Financial Stress and Economic Downturns Across Emerging Markets

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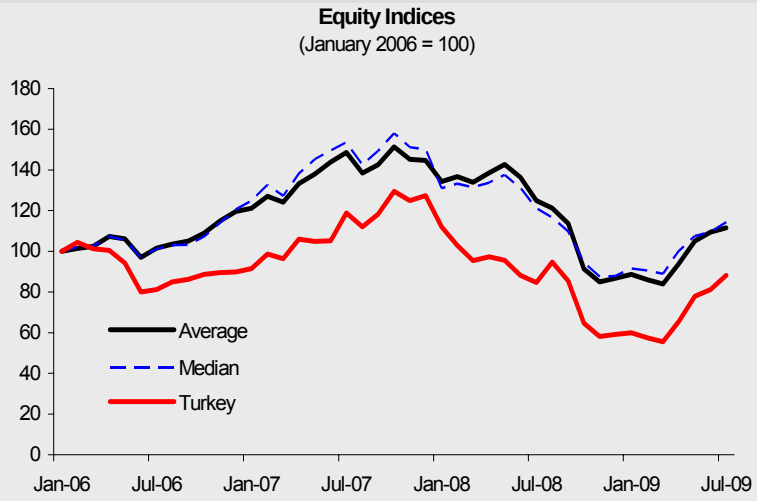
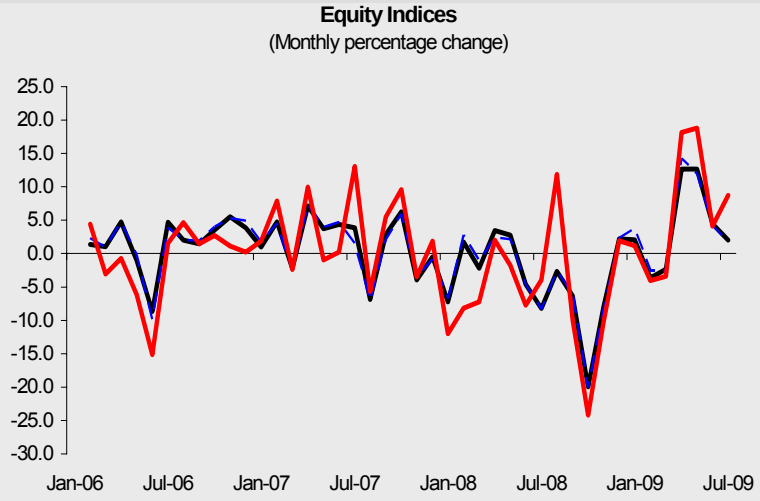
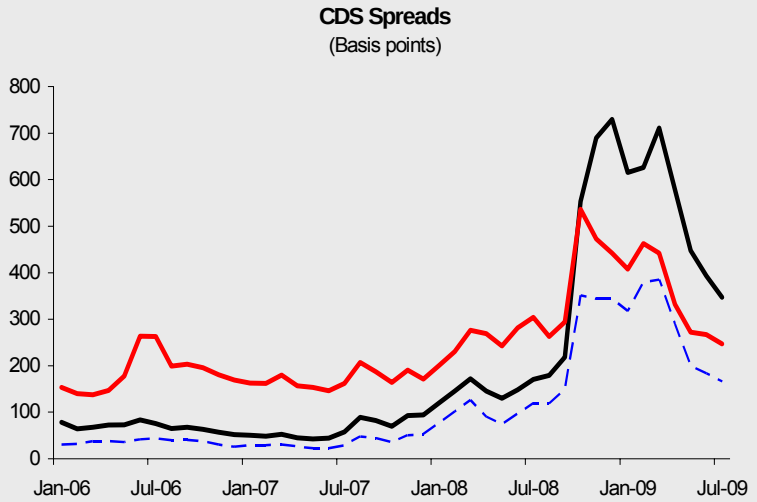
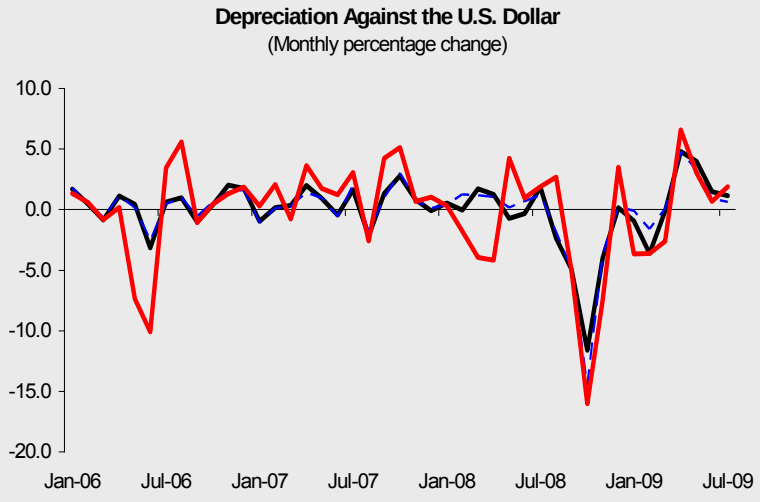
Financial Stress Across EMs



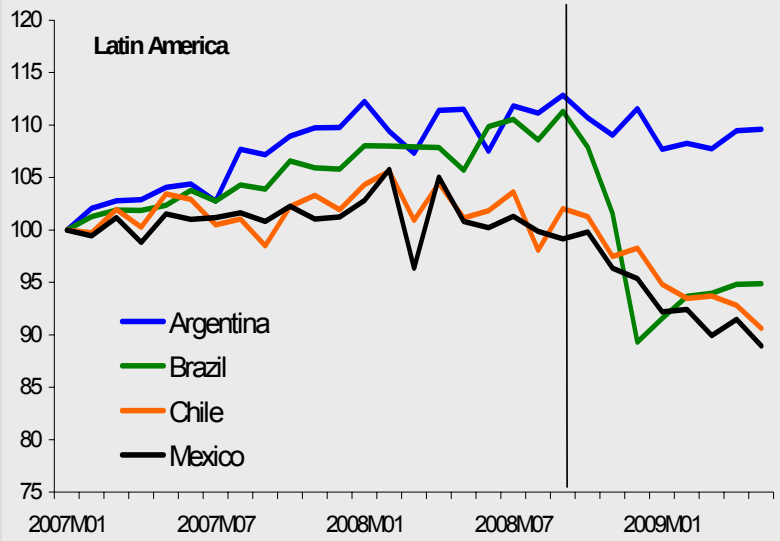


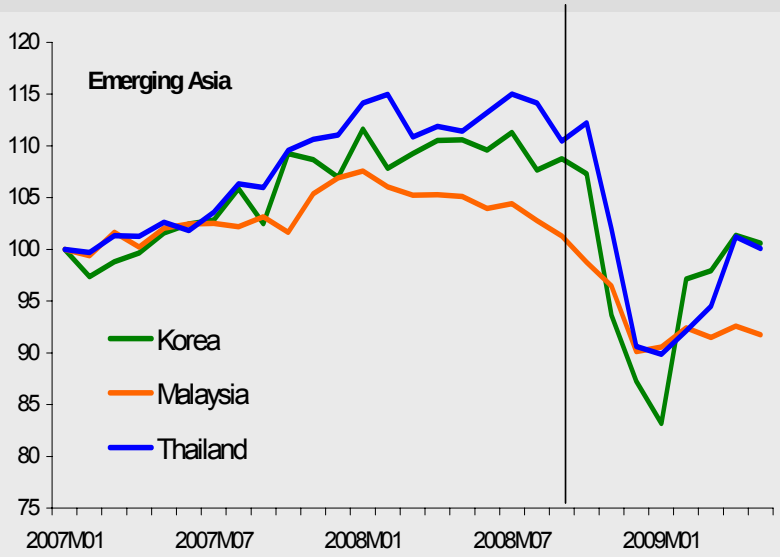


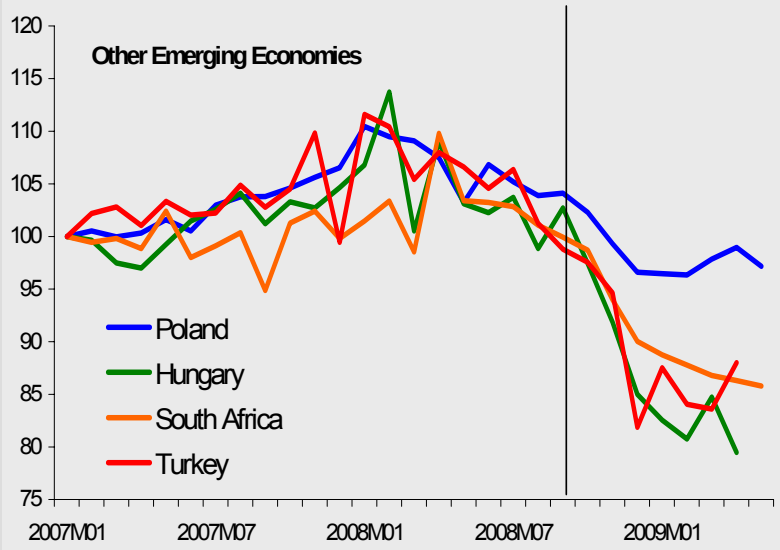


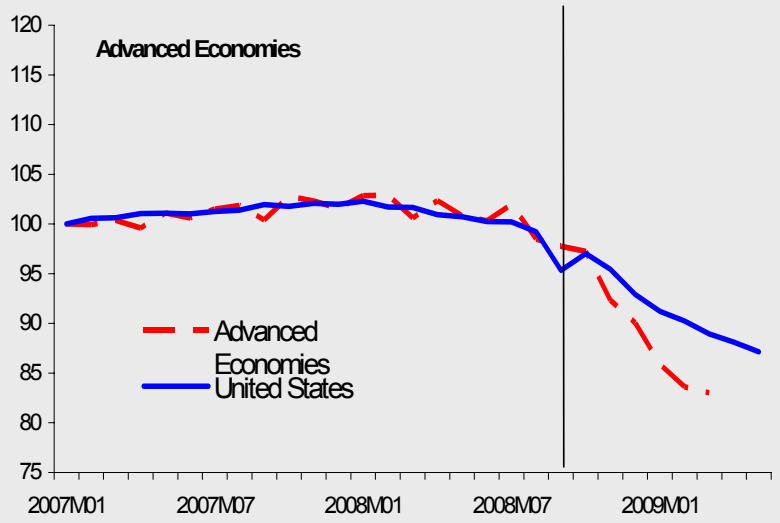
Note: Selected emerging economies include: Argentina, Brazil, Chile, Hungary, Korea, Mexico, Malaysia, Poland, South Africa, Thailand, and Turkey.

The Collapse in Global Economic Activity









Why are some episodes of financial stress associated with downturns, while others are not?

An episode of financial stress is defined as a period when the financial system is under acute strain and its ability to intermediate is impaired.

	Equities		CDS spreads		Exchange rates	
			(monthly percent changes)			
	2006 Summer	2008 Fall	2006 Summer	2008 Fall	2006 Summer	2008 Fall
Argentina	-8.4	-28.3	8.3	203.1	-0.8	-4.9
Brazil	-10.2	-24.6	17.0	112.5	-3.0	-17.6
Chile	-4.4	-12.6	3.0	142.6	-4.0	-15.0
Hungary	-14.9	-23.4	26.6	137.7	-4.5	-14.9
Korea	-10.1	-16.9	7.9	160.8	-1.4	-14.1
Mexico	-10.7	-19.3	17.0	137.3	-2.1	-15.9
Malaysia	-4.0	-11.2	17.8	77.6	-1.5	-2.2
Poland	-9.6	-20.9	22.8	132.6	-4.1	-13.3
Thailand	-10.1	-24.3	9.0	72.6	-1.0	-1.8
Turkey	-15.1	-24.2	48.4	82.5	-10.1	-16.0
South Africa	-4.6	-18.1	35.2	109.8	-9.2	-17.8
Average	-9.3	-20.3	19.4	124.5	-3.8	-12.1
Median	-10.1	-20.9	17.0	132.6	-3.0	-14.9

Notes:

Summer of 2006 refers to the extreme value during May or June.
Fall of 2008 refers to the extreme value during September through November 2008.
Exchange rates are against the U.S. dollar.

Linking Financial Stress and Economic Activity Across EMs

- The main goal is to study the interaction between financial stress and economic activity across EMs.
- How can we measure financial stress?
- How much does financial stress matter?
- What policies seem to mitigate the adverse consequences of financial stress for EMs?
- The work discussed below represents a first pass at trying to address these questions…

Highly Selected Review of Recent Studies

1. Lall, Cardarelli, and Elekdag (2008), and Cardarelli, Elekdag, and Lall (2009) focus on financial stress and economic downturns across advanced economies (AEs).

   They find the downturns associated with financial stress (defined below) are longer and deeper than other types of downturns.

2. Balakrishnan, Danninger, Elekdag, and Tytell (2009) concentrate on the transmission of financial stress from AEs to EMs.

   They find that **higher reserves and lower fiscal deficits provide little insulation** from the transmission of a **major** financial shock from AEs.

3. The study represents the missing linking in this research agenda by focusing on the link between financial stress and economic activity across EMs.

Preliminary Results

- Using a financial stress index developed for EMs…
- Financial stress matters.
- A one standard deviation financial stress shock can drag industrial production 2.5 percent below trend…
- …recent episode of financial stress was an event greater than two standard deviations.

Main Policy Implications

Preliminary results indicate that less severe downturns were associated with:

- **higher** average **reserve cover** over the sample period
  - Among other things, reserves provide self-insurance against sudden stops…
- **lower** average aggregate **credit growth** (M2/GDP or banking credit) over the sample
  - While growth in M2-to-GDP growth may indicate financial deepening, the growth in banking credit seems to be a symptom of a credit boom, possibly driven by large capital inflows and/or less than optimal policies…
- **lower** average **government consumption growth** over the sample
  - Echoes results of Kaminsky, Reinhart, and Vegh (2004), but also Cardarelli, Elekdag, and Kose (2009), who find that keeping public expenditure growth steady during episodes of large capital inflows—rather than ratcheting up spending—can foster better macroeconomic outcomes in their aftermath.
- relatively more **closed economies…**

Outline of the Rest of the Presentation

- Financial Stress Index for Emerging Markets
- Main (preliminary) results
- Concluding remarks

What is an Episode of Financial Stress?

- An episode of financial stress is defined as a period when the financial system is under acute strain and its ability to intermediate is impaired.

- Financial crises represent the most extreme manifestations of financial stress.

The Financial Stress Index for Emerging Markets

EM-FSI = EMPI (exchange market pressure index)

+ sovereign spreads

+ banking β (banking-sector β)

+ stock returns

+ stock volatility

Components standardized, and FSI is robust to other weighting schemes (principal components analysis).

The EM-FSI Components

1. Exchange Market Pressure Index (EMPI):

$$EMPI_{i,t} = \frac{\left(\Delta e_{i,t} - \mu_{i,\Delta e}\right)}{\sigma_{i,\Delta e}} - \frac{\left(\Delta RES_{i,t} - \mu_{i,\Delta RES}\right)}{\sigma_{i,\Delta RES}}$$

- A sharp loss in international reserves or a sudden increase in the exchange rate (depreciation) indicate that exchange market pressures have increased.

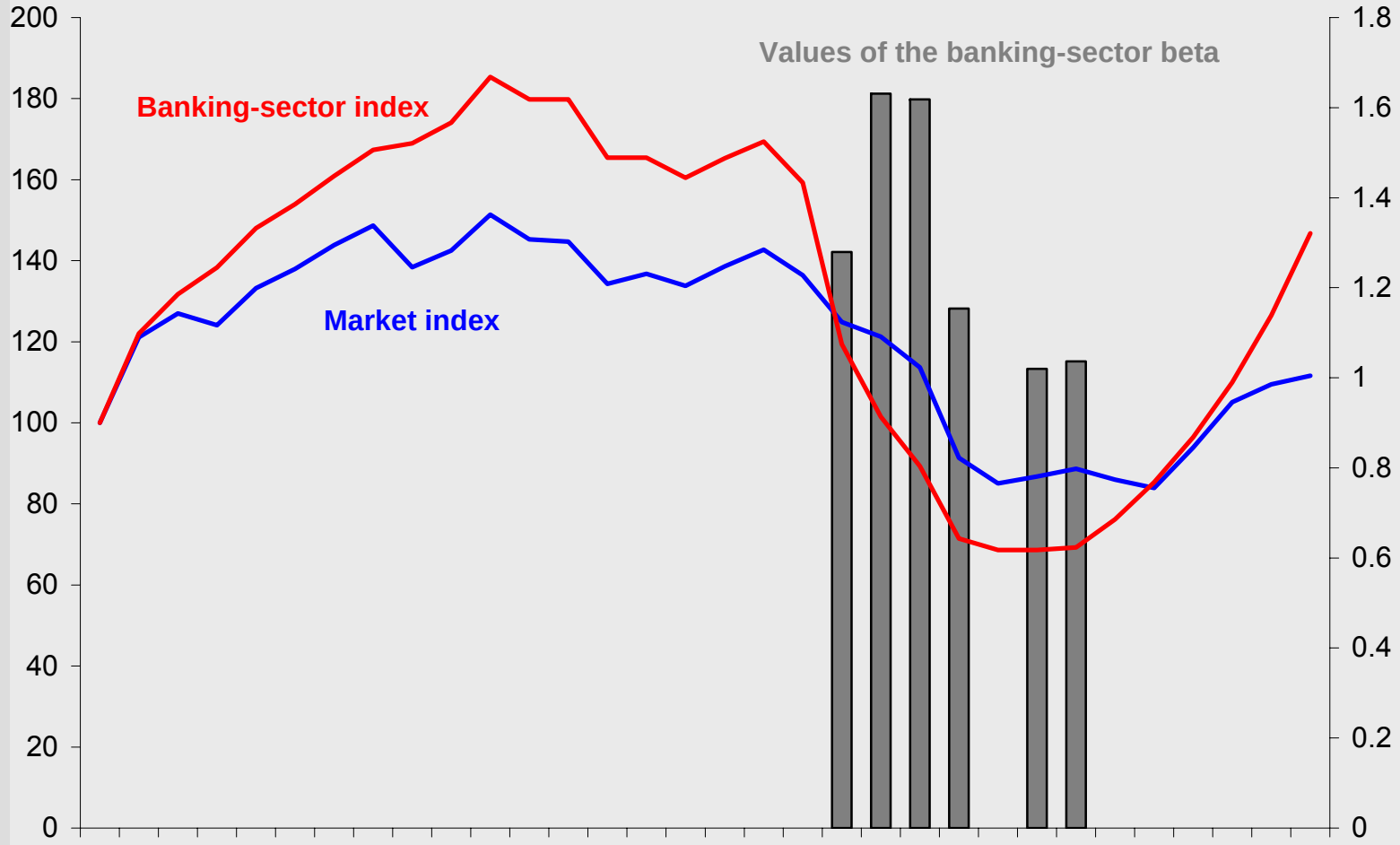
The EM-FSI Components

2. Banking-Sector β:

$$\beta_{i,t} = \frac{COV(r_{i,t}^{BANK}, r_{i,t}^{MRKT})}{VAR(r_{i,t}^{MRKT})}$$

- Basically a Capital Asset Pricing Model (CAPM) β.
- β > 1 indicates that banking stocks move more than proportionately than the overall stock market, suggesting that the banking sector is relatively risky.
- Refinements described in paper…

The Banking-Sector Beta



The EM-FSI Components

3. Stock returns

- Month-over-month returns multiplied by -1 so that a decline corresponds to increase financial stress.

4. Stock return volatility

- Time-varying stock return volatility is estimated with a GARCH(1,1) specification.

5. Sovereign spreads

- Either EMBI or CDS spreads were used.

FSI Performance

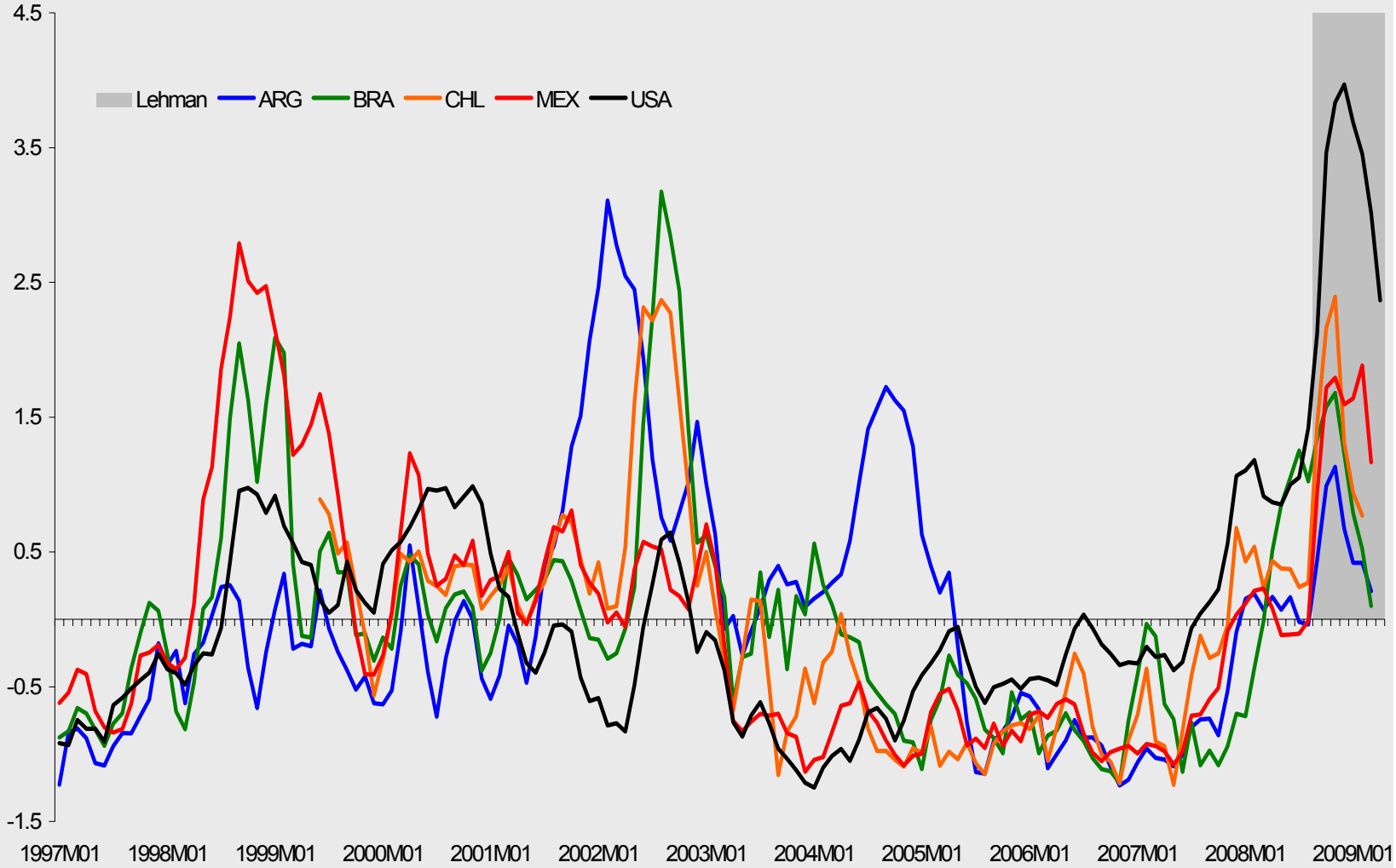
The EMPI component performs well

- Focusing on the 22 EMs (best documented across various studies), the EMPI captures over 80 percent of the currency crises noted in the literature, from 1980 onwards (12 of the most recent, classic, and/or most comprehensive studies where used).

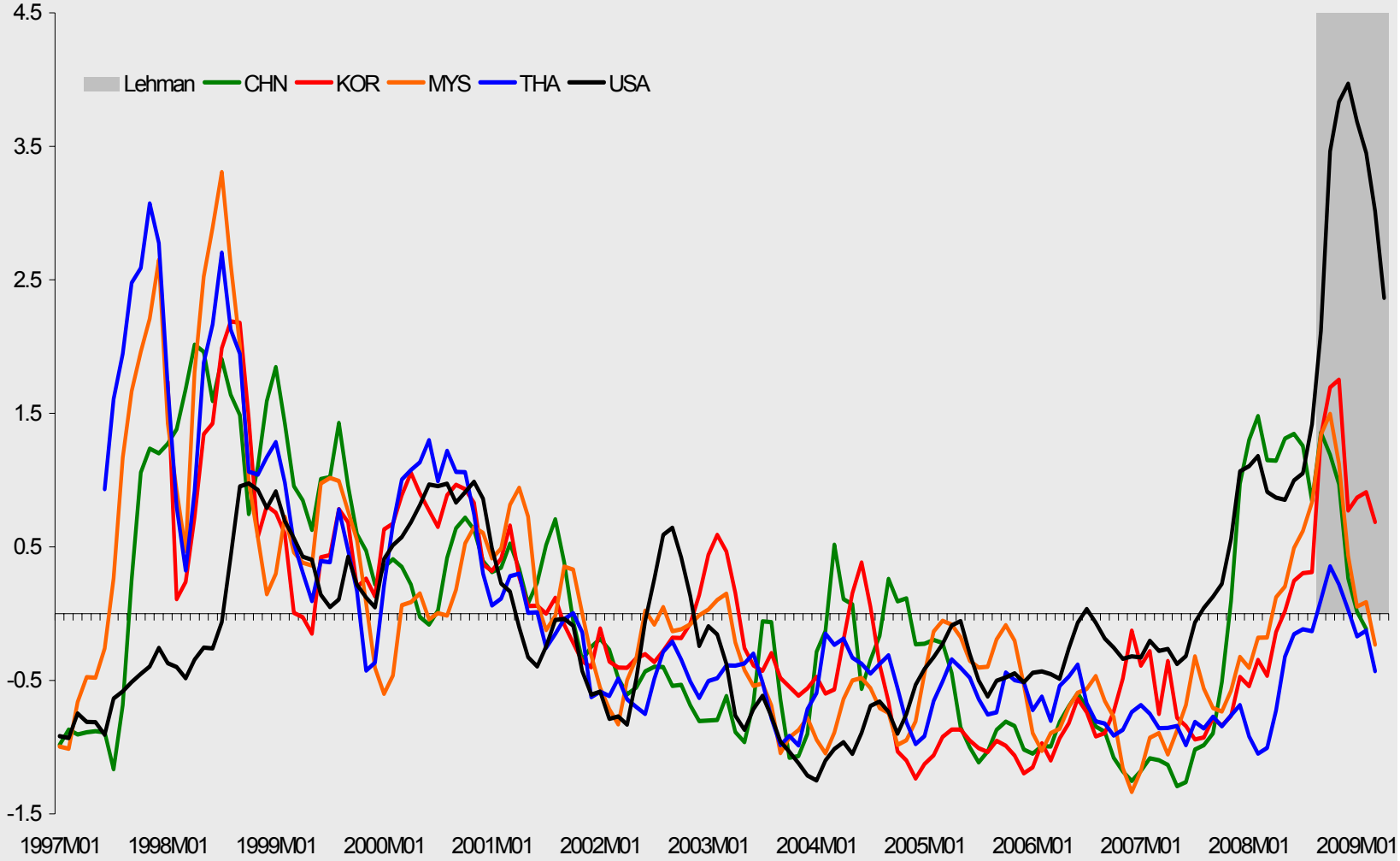
The FSI also performs well

- However, owing to vastly different sample periods, countries coverage, and crisis characterizations, these results are very difficult to quantify. Nonetheless, there are two other performance measures of interest (based on the limited sample):
  - The FSI (based on its spread component) signals correctly all debt-related crises (Argentina 2002, 2005; Korea 1998; Mexico 1995; Russia 1998).
  - The FSI (based on the β, stock returns and volatility) also signals 8 out the 9 banking-related stress episodes determined by the literature

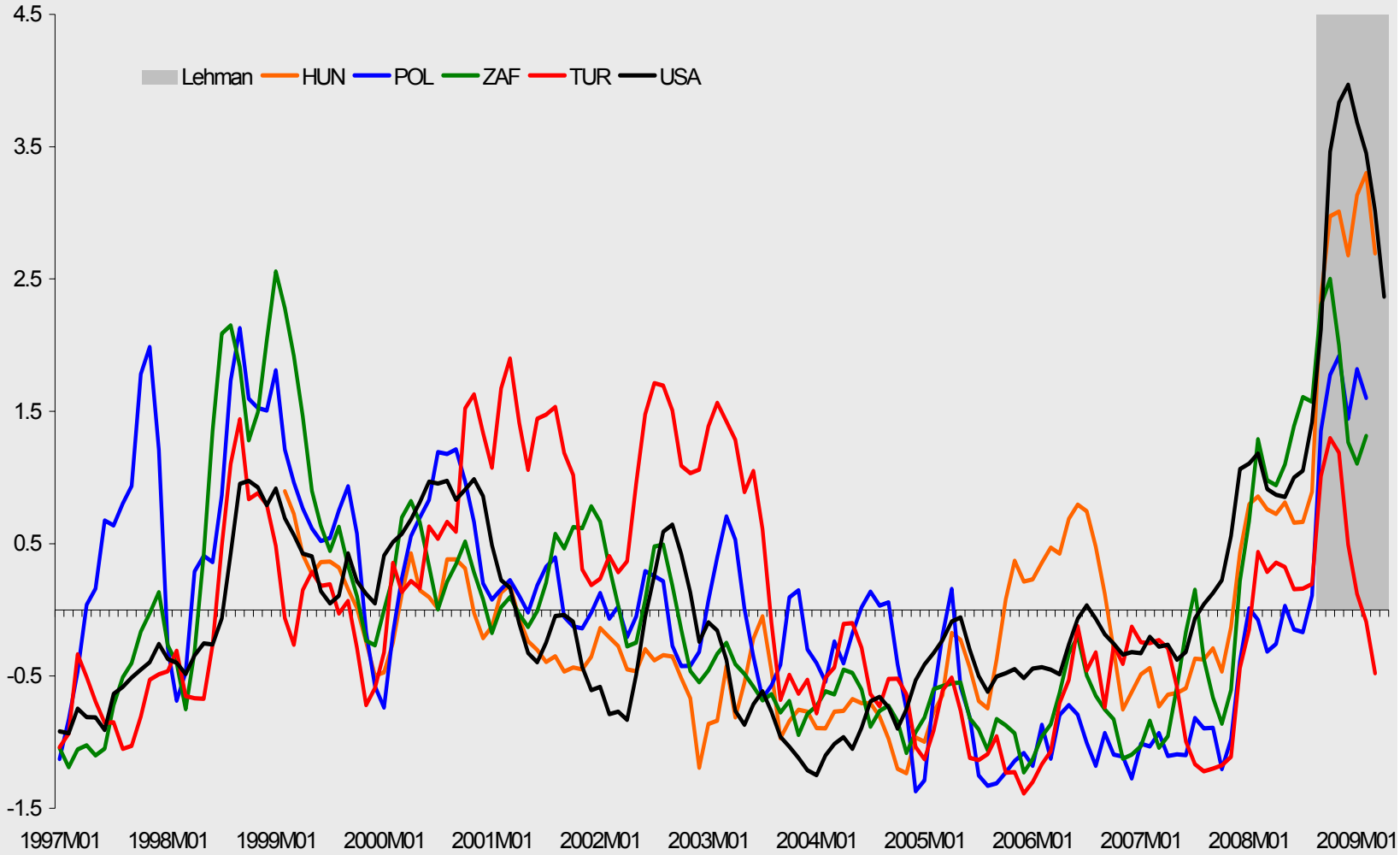
EM FSI—Selected Latin American Countries



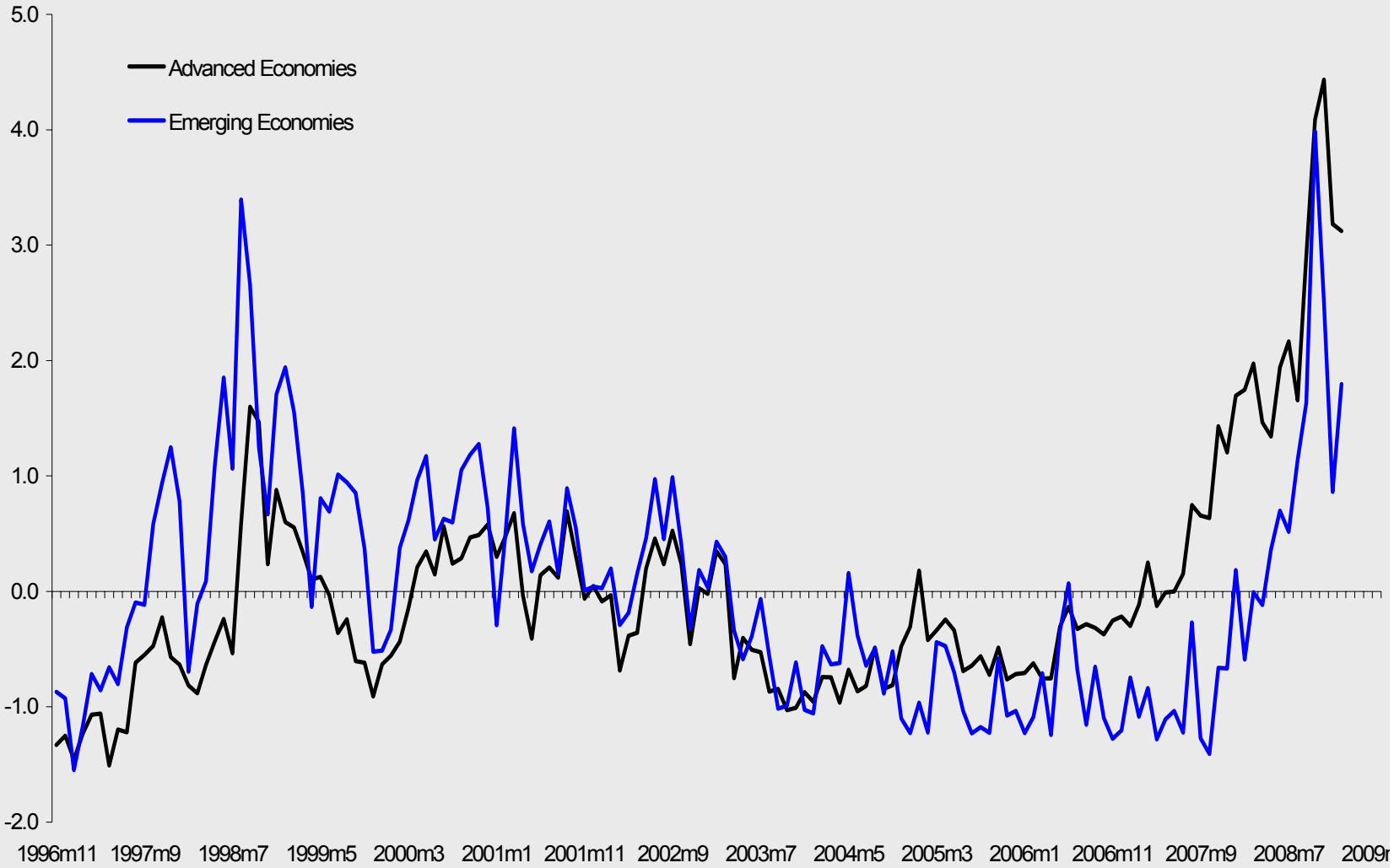
EM FSI—Selected Asian Countries



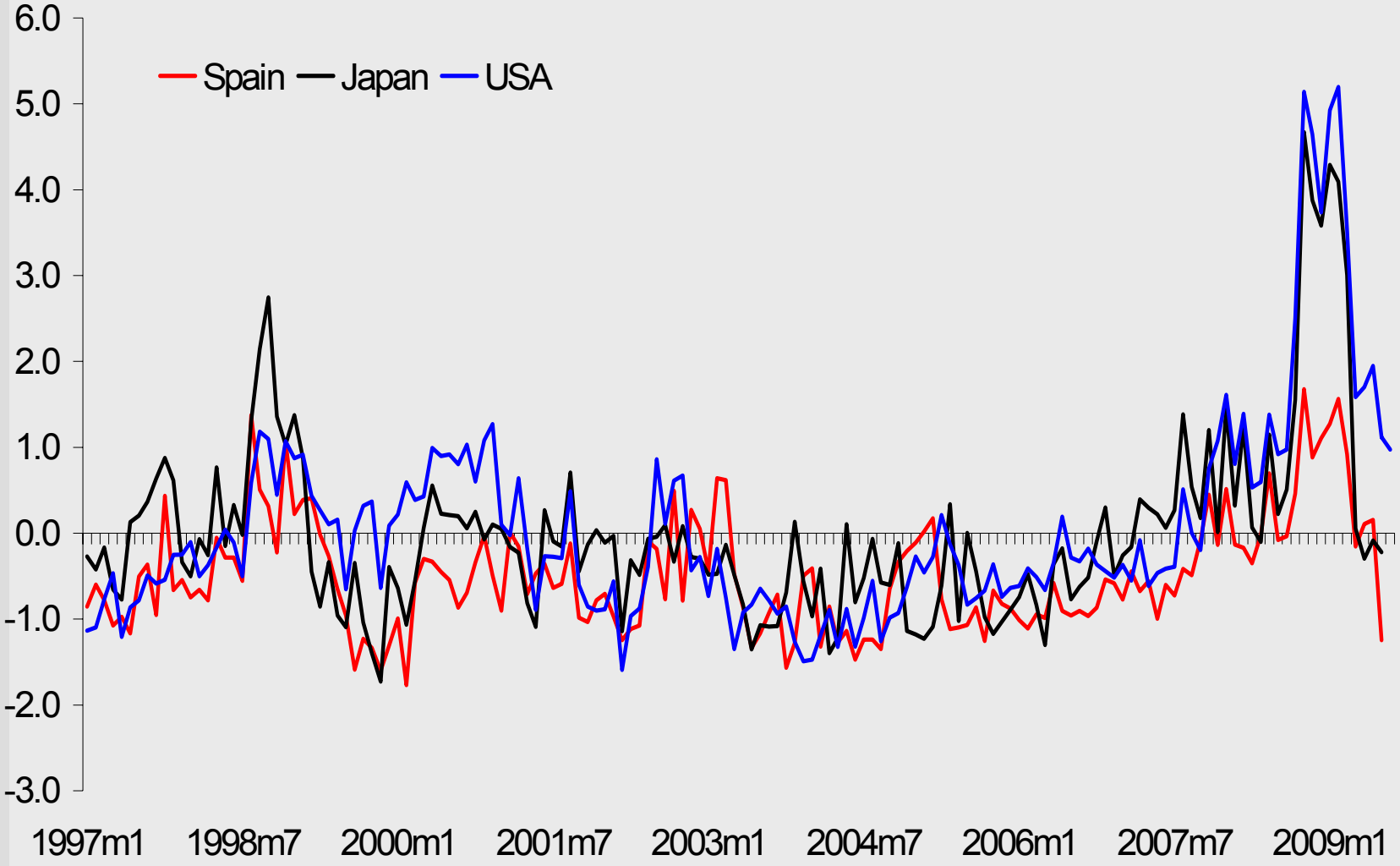
EM FSI—Selected EMs



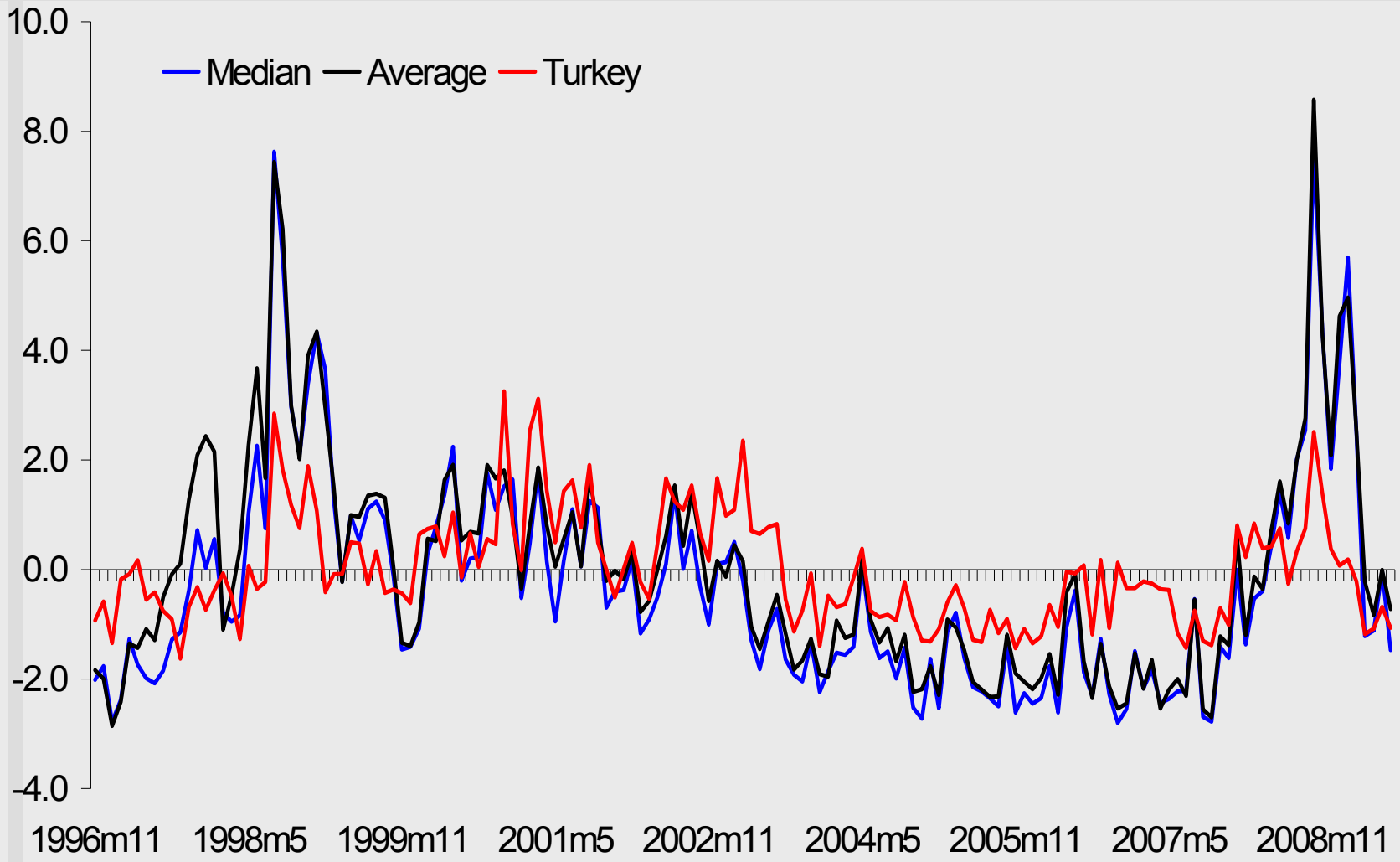
The FSI Advanced Economies and EMs



The FSI for Selected Advanced Economies



The Emerging Markets FSI



Empirical Approach

- VAR analysis

- Theoretical framework is based on a small open economy that takes foreign output and FSI exogenous.

- Four types of shocks: domestic and foreign industrial production and FSI shocks.

Empirical Approach

- Benchmark VAR used the standard Cholesky identification scheme to identify shocks with the following ordering:

$$Y_t = \begin{bmatrix} IP_t^* \\ FSI_t^* \\ IP_t \\ FSI_t \end{bmatrix}$$

- Robustness analysis consider a system that is further augmented by including foreign interest rates shocks.

Empirical Approach

The Cholesky identification scheme implies a recursive ordering:

- FSI can react to all four shocks immediately,
- IP responds to (domestic) FSI shocks only after one period,
- FSI* can react to FSI and IP shocks only after one period,
- IP* can react to FSI*, IP, ad FSI shock only after one period.

Future work will consider specifications were external factors are block exogenous (utilizing Bayesian VARs).

Data Summary: FSI

Emerging economies			
Argentina	1996m11	2009m4	*
Brazil	1996m11	2009m4	*
Chile	1999m5	2009m3	*
China,P.R.: Mainland	1996m11	2009m3	
Colombia	1997m2	2009m4	
Czech Republic	2004m1	2009m4	
Egypt	2001m7	2008m12	
Hungary	1999m1	2009m4	*
India	2008m2	2008m12	
Indonesia	2004m5	2009m3	
Israel	2004m5	2009m4	
Korea	1997m12	2009m4	*
Malaysia	1996m11	2009m4	*
Mexico	1996m11	2009m4	*
Morocco	1996m12	2009m3	
Pakistan	2001m6	2009m4	
Peru	1997m3	2009m3	
Philippines	1997m12	2009m4	
Poland	1996m11	2009m3	*
Romania	2007m10	2009m3	
Russia	1997m12	2009m4	
Slovak Republic	2006m12	2009m4	
Slovenia	2006m2	2009m4	
South Africa	1996m11	2009m3	*
Sri Lanka	2007m11	2008m5	
Thailand	1997m5	2009m4	*
Turkey	1996m11	2009m4	*

Advanced economies		
Australia	1983m6	2009m4
Austria	1980m12	2009m4
Belgium	1980m12	2009m4
Canada	1980m12	2009m5
Denmark	1980m12	2009m5
Finland	1980m12	2009m5
France	1981m3	2009m4
Germany	1980m12	2009m5
Italy	1980m12	2009m3
Japan	1980m12	2009m4
Netherlands	1980m12	2009m3
Norway	1984m1	2008m10
Spain	1980m12	2009m4
Sweden	1984m1	2009m4
Switzerland	1982m1	2009m4
United Kingdom	1980m12	2009m2
United States	1980m12	2009m5

Both FSIs and their components with data up to May 2009 are now available for download
see Balakrishnan, Danninger, Elekdag, and Tytell, 2009,
The Transmission of Financial Stress from Advanced to Emerging Economies,
IMF Working Paper No. 09/133;
http://www.imf.org/external/pubs/cat/longres.cfm?sk=23039.0.

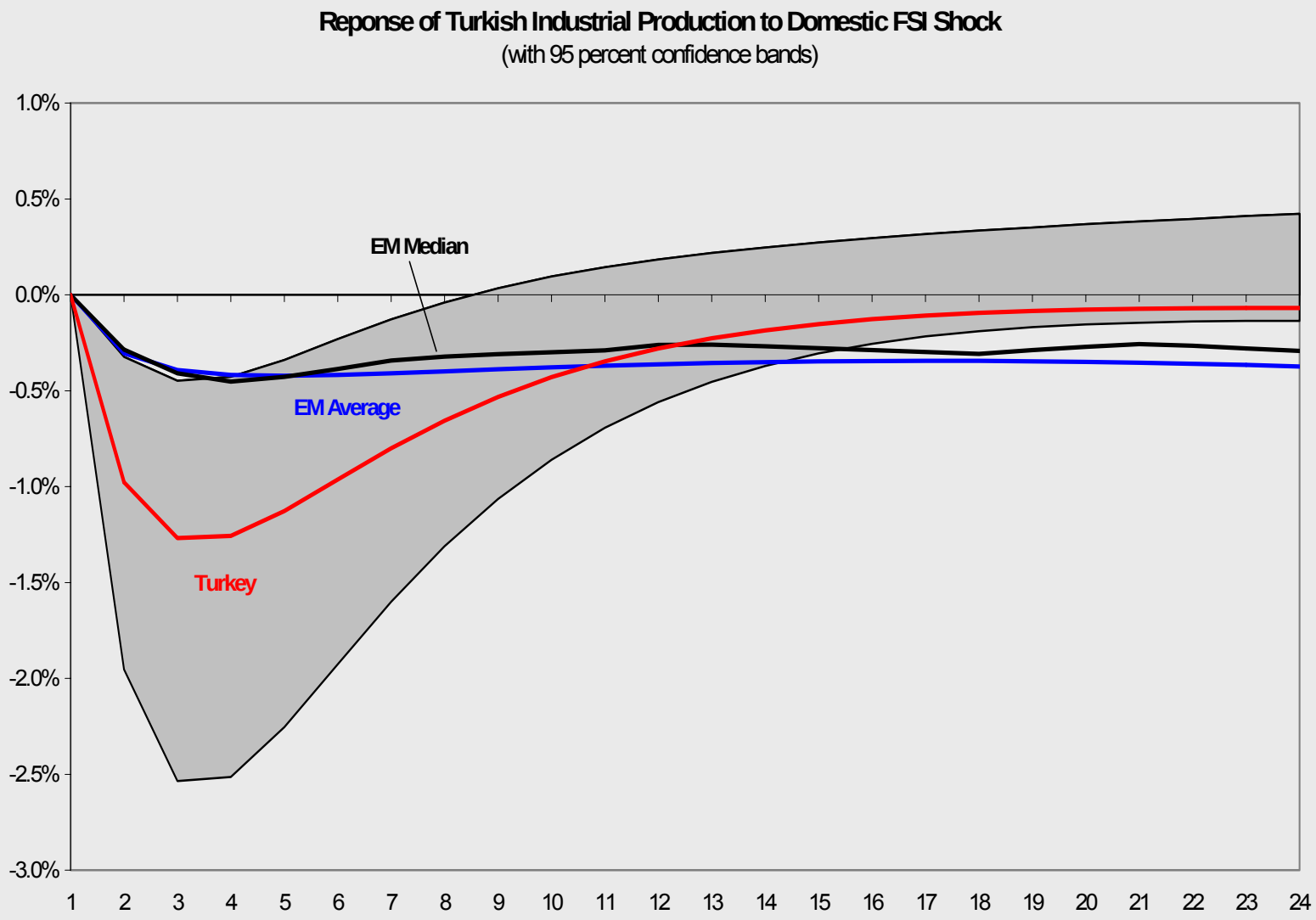
Data Summary: Industrial Production

Industrial production series:

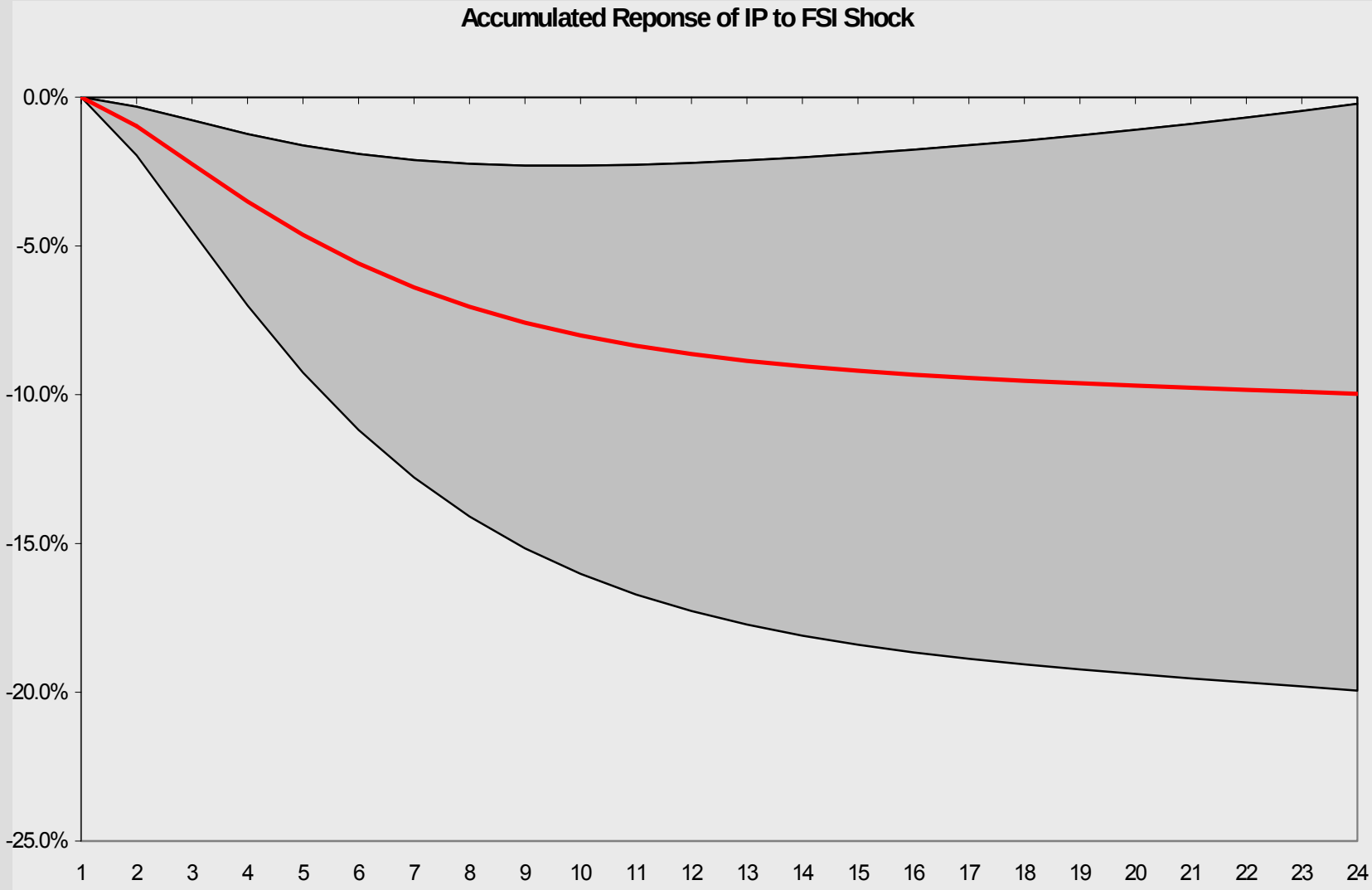
Argentina	1995m1	2009m5
Brazil	1995m1	2009m5
Chile	1996m1	2009m5
Hungary	1995m1	2009m4
Korea	1995m1	2009m5
Malaysia	1995m1	2009m4
Mexico	1995m1	2009m5
Poland	1995m1	2009m5
South Africa	1995m1	2009m5
Thailand	1995m1	2009m5
Turkey	1995m1	2009m4

Series seasonally adjusted using X-12, logged, and linearly detrended.

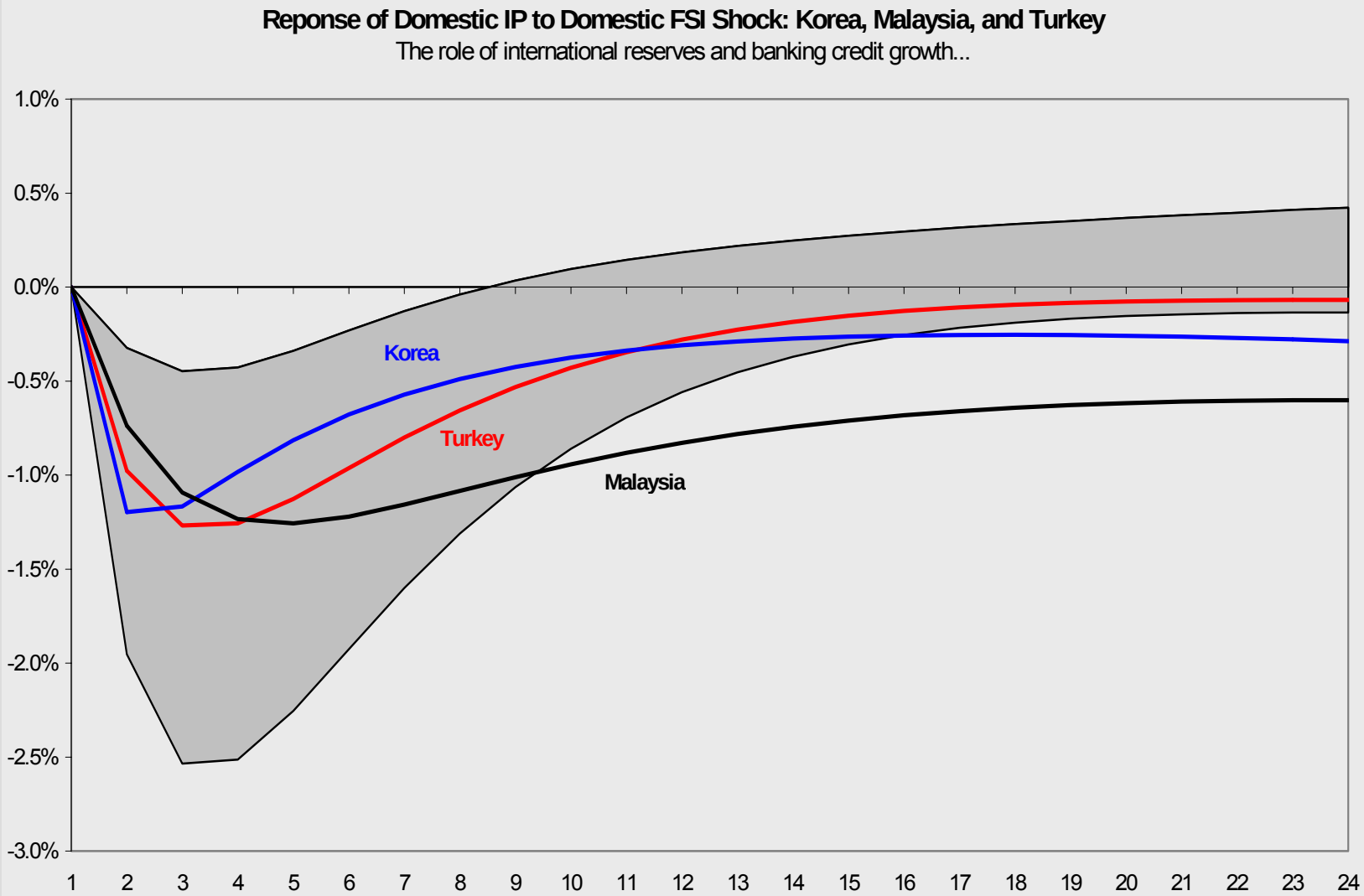
Financial Stress Seems to be Important



The Level Effects of an FSI Shock



Impulse Response Analysis

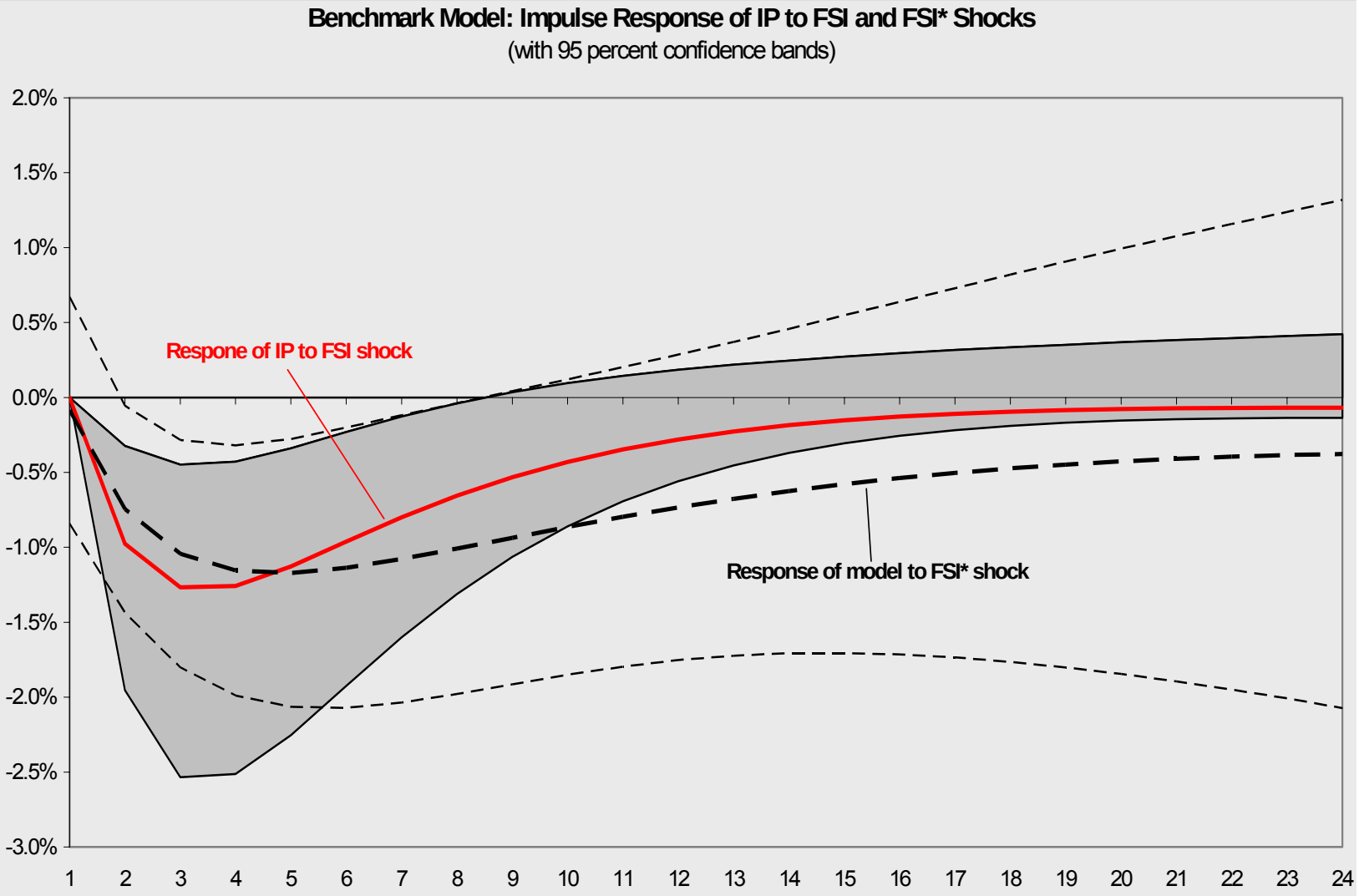


Two Noteworthy Results

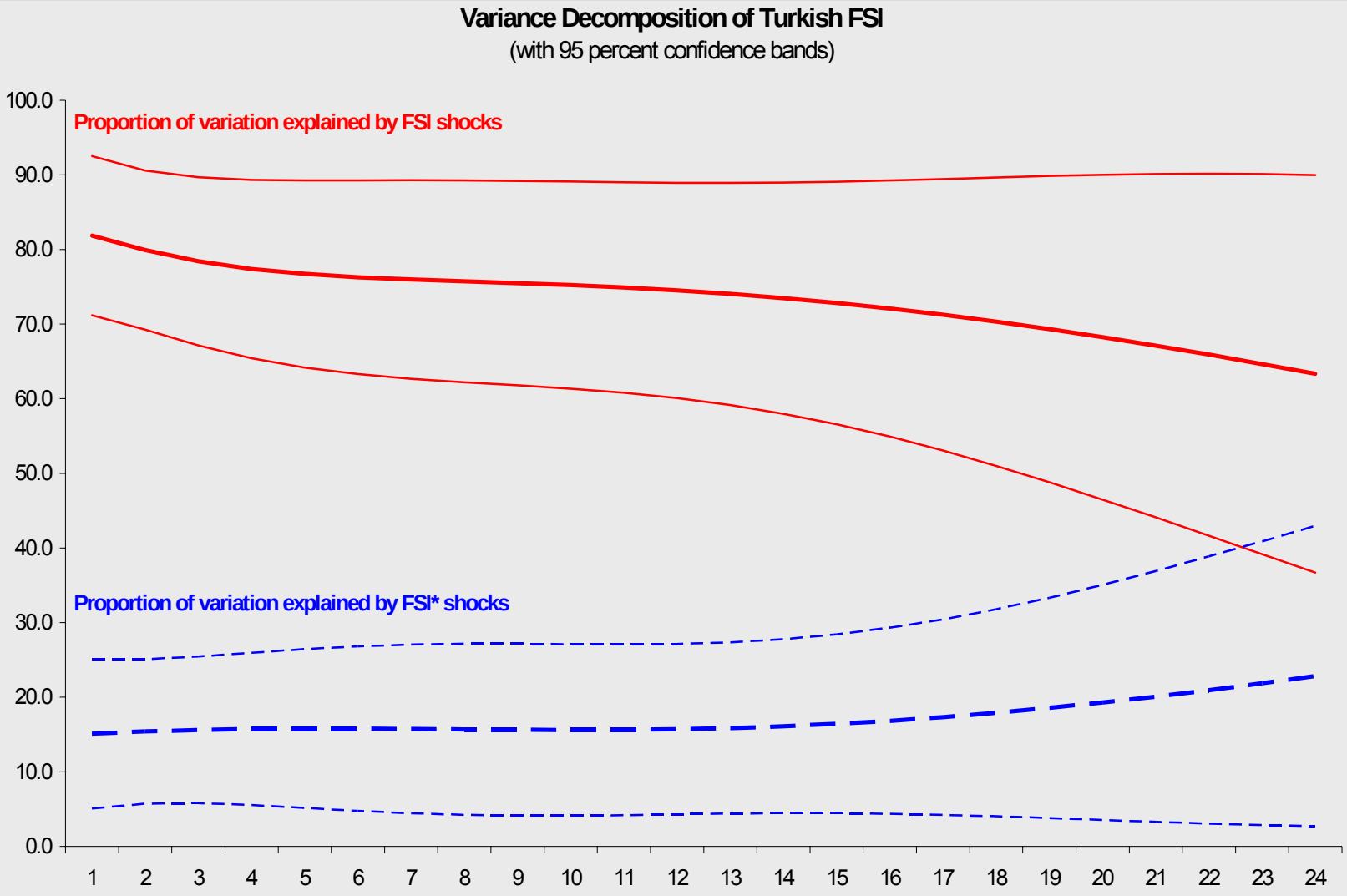
- A one standard deviation FSI shock may imply up to a 2.5 percent downward deviation from trend output—recent shock was a two standard deviation shock…

- Turkish, Korean, and Malaysian IP responded similarly to the FSI shocks…
  - Turkey and Korea both had relatively higher growth rates of credit provided by the banking sector.
  - Turkey and Malaysia had relatively lower reserves

FSI versus FSI* Shocks



Is Turkish FSI Entirely Driven by FSI*?



What Role for Policies?

- Split impulse response function of the selected EM according to whether they are above or below a certain macroeconomic indicator through 1997–2007.

- This split allows us to assess the role of policies and initial conditions…

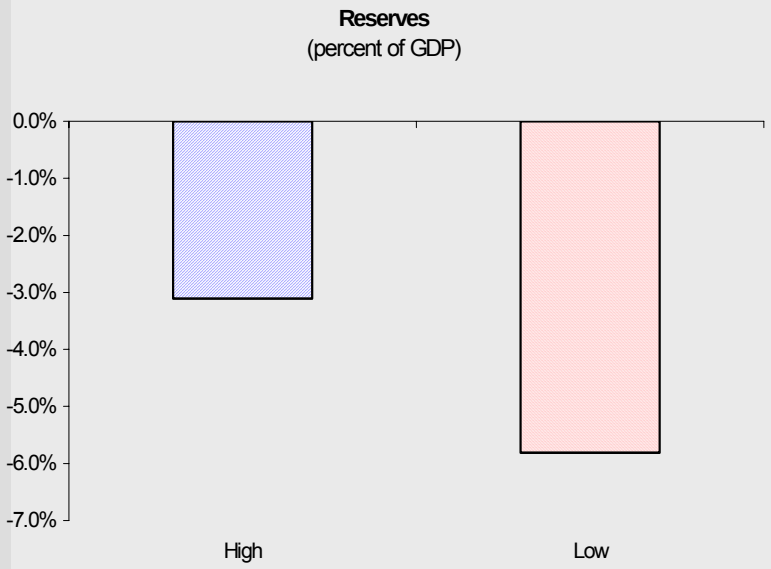
Selected Macroeconomic Indicators

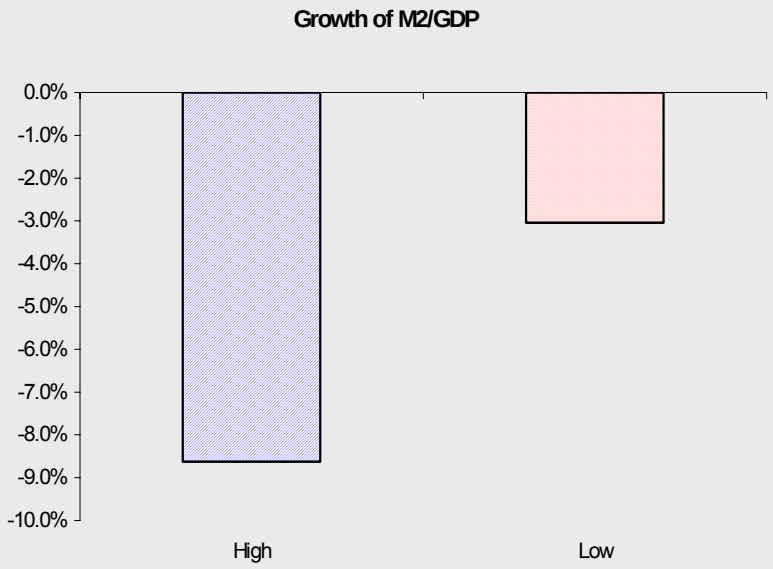
Averages from 1997 to 2007	**Openness** (exports plus imports scaled by GDP)	**Exports** (percent of GDP)	**Exports** (percent of GDP)	**Current Account** (percent of GDP)	**Reserves Cover** (percent of GDP)	**Reserves Cover** (months of imports)	**Domestic Credit to Private Sector** (percent of GDP)	**Change in Domestic Credit to Private Sector** (percent of GDP)	**Domestic Credit Provided by the Banking Sector** (percent of GDP)
	(X + M)/Y	X/Y	M/Y	CA/Y	RES/Y	12*RES/M	CRED/Y	Δ(CRED/Y)	CREDBK/Y
Argentina	28.5	18.8	14.8	0.5	10.9	11.1	17.4	-0.5	38.7
Brazil	19.7	12.2	11.6	-1.4	7.3	9.6	34.5	0.7	75.7
Chile	55.1	35.8	31.0	-0.1	18.3	8.7	76.4	2.1	83.0
Hungary	139.2	66.8	68.5	-7.2	18.5	3.2	39.1	3.6	59.8
Korea	60.8	40.4	37.2	2.6	20.0	8.2	94.3	3.9	97.0
Malaysia	202.4	112.2	93.5	10.8	39.8	5.2	156.8	-7.5	171.6
Mexico	51.3	28.5	30.0	-1.7	7.4	3.4	19.2	0.3	35.5
Poland	67.7	31.3	34.7	-3.7	14.3	5.1	28.0	1.9	37.6
South Africa	55.5	28.3	27.3	-2.2	5.7	2.5	134.2	4.0	167.3
Thailand	123.2	65.3	58.8	4.0	28.1	5.9	113.8	-5.0	135.7
Turkey	35.7	22.1	23.7	-2.3	9.7	5.4	19.6	1.1	42.1

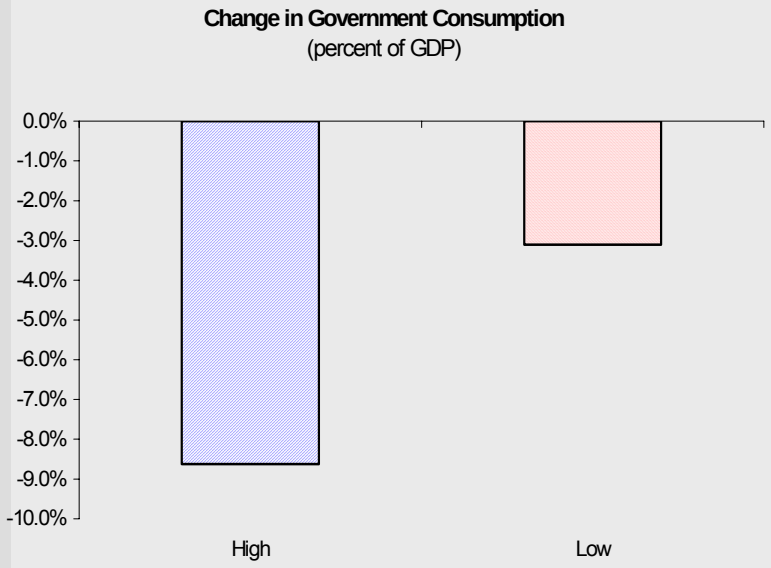
Selected Macroeconomic Indicators

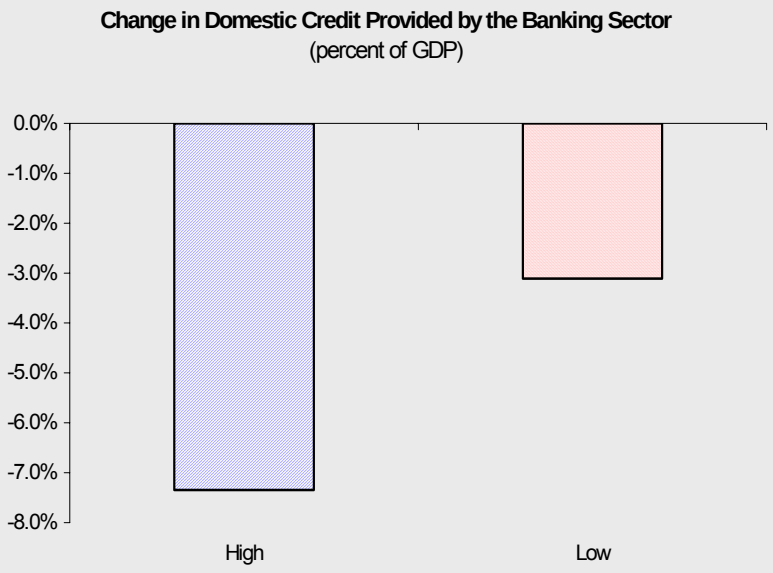
Averages from 1997 to 2007	**Change in Domestic Credit Provided by the Banking Sector** (percent of GDP)	**M2** (percent of GDP)	**Change in M2** (percent of GDP)	**Change in M2** (percent)	**Short-term interet rate** (percent)	**Inflation** (percent)	**Real Interest Rate** (percent)	**Government Consumption** (percent of GDP)	**Growth of Government Consumption** (percent of GDP)
	Δ(CREDBBK/Y)	M2/Y	Δ(M2/Y)	ΔM2	i	π	r	GCON/Y	Δ(GCON/Y)
Argentina	0.0	42.3	4.1	14.5	10.7	6.5	4.2	12.5	2.4
Brazil	3.3	38.2	3.7	14.0	20.1	6.7	13.4	19.9	2.5
Chile	0.9	45.9	3.6	12.8	6.7	3.6	3.2	11.5	3.9
Hungary	0.2	51.7	4.2	13.7	11.3	8.5	2.8	10.1	2.2
Korea	4.1	111.1	5.6	10.5	6.1	3.3	2.8	13.3	4.2
Malaysia	-7.3	115.1	7.4	11.9	3.9	2.4	1.5	11.7	7.2
Mexico	0.0	40.9	4.0	16.8	13.6	8.6	5.0	10.9	1.1
Poland	1.4	43.9	3.1	13.8	11.5	5.6	6.0	18.8	3.0
South Africa	5.3	68.3	7.2	15.6	11.3	5.8	5.6	18.7	3.5
Thailand	-3.8	192.0	6.8	7.4	5.5	3.1	2.5	11.3	3.7
Turkey	2.1	127.8	30.5	58.0	47.4	40.9	6.5	11.7	4.3

Macroeconomic Conditions and Cumulative Output Losses









Main Policy Implications

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- **higher** average **reserve cover** over the sample period
  - Among other things, reserves provide self-insurance against sudden stops…
- **lower** average aggregate **credit growth** (M2/GDP or banking credit) over the sample
  - While growth in M2-to-GDP growth may indicate financial deepening, the growth in banking credit seems to be a symptom of a credit boom, possibly driven by large capital inflows and/or less than optimal policies…
- **lower** average **government consumption growth** over the sample
  - Echoes results of Kaminsky, Reinhart, and Vegh (2004), but also Cardarelli, Elekdag, and Kose (2009), who find that keeping public expenditure growth steady during episodes of large capital inflows—rather than ratcheting up spending—can foster better macroeconomic outcomes in their aftermath.
- relatively more **closed economies…**

Next Steps

- Update the financial stress index (FSI)
- Expand country coverage
- May also use real GDP as a measure of economic activity

  Would help address issues of recovery patterns…
- Bayesian VARs and block exogenous foreign country block
- Depending on country coverage, may consider a complementary event study, or use alternative empirical strategies such a panel methods

Concluding Remarks

- Developed a financial stress index (FSI) for emerging economies that captures episodes of financial stress remarkably well.

- Preliminary policy implications include:

  - Financial stress matters: a one standard deviation financial stress shock can drag industrial production 2.5 percent below trend…

  - EMs with higher average reserve cover, lower average aggregate credit growth, and lower average government consumption growth over the sample seem to have experienced less severe downturns.

Thank You

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