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# **CONNECTED TO WHOM? INTERNATIONAL BANK BORROWING DURING THE GLOBAL CRISIS**

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BIS Workshop on Research on Global Financial Stability:  
the Use of BIS International Banking and Financial Statistics

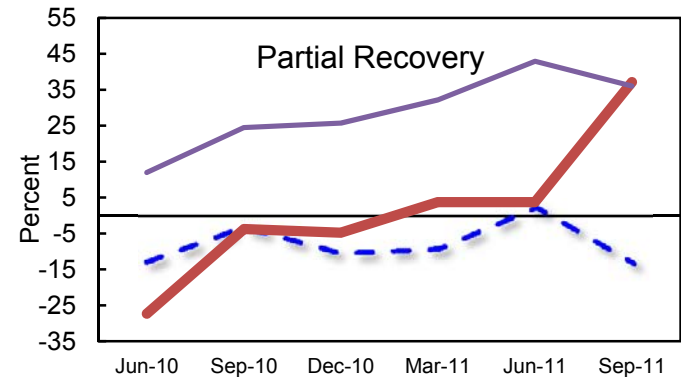
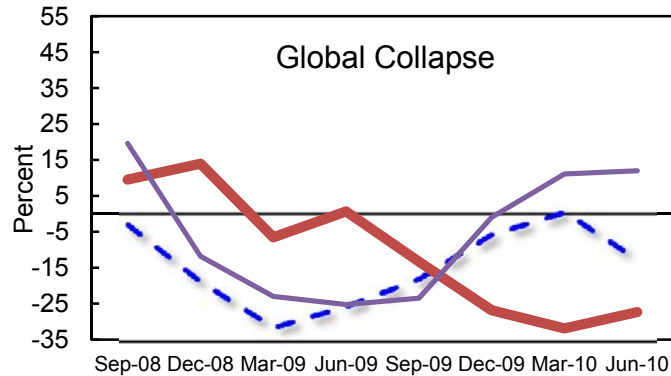
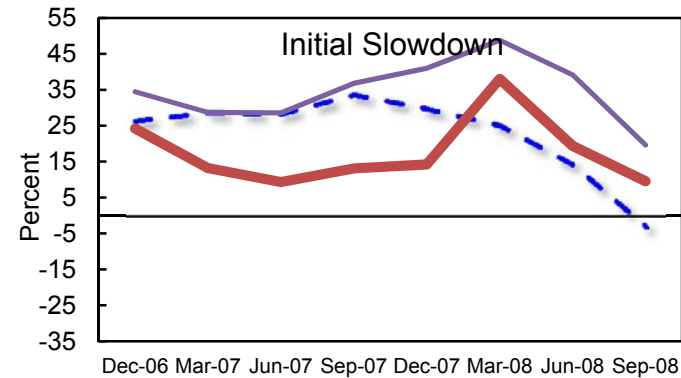
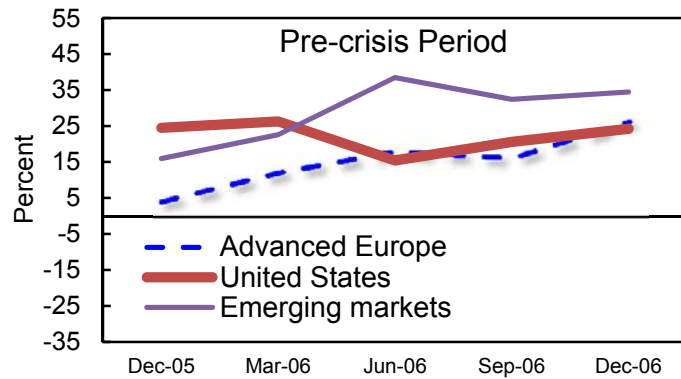
*May 7, 2016*

*Basel, Switzerland*

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# INTERNATIONAL BANK BORROWING DURING THE GLOBAL CRISIS

percent change (y-o-y) in BIS-reported international claims vis-à-vis banks



Source: BIS International Consolidated Banking Statistics on immediate borrower basis; author's calculations.

# DETERMINANTS OF INTERNATIONAL BANK BORROWING

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- *Push factors:* global creditor fragilities
- *Pull factors:* borrower fragilities

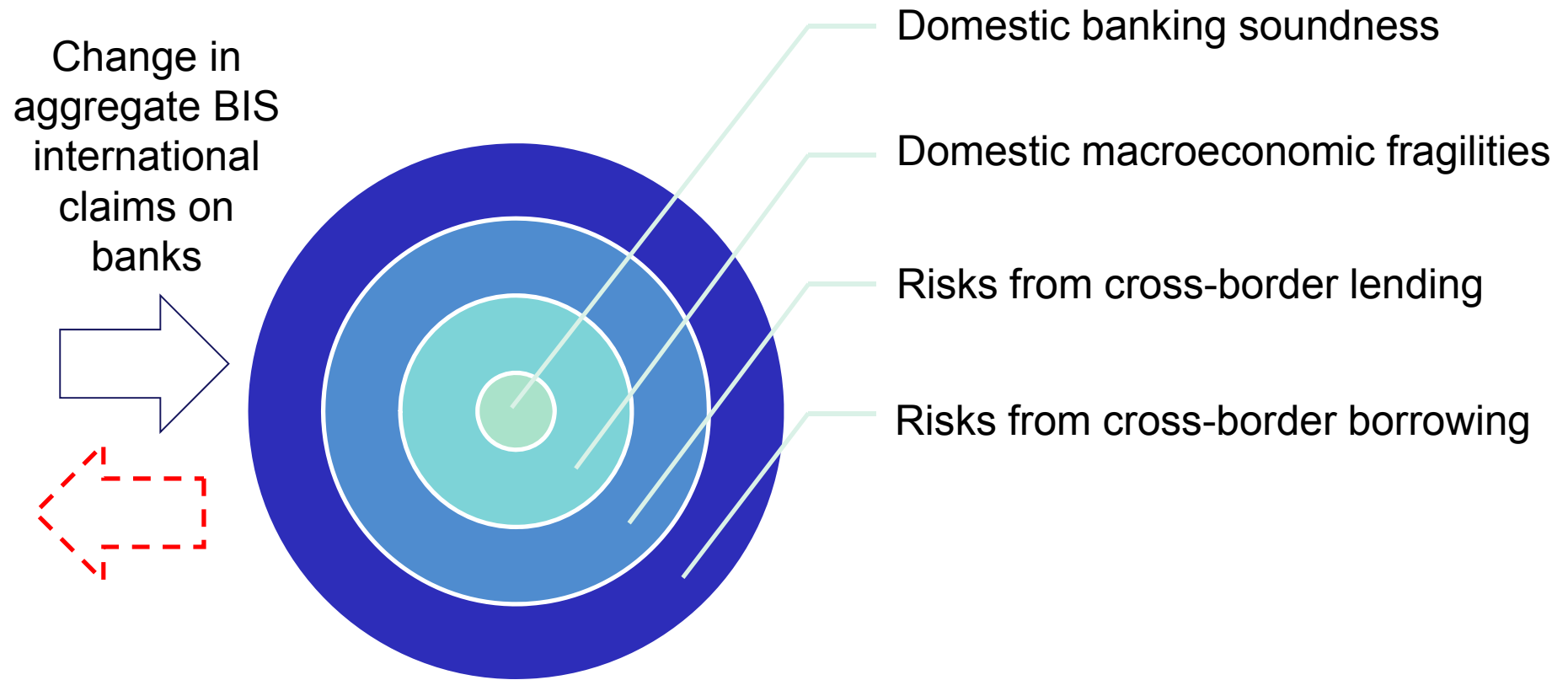
## QUESTION

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What was driving the decline in international bank lending?

- indiscriminate panic
- countries' risk characteristics
  - borrower fragilities
  - lender fragilities

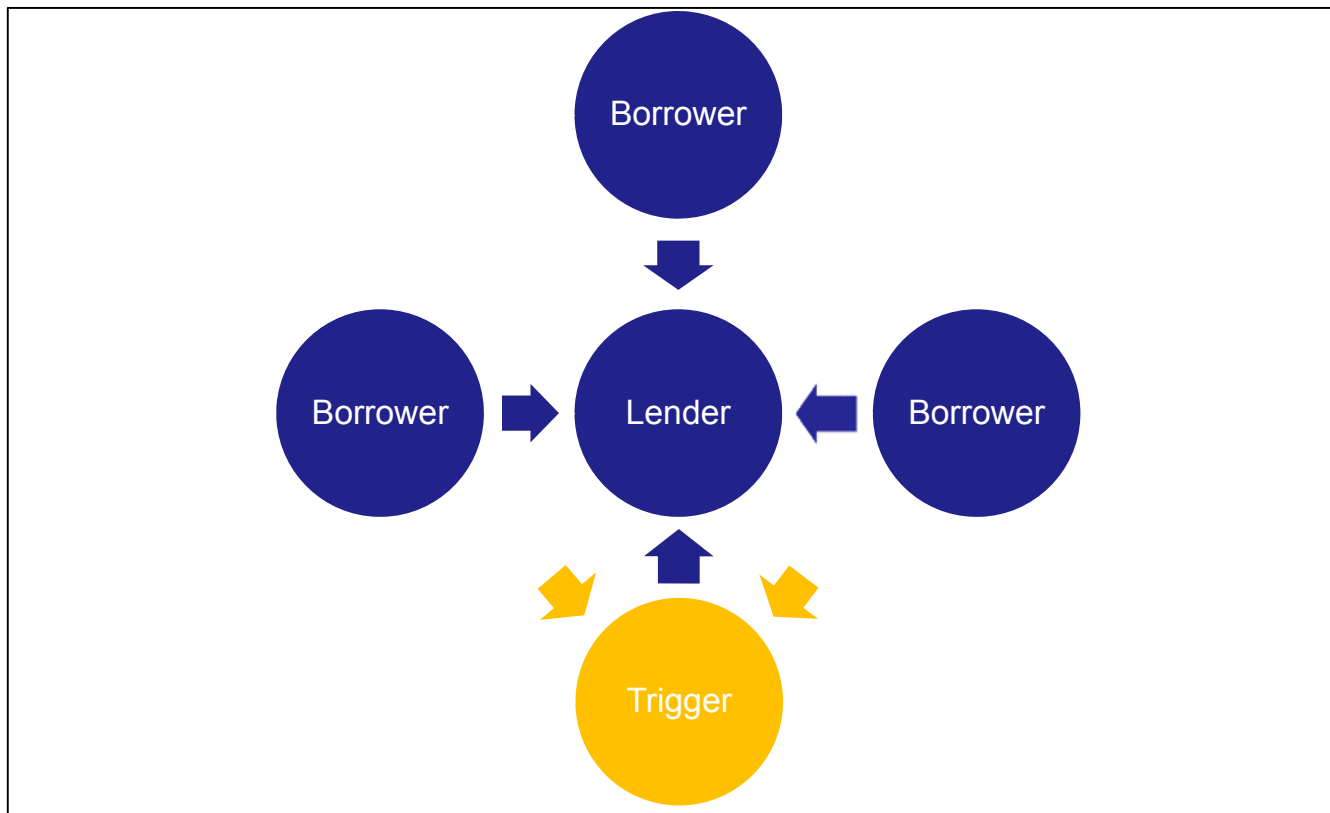
# DETERMINANTS OF COUNTRIES' RISK PROFILE



# CREDITOR EFFECTS

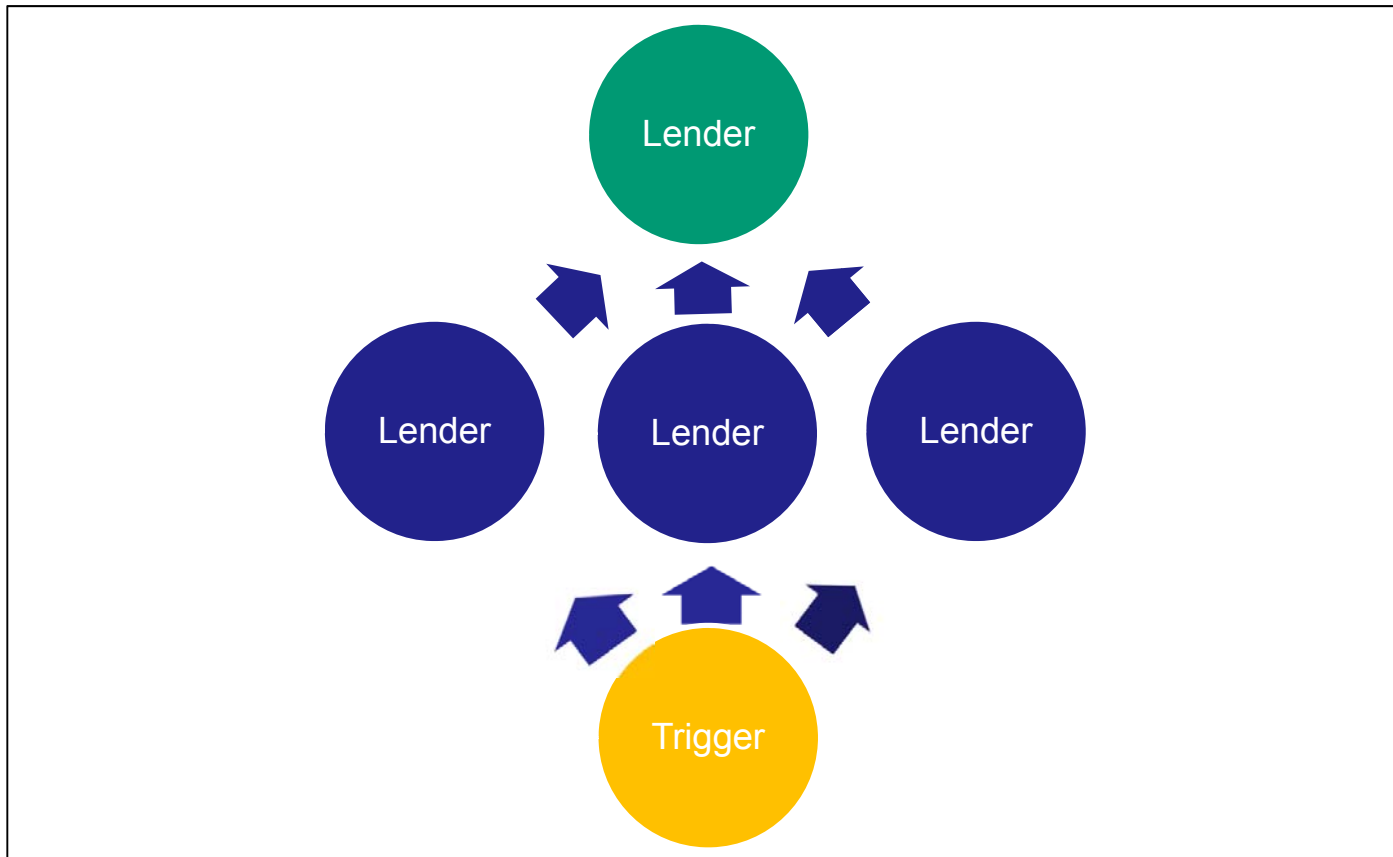
(KAMINSKY AND REINHART, 2000)

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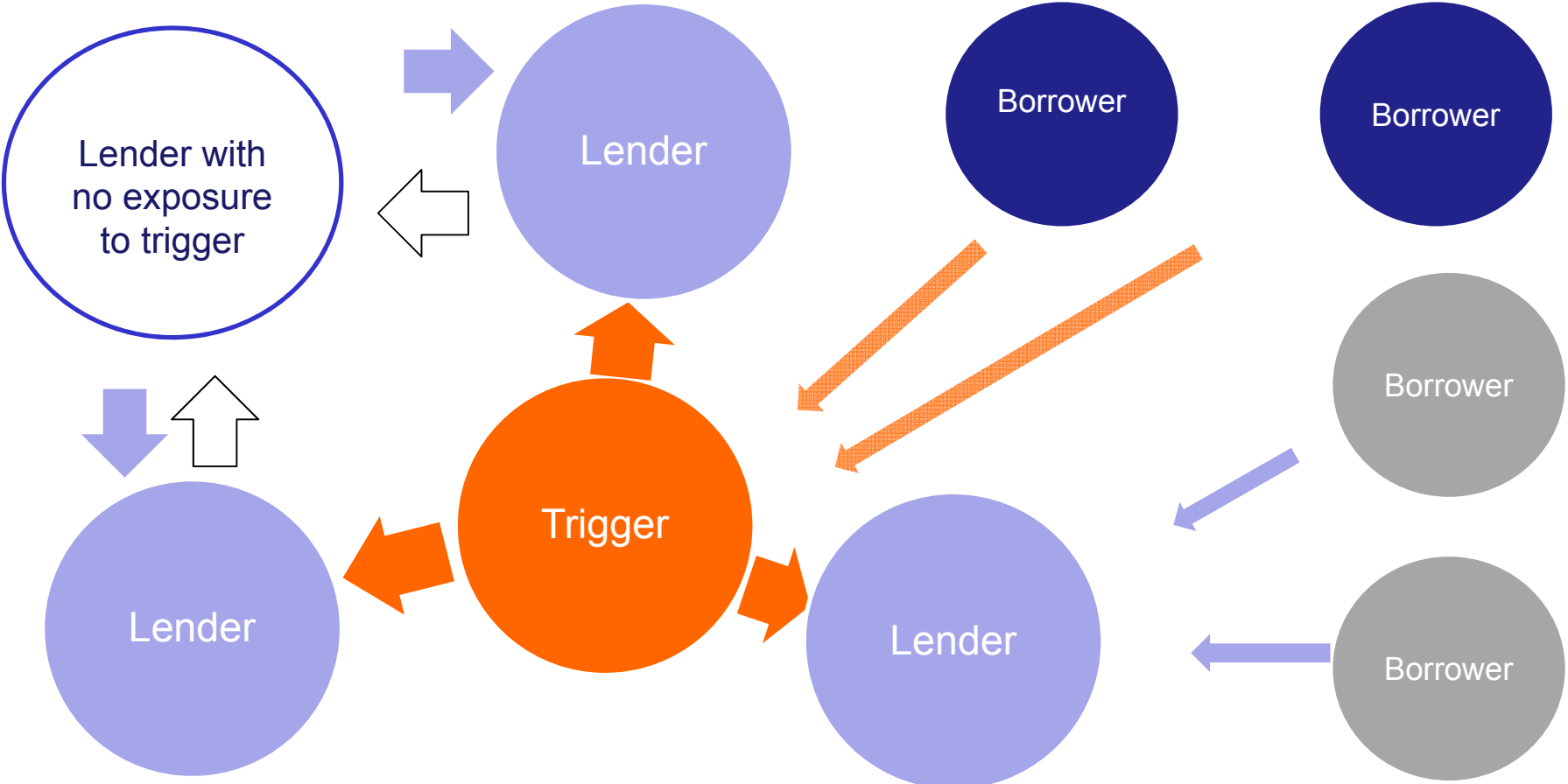


# BORROWER EFFECTS

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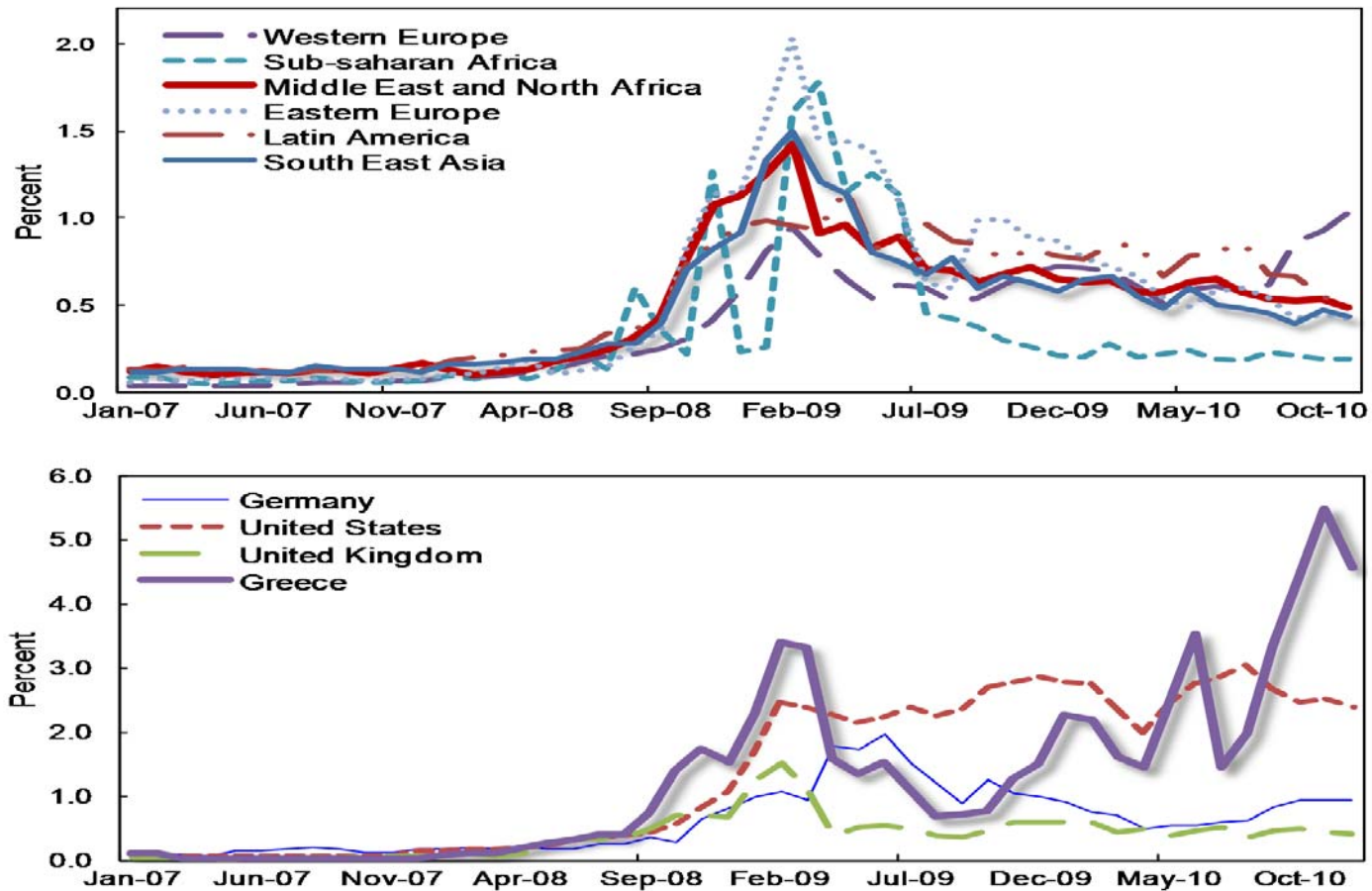
# COMBINING BORROWER AND CREDITOR EFFECTS





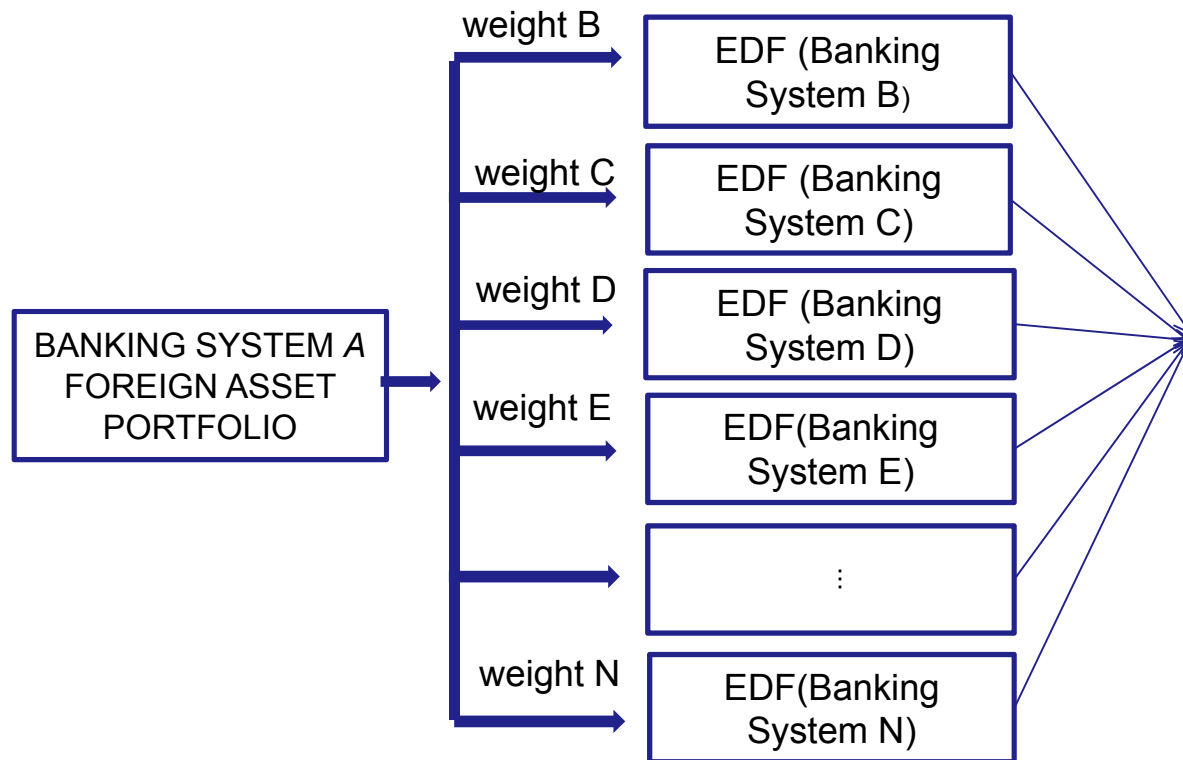
# DOMESTIC BANKING SOUNDNESS: CREDIT RISK INDEX

## Moody's Expected Default Frequency (EDF)



Source: Moody's KVM CreditEdge.

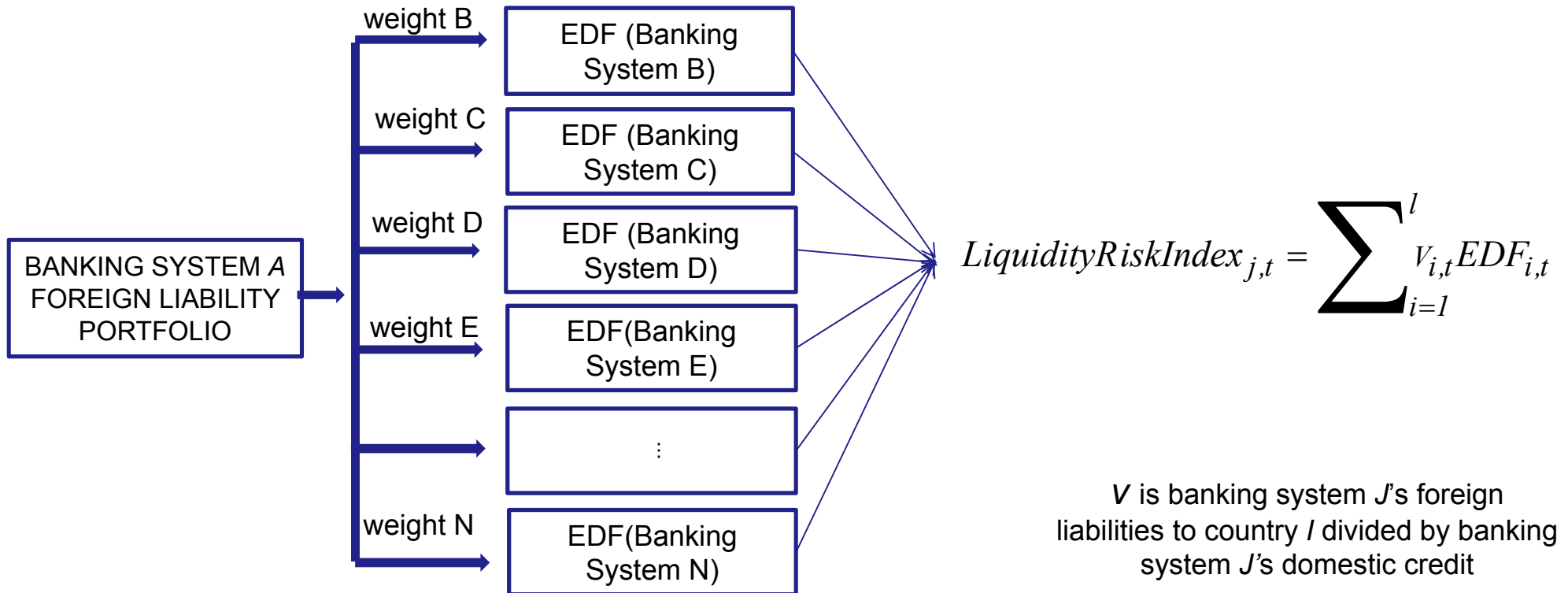
# INDIRECT CREDIT RISK INDEX



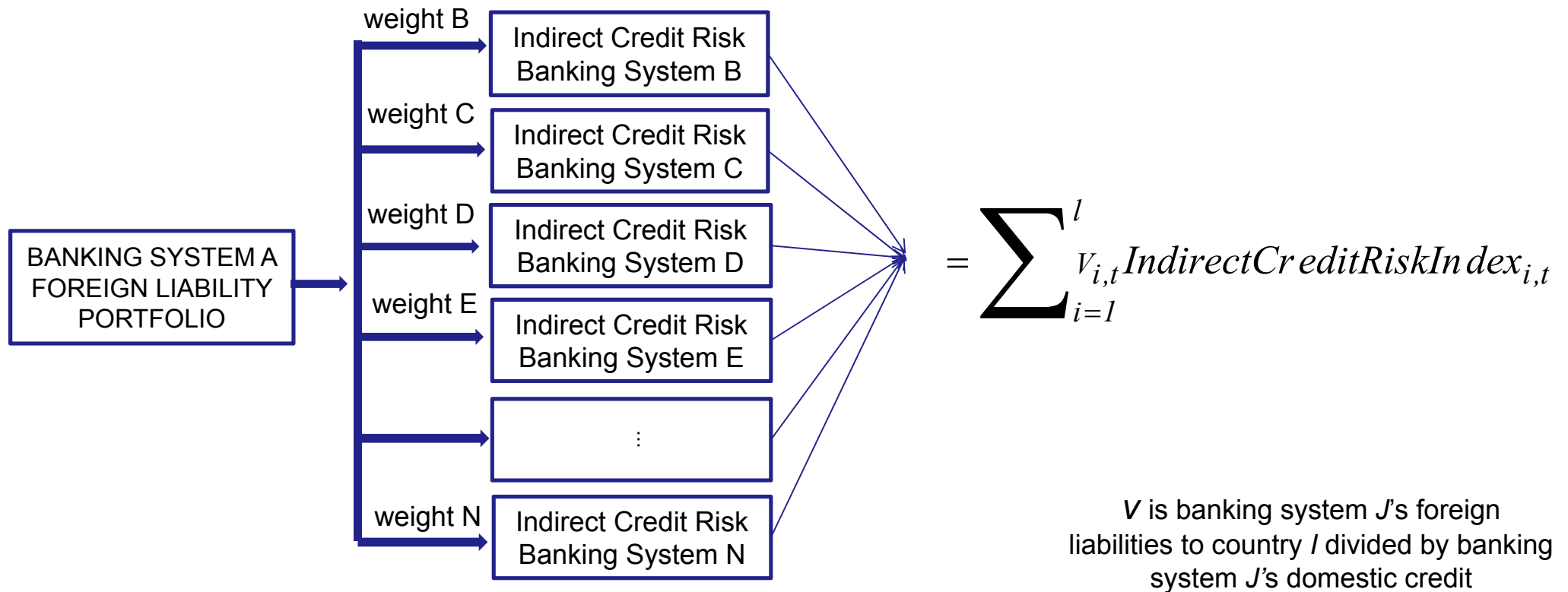
$$IndirectCreditRiskIndex_{j,t} = \sum_{i=1}^k w_{i,t} EDF_{i,t}$$

$w$  is banking system  $J$ 's foreign assets in country  $I$  divided by banking system  $J$ 's domestic credit

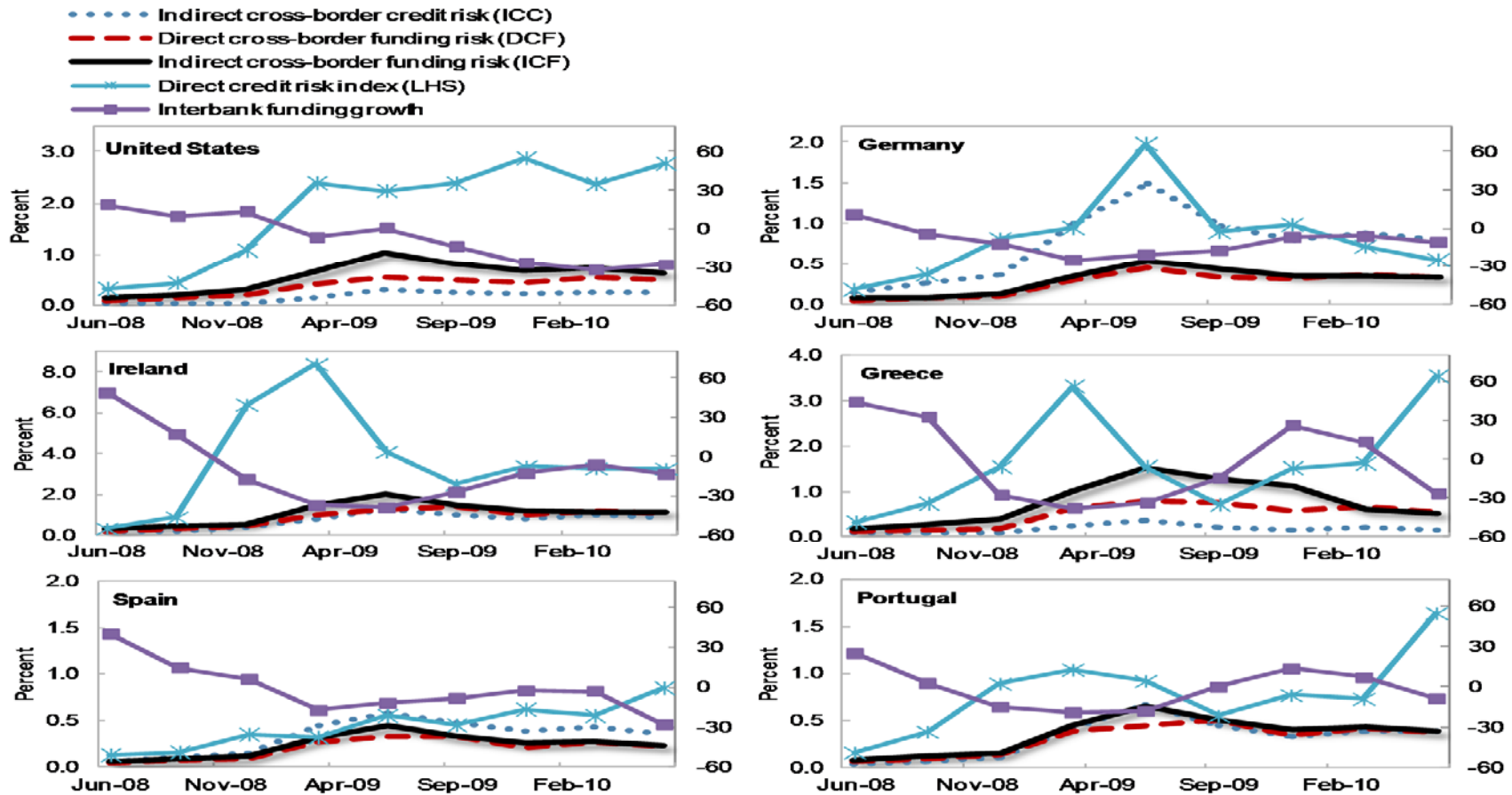
# LIQUIDITY RISK INDEX



# INDIRECT LIQUIDITY RISK INDEX



# FINANCIAL INTERCONNECTEDNESS RISK INDICATORS (Cross-border counterparty risk indexes)



Source: BIS International Consolidated Banking Statistics on immediate borrower basis; author's calculations.

# EMPIRICAL MODEL

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$$\text{IntBorrowing}_{j,t} = \alpha + \beta \text{BorrowerRisk}_{j,t-1} + \gamma \text{CreditorRisk}_{j,t-1} + \varepsilon_{j,t}$$

*International Borrowing*: percent change in international claims on banking system  $J$

*Borrower Risk Indicators*:

- *Moody's KMV EDF (credit risk index)*
- *Indirect credit risk index*
- *Macroeconomic variables (depreciation; GDP growth; fiscal balance to GDP)*

*Creditor Risk Indicators*:

- *Liquidity risk index*
- *Indirect liquidity risk index*

# SAMPLE

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<b>Advanced economies</b>	<b>Emerging markets</b>
Australia	Argentina
Austria	Brazil
Belgium	Chile
Canada	Colombia
Denmark	Hong Kong SAR
Finland	India
France	Indonesia
Germany	Israel
Greece	Malaysia
Ireland	Mexico
Italy	Peru
Japan	Philippines
Netherlands	Poland
Portugal	Singapore
Spain	South Africa
Sweden	South Korea
Switzerland	Thailand
United Kingdom	Turkey
United States	Venezuela

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# SUMMARY RESULTS: IMMEDIATE CRISIS PERIOD

(SEPTEMBER 2007–JUNE 2010)

Dependent variable: percent change (y-o-y) in BIS-reported international claims vis-à-vis banks

	Full Sample		Advanced Banking Systems		Advanced Europe		Emerging Banking Systems		Advanced Banking Systems 1/		Advanced Europe 1/	
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
<b>Cross-border counterparty risk</b>												
Credit risk index (t)	-6.699*** (1.400)	-6.905*** (1.425)	-5.024*** (1.546)	-4.043*** (1.546)	-3.525** (1.688)	-2.680 (1.661)	-9.034*** (2.482)	-9.814*** (2.509)	-5.771*** (1.580)	-4.814*** (1.576)	-4.325** (1.734)	-3.441** (1.713)
Indirect credit risk index (t-1)									-5.580** (2.827)	-5.549** (2.659)	-5.589* (3.117)	-4.938* (2.961)
Liquidity risk index (t-1)	-28.960*** (5.189)		-30.368*** (7.433)		-28.127*** (7.865)		-24.429*** (7.713)		-24.121*** (8.025)		-22.327*** (8.451)	
Indirect liquidity risk index (t-1)		-21.641*** (4.811)		-28.261*** (5.570)		-27.327*** (5.772)		-17.654** (8.527)		-24.659*** (5.782)		-24.051*** (6.065)
<b>Control variables</b>												
Depreciation (t-1) 2/	1.125*** (0.168)	1.146*** (0.170)	1.608*** (0.184)	1.588*** (0.180)	1.834*** (0.227)	1.804*** (0.220)	0.526* (0.306)	0.533* (0.312)	1.555*** (0.184)	1.530*** (0.180)	1.753*** (0.230)	1.727*** (0.224)
Real GDP growth (t-1)	1.694*** (0.328)	1.684*** (0.352)	2.367*** (0.547)	2.228*** (0.515)	2.738*** (0.593)	2.542*** (0.549)	1.694*** (0.457)	1.697*** (0.504)	1.968*** (0.579)	1.740*** (0.561)	2.317*** (0.634)	2.106*** (0.605)
Fiscal balance to GDP (t-1)	0.289 (0.225)	0.399* (0.228)	0.053 (0.243)	0.099 (0.233)	0.062 (0.250)	0.102 (0.240)	0.771* (0.419)	0.915** (0.424)	0.089 (0.241)	0.110 (0.231)	0.094 (0.249)	0.114 (0.239)
Statistical breaks dummy	-3.091 (3.314)	-3.161 (3.365)	-1.598 (2.899)	-1.913 (2.835)	-1.259 (3.031)	-1.490 (2.945)	-20.407 (12.803)	-20.073 (13.065)	-1.893 (2.880)	-2.156 (2.812)	-1.559 (3.014)	-1.731 (2.931)
Constant	16.711*** (2.182)	14.930*** (2.180)	14.578*** (2.267)	15.079*** (2.088)	13.138*** (2.551)	14.052*** (2.330)	19.382*** (4.347)	16.514*** (4.492)	16.391*** (2.430)	17.336*** (2.333)	15.173*** (2.775)	16.156*** (2.637)
Number of observations	372	372	204	204	168	168	156	156	204	204	168	168
R-squared	0.44	0.42	0.55	0.55	0.57	0.58	0.39	0.34	0.59	0.59	0.61	0.61

Note: standard errors in parenthesis. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

1/ The estimates in these columns include indirect credit risk effects.

2/ Quarterly percentage change in the nominal exchange rate, defined as US dollars per unit of domestic currency.



# SUMMARY RESULTS: EXTENDED PERIOD

(SEPTEMBER 2007–SEPTEMBER 2011)

Dependent variable: percent change (y-o-y) in BIS-reported international claims vis-à-vis banks

	Full Sample		Advanced Banking Systems		Advanced Europe		Emerging Banking Systems		Advanced Banking Systems 1/		Advanced Europe 1/	
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
<b>Cross-border counterparty risk</b>												
Credit risk index (t)	-9.595*** (1.074)	-9.478*** (1.061)	-7.890*** (0.943)	-8.300*** (0.942)	-7.663*** (0.984)	-8.284*** (0.993)	-10.903*** (2.692)	-10.492*** (2.675)	-8.035*** (0.931)	-8.295*** (0.921)	-7.792** (0.969)	-8.228** (0.964)
Indirect credit risk index (t-1)									-7.454*** (2.587)	-8.985*** (2.428)	-8.284*** (2.898)	-10.347*** (2.764)
Liquidity risk index (t-1)	-9.643** (4.135)		-39.127*** (5.159)		-43.176*** (5.474)		5.560 (6.038)		-29.047*** (6.176)		-32.081*** (6.639)	
Indirect liquidity risk index (t-1)		-14.089*** (4.178)		-31.662*** (4.452)		-33.749*** (4.780)		0.447 (7.552)		-22.939*** (4.947)		-23.381*** (5.407)
<b>Control variables</b>												
Depreciation (t-1)	1.025*** (0.175)	0.980*** (0.175)	1.221*** (0.173)	1.114*** (0.178)	1.249*** (0.204)	1.103*** (0.214)	0.446 (0.337)	0.453 (0.338)	1.172*** (0.172)	1.079*** (0.174)	1.184*** (0.202)	1.063*** (0.208)
Real GDP growth (t-1)	1.440*** (0.212)	1.292*** (0.217)	0.436** (0.208)	0.283 (0.215)	0.366* (0.217)	0.234 (0.227)	2.787*** (0.414)	2.790*** (0.428)	0.349* (0.207)	0.211 (0.211)	0.269 (0.216)	0.150 (0.221)
Fiscal balance to GDP (t-1)	0.765*** (0.227)	0.685*** (0.227)	0.377 (0.235)	0.530** (0.232)	0.391 (0.247)	0.572** (0.246)	0.845** (0.406)	0.781* (0.408)	0.377 (0.232)	0.461** (0.227)	0.381 (0.243)	0.494** (0.240)
Statistical breaks dummy	-0.722 (3.400)	-0.577 (3.379)	-1.005 (2.823)	-1.039 (2.854)	-0.744 (2.974)	-0.926 (3.041)	-5.362 (11.568)	-5.012 (11.587)	-0.927 (2.785)	-0.893 (2.788)	-0.640 (2.926)	-0.722 (2.955)
Constant	15.011*** (1.969)	16.458*** (1.980)	18.842*** (1.884)	18.169*** (1.887)	19.127*** (2.134)	18.144*** (2.178)	9.807** (4.165)	11.737*** (4.393)	20.202*** (1.918)	20.317*** (1.933)	20.773*** (2.178)	20.653*** (2.219)
Number of observations	527	527	289	289	238	238	221	221	289	289	238	238
R-squared	0.30	0.31	0.42	0.40	0.43	0.41	0.25	0.26	0.48	0.48	0.49	0.49

note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

1/ The estimates in these columns include indirect credit risk effects.

2/ Quarterly percentage change in the nominal exchange rate, defined as US dollars per unit of domestic currency.

# SENSITIVITY ANALYSIS

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- Exchange rate adjustments
- Breaks in the series
- Foreign bank presence

## CONCLUDING REMARKS

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- Both borrower and creditor fragilities (push and pull factors) contributed to the collapse in international bank lending.
- Borrower risk characteristics mattered:
  - the soundness of the domestic banking system
  - the riskiness of their international credit portfolios
  - macroeconomic fragilities (depreciation and GDP growth)
- Creditor risk characteristics also mattered:
  - reliance on distressed creditors
  - creditors with risky cross-border credit exposures
  - a larger decline in cross-border funding

## CONCLUDING REMARKS

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- The model (and the counterparty risk indexes) explain better the variation in lending to advanced and European banking systems.
- Depreciation effects more important for advanced economies/Europe.
- Borrower effects stronger in the extended period.
- Creditors' effects stronger in advanced economies/Europe in the extended period/weaker in emerging markets.
- Fiscal effects become significant in the extended period.
- GDP growth more important in emerging markets in the extended period.

THANK YOU