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Moving in tandem: bank provisioning in Emerging Market Economies

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Motivation

- Financial crises are very frequently preceded by episodes of rapid credit growth. Several studies have pointed out that abnormal credit growth can be taken as an indication of increasing risk taking behaviour by the financial sector and can therefore be used as a leading indicator of financial crises.
- Nevertheless credit expansions do not always imply future loan portfolio deterioration. Particularly in emerging market economies (EMEs) credit growth could be a signal of a desirable process of financial deepening.
- A better understanding of the relationship between credit growth and subsequent financial soundness indicators is particularly important in this context.

Why we focused our analysis for EMEs?

- The literature has been mainly focused on studying this topic for advanced economies.
- Financial systems in EMEs tend to be more bank oriented, meaning that developments within this sector typically have larger macroeconomic reverberations when compared to advanced economy counterparts.
- The pro-cyclicality of the financial sector may deserve particular attention in these economies, which often exhibit larger volatility among others, due to less diversified economic structures and greater exposure to capital flow reversals.
- Moreover, in the recent past EMEs have presented significantly higher levels of credit growth when compared to advanced economies. Between 2009 and 2014, credit growth in considered EMEs was 8.1% in real terms - compared to only 0.5% in the G7 economies.

Credit growth and financial soundness indicators

1) One strand of the literature has examined the relationship between relevant banking variables and macroeconomic developments. Focused mainly in detecting pro-cyclicality of the financial sector (Laeven and Majnoni, 2003; Bikker and Metzemakers, 2005).
2) Other papers have focused on the inter-temporal relationship between bank health and individual risk-taking decisions. According to this approach, the difference between individual credit growth of a particular financial institution and the aggregate credit growth in a given economy can be a signal of individual risk-taking (Foos *et al.*, 2010)

What do we do?

- With the aim of providing further basis to the discussion on financial deepening vs. excessive risk taking in the context of EMEs, our study provides an analysis of the dynamics of loan loss provisions and of non-performing loans.
- For this, we use information contained in the balance sheets of 554 EME banks from 18 countries (*BankScope*).

  (Brazil, Chile, China, Colombia, Czech Republic, Hungary, India, Indonesia, Israel, Korea, Malaysia, Mexico, Peru, Philippines, Poland, South Africa, Thailand and Turkey)
- We simultaneously evaluate the relative contribution of aggregate and bank-specific variables for explaining the differences in bank provisioning behaviour and reported loan losses.
- The identification of these determinants enables us to better understand some characteristics of banking in these countries and to detect some pro-cyclical patterns.

Main findings

- Provisions in EME banks respond mostly to aggregate variables, and very little to idiosyncratic factors.
- In particular, the bank-specific credit growth rates – usually thought of as a measure of individual risk taking – do not explain the level of loan loss provisions.
- We do find some evidence that bank-specific earnings and the size of the intermediaries have an effect on provisions. However, the level of provisions and reported credit losses is clearly negatively related to past economic growth and positively related to past aggregate credit growth.
- These findings suggest that EME banks' provisioning decisions in emerging economies are highly correlated. Macro-prudential tools based on aggregate variables could therefore be effective to dampen credit cycles and banking pro-cyclical behaviour.

Determinants of loan loss provisions and pro-cyclicality

- Some works have evaluated the existent relationship between GDP growth and credit growth with respect to the level of loan loss provisions. A pro-cyclical behaviour of banks emerges if the relationship between credit and business cycle with respect to loan losses provisions is negative. Literature has found that LLP with GDP(-) and with Credit (+/-)
- Another aspect for identifying pro-cyclical behaviour that the literature has examined is the relationship between earnings and loan loss provisions. This test is based on the "income-smoothing" hypothesis. LLP and Earnings (+)
- Evaluating the inter-temporal effects of credit growth on banks' performance indicators, some works highlight the role of individual risk taking decision of banks with respect to posterior financial performance. LLP and ALG (+)

Effects on loan loss provisions and non-performing loans

- We look at both, aggregate factors as well as idiosyncratic ones as possible drivers of provisions.

$$Llp_{i,t} = \alpha + \alpha_1 Llp_{i,t-1} + \sum_{s=1}^{n} \beta_s Medianx_{i,t-s} + \sum_{s=1}^{n} \beta_s ALG_{i,t-s} + \sum_{s=1}^{n} \beta_s \Delta GDP_{i,t-s}$$
$$+ \gamma\, Earnings_{i,t} + \delta Cap_{i,t} + \phi Liq_{i,t} + \upsilon Size_{it} + \gamma_i + \delta_t + \varepsilon_{it}$$

where $Llp_{i,t}$ represents the ratio between LLP and the total loans of institution i at time t (in logs). $Medianx_{it}$ is the country-specific median bank loan growth rate in year t. $ALG_{i,t}$ is the difference between institution i annual loan growth rate in period t and the median annual loan growth rate in the respective country.

Statistical Method

- To address the issue of endogeneity of regressors, we used the system GMM estimator developed by Arellano and Bover (1995).
- Our dynamic model specification allows for the fact that bank variables show a tendency to persist over time and tend to be serially correlated. Lagged variables of explanatory variables were used as instruments in the GMM equation. Throughout, we included time and country effects to control for unobserved heterogeneities.

Results 1

Determinants of Loan loss provisions[1]

Table 1

Dependent variable: $Llp_{i,t}$ (colums I to III) and NPL (columns V and VI),

	I	II	III	IV (DLPROV)	V (NPL)	VI (NPL)
Lagged dependent variable	0.8231***	0.8102***	0.7706***		0.5841***	0.5582***
	(0.0356)	(0.0349)	(0.0386)		(0.0524)	(0.0586)
$Size_{i,t}$	0.0718**	0.0766**	0.0511*	0.0311	-0.6744*	-1.1001*
	(0.0369)	(0.0332)	(0.0359)	(0.2709)	(0.3650)	(0.6097)
$Earnings_{i,t}$	1.3398*	1.7141**	0.0789	1.9837**	6.8649	5.8611
	(0.7087)	(0.7461)	(0.7979)	(0.6970)	(6.5144)	(7.5091)
$Cap_{i,t}$	-0.1867	0.3566	0.7717	0.39055	-3.4636	-7.0399
	(0.5753)	(0.6080)	(0.6860)	(0.6257)	(5.4811)	(6.8207)
$Liq_{i,t}$	-0.0174	0.0520	0.3976	-0.3412	-2.4554	-2.2283
	(0.3310)	(0.3215)	(0.2889)	(0.3392)	(2.7234)	(2.9524)
$ALG_{i,t-1}$			0.0000			-0.0073
			(0.0004)			(0.0104)
$ALG_{i,t-2}$			0.0000			0.0044
			(0.0006)			(0.0101)
$ALG_{i,t-3}$			0.0002			-0.0025
			(0.0003)			(0.0059)
$Medianx_{i,t-1}$	-0.2227	-0.1295	-0.0297	0.28628	4.3406*	4.5552*
	(0.2765)	(0.2938)	(0.2955)	(0.3276)	(2.4519)	(2.6410)
$Medianx_{i,t-2}$	0.5694***	0.8264***	1.0927***	0.9381***	4.0796**	3.2397*
	(0.2309)	(0.2397)	(0.2226)	(0.2672)	(1.9130)	(1.8984)
$Medianx_{i,t-3}$	-0.3983*	-0.1434	-0.0082	-0.19061	-0.3588	-0.8559
	(0.2428)	(0.2264)	(0.2005)	(0.24941)	(1.7928)	(1.9261)
$GDP_{i,t-1}$	-1.1344	-0.0423	-0.9580	0.80122	-10.3671	-14.1597*
	(1.0287)	(1.1024)	(1.0308)	(1.1627)	(8.3637)	(8.2528)
$GDP_{i,t-2}$	-5.4280***	-4.6525***	-4.4581***	-4.02467***	-25.8255***	-22.2081***
	(1.0635)	(1.1274)	(0.9535)	(1.2533)	(8.1019)	(8.0790)
$GDP_{i,t-3}$	0.3576	1.0092	0.7329	1.3763	-8.4184	-8.1296
	(0.8677)	(1.0044)	(1.1532)	(1.0747)	(6.6888)	(7.6003)
Constant	-1.1774***	-1.4779***	-1.4257***	-0.7517**	8.8515**	12.6769**
	(0.3692)	(0.3451)	(0.4210)	(0.3279)	(3.7046)	(5.7687)
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Country effects	No	Yes	Yes	Yes	Yes	Yes
Number of banks	553	553	471	553	554	472
Number of observations	3013	3013	2528	3013	3029	2541

Analysis of results (1)

- Loan loss provisions in EME banks of EMEs are driven mainly by aggregate variables. Most notably, the level of provisions responds negatively to changes in GDP growth, a finding which is in line with the conclusions of Bikker and Metzemakers (2005) for advanced economies.
- Provisions are also clearly related in a positive and significant way to variations in the median loan growth rate in the respective country. More precisely, an increase in aggregate loan growth leads to a significant increase in loan loss provisions two years later.
- Put differently, the negative sign of GDP suggests a pro-cyclical behaviour of banks in terms of provisions, which is attenuated by the positive sign of median credit growth.

Analysis of results (2)

- Looking at the bank-specific control variables, we detect a significant effect of earnings on general provisions, which is in line with the earnings smoothing hypothesis. This behaviour is desirable in the sense that banks in EMEs tend to reduce the negative impact of asset volatility on bank capital.
- In contrast to the results for advanced economies (Foos *et al*, 2010), idiosyncratic credit growth does not seem to affect individual provisions and credit losses in EME banks.
- Then, bank losses and provisions respond much more to aggregate data than to individual information. This result would seem to indicate a certain extent of group behaviour in provisioning. One possible conjecture is that individual banks may not want to deviate very much from the ratios practiced by their peers in the same jurisdiction.

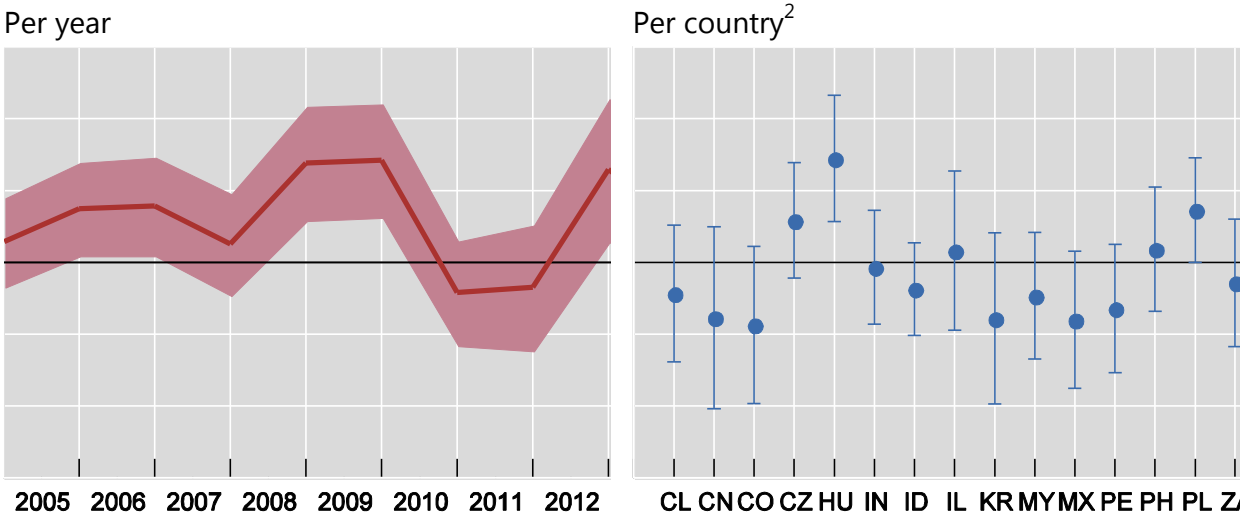
Analysis of results (3)

- We found that the size of the financial intermediaries does matter, since larger banks tend to exhibit higher loan loss provisions. This result is in line with some previous works that find that larger banks tend to exhibit riskier behaviour and more pro-cyclical patterns than smaller banks (see Jopikii and Milne, 2008; García-Suaza et al., 2012; Carvallo et al., 2015).

Time and country effects

Determinants of Loan loss provisions. Time and country effects[1]

Point coefficients and 95% confidence interval — Graph 1



[1] Robust standard errors used when constructing confidence intervals. [2] Brazil taken as benchmark.

Source: Authors calculations.

Backward and forward component of Loan loss provisions

- The results shown suggest that loan loss provisions and delinquency ratios respond strongly to the same determinants. Namely, both variables are driven mostly by GDP growth and by aggregate credit growth. These results indicate that loan loss provisions in EMEs mainly reflect past losses.

- To scrutinize this finding further, we estimated the equation proposed by Bushman and Williams (2012) for our set of EMEs in order to identify the forward and backward looking components of provisions. Earlier, Bouvatier and Lepetit (2008) used a comparable specification for a sample of European banks.

Backward and forward component of Loan loss provisions

- $$Llp_{i,t} = \alpha + \alpha_1 Llp_{i,t-1} + \beta_1 \Delta NPL_{i,t-1} + \beta_2 \Delta NPL_{i,t} + \beta_3 \Delta NPL_{i,t+1} + \sum_{s=1}^{n} \beta_s Medianx_{i,t-s} + \sum_{s=1}^{n} \beta_s \Delta GDP_{i,t-s} + \gamma\, Earnings_{i,t} + \delta Cap_{i,t} + \phi Liq_{i,t} + \upsilon Size_{it} + \gamma_i + \delta_t + \varepsilon_{it}$$

- The main coefficients of interest are β_1, β_2 and β_3, which evaluate the relationship of loan loss provisions with respect to past, current and future changes in reported credit losses, respectively. Since the objective of provisions consists in covering expected losses (and assuming that the trend of loan losses is predictable to some extent), we should ideally observe a significant positive relationship between provisions and future losses.

Results 2

Backward and forward component of provisions[1]

Dependent variable: $Llp_{i,t}$ Table 2

$Llp_{i,t-1}$	0.8371***
	(0.0428)
$dNPL_{i,t-1}$	0.0410**
	(0.0182)
$dNPL_{i,t}$	0.2704***
	(0.0429)
$dNPL_{i,t+1}$	-0.0776*
	(0.0462)
$Size_{i,t}$	0.0360
	(0.0298)
$Earnings_{i,t}$	0.2976
	(0.6485)
$Cap_{i,t}$	-0.5593
	(0.6381)
$Liq_{i,t}$	0.0908
	(0.3291)
$Medianx_{i,t-1}$	-0.0560
	(0.2049)
$Medianx_{i,t-2}$	0.7780***
	(0.2215)
$Medianx_{i,t-3}$	-0.0537
	(0.1939)
$GDP_{i,t-1}$	1.7922*
	(1.0444)
$GDP_{i,t-2}$	-3.6531***
	(0.9766)
$GDP_{i,t-3}$	0.2661
	(0.9315)
Constant	-0.7755**
	(0.3820)

Time effects	yes
Country effects	yes
Number of banks	445
Number of observations	2173
Wald chi-squared	12576.14
AB test for AR(2)	0.190
Hansen test Prob>chi-squared	0.269

Analysis of results

- Provisions mainly respond to current and past changes in reported credit losses. In contrast, the forward looking component of provisions with respect to future losses is not positive suggesting that provisions in EMEs do not anticipate increases in reported credit losses.

Conclusions (1)

- Episodes of excessive credit growth appear to be particularly prevalent in the context of EMEs. Desirable process of financial deepening makes it harder to calibrate appropriate macro-prudential policies.
- Our results show that provisions in EME banks respond mostly to aggregate variables, and very little to idiosyncratic factors. In particular, the bank-specific credit growth rates does not seem to explain the level of loan loss provisions.
- Bank-specific earnings and the size of the intermediaries have an effect on provisions. However, the level of provisions and reported losses are negatively related to lagged economic growth and positively related to lagged aggregate credit growth

→ At least at the country level, EME banks seem to move in tandem.

Conclusions (2)

- The strong negative relationship between GDP growth and provisioning suggests a pro-cyclical behaviour of EME banks. Part of this behaviour might be related to the difficulty of assessing how permanent improvements in income are, and whether current gains are permanent or purely transitory.

- Since the basic objective of provisions is that they act as buffers for expected losses - which might be the result of sudden turns in the business cycle - there appears to be space for EMEs to improve their respective systems of bank loan provisioning. In particular, our results suggest that the design of macro prudential policies based on aggregate indicators could be helpful for smoothing credit cycles.

Thank you !!

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