

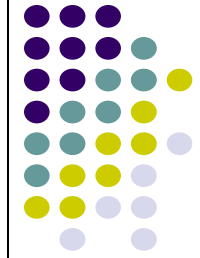
The financial crisis and sizable international reserves depletion: From ‘fear of floating’ to the ‘fear of losing international reserves’?



Joshua Aizenman (with Yi Sun)
UCSC and the NBER; UCSC

Global Dimensions of the Financial Crisis
FRB of New York
June 3, 2010

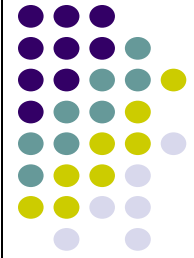




Presentation

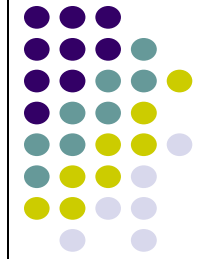
1. Summary and overview of hoarding IR before the crisis.
2. The crisis -- the experience of 21 EMs.
3. Korea, Brazil and other EMs: from the “fear of floating” to the “fear of using IR”.
4. Implications and future trends.
5. Concluding remarks.

Overview and summary



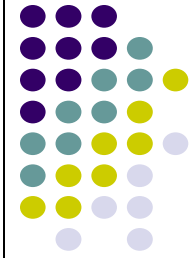
- During earlier crises episodes, EMs were forced to adjust mostly via rapid depreciation.
- The sizable hoarding of IR during 1998-2007 provided EMs with a richer menu of choices.
- We study the degree to which earlier hoarding of IR “paid off,” allowing EMs to buffer their adjustment by drawing down IR during the crisis.
- Mixed and complex picture: **only about half of the EMs relied on significant depletion of their IR as part of their adjustment, using not more than 1/3 of their IR.**

During the 2008-9 crisis, factors associated with larger IR losses among 21 EMs were



- Large primary commodity exports (oil, etc),
- A medium level of financial openness,
- A large short term external debt/GDP ratio.
- Next, we compare the pre-crisis demand for IR/GDP of 9 EMs that experienced sizable depletion of their IR during July 08-Feb. 09 (IR losses $\geq 10\%$), to the 11 EMs that did not (IR losses $< 10\%$), and find differential patterns across the two groups.

For EMs that experienced a sizable IR depletion in the first phase of the crisis

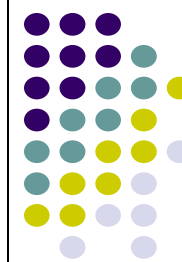


- Trade factors (trade openness, primary goods export) were more significant in accounting for the pre-crisis IR/GDP levels.
- EMs that internalized their large trade exposure before the crisis used IR as a buffer stock.
- IR losses followed an inverted logistical curve, losing not more than 1/3 of their pre crisis IR.

For the EMs that refrained from using IR

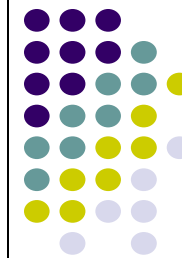
- Financial factors seem more important than trade factors in explaining their initial level of IR/GDP.
- These countries achieved external adjustment through large depreciations of their currencies.

The adjustment of EMs during the crisis has been constrained more by *fear of losing IR* than by *fear of floating*.



- The *fear of losing IR* may reflect
 - A country's concern that dwindling IR signals greater vulnerability, thereby triggering a run on its remaining reserves.
 - A country's apprehension that, as the duration of the crisis is unknown, depleting IR quickly may be suboptimal.
- **Implication: Prudential supervision tightening the link between short-term external borrowing and hoarding IR would mitigate the excessive exposure to deleveraging risks induced by short-term external borrowing.**

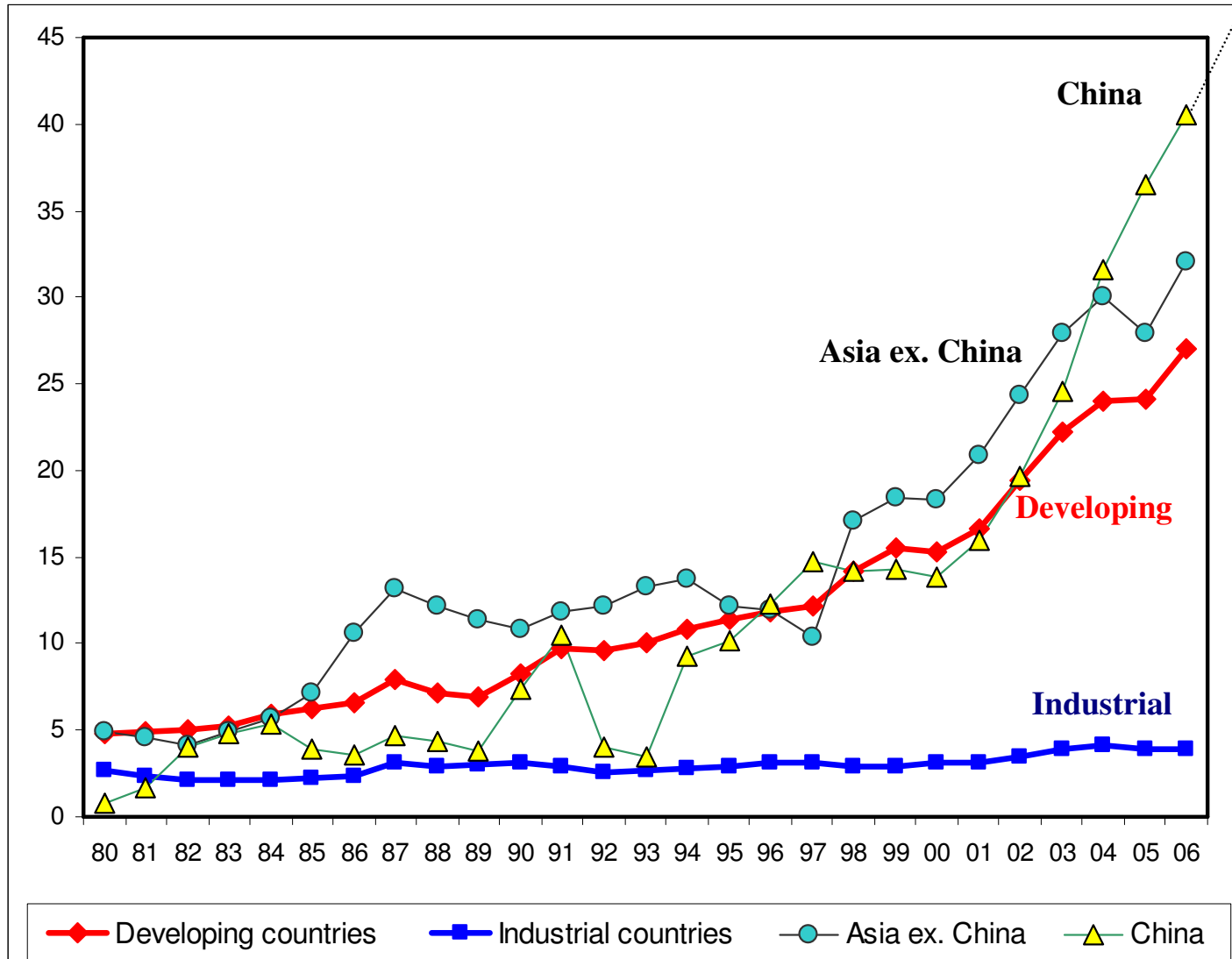
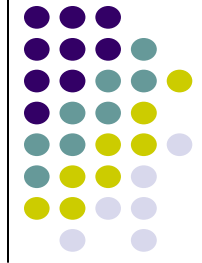
Balance sheet exposure matters



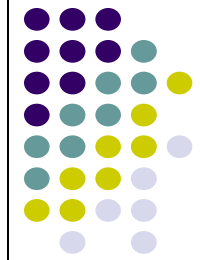
- **The case for using IR** tends to be stronger for countries with a significant balance sheet exposure, at times of deleveraging.
- **The case for depreciation** tends to be stronger for countries with a limited balance sheet exposure, at times of global recessionary pressure.
 - Deflationary shocks mitigate fears of the inflationary consequences of depreciation, increasing the perceived gain of depreciation as a form of demand switching policy, thereby improving the competitiveness of a country.

The history of hoarding IR before the 2008-9 crisis

Takeoff of IR-GDP in EMs



China,
Billion US\$
2010, Jan
IR ~ 2400
GDP ~ 4800
(2009)

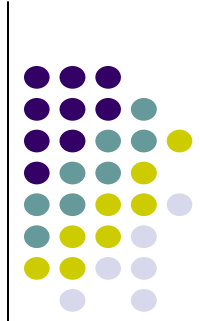


Prior to the crisis, hoarding IR reflected:

- **FOF:** The “fear of floating” [Calvo and Reinhart (2002)] -- the desire to tightly manage the exchange rate (or to keep fixing it):
 - to boost trade,
 - to mitigate destabilizing balance sheet shocks in the presence of dollarized liabilities,
 - to provide a transparent nominal anchor used to stabilize inflationary expectations.
- **PS:** Precautionary, self-insurance against capital flight and sudden stop of foreign capital inflows [Aizenman & Lee (2007)].
- **MR:** Mercantilism

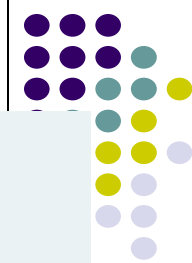
[Dooley et al. (2003), Aizenman & Lee (2007)].

The 2008-9 crisis: a case study of the actual use of IR at time of global deleveraging



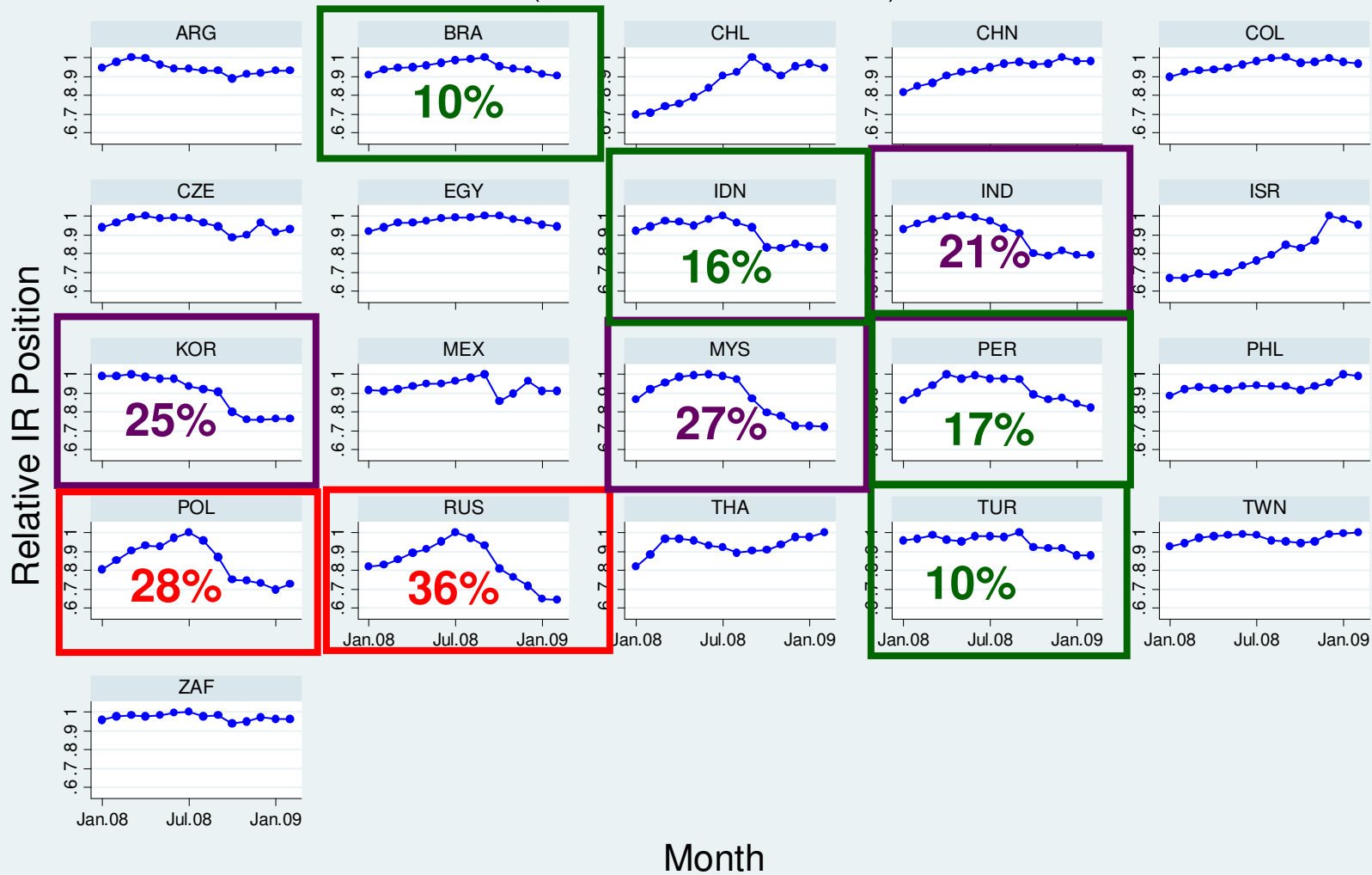
- The crisis: a test for the efficacy of large IR stocks at times of global turbulences.
- If FOF dominates, countries with sizable IR/GDP would use IR to mitigate depreciation.
- We evaluate the use of IR by 21 EMs.
- Limitations: one episode, small number of observations.
- Yet, the large adverse shocks [collapsing trade, deleveraging exposure of OECD] should provide clues about the use of IR in bad times.

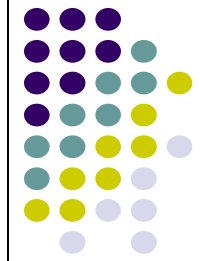
Only 1/2 of EMs relied on IR depletion (> 10%) as part of the adjustment mechanism



Emerging Market IR Position (IR/MaxIR)

(from Jan.2008 to Feb.2009)

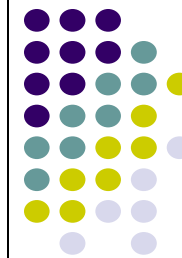




Variables

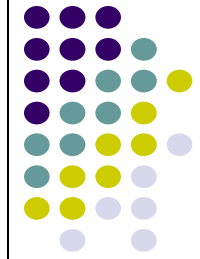
- **IR changes / GDP (d.ir_gdp) = (IR2009.2 – IR2008.7)/GDP2007**
- Trade openness (Topen) = (export + import)/GDP
- Primary product export ratio (prim2export) = (primary product export value) / (total export value)
- Oil export ratio (oilex/gdp) = net oil export volume / GDP
- Export volatility (xvolatile) = standard.deviation (monthly export growth rate during 2006-07)
- Capital Market Openness (Kopen) = Chinn-Ito Capital market openness index in 2007 (-2, -1, 0, 1, 2, 3).
- Exchange rate volatility (exstdev) = standard.deviation (monthly exchange rate growth during 2007)
- Short term debts ratio (STdebt/gdp) = Short term Loan and debt security / GDP (as %)
- GDP in 2007 (GDP07) and per capita GDP (GDPpc)

Results accounting IR losses of the 21 EMs



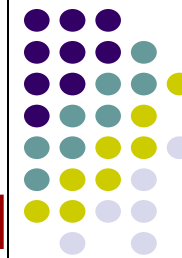
- EMs with **large primary commodity exports**, especially oil export, tend to experience relatively large IR losses during the 2008-9 global crisis.
- EMs with a **medium level of financial openness** lost a larger share of their IR holdings.
- Countries with **large short term external debts** tend to have relatively large IR losses during the crisis.
- Larger IR/GDP pre-crisis levels were associated with large IR/GDP declines during the crisis period.
- Next, we split the sample into
- I. EMs with large IR losses, $\geq 10\%$ (9 countries) and
- II. small losses (or possible gains) $< 10\%$, 11 countries.

Contrasting the pre-crisis IR demand of I and II



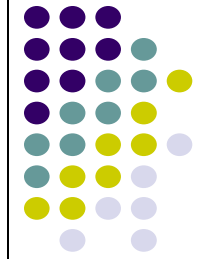
- For EMs experiencing large IR depletion, trade factors (trade openness, trade shocks, primary goods export ratio) were more important in accounting for their pre crisis IR than for the second group.
- For EMs experiencing small or no IR depletion, financial factors are much more significant, EMs with stricter financial controls and lower exchange rate flexibility tend to have a higher pre-crisis level of IR/GDP.
- An F test confirms that trade and financial related factors played different roles in these two groups.

From the “fear of floating” (before the crisis) to the “fear of losing IR” during the crisis



- Using less than 1/3 of initial IR by group I, and refraining from using reserves by group II, are consistent with the “fear of losing reserves”.
- EMs’ adjustment was constrained more by their *fear of losing IR* than by their *fear of floating*.
- Possible interpretations:
 - Uncertainty regarding crisis duration and depth.
 - EMs fear that reducing IR/GDP ratio below the average of its reference group would increase its vulnerability to deleveraging and sudden stop crisis.
 - During times of low inflation, EMs were willing to depreciate to keep or improve their competitiveness.
 - Large trade losses, balance sheet exposure and deleveraging induced group I to adjust both by large depreciations and sizable depletion of IR.

Only 1/2 of EMs relied on IR depletion as part of the adjustment mechanism

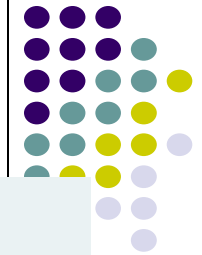


- IR depletion followed (inverted) logistic pattern, reached within seven months a markedly declining rate of reserve depletion, losing not more than 1/3 of their pre-crisis IR.

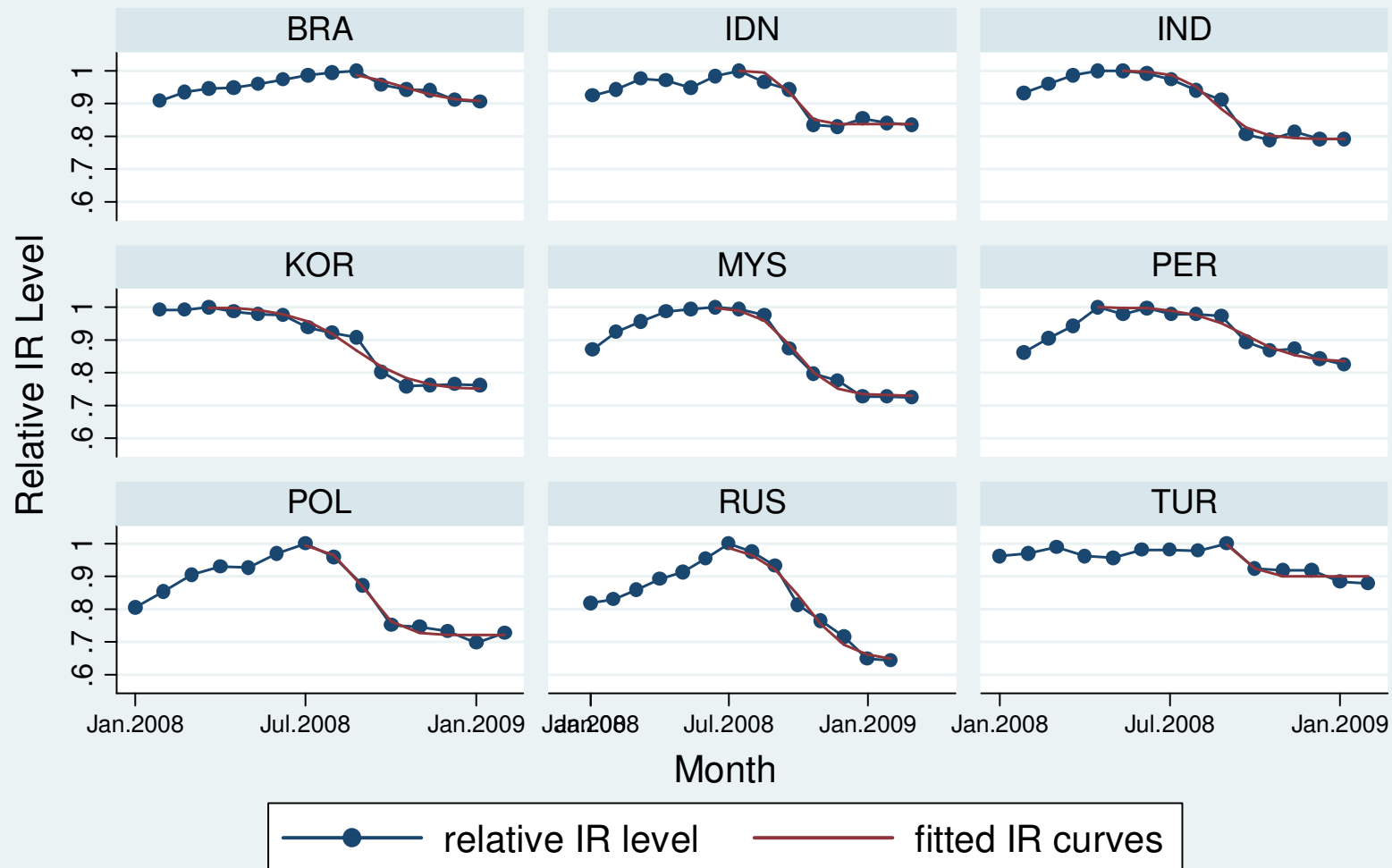
Fitting the logistic curves, we find

- A tradeoff between tolerating ER adjustment and IR adjustment.
- EMs which had begun depleting their IR sooner had also an earlier turning point.¹⁶

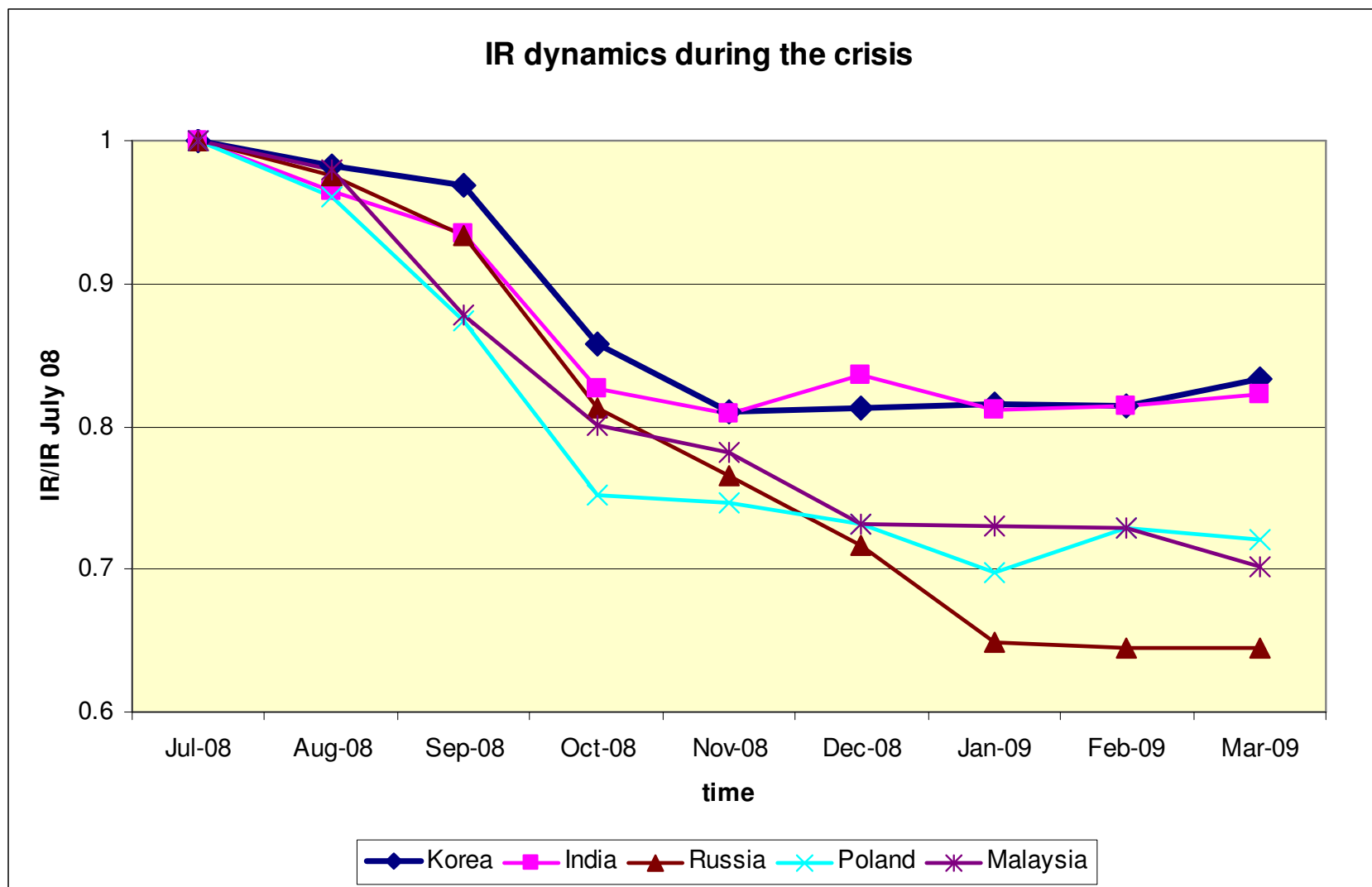
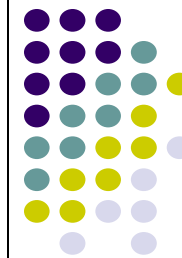
The 'predicted logistic lines' fit the data very well



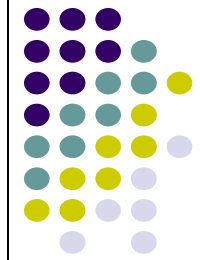
Relative IR level with fitted logistic curves
for large IR loss countries (Jan.08-Feb.09)



International reserves and the deleveraging crisis, 7-08 to 3-09

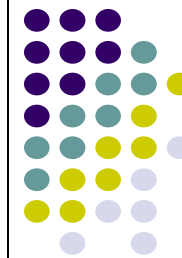


Robustness analysis



- The choice of the threshold for losing IR in our base regression is 10%. The main results are not impacted by varying the threshold to be 5% or 15%.
- We have run regressions including an Asian dummy, to verify if there a regional Asian bias. Overall, adding the Asian dummy does not affect the main results.

Deleveraging and exchange rate pressure during the crisis.



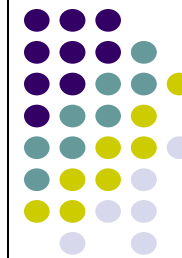
- EMs that experienced sizable IR losses were exposed to a much larger deleveraging of short term external debt than other EMs.
 - During Q4, 2008, average IR losses were 28 Billion US\$ for EMs in the sizable IR losses group, *half* of it funded deleveraging of short term external debt.
- In contrast, IR losses and the deleveraging of short term debt were close to zero for countries experiencing non-sizable IR losses during Q4 2008.

Changes in International Reserve and Short-term Debt

Large IR change countries (group 1) vs small IR change countries (group 2)

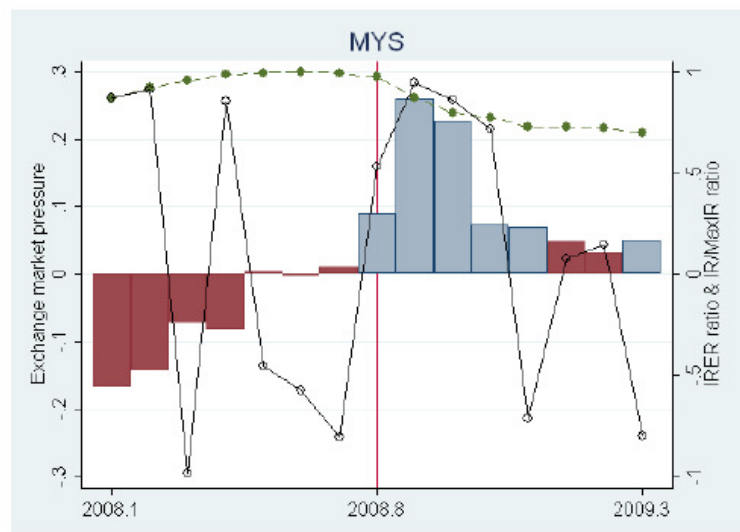
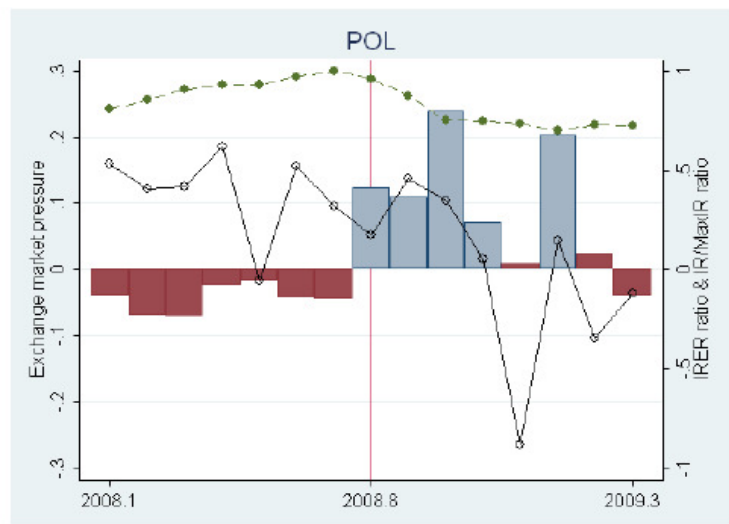
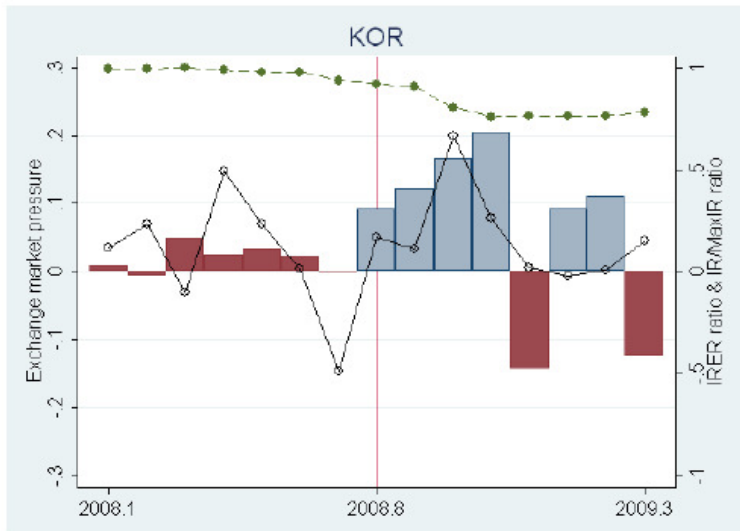
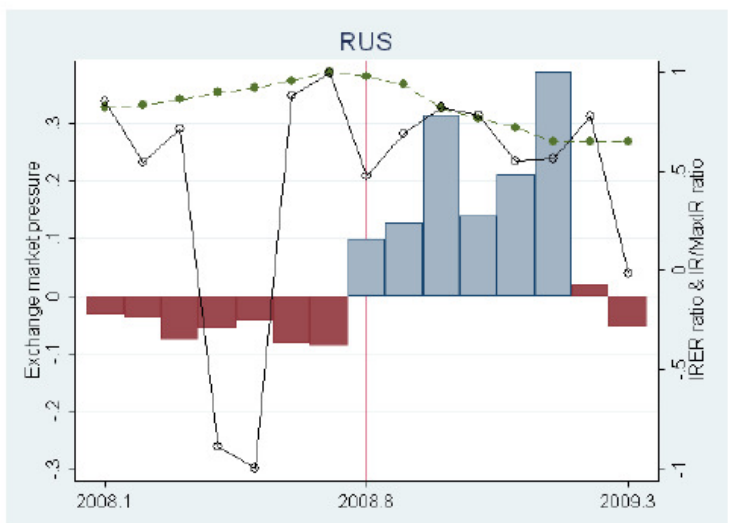
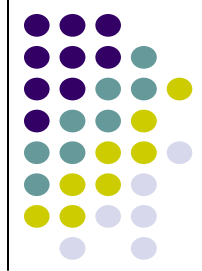


Large exchange market pressure and IR adjustment

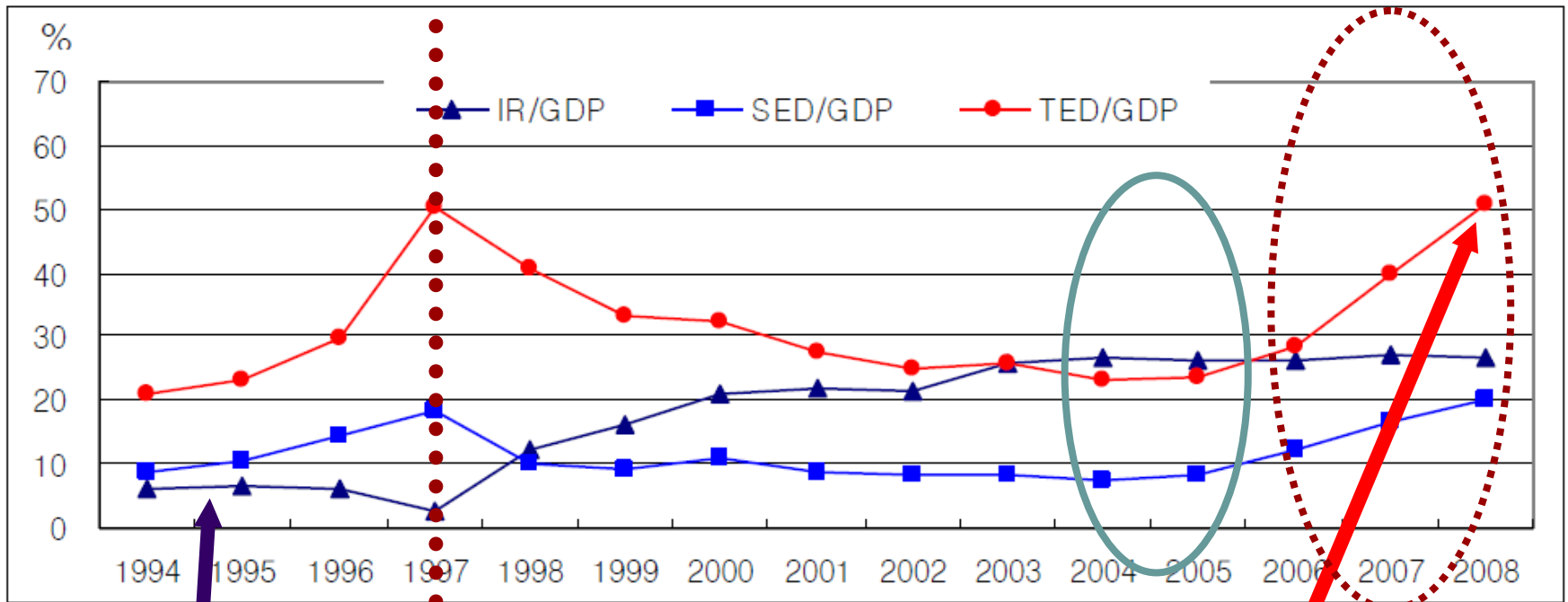
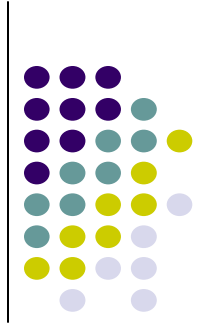


- We focus on EMs that experienced a large exchange market pressure -- a spell of at least three consecutive months with an exchange market pressure exceeding 0.05 each month.
 - Brazil, Columbia, Indonesia, India, Korea, Malaysia, Poland, Russia, and South Africa.
- After experiencing large losses of IR during a few months in the first phase of the crisis, countries increased the weight of exchange rate depreciation, and reduced the weight of losing IR as a way of dealing with exchange market pressures. A pattern consistent with the growing fear of losing IR.

Exchange market pressure, IR/Max IR and the weight of IR in EMP during the crisis, Russia, Korea, Poland and Malaysia



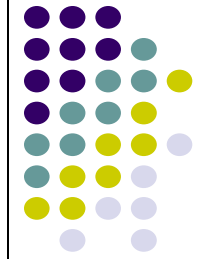
Further insight is gained by looking at Korea's IR and Ext. debt., 1994-08, *"the canary in the coal mine of IR"*



IR/GDP

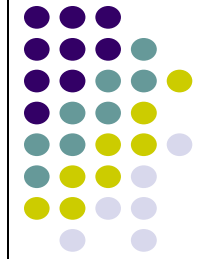
Ext. Debt/GDP

Korea and the 2008-9 crisis



- During the first stage of the crisis, Korea's reserves had dropped by roughly \$60 billion in half a year, a decline of about 25%.
- IR were key to the bailout package that the Korean government unveiled in the second half of 2008:
A \$100 billion three-year government guarantee for the K. banks' foreign debt.
- This sum was more than sufficient to cover the Korean banks' foreign debt maturing by June 2009, estimated to be about \$80 billion.
- Yet, despite the large hoarding of international reserves used to finance the bailout package, market concerns were not abated:

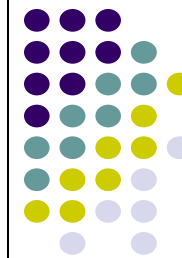
Yung Chul Park (2009)



“Only when Korea secured a swap line amounting to \$30 billion from the Fed on October 30 the foreign exchange market settled down somewhat, but not very long. The foreign exchange rate shot up to 1,509 won per dollar three weeks after the swap had been announced, which was apparently not enough to remove uncertainties surrounding Korea’s ability to service its foreign debt...

Only when it was made clear that the Fed would renew the swap agreement, foreign investors’ confidence in the Korean economy improved and stability in the foreign exchange market returned toward the end of the first quarter of 2009.”

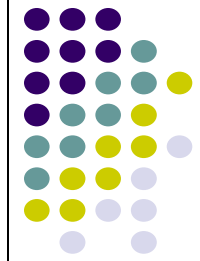
Room for prudential regulations



- Higher Short term debt/GDP due to external borrowing of private banks increases the probability of CB bailout.
- Room for prudential regulation, taxing external borrowing to fund the future bailouts, akin to an open economy version of FDIC's risk premium imposed on deposits in US banks, Aizenman (2009).

The global crisis: the first serious test of modern financial globalization.

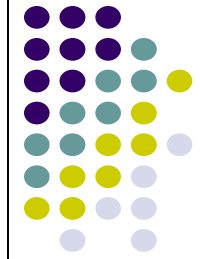
The outcome: murky, the old order is broken.



Fall-outs Financial market integration of EMs:

- Spells of “quasi sovereign” defaults, with “muddling through” bailouts.
- The regulatory changes so far are timid. No reason to expect the end of financial turbulence.
- EMs remain exposed to sudden stops and deleveraging crises.
- Proper management of external debt remains a key challenge facing developing countries.

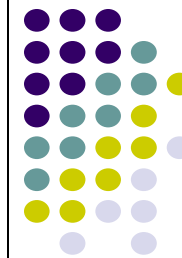
Discussion I



- EMs that embraced rapid financial integration before the crisis found that they are overly exposed to deleveraging propagated from the US.
- Even a large stock of IR may not provide efficient self-insurance against deleveraging.
- Proper prudential regulation may facilitate a more sustainable financial integration: supplementing hoarding IR with taxes on external borrowing by domestic banks would help EMs exposed to financial turbulence, internalizing the Moral Hazard exposure of the CB to external debt of private banks.

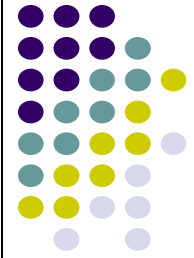
Discussion II

Alternatives to self insurance?



- Alternatives to a massive hoarding of reserves:
 - A deeper use of swap lines;
 - IR pooling arrangements;
 - Channeling IR into potentially higher yielding but riskier assets, probably managed by SWFs.
- While potentially useful, these alternatives are not a panacea.
 - Swap lines and IR pooling arrangements are typically for short duration, limited by moral hazard considerations [Aizenman & Pasricha 2009].
 - Diversification by means of SWF -- the value of the fund may collapse precisely at the time when hard currency is needed to fund deleveraging.

Thanks for your attention



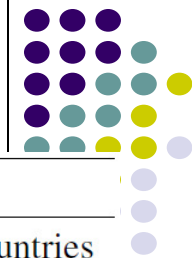
Regressions on (IR2009.2 – IR2008.7)/GDP2007



	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	d.ir_gdp	d.ir_gdp	d.ir_gdp	d.ir_gdp	d.ir_gdp	d.ir_gdp	d.ir_gdp	d.ir_gdp
Topen	-0.0299 (-1.02)	-0.0667** (-2.13)	-0.0541** (-2.40)	-0.0548** (-2.54)	-0.0540** (-2.58)	-0.0490** (-2.45)	-0.0204 (-0.97)	-0.000332 (-0.01)
Prim2export		-0.126** (-2.13)						
oilexgdp			-0.0238*** (-4.07)	-0.00469 (-0.37)				
topenXoilex				-0.0224 (-1.66)	-0.0269*** (-4.67)	-0.0245*** (-4.37)	-0.0216*** (-4.28)	-0.0221*** (-4.64)
Kopen.abs						0.0177* (1.77)	0.0182* (2.06)	0.0157* (1.87)
STdebts/gdp							-0.00498** (-2.45)	-0.00487** (-2.55)
Ini.IR								-0.0810* (-1.78)
_cons	0.00000225 (0.00)	0.0669 (1.72)	0.00635 (0.32)	0.00354 (0.19)	0.00274 (0.15)	-0.0196 (-0.92)	0.00278 (0.13)	0.0110 (0.55)
N	21	20 ⁺	21	21	21	21	21	21
R-sq	0.052	0.269	0.506	0.575	0.571	0.638	0.737	0.783

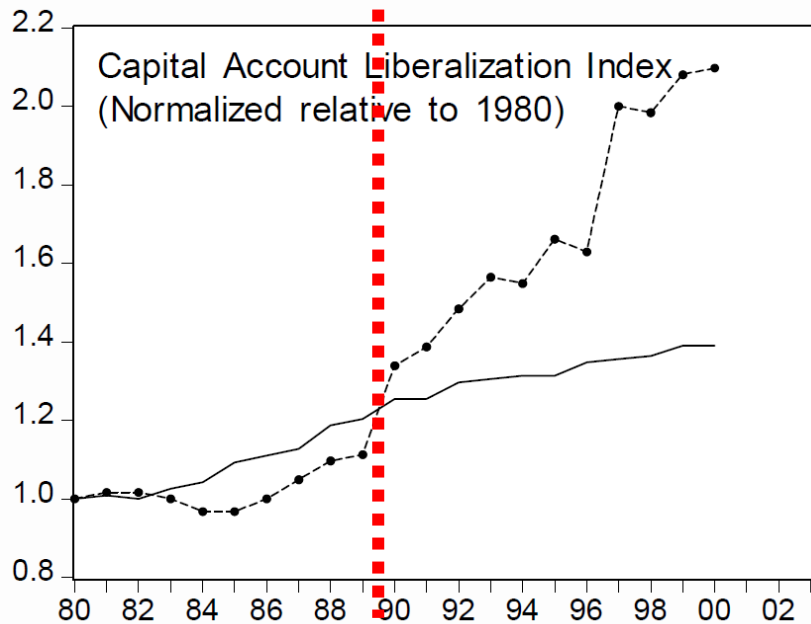
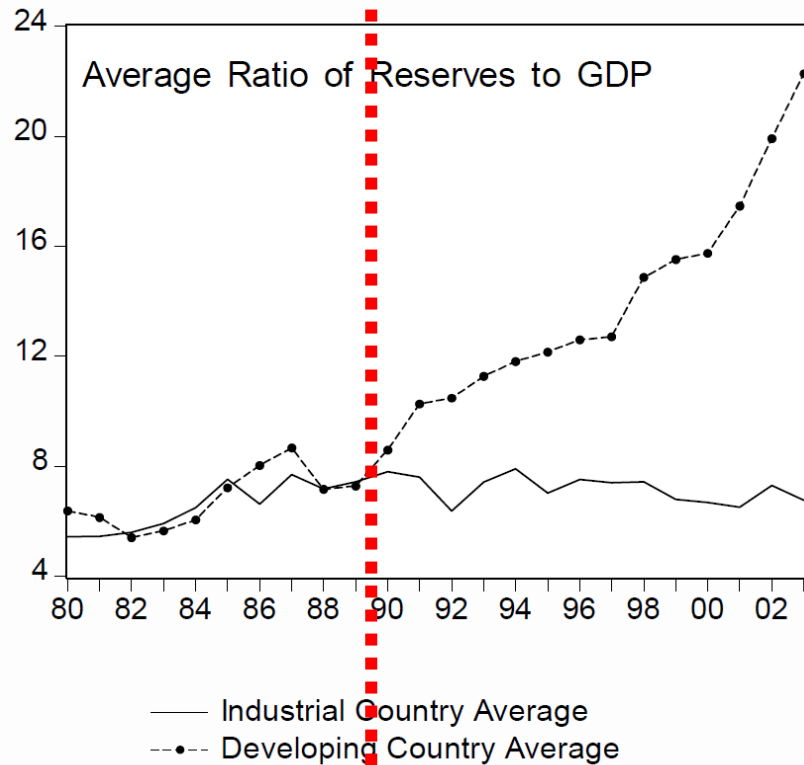
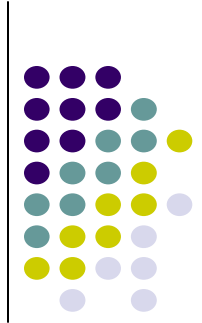
Notes: t statistics in parentheses. For confidence level, * p<0.1, ** p<0.05, *** p<0.01

Contrasting the pre crisis IR demand of the two groups



Dependent Var	IR level (Jun 2008)						
	Large IR loss countries			Less IR loss countries			All countries
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Topen	0.359** (12.00)		0.266** (4.89)	0.0852 (0.45)		0.421** (4.45)	0.283** (4.15)
Prim2export	0.307* (2.06)		0.514* (3.29)	-0.125 (-0.38)		-0.0953 (-0.53)	0.182 (1.09)
xvolatile	1.916 (1.60)		1.416 (0.70)	-0.349 (-0.55)		2.842** (2.82)	0.0197 (0.03)
kopen		-0.00834 (-0.29)	-0.0408 (-1.75)		-0.0745 (-1.73)	-0.0877* (-2.16)	-0.0418 (-1.59)
exstdev		-9.197 (-1.49)	-0.00143 (-0.00)		-4.432 (-1.43)	-6.620* (-2.67)	-5.349* (-1.83)
STdebt/gdp		0.0154 (0.89)	0.0128 (0.99)		0.00972 (0.59)	-0.0376** (-3.28)	-0.00557 (-0.77)
_cons	-0.253* (-2.08)	0.304 (1.33)	-0.336 (-0.84)	0.239 (0.92)	0.325* (2.10)	0.0764 (0.49)	0.154 (1.04)
N	9	9	9	11	12	11	20
R-sq	0.883	0.533	0.938	0.204	0.422	0.799	0.603

Notes: t statistics in parentheses. For confidence level, * p<0.1, ** p<0.05, *** p<0.01



IR/GDP takeoff in developing countries has been associated with the rapid financial integration of 1990-present
Aizenman and Lee (2007)