Comments on
"Cross-Country Causes and Consequences of the 2008 Crisis: Early Warning"
by
Andrew Rose And Mark Spiegel

Discussion

by

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Predicting the "Storm"

- The Queen of England: "Why our economists were not able to predict the financial crisis and have few ideas about how to prevent a repetiton?"

- Andrew Rose and Mark Spiegel are to be recommended for being the first to take seriously the Queen's challenge about predicting the crisis.

But

- But.. They tell us : Doing Cross-country econometrics may not produce early warning forecasts of the 2008 crisis.

Outline of my discussion

- Background on the global picture
- Review of the Rose-Spiegel analysis
- The cross-country heterogeneity problem
- Few pitfalls in the Rose-Spiegel econometric approach
- Threshold balance-sheet Effects—The The Razin-Rubinstein (2006) approach
- The role of different institutional factors

Different focus

- The need for a focus first on the understanding of early warning for the epi-center

Background: The Global Picture

- In the mid-1990s, Bernanke pointed out, the emerging economies of Asia had been major importers of capital, borrowing abroad to finance their development. But after the Asian financial crisis of 1997-98, these countries began protecting themselves by amassing huge war chests of foreign assets, in effect exporting capital to the rest of the world.

Global Picture (Continued)

- Most of the Asia cheap money went to the United States — hence US giant trade deficit, because a trade deficit is the flip side of capital inflows. But as Mr. Bernanke correctly pointed out, money surged into other nations as well. In particular, a number of smaller European economies experienced capital inflows that, while much smaller in dollar terms than the flows into the United States, were much larger compared with the size of their economies.

GLOBAL IMBALANCES

Lopsided
Current-account balances, $bn

Developing economies*

United States

1996 98 2000 02 04 06 08†

900 600 300+ 0- 300 600 900

*Includes Hong Kong, South Korea, Singapore and Taiwan †Estimate

Source: IMF

Global Picture (Continued)

- Wide-open, loosely regulated financial systems characterized the US shaddow banking system and mortgage institutions, as well as many of the other recipients of large capital inflows.

- "How Ireland Became the Celtic Tiger" was the title of one Heritage Foundation article; "The Estonian Economic Miracle" was the title of another. All these nations are in deep crisis now.

Global Picture (Continued)

- For a while, the inrush of capital created the expected capital gains in these countries, just as it did for American homeowners: asset prices were rising, currencies were strong, and everything looked fine. But bubbles always burst sooner or later, and yesterday's miracle economies have become today's basket cases, nations whose assets have evaporated but whose debts remain all too real. And these debts are an especially heavy burden because most of the loans were denominated in other countries' currencies.

Global Picture (end)

- The damage was not confined to the original borrowers. In America, the housing bubble mainly took place along the coasts, but when the bubble burst, demand for manufactured goods, especially cars, collapsed — and that has taken a terrible toll on the industrial heartland. Similarly, Europe's bubbles were mainly around the continent's periphery, yet industrial production in Germany — which never had a financial bubble but is Europe's manufacturing core — is falling rapidly, thanks to a plunge in exports.

Rose and Spiegel Analysis:
Mapping Observable Causes to Observable Manifestations thru a crisis latent variable

Crisis Performance is a Latent Variable

- 4 Manifestations of crisis: equity market collapse, exchange rate devaluation, economic growth, and change in creditworthiness

- R and S compare these to a large set of potential causal variables

- R and S Also obtain estimates of latent variable, relative performance during financial

Rose and Spiegel Indicators for Severity of the Crisis

- Indicators:
  - GDP growth rate 2008
  - Stock market change 2008
  - Depreciation against the SDR in 2008
  - Country Credit Rating Change in 2008

- The Dependent Variable:
  - First Principal Component of the four indicators
  - Index of severity estimated using the MIMIC model (jointly with an equation capturing the possible indicators "triggering" the crises).
  - Some robustness checks: eliminate exchange rate, various ratings.

Rand S Controls:
Measures of Financial Conditions

- Conditions products of policies (endogenous)
  - Interested in prediction
- Measures included in specification:
  - *Private Sector Domestic Credit* as share of GDP
  - *Domestic Bank Credit* as share of GDP
  - Share of domestic credit consumed by *Private Sector*
  - *Bank Liquid Reserves* as a share of assets
  - Share of *Non-Performing Loans*
  - *Bank Capital* as a share of assets
  - *Bank Claims* as a share of deposits

But, A partial answer to the heterogeneity problem: controlling for institutional, financial conditions, policy regimes, etc.

- It is true that the cross-section heterogeneity is difficult to take of.

- Indeed, Rose and Spiegel **do** control for a variety of institutional and policy regimes!

R and S Controls: Macro Policy Measures

- Monetary policy
  - *Currency Union* dummy
  - *Aggregate GDP of Monetary Zone*
  - *EU, but not EMU* dummy
  - *Inflation Targeter*
  - *M2* as % of GDP
  - *M3* as % of GDP
- Fiscal policy
  - *Government Budget Surplus/Deficit* as % of GDP
  - *Central Government Debt* as % of GDP
  - *Total Debt* as % of GDP
  - *Debt Service Burden* as % of GDP.
- Macro conditions
  - *CPI inflation*
  - *GDP growth*

# The Cross-Section Heterogeneity problem: (1) Measurement of the Severity of crises

- This set of slides follows Graciela Kaminsky's comments.
- GDP Growth:

  - Not all countries are created equal. Most of the developing countries have rapid population growth, rapid productivity growth. These countries seldom experience a recession by NBER Standards.

  - To capture "abnormal" collapse in economic activity and the degree of severity of the crisis, we need to relate output declines to the growth history of each country.

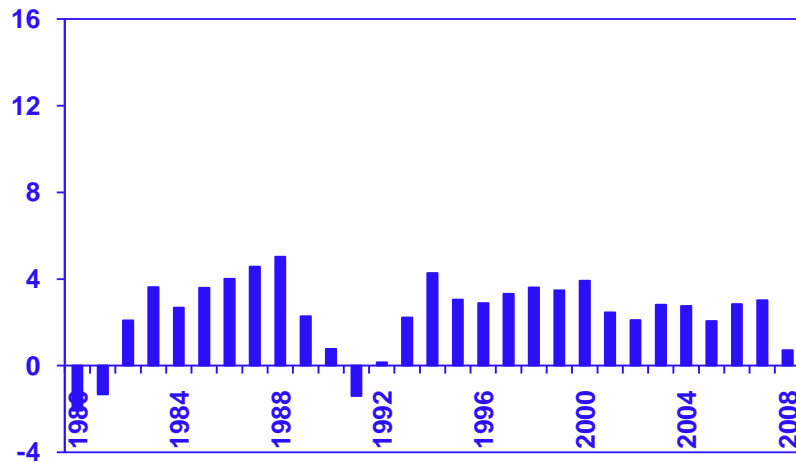# Cross-country heterogeneity (graciella Kaminsky)
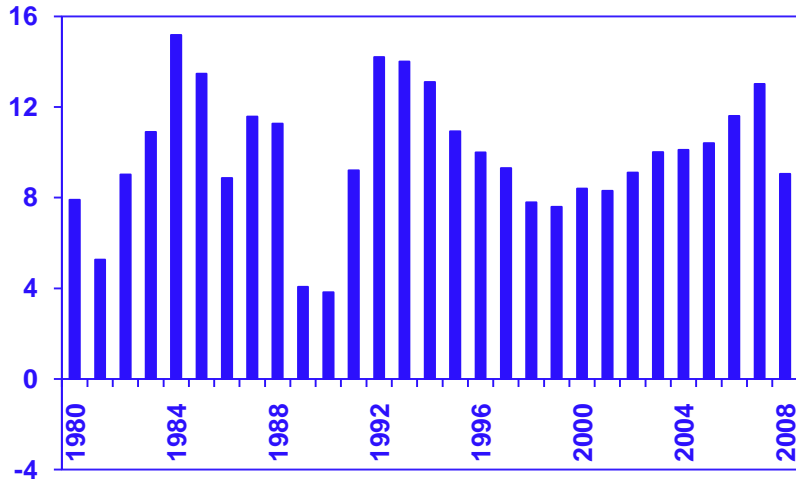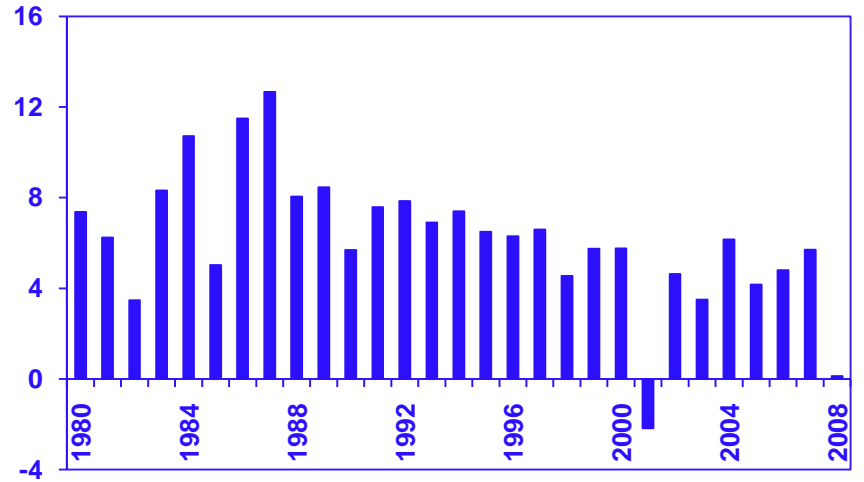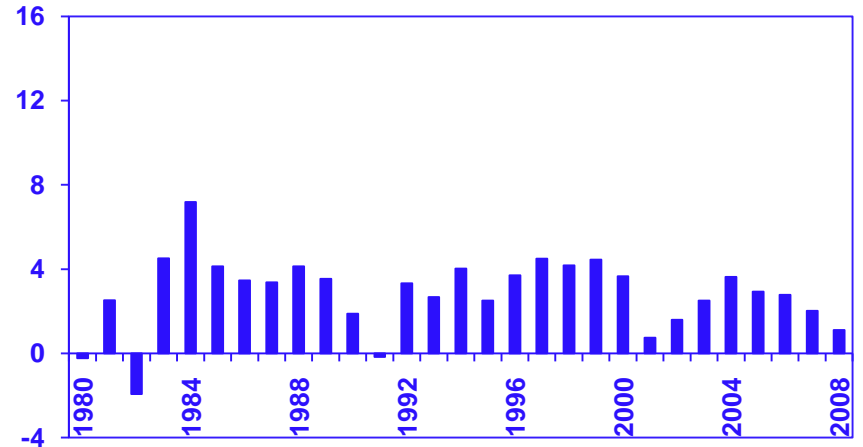
Cross –Country heterogeneity of the Stock Market performance: Market Capitalization, Liquidity, and Volatility (Graciela Kaminsky)

Country	Market Capitalization/GDP (in percent)	Value of Shares Traded/GDP (in percent)
Argentina	40	2
Armenia	2	0
Bulgaria	31	17
Colombia	35	7
Germany	72	85
Hungary	36	27
Indonesia	40	13
Japan	100	143
United States	150	250

Country	Standard Deviation Of Stock Returns
Argentina	23
Brazil	14
Denmark	6
Sweden	4
United States	4

# (2) Muserment of BOP- Crisis of the Severity Index (Graciela Kaminsky)

Country	Reserve Losses (in percent)	Exchange Rate Depreciation (in percent)	Index of Severity (in percent)
Brazil	13	30	22
Chile	0	30	15
Hungary	7	9	8
Indonesia	12	17	15
Korea	-7	31	12
Lithuania	15	1.6	8
Peru	8	3	6

Domestic Vulnerabilities: History Matters (Graciela Kaminsky)

- Graciela Kaminsky cites Reinhart, Rogoff, and Savastano (2003) in "Debt Intolerance," who strongly argue that history matters.

- Emerging economies with histories of inflation and default cannot run large Debt/GDP ratios. In fact, RRS estimate that most emerging countries cannot run debt/GDP ratios higher than 40%.

Net Foreign Assets/GDP
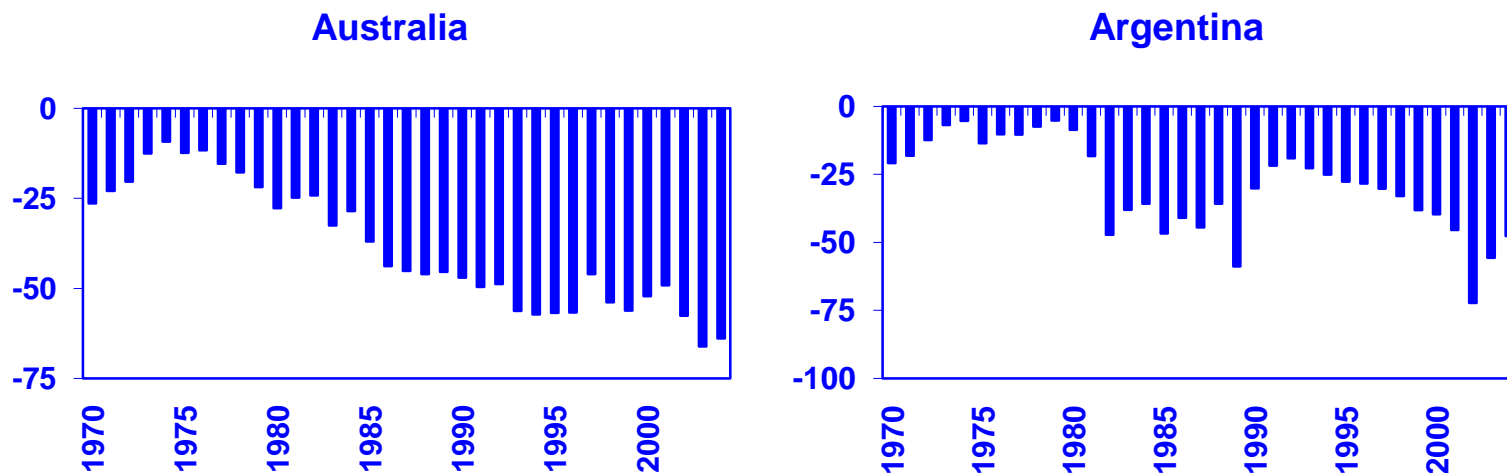
Source: Lane and Milesi-Ferretti, 2006.

The R and S Non-Structural Methodology

- MIMIC (multiple-indicator, multiple cause) model explicitly incorporate difficulties in observing relative crisis severity
  - Treats crisis as a latent variable
  - Observed with error as function of observable manifestations
- Sample is cross-section of 107 countries

The MIMIC model

- MIMIC model consists of two sets of equations:

$$y_{i,j} = \beta_j \xi_i + \upsilon_i \qquad (1)$$

$$\xi_i = \gamma_k x_{i,k} + \zeta_i \qquad (2)$$

where $y_{i,j}$ is crisis indicator, $x_{i,k}$ is an observation for potential crisis cause; ξ_i is latent variable representing severity of the crisis (or lack thereof in our case), and υ_i and ζ_i are well-behaved disturbances

- Equation (1) links observable *manifestations* of the crisis to latent variable

- Equation (2) links latent variable to *causes* of crisis

Characteristics of MIMIC Model

- Substitute (2) into (1), eliminate latent variable
- MIMIC model is then a system of J equations with right hand sides restricted to be proportional
- With normalization, system is identified
  - We normalize on equity returns
- Desirable feature of MIMIC model is ability to systematically address measurement error
- Estimate with STATA using GLLAMM model [Rebe-Hesketh, et al (2004)]

R and S Main Results

- Plausible estimates of relative *severity* of crisis
  - Ex: Iceland and Estonia identified as exceptionally bad
- Less success linking crisis to *causal* variables
  - Very few variables (e.g., size of equity run-up) consistently enter at statistically significant levels
  - Other equally-plausible variables, such as real estate appreciation, fail to enter
- Conclusion: *R and S model better the severity of the crisis, but not its causes!*

The Linearity Assumption

- Because (1) and (2) are linear, RS can substitute (2) into (1), estimate the model in one stage and thereby and avoid a two-stage procedure.

- However, the existence of "threshold effect" as in most liquidity crisis and sudden stop theory is not accommodated by the linearity assumption.

Threshold Effects: A way to take care of Conflicting Effect of Policy Dummies

- The Approach needs to recognize conflicting effects of policy regimes.

- Example: Financial regulation

Regulation curtail growth in normal times but boost growth via its mitigating effect on the crisis.

The Razin and Rubinstein (2006) Model

$Growth = \gamma PolicyDummy + \phi \text{Pr } Crisis + Controls + Error$

where $\text{Pr } Crisis = \Phi(\alpha PolicyDummy + \beta x)$ and $\Phi(.)$ is the standard normal probability. Thus, the effect on growth of changing the policy dummy from 0 to 1 is made of a direct effect (γ) and an indirect effect due to the change in the crisis probability:

$PolicyEffect = \gamma + \phi[\Phi(\alpha + \beta x) - \Phi(\beta x)]$

The signs of estimates are $\gamma > 0$, $\alpha > 0$, and $\phi < 0$. If the baseline crisis probability $\Phi(\beta x)$ is close to 1 or 0, then

$PolicyEffect \approx \gamma,$

but for intermediate values of $\Phi(\beta x)$, the estimated policy effect is negative because it is dominated by the negative impact of the probability increase.

The policy conclusion is that an exchange rate regime or a capital control regime may be good or bad for macro performance depending on a country's fundamentals as captured by the crisis probability.

How Razin and Rubinstein (2006) Identify Balance Sheet Effects

Razin –Rubinstein (2006) section on
: Debt-Dollarization in the presence
of Extreme Real Depreciations

Table 9. The effect of sudden stop crisis and dollarization (foreign liabilities – money supply ratio) on growth

Variable	(i)	(ii)	(iii)
Foreign liabilities – Money supply ratio (FLM)	0.001	−0.001	0.000
	(0.042)	(0.042)	(0.042)
Sudden stop crisis	−0.881	−0.781	−0.250
	(0.384)	(0.378)	(0.431)
Growth at $t-1$		0.173	0.172
		(0.021)	(0.021)
Interaction			
Sudden stop crisis * FLM			**−2.384**
			(0.931)
Country fixed effect	Yes	Yes	Yes
Observations	2228	2228	2228

Effects of Excange Rate Regimes on Extreme Real Depreciations (Razin and Rubinstein (2006)

Table 10. The effect of sudden stop crisis on dollarization (foreign liabilities – money supply ratio)

Variable	(i)	(ii)	(iii)
Crisis at $t-2$	−0.034		−0.034
	(0.020)		(0.020)
Peg at time $t-2$	0.042		0.010
	(0.024)		(0.028)
Capital controls at $t-2$	−0.013		−0.009
	(0.028)		(0.028)
The probability of having currency crisis this year^		−0.200	−0.176
		(0.070)	(0.083)
Country fixed effect	Yes	Yes	Yes
Observations	1176	1176	1176

Probit

- Suppose that the latent variable y* follow

$$y_i^* = X_i \theta + e_i$$

θ Is a 1XK vector of parameters

Instead of observing y_i^*

We observe a binary variable indicating the sign of y_i^*

$$y_i = \begin{cases} 1 \text{ , if} & y_i^* \geq 0 \\ 0 \text{ , if} & y_i^* < 0 \end{cases}$$

Conditional density of y_i

The density of y_i , Given X_i is:

$$f(y / X_i) = [\Phi(X_i\theta)]^y [1 - \Phi(X_i\theta)]^{1-y}$$

How Hale, Razin, and Tong (2009) Identify the Effect of Creditor Rights

- Hale, Razin, and Tong model predicts that (1) the incidence of financial crises should be lower in countries with better creditor protection and that (2) the decline in the stock market index during crises should be lower in countries with better creditor protection.

- HRT brings out evidence is the fact that countries with higher level of creditor protection experienced less of a decline in the stock market index during the current financial crisis is indeed consistent with the predictions of our model. They want to make sure, however, that there is also historical evidence to support mechanisms described in their model.

HRT List of liquidity crises

Table A2. List of liquidity crises in the sample

Country	Years of financial crisis
Non-OECD countries:	
Argentina	1982-85, 1990-1991, 2001-2003
Brazil	1985-1987, 1990, 1994-1995, 1999
Bulgaria	1992-1995, 1997
Chile	1983, 1985-1986, 1991
China	1994
Colombia	1988, 1991, 1999-2000
Hong Kong	1991, 1999
Hungary	1988, 1991-1993, 1995
Indonesia	1998-1999
Israel	1981, 1985-1986
Malaysia	1987, 1990, 2000
Mexico	1982-1983, 1988
Pakistan	2000
Peru	1984-1987, 1989, 1991, 2000, 2003-2004, 2006
Philippines	1984-1986, 1998-1999, 2001, 2005
Poland	1982-1984, 1987-1990, 1992, 1994-1995
Romania	1991, 1997, 1999-2000
Singapore	2002, 2004
Slovenia	1992
South Africa	2002
Sri Lanka	1984, 1991
Thailand	1999-2001
Venezuela	1984, 1989-1990, 1993-1994, 2002-2003
OECD countries:	
Canada	2007
Czech Republic	1998-2002
Denmark	1991, 1993-1994
Finland	1993-1995, 1997
Japan	2001
Mexico	1995-1996, 1998-2001, 2003
Norway	1991
Portugal	1985-1987
Spain	1984
Sweden	1991, 1993-1995
Turkey	1988, 1994, 1998, 2001

Frequency of liquidity crises

Table 3: Frequency of liquidity crises and creditor protection

	Full sample	Non-OECD	OECD
Incidence of liquidity crises			
Mean Low CRI	0.133	0.203	0.0706
(N.obs)	(799)	(374)	(425)
Mean High CRI	0.0578	0.0823	0.0339
(N.obs)	(467)	(231)	(236)
Difference	-0.0748***	-0.121***	-0.0367**
(P-value)	(0.000)	(0.000)	(0.0328)
Share of crisis years			
Mean Low CRI	0.137	0.197	0.0977
(N.obs)	(28)	(11)	(17)
Mean High CRI	0.0733	0.0961	0.0505
(N.obs)	(20)	(10)	(10)
Difference	-0.0634*	-0.101**	-0.0472
(P-value)	(0.0546)	(0.0232)	(0.328)

* significant at 10%; ** significant at 5%; ***significant at 1%

OECD vs. Non-OECD

- HRT find that countries with higher level of creditor rights protection are less likely to experience liquidity crises, even within the sub samples of OECD and non--OECD countries. These differences in the frequency of liquidity crises are statistically significant.

The decline in stock market return is larger during crisis for countries with lower creditor rights

Table 4: Decline in stock market return during crises and creditor protection

	Full sample		Non-OECD		OECD	
	Low CRI	High CRI	Low CRI	High CRI	Low CRI	High CRI
Mean annual stock market return						
Crisis years	-0.197	-1.002	-0.756	-0.977	0.785	-1.050
(N.obs)	(80)	(26)	(51)	(17)	(29)	(9)
Non-crisis years	0.686	0.513	0.916	0.477	0.535	0.545
(N.obs)	(650)	(423)	(258)	(203)	(392)	(220)
Difference	0.884*	1.515*	1.672**	1.454	-0.250	1.596**
(P-value)	(0.0943)	(0.0502)	(0.0230)	(0.210)	(0.741)	(0.0138)

* significant at 10%; ** significant at 8%

Why are results so weak?

- Data limitations
  - Collected in spring 2009; crisis was still developing
  - Still, measures of incidence of crisis plausible
- Causes may have conflicting effects on the severity of the crisis
- Understanding what happened in the epi-center (USA) before the crisis, and the policy reaction there after the crisis is key for early warning for the global crisis.