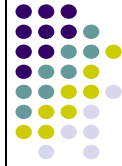**Financial Deepening, Macro-Stability, and Growth in Developing Countries**

IMF Conference
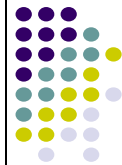Monday, September 24, 2012

Financial Sector Ups and Downs
and the Real Sector:
Up by the Stairs and Down by the Parachute

Joshua Aizenman, Brian Pinto, Vladyslav Sushko
UCSC & the NBER,   WB,   BIS

The agenda

The financial sector provides services to the non-financial sector →

The financial sector should be assessed in terms of its impact on the growth of the real sector, which is where the social costs and benefits ultimately reside.

- "…effective financial regulations require having an adequate understanding of the financial system." 2010 Squam Lake Report (French et al. 2010)

- We study the links between the financial sector and growth in the nonfinancial sector, looking at 8 nonfinancial sectors in 28 countries over 1960-2005.

2

US financial services/GDP
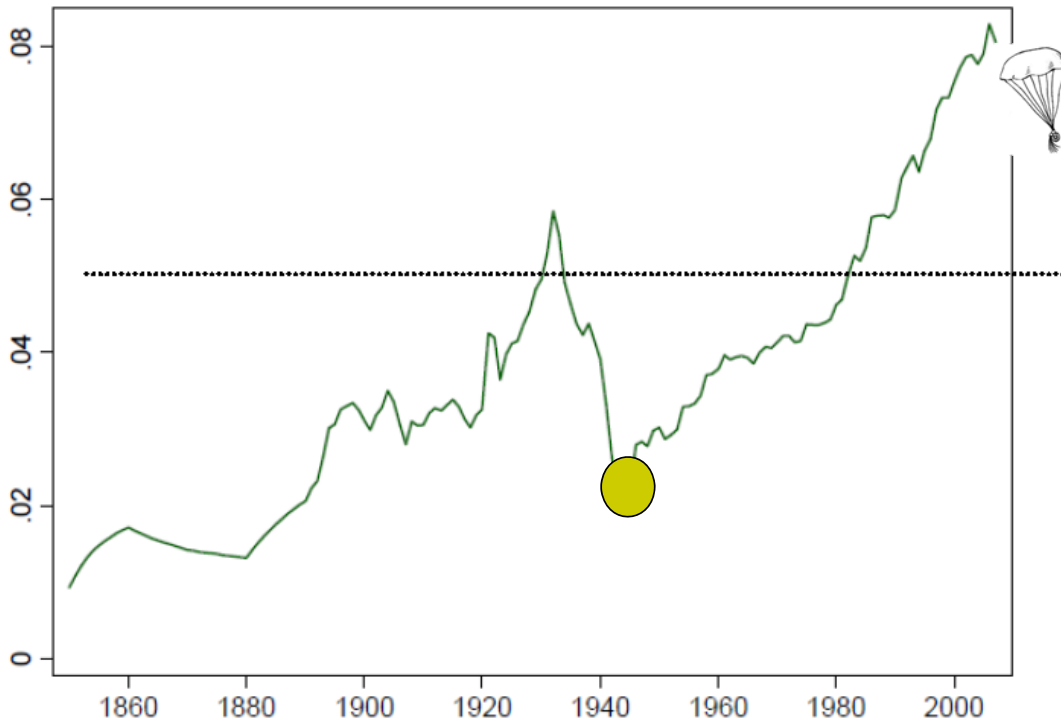
The agenda, cont.
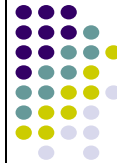
- We focus on the symmetry/asymmetry patterns of financial deepening cycles, and tail events,

- study the impact of financial sector's boom-bust cycles on the real economy (Agriculture, Construction, Government, Mining, Manufacturing, Public utilities, Transportation, Wholesale & retail); and identify sectors that are most vulnerable,

- study factors that amplify/mitigate the effect of financial sector's fluctuations on the real sectors.

4

Main results

- *Up by the stairs, down by the parachute*
  - Financial sector growth exhibits negative skewness and "fat tails" (slower increases, more abrupt collapses)
  - Abrupt financial contractions are more likely to take place following a period of accelerated growth of the finan. sector
- Financial sector's fluctuations have asymmetric short-run effects
  - The majority of real sectors adversely affected by financial contractions but not helped by financial accelerations
  - Construction most sensitive; followed by transportation, wholesales & retail, and manufacturing
- The adverse effects of financial contractions are transmitted mostly by the financial openness channel
- Self-insurance via international reserves mitigates the impact of contractions.

5

Data:

- Real value added of 10 economic sectors in 28 countries,1960-2005 from Groningen Growth and Development Centre (GGDC) 10-Industry Database (http://www.ggdc.net)
- The sectors: Finance, Agriculture, Construction, Government (community, social, and personal services + government services), Mining, Manufacturing, Public utilities, Transportation, Wholesale & retail.
- Other controls:
  - WB World Development Indicators & Governance Indicators
  - Penn World Tables (Heston, Summers and Aten, 2009)
  - External Wealth of Nations Mark II database (Lane and Milesi-Ferretti, 2007)
  - Banking and currency crises (Calvo and Reinhart, 2000; author calculations)

6

Methodology
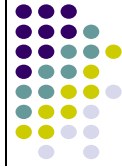
- Real GDP growth is used frequently as a first order approximation of welfare gains. This induces us to use the value added of each sector as a proxy for its flow contribution to economic activity.

- As a key role of financial services is to support economic growth, our econometric specification accounts for the marginal contribution of lagged growth of financial services on the growth of other sectors, all measured in terms of their real value added.

7

Financial industry, while growing in the long-run, is subject to abrupt periodic contractions

We find fat tails and higher frequency of occurrences of sudden declines in financial sector value added then the one predicted by the symmetric normal distribution.

- The mean growth rate for each country is positive

- 17 out of the 28 countries exhibit negative skewness, mostly EMs,

- Countries with positively skewed financial sector growth series include mostly OECD economies.

8

Financial industry is subject to abrupt periodic contractions
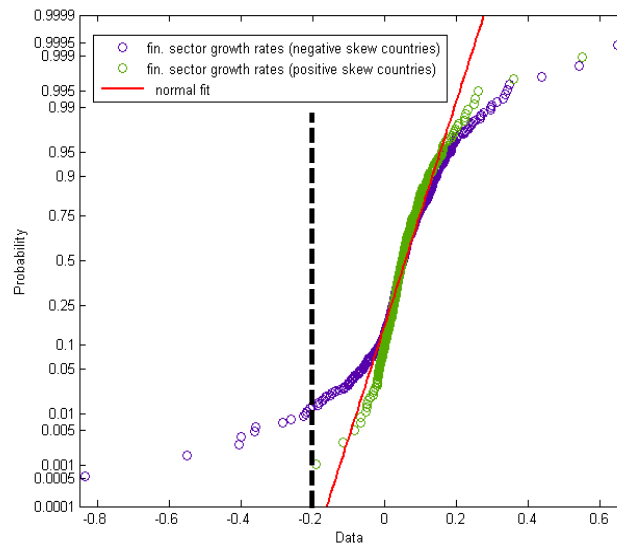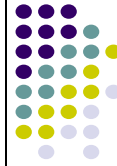
A growth rate of - 20 % a year in financial sector real value added has 0.0 probability of occurrence under the normality,
   0.1% in countries with positive skew,
   1.0% in countries with negative skew.

Analysis stage I – time-series dynamics of financial sector VA
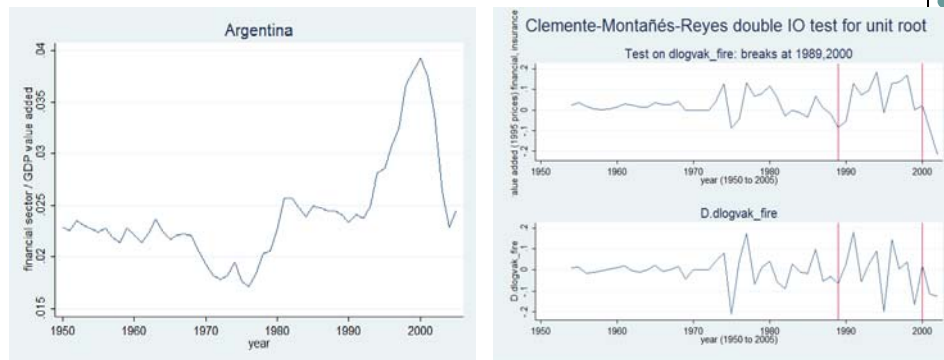
- Identify financial contractions (expansions) as structural breaks in the value added growth rate of the financial sector in each country followed by a negative (positive) growth rate.

Analysis stage I – time-series dynamics of financial sector VA
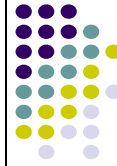
Conditional probability of large financial contractions:

$$\Pr\left(FIN.CONTRACTION_{k,t} = 1 \mid x_{k,t}, \boldsymbol{Controls}_{k,t}, \beta, \boldsymbol{\gamma},\right) = 1 - \Phi(\beta x_{k,t} + \boldsymbol{Controls}_{k,t}'\boldsymbol{\gamma})$$

where $x_{k,t}$ is the deviation of the average growth rate (either 3-year or 5-year) of financial sector real value added from the corresponding GDP growth rate, one year before the contraction episode :

$$x_{k,t} \equiv \frac{1}{n}\sum_{s=1}^{n} dlog(Fin.\ value\ added_{t-s}) - \frac{1}{n}\sum_{s=1}^{n} dlog(GDP_{t-s})$$

β > 0 indicates that the likelihood of sharp financial contraction is increasing in the excess growth of financial sector relative to GDP,

Φ( ) denotes either a standard normal or a logistic cumulative distribution function (better fit to the extremes of the distribution)

11

Analysis stage I: time-series dynamics of financial sector VA
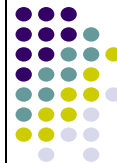
Abrupt financial contractions are more likely to take place following a period of accelerated growth of the financial sector

dependent variable: LARGE financial contractions	Probit		Logit	
	(1)	(2)	(3)	(4)
lag dlog(value added fin.)-dlog(GDP), 3-yr. avg.	0.306**	0.297**	0.744***	0.717***
	(0.147)	(0.150)	(0.260)	(0.265)
currencycrisis	1.410***	1.376***	3.667***	3.472***
	(0.273)	(0.267)	(0.737)	(0.810)
lag log(govt spending)		0.804*		1.438
		(0.471)		(1.315)
Constant	-2.907***	-5.176***	-6.298***	-10.257***
	(0.215)	(1.274)	(0.691)	(3.427)
Pseudo R2	0.222	0.243	0.221	0.232
	(5)	(6)	(7)	(8)
lag dlog(value added fin.)-dlog(GDP), 5-yr. avg.	0.256*	0.247*	0.625**	0.601**
	(0.132)	(0.136)	(0.255)	(0.265)
currencycrisis	1.407***	1.373***	3.656***	3.462***
	(0.273)	(0.268)	(0.738)	(0.811)
lag log(govt spending)		0.804*		1.441
		(0.470)		(1.313)
Constant	-2.904***	-5.173***	-6.289***	-10.256***
	(0.216)	(1.272)	(0.691)	(3.422)
Pseudo R2	0.220	0.242	0.220	0.231
Clustering by country	yes	yes	yes	yes
Observations	1,119	1,089	1,119	1,089

12

Analysis stage II – financial shocks and the real sector

Real VA growth rate of sector i in country k in year t: $GROWTH_{i,k,t}$

Diminishing returns in the neoclassical growth model imply a positive convergence parameter λ such that:

Real VA growth rate of sector i in country k in year t:

$$GROWTH_{i,k,t} = \lambda \left[\left(\frac{Value\ Added}{Worker} \right)^*_{i,k} - \frac{Value\ Added}{Worker}_{i,k,t} \right]$$

The long-run real value added per worker implicitly determined by structural parameters in the economy. Replacing the unobservable technological frontier with fundamental economic determinants obtain the empirical specification:

$$GROWTH_{i,k,t} = \sum_i \phi_i\, GROWTH_{i,k,t-1} + \gamma'\, X_{k,t} - \delta \left(\frac{Value\ Added}{Worker}_{i,k,t-3} \right) + \beta_{+/-}\, (FINSHOCK_{k,t-1}|I_{+/-}) + \varepsilon_{i,k,t}$$

The above model is based on Hassan, Sanchez and Yu (2011).

Analysis stage II – financial shocks and the real sector
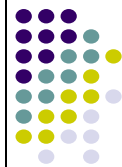
o All sectors, except for mining and public utilities, are affected by sharp contractions in the financial sector within a year. Construction is the most sensitive sector.

o Only the transportation sector is affected by sharp expansions of the financial sector.

o Currency crises have the most adverse impact on construction sector's growth, while public utilities are the most affected by banking crises, followed by the manufacturing sector.

Analysis stage II –
financial shocks and the real sector
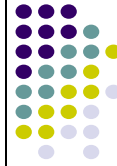
- Cycles in financial sector value added Granger-cause non-financial sector cycles, with a negative sign.

- The negative association between financial sector expansions and future real sector contractions is robust to controlling for lagged real sector growth.

- Positive coefficients on lagged dependent variable, in turn, indicate that expansions and contractions of the real sector tend to be fairly persistent.

15

Analysis stage II –
financial shocks and the real sector
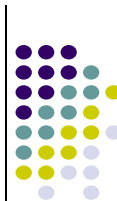
The negative impact is robust to reclassifying financial sector ups and downs as turning points in the cyclical component extracted using a band-pass filter.

- 6 of the non-financial sectors show a significant negative response to financial contractions within a year

- Only construction shows a positive response to turning points leading to financial sector expansions.

16

Analysis stage III – factors that magnify or mitigate the impact of financial contractions

Most of the significant financial contractions are associated with sharp reversals in foreign financial capital inflows, or sudden-stops.

Consistent with

o **The credit channel** (Calvo and Reinhart, 2000) -- abrupt stops in foreign capital inflows cause local credit markets to dry up, thus reducing investment and domestic demand.

o **The Collateral channel** (Mendoza, 2001) -- combined effect of sudden-stops and currency crises, whereby the deterioration of collateral in the financial sector causes debt deflation followed by real contraction. 17

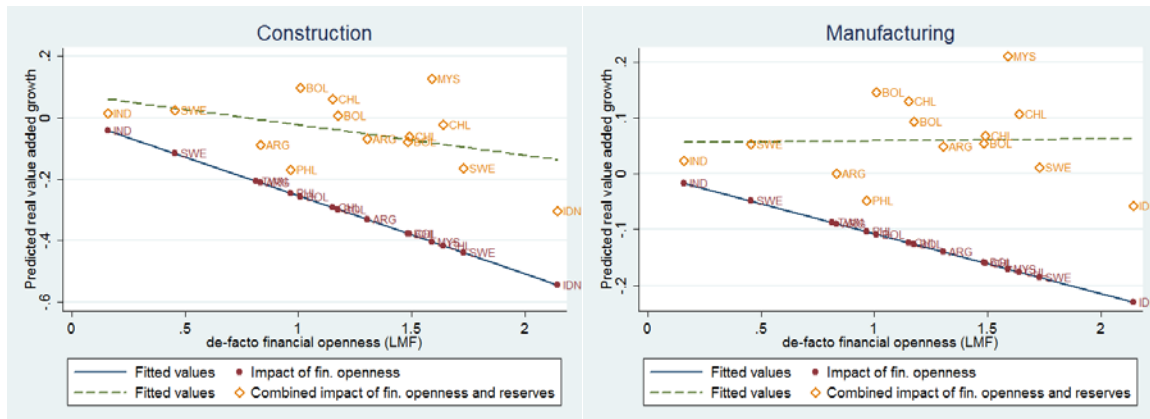## Analysis stage III – factors that magnify or mitigate the impact of financial contractions

● All the adverse effects of financial contractions on the real economy appears to work through the financial openness channel.

● International reserves buffer the economy during episodes of sharp financial contraction, mitigating the adverse growth effects of financial busts.

● Countries in which the severity of the financial shock is magnified by financial openness tend to rely on international reserves to mitigate the adverse impact of such capital flight on the real sectors.

18

Analysis stage III – factors that magnify or mitigate the impact of financial contractions
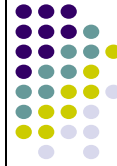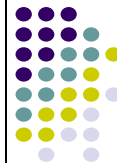
Key finding: reserves buffer the economy during episodes of sharp financial contraction, mitigating the adverse growth effects of financial busts.

Predicted contribution of financial openness and reserves to real sector growth during financial contractions:

Analysis stage III – factors that magnify or mitigate the impact of financial contractions

- The non-linear impact of IR is most prominent in the sectors identified as most vulnerable to fin. Contractions

- For the construction sector, a 1% higher IR/ GDP ratio is associated with a 0.2% higher value added growth rate on average, but a 2.8% point higher growth rate in times of financial contraction, hence partially offsetting the effect of financial contractions.

20

Analysis stage III – factors that magnify or mitigate the impact of financial contractions

Reclassify as deep contractions only episodes with fall in the growth rate of the financial sector value added exceeded the median of all contractions in absolute value (exceeding 9.3% drop in financial sector real value added over one year).

	All Contractions			SHARP Contractions	
	× OPEN	× IR		× OPEN	× IR
construction	-0.233***	0.028**		-0.656***	0.083***
	(0.077)	(0.013)		(0.156)	(0.024)
manufacturing	-0.105***	0.019***		-0.264***	0.038***
	(0.039)	(0.007)		(0.079)	(0.012)
wholesale, retail	-0.131***	0.022***		-0.455***	0.070***
	(0.036)	(0.006)		(0.071)	(0.011)
transportation	-0.156***	0.009*		-0.289***	0.021**
	(0.028)	(0.005)		(0.058)	(0.009)

Analysis stage III – factors that magnify or mitigate the impact of financial contractions

Optimal IR management helps

- A trilemma middle ground configuration buffered by sizable IR tends to stabilize output volatility (Aizenman, Chinn and Ito, 2011).

- IR management in LATAM lowered the short-run impact of commodity terms of trade shocks on the real exchange rate, and reduced real exchange rate volatility (Aizenman, Edwards and Riera-Crichton, 2011).

- EME rely on IR to an even greater extent than commonly believed once CB positions in FX forwards are accounted for. To buffer the impact of 2008/09 crisis, EMEs extensively drew down their forward dollar books (McCauley, 2012).

Conclusion

i. Abrupt financial contractions are more likely to take place following periods of accelerated growth in the financial sector.

- This asymmetric feature was pointed out by Philippon (2008) for the U.S.; we find that it applies more universally

ii. In the short-run, the transmission of shocks from financial to the real sector is asymmetric

- financial contractions followed by large declines in the value added of key real sectors, but financial expansions relative to the trend do not seem to have much effect.

iii. In addition to crowding out real sectors, excessive financial deepening can impair growth because of it's susceptibility to crashes.

23

Conclusion, cont.

- The adverse impact of financial contractions on the real economy works through the financial openness channel.
- Evidence in favor of EMs "self-insurance" via international reserves
    - The US's position as the supplier of the key global currency allows it to buffer its exposure to financial contractions via FED's QE policies, *de facto* supplying the key reserve currency elastically.
    - For EMs, the adverse effects of abrupt financial contractions are magnified by financial openness and mitigated by international reserves.

24

Thank you for you attention