Crisis Period				0.22***
Size	Yes	Yes	Yes	Yes
Gravity country-pair ctrls	No	No	No	No
Country-pair FE	Yes	Yes	Yes	Yes
Bank country FE	Yes	Yes	Yes	Yes
Depositor country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R-squared	0.925	0.925	0.933	0.928
Observations	25,218	25,218	20,388	22,552

Emergency Action Hypothesis

	Sample period 2006-2009						
	All bank countries				Bank countries in crisis		
	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Explicit DI Introduction * 2008/09 Crisis Period	0.20***						
Official government guarantee * 2008/09 Crisis Period		0.10***			0.09***		
Limited government guarantee * 2008/09 Crisis Period			0.09**			0.10**	
Unlimited government guarantee * 2008/09 Crisis Period				0.11***			0.09**
Size	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Gravity country-pair ctrls	No	No	No	No	No	No	No
Country-pair FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Depositor country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.951	0.951	0.960	0.953	0.956	0.963	0.959
Observations	9,223	9,223	7,585	8,272	7,588	6,323	6,637

Conclusions

- Existence of explicit DI and DI features matter

- Safe havens – as created by DI – become more important during crisis times

- Regulatory arbitrage regarding explicit DI, DI power, DI moral hazard mitigation limited to stable times

- 2008/09 crisis' emergency actions matter and can lead substantial relocations of cross-border deposits

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Deposit Insurance

country	Explicit DI			DI power			DI moral hazard mitigation			DI repayment history			DI coverage intensity			DI coverage limit in ln($)		
	1998	2002	2006	1998	2002	2006	1998	2002	2006	1998	2002	2006	1998	2002	2006	1998	2002	2006
Australia	0	0	0															
Austria	1	1	1	0	1	1	1	1	1	2	1	1	1	1	2	10.0	9.8	10.1
Belgium	1	1	1	0	2	2	2	2	2	2	1	1	0	0	2	10.0	9.8	10.1
Brazil	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	9.8	8.9	9.1
Chile	1	1	1	2	0	1	0	0	0	1	0	0	1	1	1	8.1	7.8	8.3
Denmark	1	1	1	0	1	1	1	1	1	1	1	0	2	2	2	10.7	10.5	10.8
Finland	1	1	1	0	2	0	2	2	2	1	0	0	2	2	2	10.2	10.1	10.4
France	1	1	1	1	2	2	2	2	2	1	2	1	1	1	1	11.3	11.1	11.4
Germany	1	1	1	1	1	0	2	2	1	1	2	2	0	0	0	9.9	9.8	10.1
Greece	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	10.0	9.8	10.1
India	1	1	1	1	1	1	1	1	0	1	1	1	2	2	2	7.8	7.6	7.7
Ireland	1	1	1	2	1	2	1	1	1	0	0	0	1	1	1	9.7	9.8	10.1
Italy	1	1	1	2	2	0	2	2	2	2	2	1	2	2	2	11.7	11.5	11.8
Luxembourg	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	10.0	9.8	10.1
Macao SAR	0	0	0															
Netherlands	1	1	1	0	0	1	1	1	1	1	0	0	3	3	3			
Panama	0	0	0															
Spain	1	1	1	2	2	2	1	1	1	1	1	1	2	2	2	9.7	9.8	10.1
Sweden	1	1	1	0	1	0	2	1	0	0	0	0	2	2	2	10.4	10.1	10.4
Switzerland	1	1	1	0	1	3	1	1	1	1	1	2	3	2	2		9.9	10.1
UK	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	10.3	10.8	11.0
United States	1	1	1	4	4	4	2	1	2	2	0	0	3	3	3			

Emergency Actions

Country	Experienced banking crisis	Explicit DI introduction	Official government guarantee	Limited government guarantee	Unlimited government guarantee
Australia	0	1	1	0	1
Austria	1	0	1	0	1
Belgium	1	0	0	0	0
Brazil	0	0	0	0	0
Chile	0	0	0	0	0
Denmark	1	0	1	0	1
Finland	0	0	0	0	0
France	1	0	0	0	0
Germany	1	0	1	1	0
Greece	1	0	0	0	0
India	0	0	0	0	0
Ireland	1	0	1	0	1
Italy	1	0	0	0	0
Luxembourg	1	0	0	0	0
Netherlands	1	0	0	0	0
Spain	1	0	0	0	0
Sweden	1	0	0	0	0
Switzerland	1	0	0	0	0
UK	1	0	0	0	0
United States	1	0	1	1	0

Descriptive Statistics

Summary statistics

Variable	Obs	Mean	SD	Min	Max
Cross-border deposits	20,820	2.89	2.74	0	13.13

Bank country

	Obs	Mean	SD	Min	Max
Explicit DI	20,820	0.91	0.29	0	1
DI power	18,870	1.10	0.95	0	4
DI moral hazard mitigation	18,870	1.28	0.55	0	2
DI repayment history	18,870	0.99	0.63	0	2
DI coverage intensity	18,870	1.61	0.86	0	3
DI coverage limit	16,460	10.04	0.95	7.60	11.77

Descriptive Statistics

Summary statistics

Variable	Obs	Mean	SD	Min	Max
Country-pair differences					
Explicit DI	20,820	0.33	0.58	-1	1
DI power	10,763	0.02	1.51	-4	4
DI moral hazard mitigation	10,763	0.29	0.91	-2	2
DI repayment history	10,763	0.10	0.97	-2	2
DI coverage intensity	10,763	0.10	1.13	-3	3
DI coverage limit	7,694	0.36	1.97	-9.79	6.44
Size	20,820	23.53	2.78	14.12	35.37
Credit	20,820	0.57	0.55	0.00	5.95
Trade	20,820	5.19	2.88	0.00	13.25
Globalisation	20,820	8.49	0.41	5.06	9.07
FTA	20,820	0.07	0.26	0	1
Currency union	20,820	0.05	0.22	0	1
Deposit rate	20,820	-3.80	10.74	-202.63	27.73
Internet	20,820	0.08	0.11	0.00	0.71
Governance	20,820	1.04	1.09	-2.21	3.50