

# GLOBAL FINANCIAL SAFETY NETS

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\*This presentation draws on “Analytics of Systemic Crises and Liquidity Responses: Implications For The Global Financial Safety Net.”

*The views herein are those of the author and do not necessarily represent the views of the IMF, its management or Executive Board.*

# THE GLOBAL FINANCIAL SAFETY NET: DOES IT NEED A FIX?



# PRESENTATION OUTLINE

- Global financial safety net:
  - Fire extinguisher or sprinkler system?
- Systemic crises
  - Examples and underlying vulnerabilities
  - Contagion and co-movement
    - Role of common factors
    - Impact on “innocent bystanders”
- Preventing individual crises
  - Analytical framework
  - Empirical evidence
  - Implementation in IMF facilities
- Preventing systemic crises
  - Analytical framework
  - Stylized facts

# GLOBAL FINANCIAL SAFETY NET

## ○ What?

- Crisis mitigation (“fire extinguisher”)
- Crisis prevention (“sprinkler system”)

## ○ Why?

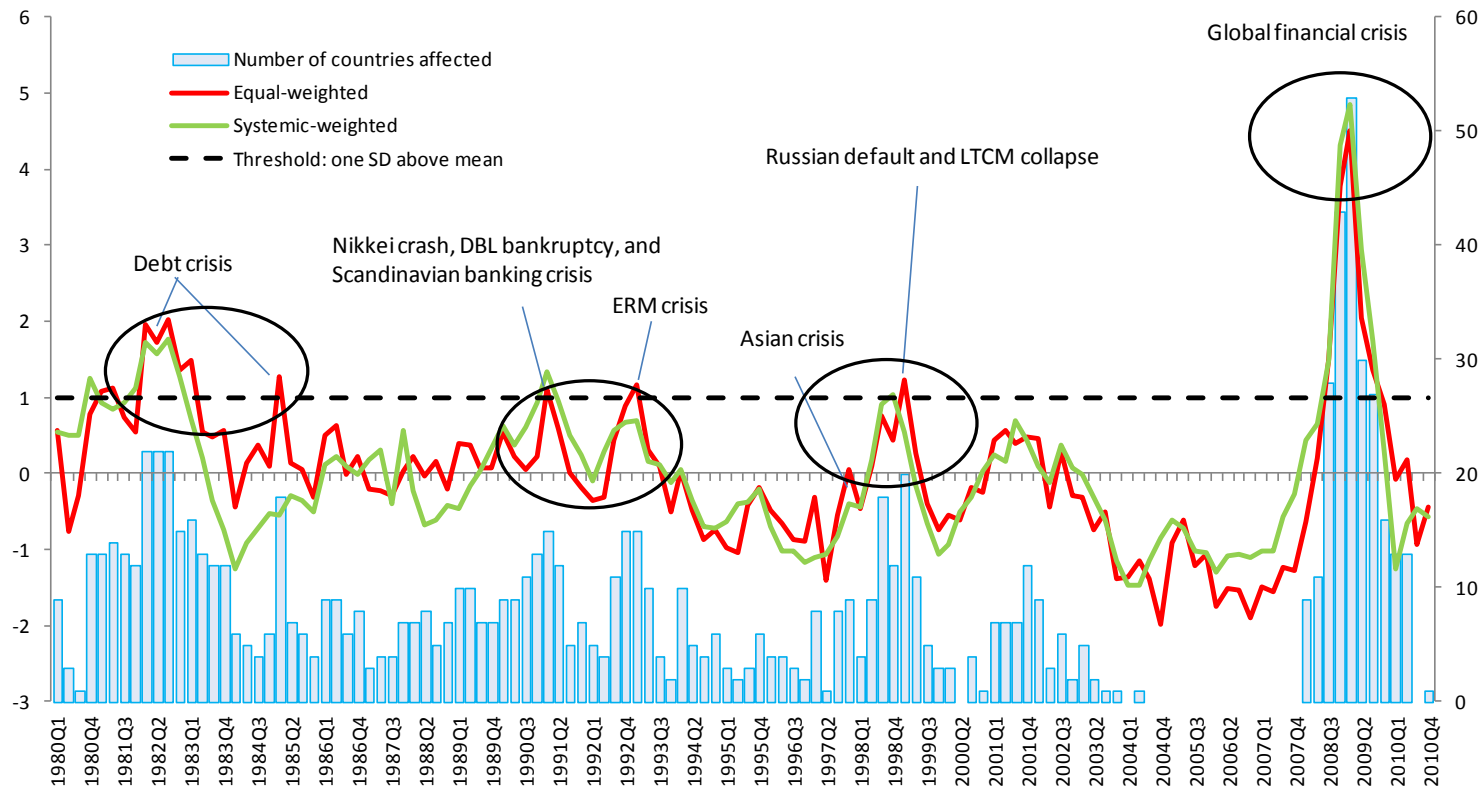
- Interconnectedness through trade and financial channels
- Conflagration in one part of the system can spread, amplify, and engulf the system

## ○ How?

- Complementary system of central bank swap lines, regional pools, and IMF precautionary instruments
- IMF contingent instruments triggered simultaneously in the event of systemic crisis, with access/design taking account of simultaneous availability

# EXAMPLES OF SYSTEMIC CRISES

## Systemic-weighted and Equal-weighted Global Systemic Crisis Indicators



Source: WEO database and IMF staff calculations.

1/ A country is considered "affected" if its country-level crisis indicator (a simple average of FSI/EMPI and real GDP growth, both normalized) is above one standard deviation from its mean. Global systemic crisis indicators are constructed as a simple average of normalized global real and financial stress indices, which aggregate country-level indicators using either "systemic importance" as weights (systemic-weighted) or equal weights. Both global crisis indicators are normalized for easy presentation and comparison.

# CONTAGION AND CO-MOVEMENT

- Systemic crises affect multiple countries simultaneously, reflecting:
  - Common external shocks (e.g., tightening monetary policy in advanced economies after a period of low interest rates)
  - Contagion: crisis in one country (underlying vulnerability + crisis trigger) affecting other vulnerable countries through:
    - Market reassessments
    - Direct linkages
      - Real
      - Financial
    - Upstream capital market linkages
  - And otherwise non-vulnerable countries (“crisis bystanders”) through:
    - Direct linkages
      - Real
      - Financial
    - Upstream capital market linkages

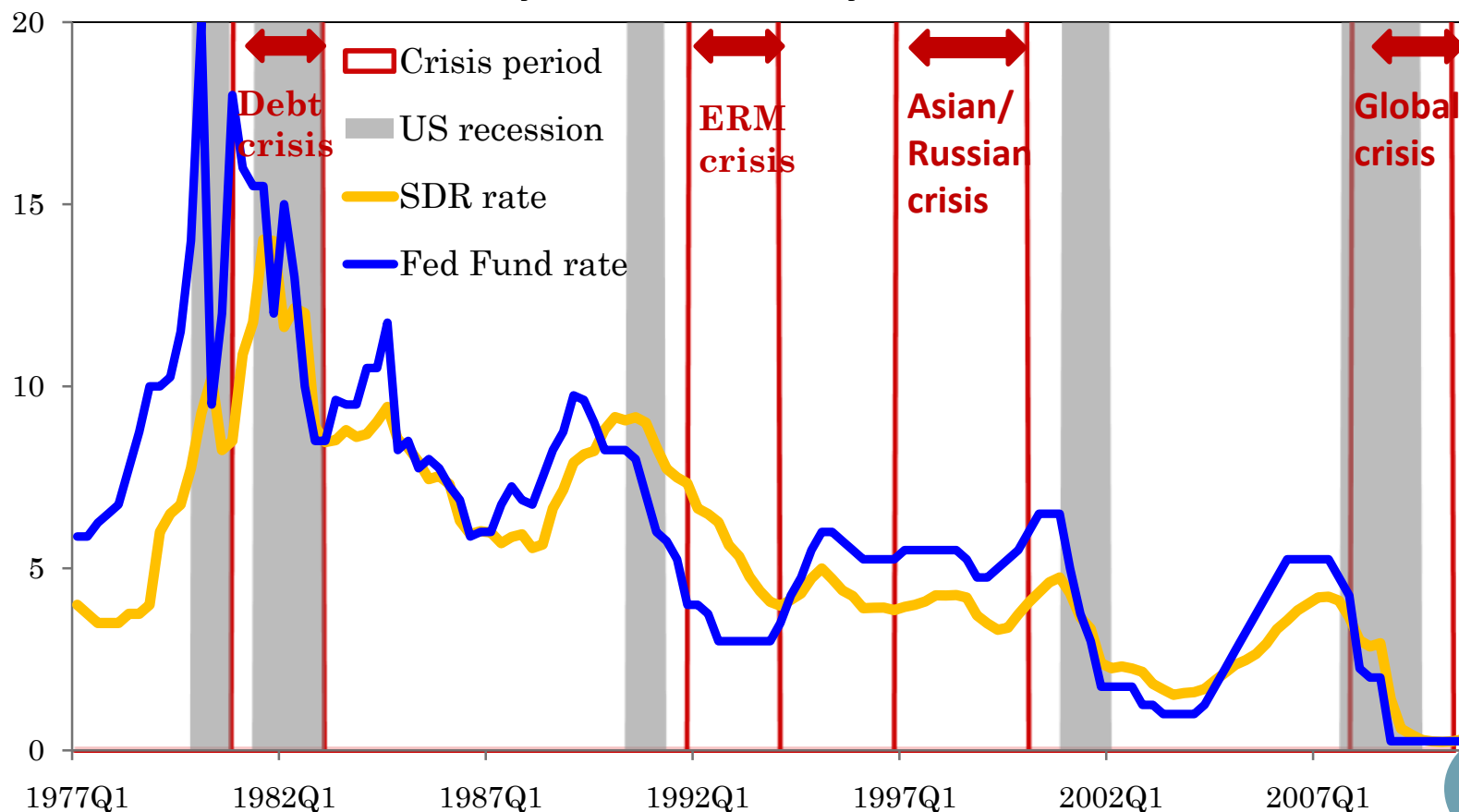


# FACTORS UNDERLYING SYSTEMIC CRISES

Underlying factor	Debt	ERM	Asia	Russia	Global
<b>Domestic factors</b>					
Balance sheet mismatches	✓		✓	✓	✓
Public debt sustainability	✓	✓	✓	✓	✓
Unsustainable ER pegs		✓	✓	✓	
Asset price bubble	✓	✓			✓
<b>External factors</b>					
Monetary policy in major AMs	✓	✓			
Commodity prices	✓			✓	✓

# COMMON FACTORS (G7 Policy Rates)

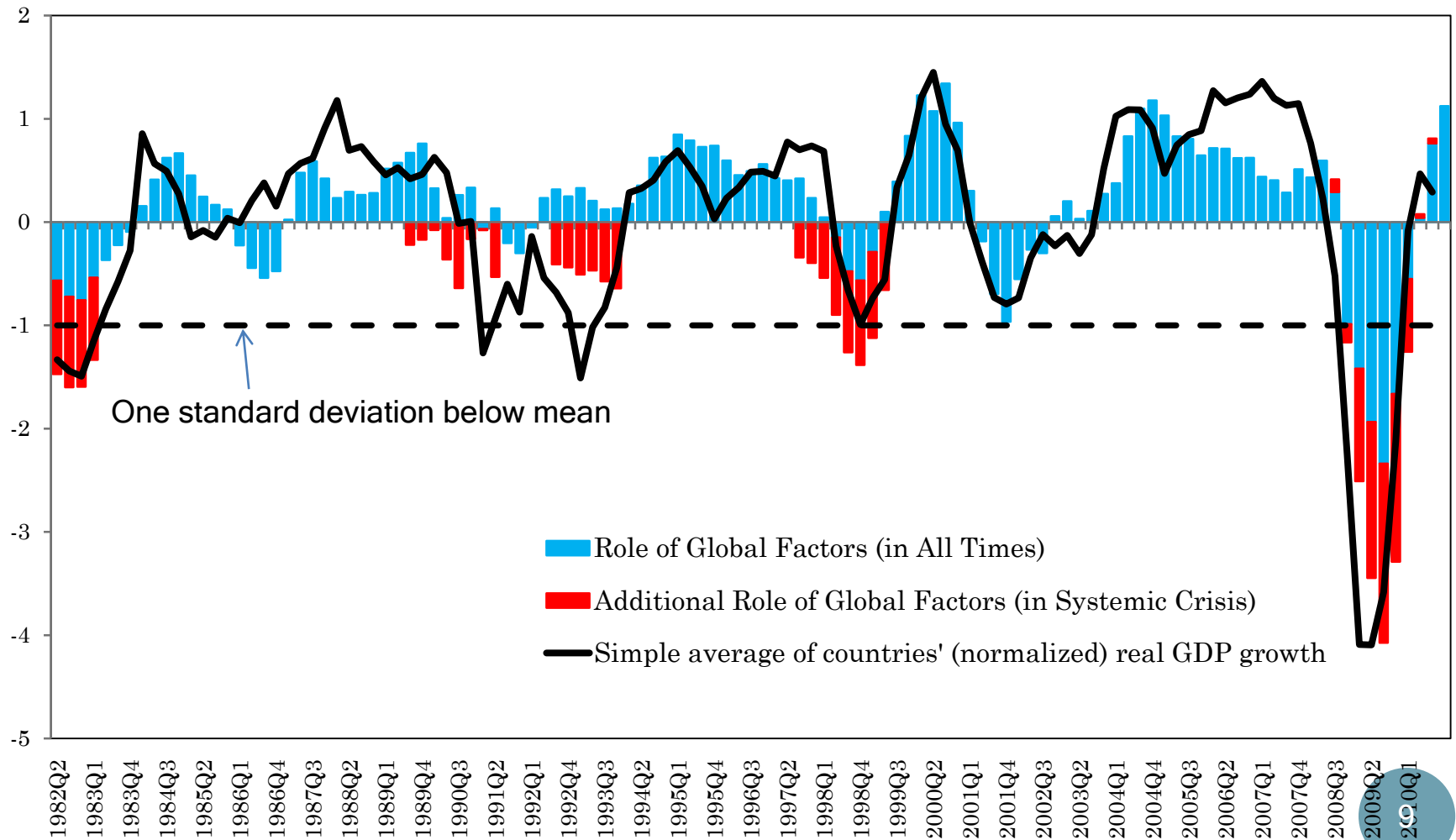
## G7 Policy Rates Across Systemic Crises



Sources: IFS and staff estimates.



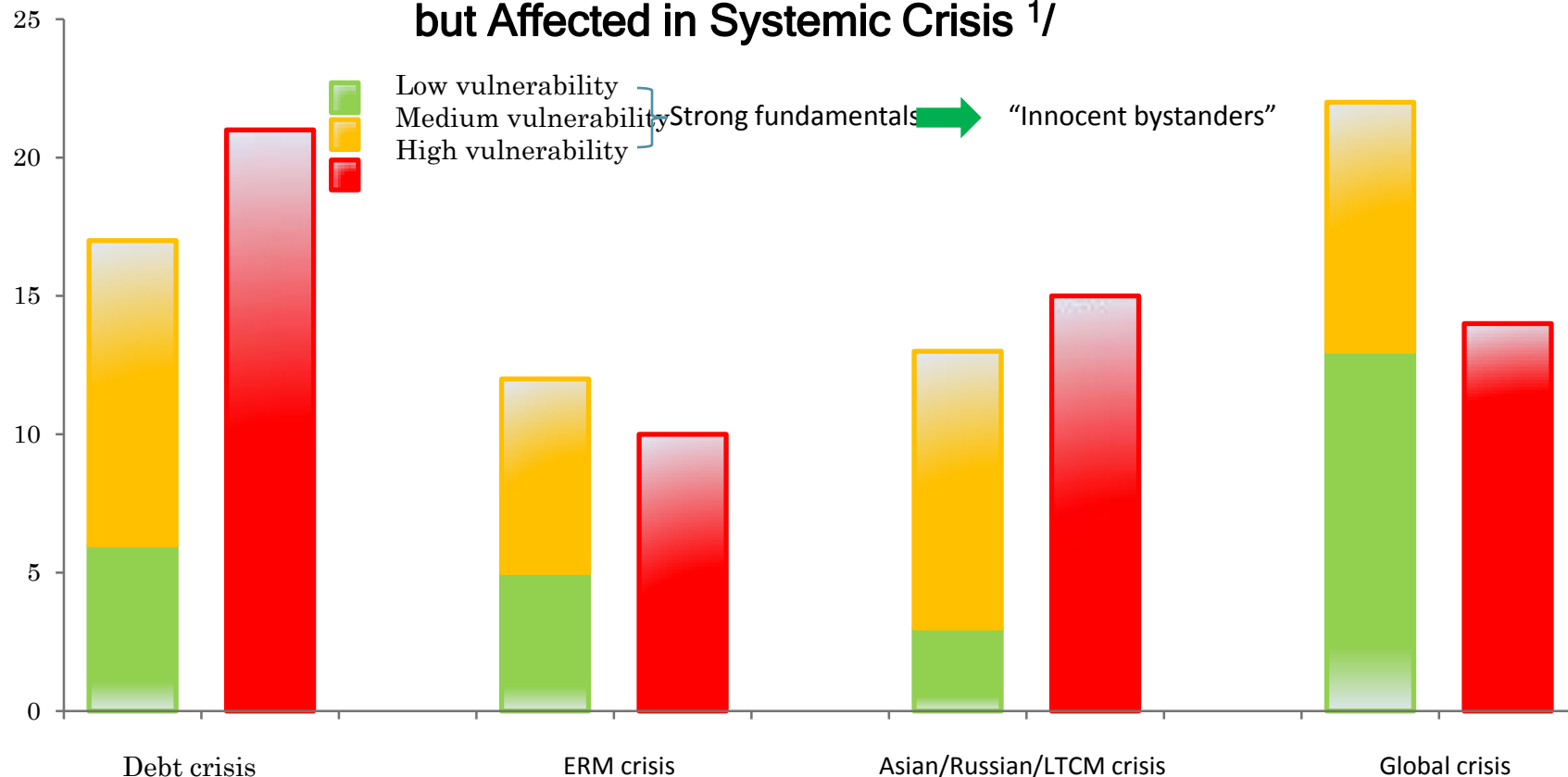
# ROLE OF COMMON FACTORS IN SYSTEMIC CRISES



Note: Global factors include VIX, oil price growth (yoy), and lagged world import volume growth (yoy). During systemic crisis, a systemic crisis dummy is also included as a global factor.

# CONTAGION AND “BYSTANDERS”

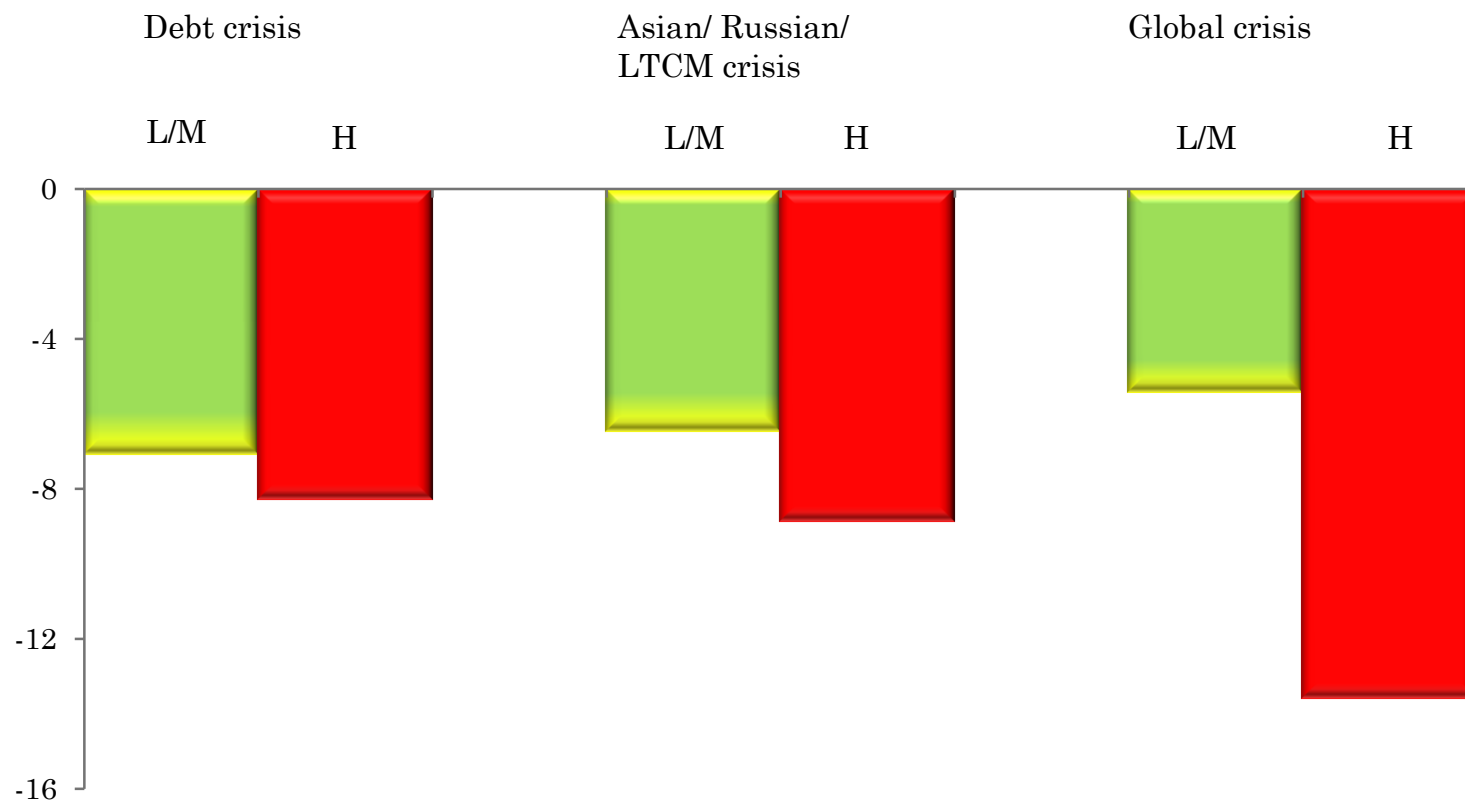
## EMs with Strong Fundamentals (“Crisis Bystanders”) but Affected in Systemic Crisis <sup>1/</sup>



<sup>1/</sup> An emerging market (EM) is considered to have strong fundamentals if it had low or medium pre-crisis external vulnerability (overall vulnerability for the global crisis). An EM is considered affected during a systemic crisis if its systemic crisis index exceeded one standard deviation above its own mean or it had an IMF arrangement starting during the crisis.

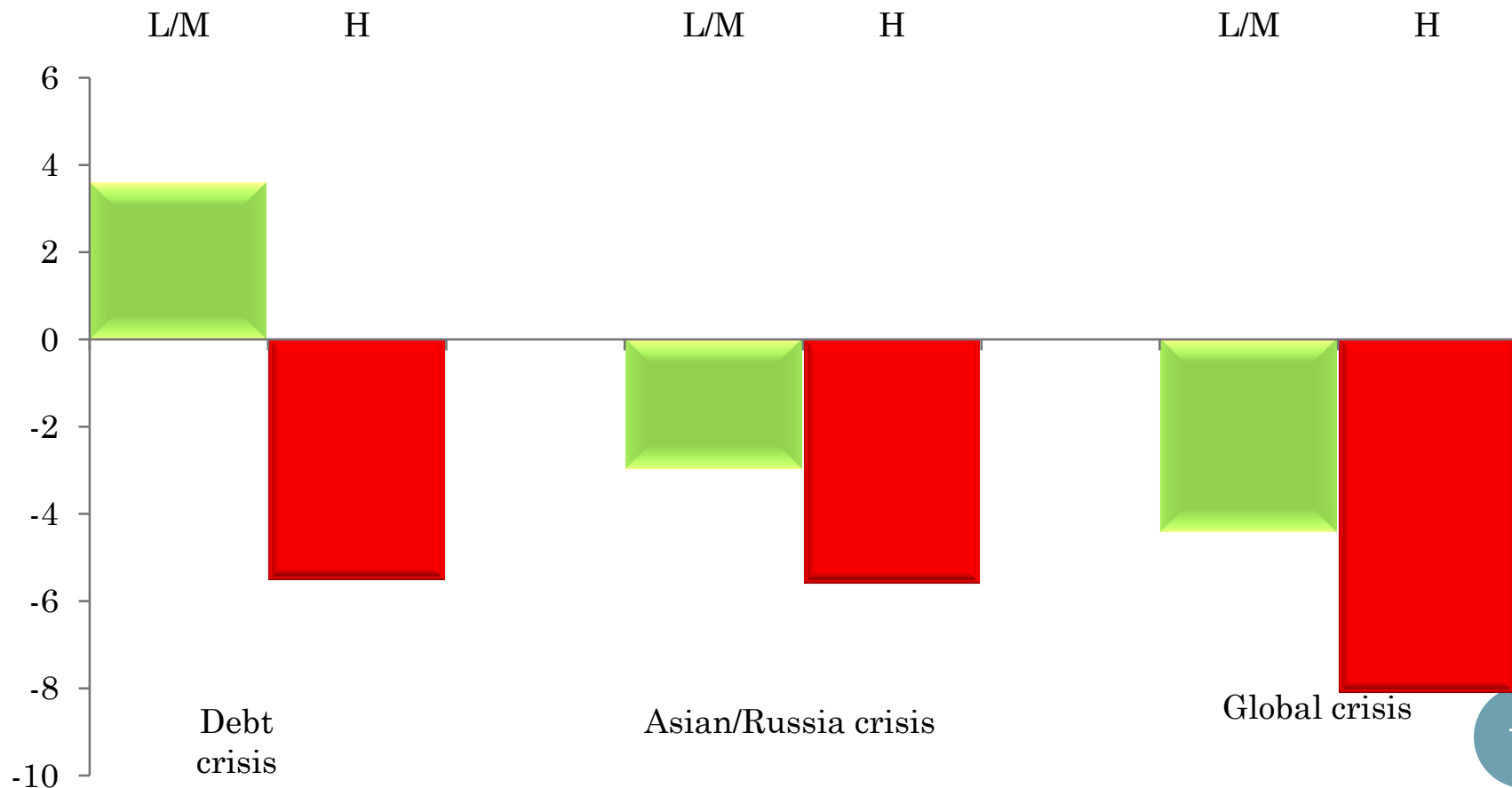
# NET CAPITAL PUTFLOWS AFFECT BOH VULNERABLE AND BYSTANDERS

**EM Affected Countries: Median Net Inflows**  
(peak-to-trough deviation in period T-3 to T+3 , percent of GDP)



# OUTPUT DECLINES OF VULNERABLE AND BYSTANDERS

**EM Affected countries: Median output loss by vulnerability**  
(peak-to-trough, percent)



# PREVENTING INDIVIDUAL FINANCIAL CRISES

- Analytical framework
- Empirical evidence
- Implementation in IMF Facilities

# PREVENTING CRISES—ANALYTICAL FRAMEWORK

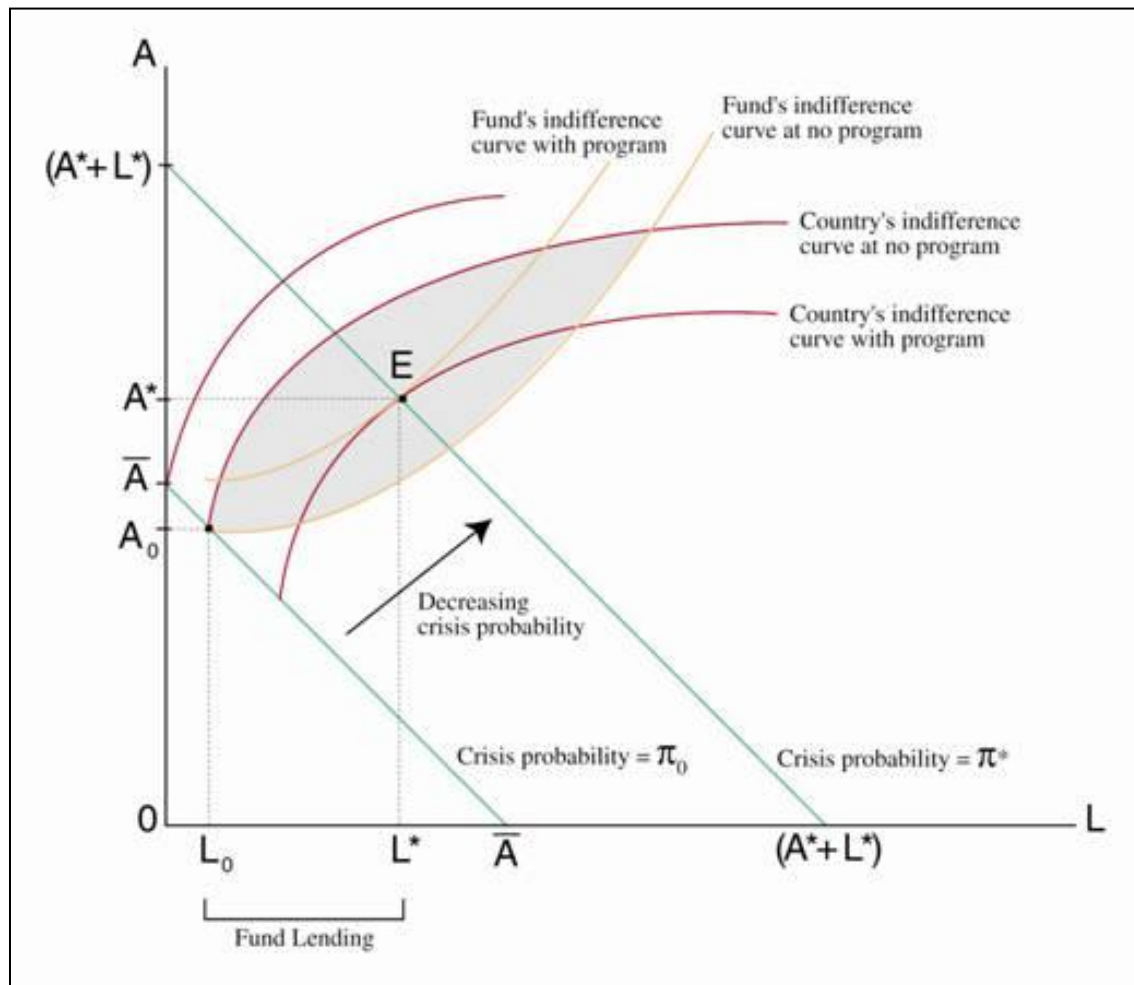
- Kim (2005): Debtor country facing liquidity constraint; proportion of short-term creditors exiting,  $x$ , must be less than available liquid resources (current account,  $CA(\theta$ ; adjustment,  $A$ ); IMF lending):

$$xD < CA + L + R = (\theta + A) + L + R$$

- Creditors who exit receive  $\lambda$ , while those who stay receive an uncertain payoff that is higher than  $\lambda$  if no default, 0 otherwise.
- Creditors rush for exit if the signal received,  $\theta$ , is less than some critical value,  $\theta^*$  (greater adjustment or IMF lending, less likelihood of liquidity run):

$$\Pr(\text{crisis}) = \Pr(\theta < \theta^* = \lambda - (A + L))$$

# ANALYTICAL FRAMEWORK (CONT.)



## ANALYTICAL FRAMEWORK (CONT.)

- Country faces cost of adjustment, hence will seek to minimize adjustment for a given probability of crisis,  $\pi_0$ . From country's perspective, adjustment and IMF financing are substitutes. Given reserves  $L_0$ , will choose point  $A_0$ ,  $L_0$ .
- Conditional IMF contingent financing of  $L^*$ , induces adjustment  $A^*$ , and reduces probability of crisis to  $\pi^*$ .
- Key results:
  - Conditional credit line is Pareto improving, even recognizing political and other costs of adjustment. Ex ante conditional IMF lending can reduce likelihood of liquidity crisis that could be costly if it requires value-destroying liquidation of projects.
  - Reduction in crisis probability reflects both more financing and better (induced) policies; conditional financing is more effective in crisis prob. reduction than country's own reserves.
  - Ex ante, financing and adjustment are substitutes, both in equilibrium they are complements.



# PREVENTING CRISES—EMPIRICAL EVIDENCE

- Ramakrishnan and Zaldendo (2006) examine periods of heightened vulnerability—in panel of 27 emerging market countries over 1994-04, identify 32 high market pressure episodes. Of these 11 turned into capital account crises, and 21 avoided a crisis. Why?
- Possible channels:
  - Provide liquidity—reduce likelihood of a “run” on the country by atomistic creditors
  - Incentive for stronger policies
  - Enhance credibility of policies through conditionality
  - Signal markets, including by putting IMF resources on the line.

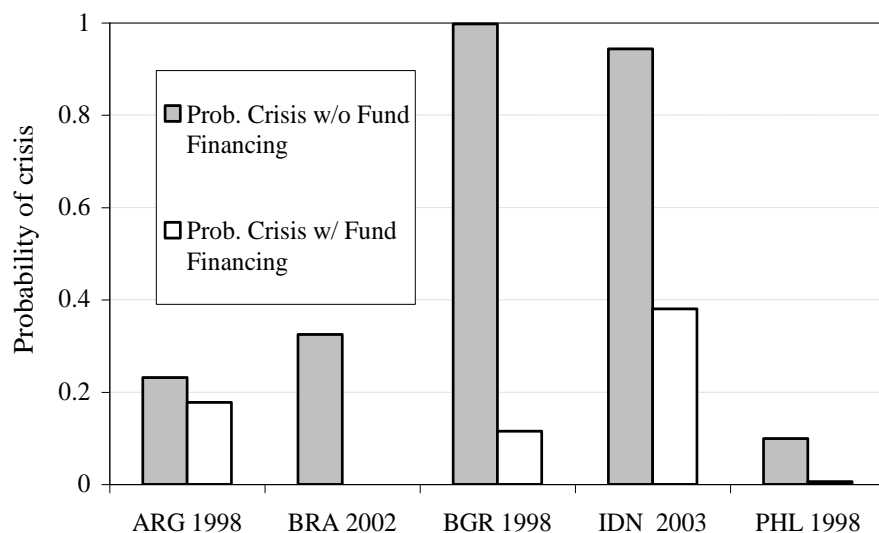
# ESTIMATION RESULTS

- Balance sheet vulnerabilities (debt/GDP, short-term debt/reserves), pegged exchange rate regimes, exchange rate overvaluation, political instability—all significantly associated with higher crisis probability
- Stronger monetary and fiscal policies are significantly associated with lower crisis probability
- IMF disbursements (or accumulated drawing rights under precautionary) are significant in crisis prevention
  - There is an important liquidity effect as it is disbursements (or availability under precautionary arrangements) of IMF resources that matters, rather than just an on-track program or possible future drawings.
  - Benefits go beyond liquidity effects, since IMF financing variable is significant even controlling for the country's foreign exchange reserves. This must reflect stronger policies under programs and the signal to markets (which also depends on the IMF putting its “money on the line”)

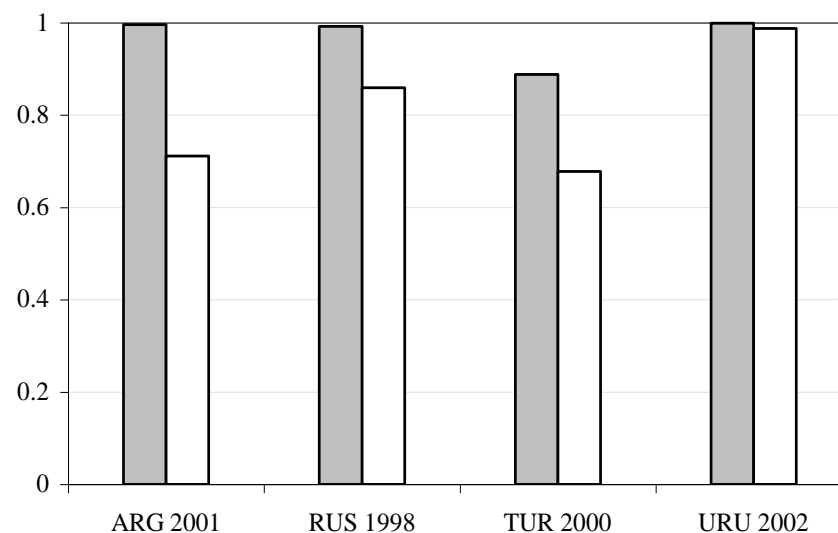
# Estimated Probability of a Crisis with and without Fund Financing

(KAC and CG countries receiving Fund financing at time  $t-1$ )

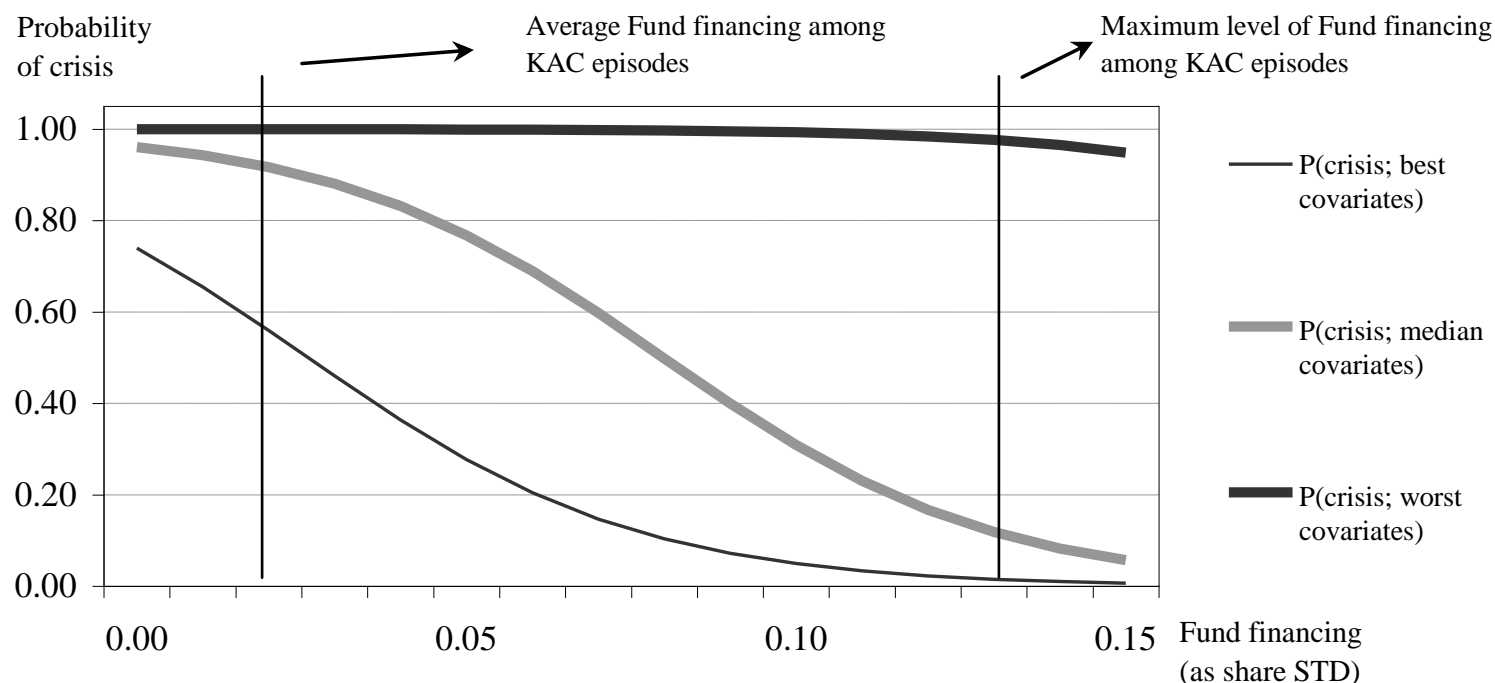
A. Countries that averted a crisis



B. Capital account crises cases



## Marginal Impact of Fund Financing, Given Country Fundamentals 1/



1/ Based on regression 4 in Table 3. Fund financing is defined as the cumulative disbursements over 12 months as a share of short-term debt. The figure reflects the probability of a crisis for different countries based on the covariate contributions (CC) at time  $t-1$ . Vertical lines are also measured at  $t-1$  and represent, respectively, the average and maximum level of Fund financing among crises episodes.

# IMPLEMENTATION IN IMF FACILITIES

## **Flexible Credit Line (FCL):**

- Target: for countries with very strong fundamentals & policies
- Purpose: primarily for crisis prevention purposes, but also for responding to a crisis.
- Duration: the length is one or two years, with an interim review after one year.
- Disbursement: available in a single up-front disbursement, and not conditioned on adoption of specific policies; there is no cap on access to IMF resources
- Implementation: the credit line can either be drawn at the time it is approved or treat it as precautionary.

## **Precautionary Credit Line (PCL):**

- Target: for countries with sound fundamentals and policies
- Purpose: only for crisis prevention purposes
- Duration: the length can be between one and two years, with semi-annual monitoring.
- Disbursement: access can be front-loaded, with up to 500 percent of quota made available on approval, and up to a total of 1000 percent of quota after 12 months subject to satisfactory progress in reducing vulnerabilities
- Implementation: can be drawn should a need arise unexpectedly; if funding needs do

# PREVENTING SYSTEMIC CRISES

- Analytical framework (work in progress)
- Empirical Evidence (some stylized facts)



# SYSTEMIC CRISES—ANALYTICAL FRAMEWORK

- Can analytical framework presented above be extended to systemic crises?
- Sure...
  - But that would give rationale for multiple individual contingent credit lines, possibly simultaneously during systemic events.
  - Is there rationale for a global financial safety net?
- Conceptual difference between multiple credit lines and GFSN:
  - Program design and access of individual credit lines under GFSN would take account of other countries' credit lines.
  - This leads to a saving of total IMF resources that would be required to provide the safety net (current FCC: \$440 billion).

# ANALYTICAL FRAMEWORK—AN EXAMPLE

- Two countries, I and B, with output:

$$y^I = \eta^I + \theta\eta^B, \eta^I \sim N(\mu, \sigma^2)$$

$$y^B = \eta^B + \theta\eta^I, \eta^B \sim N(\mu, \sigma^2)$$

$$y^c \sim N(\mu(1+\theta), (1+\theta^2)\sigma^2); \quad c = B, I$$

- Assume normalization such that value-destroying crisis whenever  $y^c \leq 0$
- Individual credit lines, each country ( $c=I, B$ ) needs (for probability of crisis equal to  $\varepsilon$ ):

$$pr(y^c + L^c \leq 0) = \varepsilon \Rightarrow \frac{-L^c - (1+\theta)\mu}{\sigma\sqrt{1+\theta^2}} = \Phi^{-1}(\varepsilon); \Phi \text{ cdf of } N(0,1)$$

$$\Rightarrow L^c = -\Phi^{-1}(\varepsilon)\sigma\sqrt{1+\theta^2} - (1+\theta)\mu$$



# ANALYTICAL FRAMEWORK—AN EXAMPLE (CONT.)

- Global financial safety net, choose  $L^B$ ,  $L^I$  simultaneously, to ensure  $\Pr(y^I + L^I \mid L^B \leq 0) = \varepsilon$   $\Pr(y^B + L^B \mid L^I \leq 0) = \varepsilon$

recognizing that both will receive credit line, so output for B will be (symmetric for I):

- $$y^B = \eta^B + \theta f(\eta^I, L^I); f(x, L^I) = \begin{cases} x, & x \geq 0 \\ 0, & -L^I \leq x < 0 \\ x + L^I, & x < -L^I \end{cases}$$

$$\Pr(y^B + L^B \leq 0 \mid L^I) = \int_{x=0}^{\infty} \Pr(\eta^B + \theta x + L^B \leq 0) \phi(x) dx$$

- $$+ \int_{x=-L^I}^0 \Pr(\eta^B + L^B \leq 0) \phi(x) dx$$

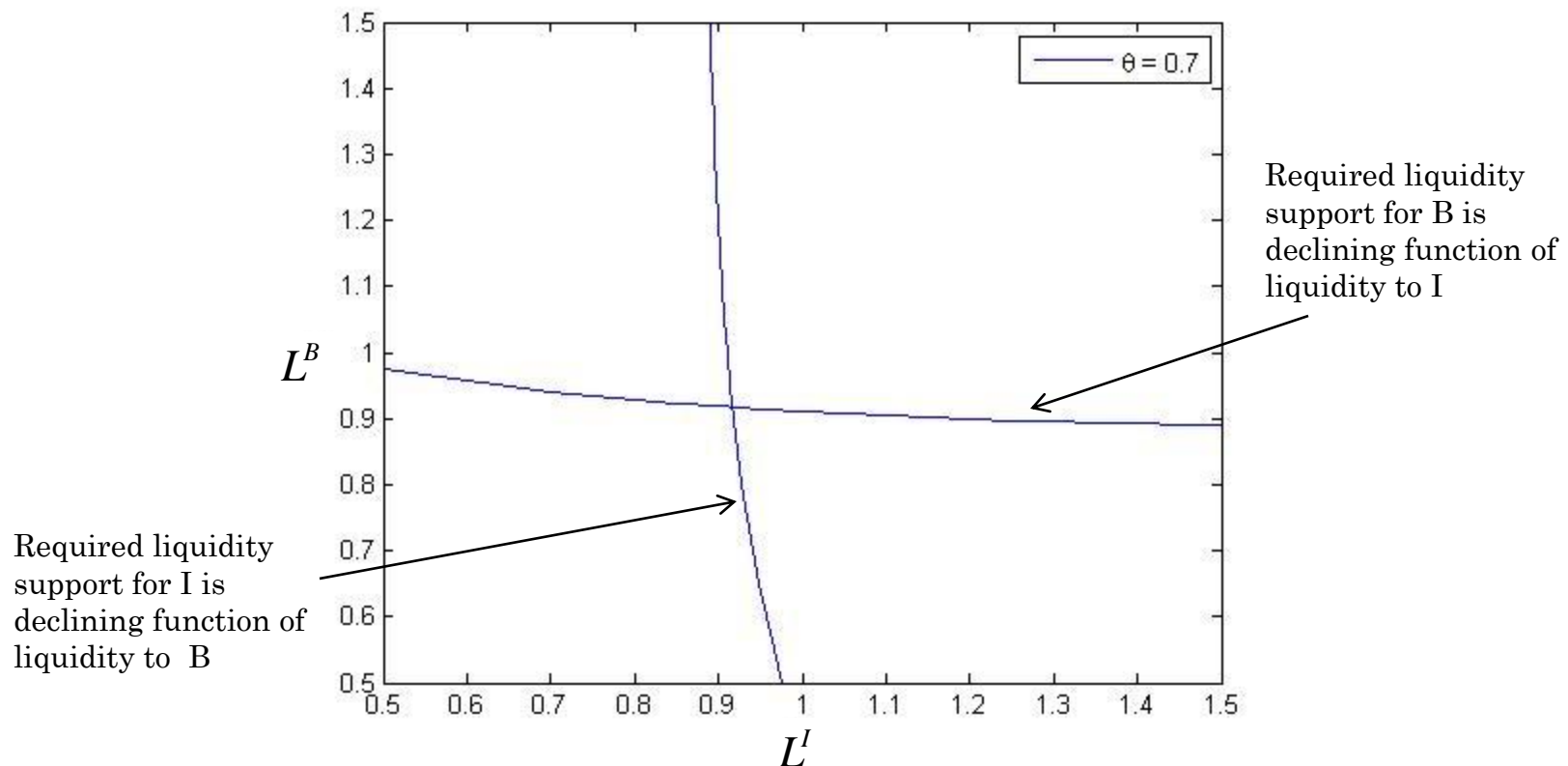
$$+ \int_{x=-\infty}^{-L^I} \Pr(\eta^B + \theta(x + L^I) + L^B \leq 0) \phi(x) dx$$

# ANALYTICAL FRAMEWORK (CONT.)

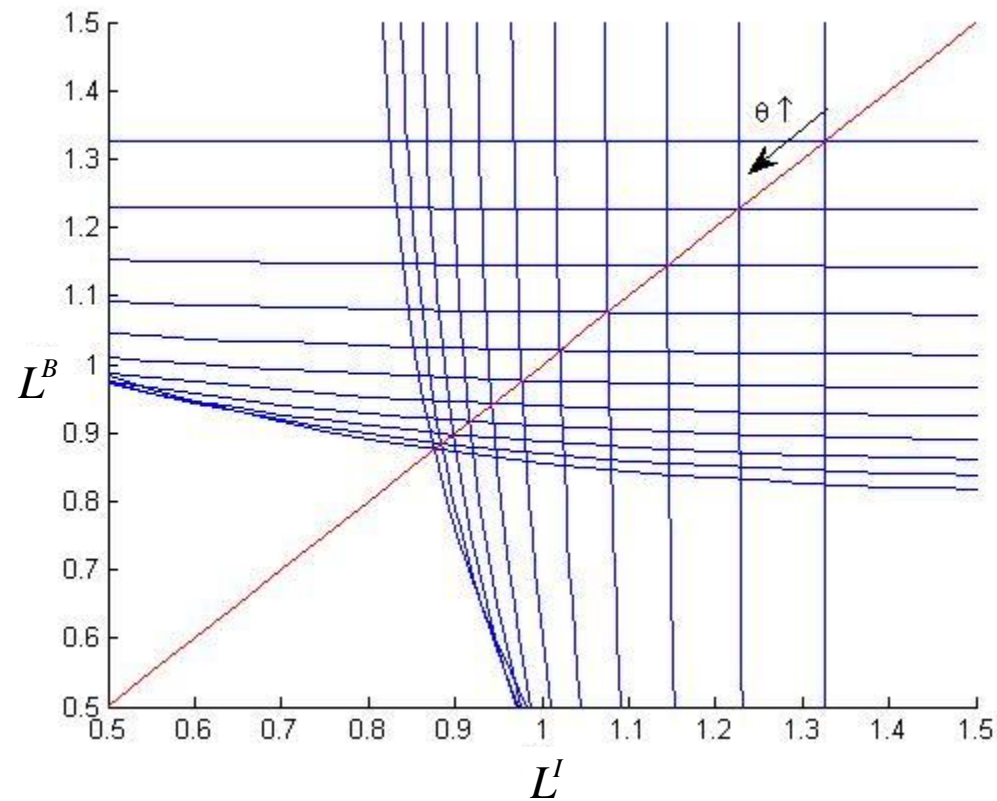
Choose  $L^B$ ,  $L^I$  simultaneously, to ensure

$$\Pr(y^I + L^I \mid L^B \leq 0) = \varepsilon \quad \Pr(y^B + L^B \mid L^I \leq 0) = \varepsilon$$

Simultaneous Determination of  $L^I$ ,  $L^B$ , for given  $\theta$

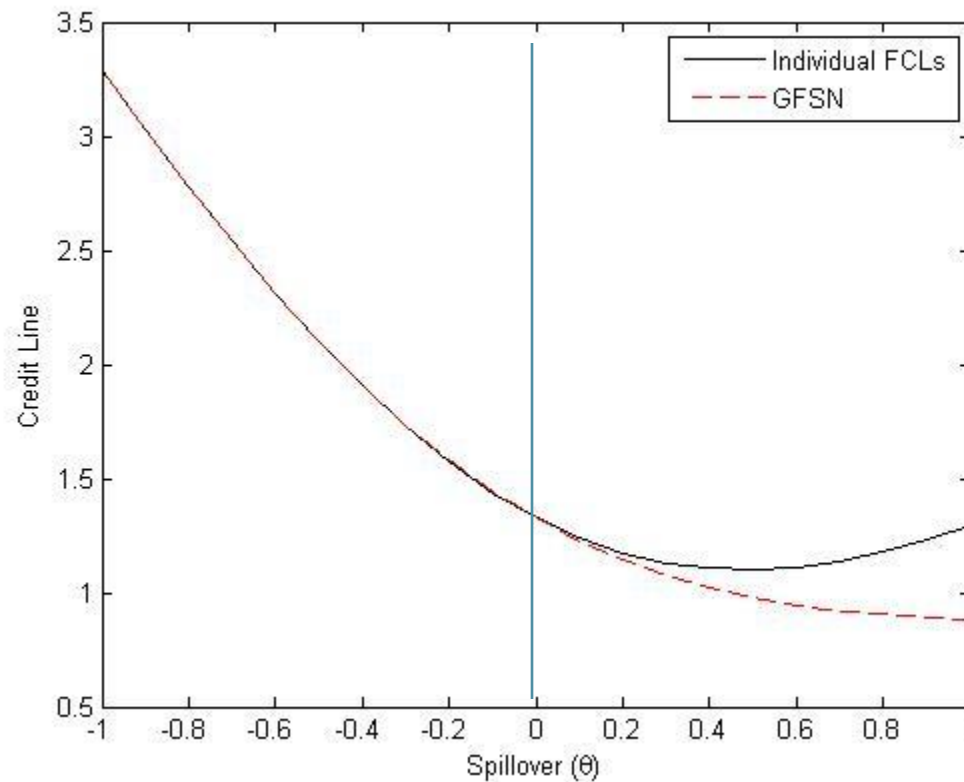


# ANALYTIC FRAMEWORK (CONT.)



# ANALYTICAL FRAMEWORK (CONT.)

## Resource Saving From GFSN vs. Individual Credit Lines



# STYLIZED FACTS—GROWING IMPORTANCE OF EMEs FOR OTHER EMEs: SPILLOVERS

## Regression of EME GDP Growth on Other EME and ADV GDP Growth

Descriptive Variable	EME			ADV			
	coefficient	t-stat	R-squared	coefficient	t-stat	R-squared	R-squared
Dollar GDP (1980-2010)	0.0130 ***	(6.396)	0.059	0.0087 ***	(3.416)	0.022	0.117
Dollar GDP (1980-1999)	0.0121 ***	(4.819)	0.030	0.0093 ***	(2.847)	0.004	0.062
Dollar GDP (2000-2010)	0.0182 ***	(6.524)	0.351	0.0031	(0.868)	0.241	0.383
PPP GDP (1980-2010)	0.0135 ***	(6.614)	0.150	0.0147 ***	(4.989)	0.139	0.167
PPP GDP (1980-1999)	0.0059	(1.130)	0.083	0.0305 ***	(4.118)	0.100	0.107
PPP GDP (2000-2010)	0.0169 ***	(5.931)	0.390	0.0058	(1.288)	0.347	0.402

\* Regression include changes in oil prices and changes in terms of trade.

# CONCLUSIONS

- Systemic crises are costly: 2008 GFC cost (output foregone) estimated at 100% of world annual GDP (discounted difference between world GDP projected in 2008 WEO for 5 years relative to latest actual/projected).
- Growing interconnectedness makes likelihood and severity of systemic crises greater
- Precautionary credit lines can help reduce likelihood of a “run” on the country, thus preventing liquidation that is value destroying for the country, and for other countries with trade, financial or capital market linkages
- But multiple individual credit lines is resource-inefficient compared to GFSN, with resource saving increasing in interdependence—which has been rising for EMEs