Corporate Debt in Emerging Markets

Corporate debt, firm size and financial fragility in emerging markets
Journal of International Economics - Vol. 118 (2019), p. 1-19

Laura Alfaro
Harvard & NBER

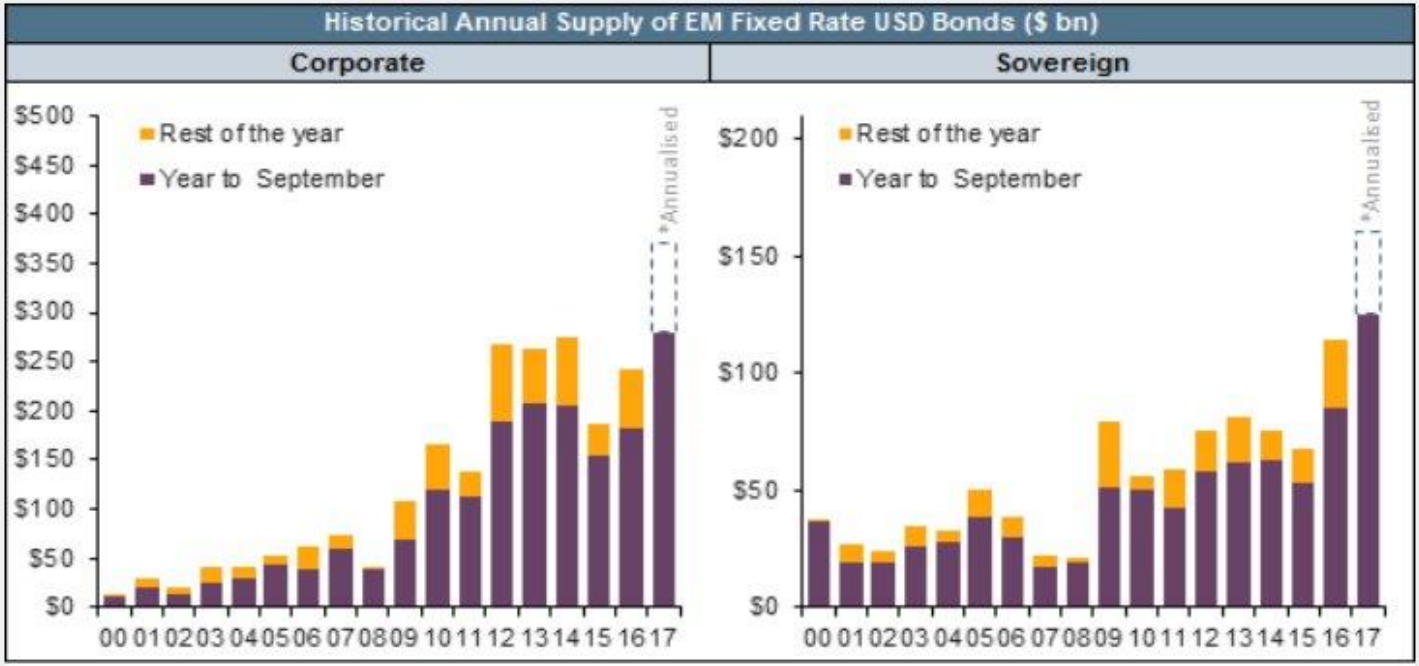
Gonzalo Asis
UNC Chapel Hill

Anusha Chari
UNC Chapel Hill & NBER

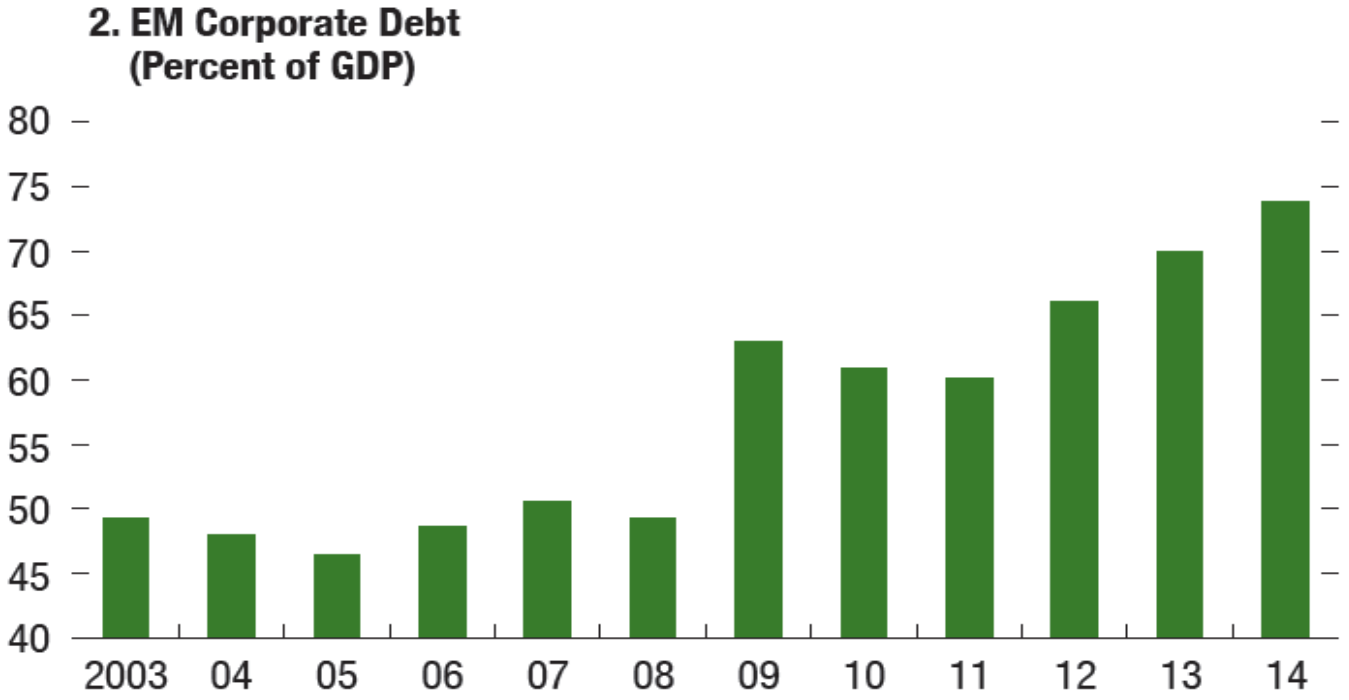
Ugo Panizza
The Graduate Institute Geneva & CEPR

Central Bank of Thailand, December 3, 2019

Motivation
Aftermath of The Global Financial Crisis



Motivation
Aftermath of The Global Financial Crisis



Source: IMF (2015)

Reasons To Be Worried

- May 2013 “taper tantrum” → considerable speculation about dollar-funding conditions tightening & financial stability concerns in emerging economies.
- Impaired health of non-financial EM corporates could harm domestic financial intermediaries & fiscal authorities.
- Policymakers have a challenging task controlling these risks generally associated with unregulated institutions.

But, Is the Increase in Leverage a BIG Problem?

- Research so far has been inconclusive
  - CIEPR (2015), Avdjiev et al. (2015), BIS (2014), Caballero et al. (2015), Bruno and Shin (2015), IMF (2015), McCauley et al. (2015)
- This is because (obviously) leverage **is not always bad** and vulnerabilities depend on debt structure
- However, it is hard (almost impossible) to obtain firm-level information on debt-structure
- It is also difficult to evaluate whether problems of individual firms will have systemic effects

The Key Question

*But the **rising amount of debt by itself** does not tell us whether this debt is **excessive** and how **vulnerable** EME corporates are to global monetary and market shocks.*

*For that assessment **we need to drill down deeper** into the health of the corporate sector.*

Governor Jerome H. Powell
Prospects for Emerging Market Economies in a Normalizing Global Economy
October 12, 2017

Literature

- Increase in corporate leverage
  - BIS (2015), Avdjiev et al. (2014) CIEPR (2015)
- The role of global liquidity
  - Shin (2013)
- Non financial corporate act as financial intermediaries
  - Bruno and Shin (2018), Caballero, Powell and Panizza (2012), Huang, Panizza, and Portes (2018)

Data

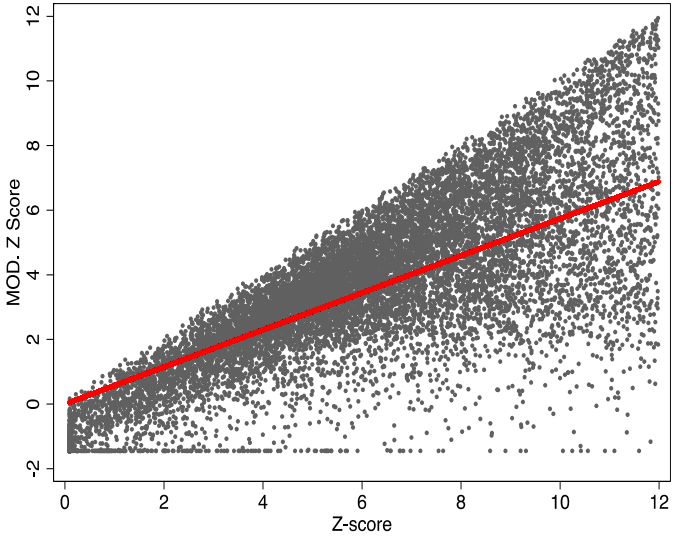
- Detailed firm-level data on non-financial corporations from Worldscope & Osiris
  - 26 Emerging Market Countries over 1992-2014 and up to 8,286 firms for a total of 41,888 observations
- The sample is unbalanced and there is entry and exit, but…
  - These are the best data for our study: all the data that exist
    - Datasets such as Orbis have no coverage for EMs going back to the 1990s
  - We show that our results become stronger when we use firms that are in the sample for at least 15 years

Measuring Firm Fragility: Altman's Emerging Market Z-score

	Z' Score			Rating		Z' Score			Rating	
Safe Zone		>	8.15	AAA	Grey Zone	5.65	-	5.85	BBB-	Grey Zone
	7.60	-	8.15	AA+		5.25	-	5.65	BB+	
	7.30	-	7.60	AA		4.95	-	5.25	BB	
	7.00	-	7.30	AA_		4.75	-	4.95	BB-	
	6.85	-	7.00	A+		4.50	-	4.75	B+	
	6.65	-	6.85	A		4.15	-	4.50	B	
	6.40	-	6.65	A-		3.75	-	4.15	B-	
	6.25	-	6.40	BBB+						
	5.85	-	6.25	BBB		3.20	-	3.75	CCC+	Distress Zone
						2.50	-	3.20	CCC	
						1.75	-	2.50	CCC-	
							<	1.75	D	

The Modified Z-score

$$Z - Score = 3.25 + C$$
$$+6.56\frac{working\ capital}{total\ assets} +$$
$$+3.26\frac{retained\ earnings}{total\ assets} +$$
$$+6.72\frac{operating\ income}{total\ assets} +$$
$$+1.05\frac{book\ value\ of\ equity}{total\ liabilities}$$

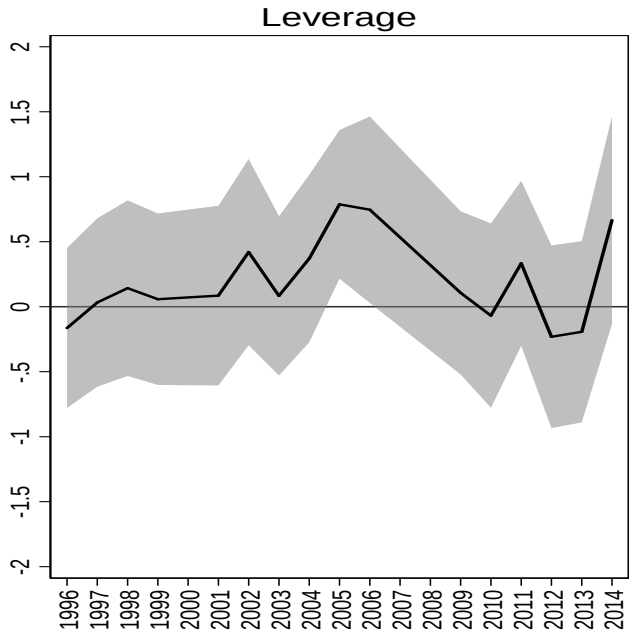


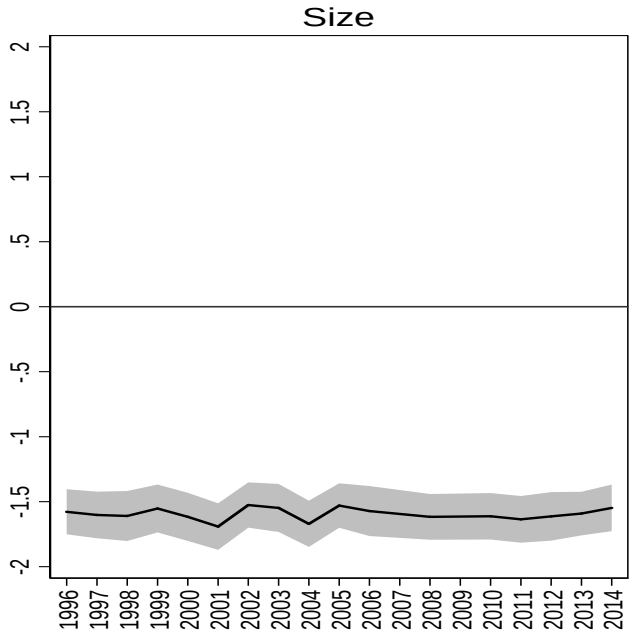
$$MOD.Z\ Score = 0.57 \times Z\ Score + \varepsilon$$
(0.004)

Firm Fragility, Leverage, and Firm Size

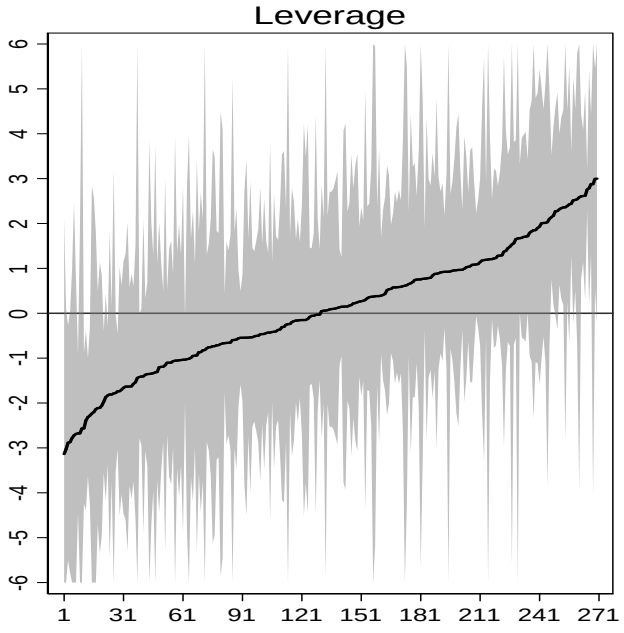
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Dependent Variable Z Score		Dependent Variable Modified Z Score						
Leverage	-1.473***	-1.426***	0.176	0.181*	0.261**	0.214*	0.193*	0.247**	0.273**
	(0.139)	(0.138)	(0.108)	(0.107)	(0.125)	(0.127)	(0.108)	(0.107)	(0.114)
Firm Size	-0.063**	-0.115**	-0.055***	-0.206***	-1.589***	-1.620***	-0.341**	-0.422***	-0.310*
	(0.026)	(0.050)	(0.019)	(0.037)	(0.082)	(0.083)	(0.135)	(0.151)	(0.163)
Investment	0.033	0.0131	0.059***	0.0492*	0.060***	0.055**	0.057**	0.051*	0.063***
	(0.020)	(0.026)	(0.023)	(0.0280)	(0.020)	(0.024)	(0.022)	(0.027)	(0.016)
Constant	9.070***		34.76***				33.91***		
	(0.454)		(0.340)				(0.071)		
Observations	11,452	11,432	11,452	11,432	10,447	10,477	11,452	11,432	9,964
R-squared	0.022	0.071	0.003	0.058	0.291	0.411	0.002	0.052	0.055
Fixed effects	No	CY	No	CY	Firm	CY & Firm	No	CY	CY
Size is	Time variant						Time invariant		

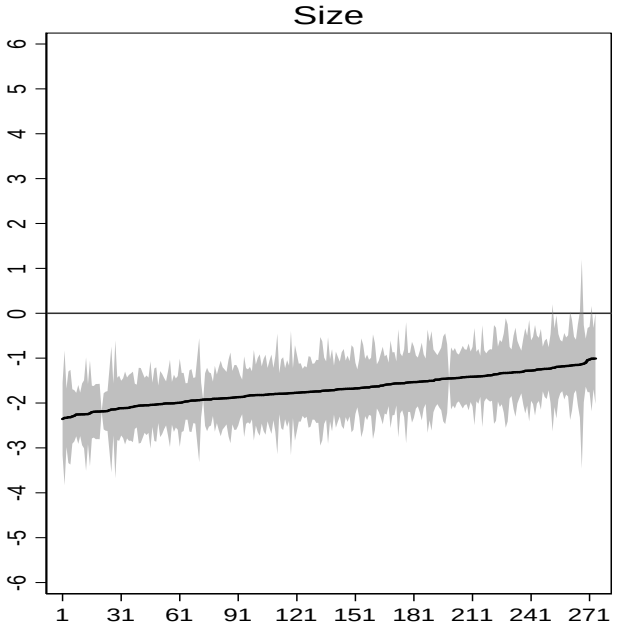
Time varying correlation between firm fragility, leverage, and firm size





Country-year specific correlation between firm fragility, leverage, and firm size





WHY DOES THE EFFECT OF LEVERAGE CHANGE OVER TIME?

Firm Fragility, Leverage, and Firm Size: The Role of the Exchange Rate

$$Z_{i,c,t} = \alpha_i + \delta_{c,t} + \beta L_{i,c,t} + \gamma\left(L_{i,c,t} \times \Delta EX_{c,t-1}\right) + \varphi SIZE_{i,c,t} + \varepsilon_{i,c,t}$$

Firm Fragility, Leverage, and Firm Size: The Role of the Exchange Rate

	(1)	(2)	(3)	(4)	(5)	(6)
Leverage	0.220*	0.227	0.166	0.212	-0.0267	0.0663
	(0.118)	(0.207)	(0.263)	(0.212)	(0.267)	(0.522)
Firm Size	-1.600***	-1.553***	-1.601***	-1.600***	-1.604***	-1.565***
	(0.074)	(0.076)	(0.075)	(0.0737)	(0.083)	(0.086)
Leverage× ΔEX	-1.023**	-1.210**	-1.018**	-1.017**	-1.086**	-1.530***
	(0.505)	(0.555)	(0.503)	(0.513)	(0.494)	(0.556)
Leverage× GR		1.777				5.376
		(2.652)				(3.917)
Leverage× Inflation			0.015			-0.047
			(0.068)			(0.081)
Leverage× FINDEV				0.001		-0.001
				(0.002)		(0.003)
Leverage× LMF					0.250	0.236
					(0.210)	(0.236)
Observations	13,094	12,221	13,094	13,094	11,042	10,278
R-squared	0.427	0.424	0.427	0.427	0.442	0.441
Firm and Country-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Sample	All	All	All	All	All	All

Firm Fragility, Leverage, and Firm Size, The role of the exchange rate in tradable and non-tradable industries

	(1)	(2)	(3)	(4)	(5)
Leverage	0.211	0.153	0.173	0.112	0.184
	(0.177)	(0.163)	(0.116)	(0.167)	(0.159)
Firm Size	-1.529***	-1.679***	-1.618***	-1.483***	-1.745***
	(0.104)	(0.0979)	(0.0757)	(0.105)	(0.0969)
Leverage× ΔEX	-1.232*	-0.757	-0.951*	-1.054*	-0.315
	(0.680)	(0.656)	(0.548)	(0.618)	(0.912)
Observations	5,041	7,389	12,839	5,141	7,525
R-squared	0.459	0.469	0.448	0.459	0.472
Firm and CY FE	Yes	Yes	Yes	Yes	Yes
Sample	Non-tradable	Tradable	All	Non-tradable	Tradable
Exchange rate is	Bilateral rate with US$		Financially weighted effective exchange rate		

Robustness Checks

- IV
- Quasi-balanced sample
- Dropping China
- Additional interactive effects
- Additional firm-level controls

Two IVs

- We interact world capital flows with a country's sensitivity to capital flows measured by lagged values of de jure financial openness (Chinn-Ito, 2006)
  - We compute world capital flows as the sum of equity (FDI and portfolio) and debt inflows across countries (IMF, IFS).
  - We normalize the measure by world GDP

Two IVs

- We use time-invariant currency weights computed by Benetrix et al. (2015) to build an exogenous shock to the financially weighted exchange rate.

Two IVs

- Consider a world with three currencies: the peso, U.S. dollar, and the euro. The financially-weighted effective exchange rate for the peso would be:

$$E_p = wE_{p/\$} + (1 - w)E_{p/€}$$

- where $E_{p/\$}$ is pesos per dollar, $E_{p/€}$ is pesos per euro, and *w* is the weight of the dollar in the effective exchange rate for the peso.
- Also define $E_{\$/€}$ as dollars per euro, which we assume is exogenous to developments in the country that issues the peso.

Two IVs

- As $E_{p/€} = E_{p/\$}E_{p/€}$, we can therefore rewrite the effective exchange rate as:

$$E_p = E_{p/\$}\left[w + (1-w)E_{\$/€}\right]$$

- Given that currency weights tend to be relatively stable over time, we can use $(1-w)E_{\$/€}$ as an instrument for the effective exchange rate for the peso, E_p.
  - As we have more than three currencies, we instrument the financially weighted exchange rate of country *i* in time t ($E_{i,t}$) with $(1-w_i)E_{US,t}$, where w_i is the time-invariant (computed as an average over 1990-2010) of the US dollar share in country i's financially weighted exchange rate and $E_{US,t}$ is the effective exchange rate for the US.

IV results

	(1)	(2)	(3)	(4)	(5)	(6)
Leverage× ΔEX	-19.94**	-4.802**	-23.90**	-5.488**	-23.76**	-5.855**
	(8.097)	(2.140)	(9.460)	(2.448)	(9.462)	(2.391)
Observations	8,332	7,220	8,544	7,220	8,544	7,220
R-squared	0.323	0.460	0.330	0.459	0.332	0.458
Firm and CY FE	Yes	Yes	Yes	Yes	Yes	Yes
Sample	All	All	All	All	All	All
Exchange rate is	Bilateral rate with US$		Financially weighted effective exchange rate			
Instruments	World Capital Flows×Financial Openness				World Capital Flows×Financial Openness and liability weighted $XR of main financial partners	
Cragg-Donald F Statistics	73	353	76	441	38	232
P value of Sargan test					0.36	0.44

All regressions control for leverage and firm size. Columns 2 and 5 control for the interaction between leverage and growth FD, inflation and financial openness

From Micro to Macro: Granularity

- A key question is whether the increase in corporate leverage can have large negative macroeconomic consequences with monetary policy normalization in advanced economies
- We study macroeconomic vulnerabilities by focusing on the behavior of large firms.

Granularity
The Role of Large Firms

- Gabaix (2011) shows that idiosyncratic shocks to large firms have aggregate effects:
  - Macroeconomic questions can be clarified by looking at the behavior of large firms ("granular" hypothesis) and that granularity effects are likely to be even more important in countries that are less diversified than the United States.
    - He states that: ***It would be interesting to transpose the present analysis to those countries*** (Gabaix, 2011 p. 737)
- We want to test whether large firms with high levels leverage are particularly vulnerable to exchange rate movements.
- But before doing this: we need to check whether Gabaix's granularity hypothesis holds in EMs

Granularity
Emerging Market Countries

- We build Gabaix's granularity index for 26 emerging countries

$$\Gamma_t = \sum_{i=1}^{K} \frac{S_{i,t-1}}{Y_{t-1}} \left(g_{i,t} - \bar{g}_t \right)$$

- How do we set *K* (the number of large firms)?
  - Gabaix sets K=100, but the largest 100 firms in the US are much larger than the larger 100 firms in most EMs
  - We first rank firms by sales, add up total sales and we stop adding firms when the sales-to-GDP ratio reaches 20%
    - If this yields less than 25 firms we use 25 firms
    - If this yields more than 100 firms, we use 100 firms
      - Results are robust to alterative thresholds

Granularity and Growth Emerging Market Countries

	(1)	(2)	(3)
G	0.591**	0.709***	0.696**
	(0.230)	(0.255)	(0.264)
L.G		0.463*	0.428*
		(0.240)	(0.245)
L2.G			-0.129
			(0.08)
Observations	486	486	486
Number of countries	26	26	26
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Sample	1994-2014	1994-2014	1994-2014

Leverage and Firm Size

	(1)	(2)	(3)
	Leverage	Solvency	Liquidity
Large	-15.82***	1.737	0.392
	(2.606)	(1.648)	(0.944)
Observations	44,104	38,741	39,271
Sample	All	All	All
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Leverage, Depreciation and Firm Size

Dependent variable: sales growth

	(1)	(2)	(3)	(4)	(5)	(6)
Leverage	-0.0261	-0.0451	0.342	-0.111	-0.129	-0.284
	(0.129)	(0.129)	(0.277)	(0.147)	(0.142)	(0.217)
Leverage× ΔEX	-0.069	-0.097	-0.793***	-0.0914	-0.0361	-0.0388
	(0.074)	(0.073)	(0.152)	(0.0858)	(0.0742)	(0.0751)
Large	-748.2***	-991.3***			-988.7***	-771.1***
	(35.79)	(43.13)			(43.25)	(43.05)
ΔEX	-8.078					
	(5.150)					
Large× ΔEX					30.25*	11.54
					(17.18)	(15.83)
Leverage× Large					0.388	0.688**
					(0.279)	(0.302)
Leverage× ΔEX × Large					-0.866***	-0.823***
					(0.177)	(0.170)
Observations	40,674	40,674	8,616	31,024	40,674	20,504
Number of firms	0.108	0.124	0.288	0.121	0.124	0.241
Sample	All	All	Large Firms	Small Firms	All	Largest 150
Firm FE	YES	YES	YES	YES	YES	YES
CY FE	NO	YES	YES	YES	YES	YES

Back of the Envelope Calculations

Assumptions		
Currency depreciation	30%	Mean value in our sample if we only include depreciations
Leverage	55%	Mean value in our sample of large firms
Sales of large firms	50% of GDP	Assumption
Granularity coefficient	0.591	See granularity regressions (column 1)
Coefficient of interaction between leverage and exchange rate depreciation	-0.793	See sales growth regressions (column 3)

Back of the Envelope Calculations

- A 30% currency depreciation reduces large firm sales by 13% (**55x0.3x0.79=13**, we are using the estimates of column 3).
- The granularity regressions of Table 7 say that if there is a 1% shock to sales of the largest firms with total sales accounting for 50% of GDP, GDP growth will decrease by nearly 0.3 percentage points (**0.591x0.5=0.296**).
- These back-of-the-envelope calculations imply that the GDP growth effects of a 30% depreciation will be a decrease in growth of nearly 4 percentage points (**0.296x13=3.85**).

Conclusions

- There are widespread concerns about and potential macroeconomic repercussions of the rapid increase in corporate leverage in emerging markets
- Higher leverage is not always associated with higher corporate vulnerability
- Granularity effects in EMs
- While large firms are not more leveraged than smaller firms, they may have a more dangerous type of leverage. **Why?**
- Policy implications: need to monitor the behavior of NFCs
- Do NFCs act as financial intermediaries?

Corporate Debt in Emerging Markets

Corporate debt, firm size and financial fragility in emerging markets
Journal of International Economics - Vol. 118 (2019), p. 1-19

Laura Alfaro
Harvard & NBER

Gonzalo Asis
UNC Chapel Hill

Anusha Chari
UNC Chapel Hill & NBER

Ugo Panizza
The Graduate Institute Geneva & CEPR

Central Bank of Thailand, December 3, 2019