BANK FOR INTERNATIONAL SETTLEMENTS

BIS Working Papers

No 548

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Monetary and Economic Department

March 2016

JEL classification: G21; G28.

Keywords: bank credit; provisions; delinquency; emerging market; pro-cyclicality.

This publication is available on the BIS website (www.bis.org).

ISSN 1020-0959 (print)
ISSN 1682-7678 (online)

Moving in tandem: bank provisioning in emerging market economies

Andres Murcia*and Emanuel Kohlscheen†‡

Abstract

We study the determinants of loan loss provisions and delinquency ratios based on the balance sheets of 554 banks from emerging market economies (EMEs). We find that 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. There is some evidence that earnings and the size of the intermediaries have an effect on provisions. The predominant effect however is that provisions and actual losses are negatively related to past economic growth and positively related to past aggregate credit growth. We also estimate the forward and backward-looking component of provisions, finding that provisions respond mainly to past reported losses. These findings suggest that EME banks' provisioning decisions are highly correlated. Since provisions fall when output grows, macroprudential tools that counter this effect could dampen pro-cyclical behavior.

JEL codes: G21; G28.

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‡The views expressed in this paper are those of the authors and not necessarily of the Bank for International Settlements. We thank Claudio Borio, Hyun Song Shin, Leonardo Gambacorta, Ramon Moreno, Xavier Freixas, Jorge Ponce, Patricio Jaramillo, Pamela Cardozo, Jose E Gomez, Daniel Osorio, Diana Fernandez and Rodrigo Cifuentes for useful comments and suggestions. We also thank comments received at the RIDGE Workshop in Montevideo, at the Chilean Superintendence of Banking and Financial Institutions (SBIF), at the Bank of the Republic, Colombia and at the Bank for International Settlements. Research assistance from Tania Romero and Julieta Contreras is gratefully acknowledged.

1 Introduction

Financial crises are frequently preceded by episodes of rapid credit growth. Several recent studies in the economic literature have pointed out that abnormal credit growth can be taken as an indication of increased risk-taking behavior by the financial sector and can therefore be used as a leading indicator of financial crises (Borio and Drehmann (2009); Drehmann et al (2011); Jorda; Schularick and Taylor (2011); Schularick and Taylor (2012); Gourinchas and Obstfeld (2012)).

Nevertheless, credit expansions do not always imply future loan portfolio deterioration. If new loans are provided to solvent borrowers with profitable projects, there should be no significant impact of loan growth on financial soundness indicators. Particularly in emerging market economies (EMEs), credit growth could well be a signal of a healthy process of financial deepening. In this respect, a better understanding of the relationship between credit growth and subsequent financial soundness indicators is important in this context.

The existing literature on the effects of credit growth on financial soundness indicators has developed mainly along two lines. One group of studies has examined the relationship between relevant banking variables and macroeconomic developments. As we explain in more detail below, the main questions of this first strand of the literature are usually related to the procyclicality of the financial sector (see Laeven and Majnoni (2003); Bikker and

Metzemakers (2005); Packer et al (2014)). Complementing this approach, other papers have focused on the intertemporal relationship between bank health and individual risk-taking decisions. According to these studies, the difference between individual credit growth of a particular financial institution and the aggregate credit growth in a given economy is a good proxy for individual risk-taking. Within this second strand of the literature, one study of particular interest is the one by Foos et al (2010) that analyzed the behavior of advanced economy banks, highlighting the role of idiosyncratic abnormal credit growth as a predictor of poor financial performance.

To better understand financial deepening vs excessive risk-taking in EMEs, our study performs a systematic 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 in our exercise. We simultaneously evaluate the relative contribution of aggregate and idiosyncratic variables to explain the differences in bank provisioning behavior and loan losses. The identification of these determinants by means of a dynamic panel model estimation enables us to better understand some characteristics of banking in these countries and to detect some procyclical patterns.

The results that emerge from our analysis 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 – usually thought of as a measure of individual risk-taking – do not explain the level of loan loss provisions at all. We do find some evidence that bank-specific earnings and the size of the intermediaries have an effect on provisions. Throughout, however, the predominant effect is that the level of provisions and actual losses is negatively related to past economic growth and positively related to past aggregate credit growth. These findings suggest that bank provisioning decisions in emerging economies are highly correlated. Macroprudential tools based on aggregate variables could therefore be effective in dampening credit cycles and procyclical behavior.

The remainder of this paper is organized as follows: in Section 2, we provide a selective review of the related literature. In Section 3, we describe the empirical approach that we used and discuss the main results. Some concluding remarks follow.

2 Related literature

The literature on the determinants of loan loss provisions suggests that banks may respond differently to an economic upswing and rising incomes. Some banks might behave in a "myopic" manner, in that they fail to see that any improvement in the debtor probability of default could be only temporary. As a result, their provisioning decisions could reinforce credit cycles. According to this interpretation, we should observe a negative relationship between provisions and economic conditions. Other work has shown that credit risk tends to be built up gradually in boom periods, only to materialize in downturns (Borio et al (2001)). In particular, a long economic expansion can lead to an upswing in credit as the quality of risk assessments by banks deteriorates. In contrast, for conservative and far-sighted banks, provisions and the lending cycle would be positively related.

To test the relationship between provisions and the business or credit cycles, some studies have evaluated the relationship between loan loss provisions and GDP growth or credit growth. [1] Bank behavior is said to be procyclical if the relationship between provisions and credit growth or GDP growth is negative. In other words, during good times, when credit and incomes are increasing, provisions tend to fall. In contrast, during bad times, provisions tend to increase as losses materialize.

By and large, the literature has found a negative relation between economic activity and loan loss provisions (see Bikker and Hu (2002); Cavallo and Majnoni (2002); Laeven and Majnoni (2003) among others)) suggesting that provisions increase only when income falls. Findings on the relationship between the credit cycle and provisions are much more mixed. On one hand, Bikker and Metztemakers (2005) find a positive relationship between these variables. On the other hand, studies such as Laeven and Majnoni (2003) and Cavallo and Majnoni (2002) report a negative association.

Another indicator of cyclical behavior is the relationship between earnings and loan loss provisions. Tests within this literature are generally based on

[1] Packer et al (2014) argue that there is a “leaning against the business cycle” element in the behavior of bank provisions.

the "income-smoothing" hypothesis. Banks can smooth their earnings by drawing from loan loss reserves if actual losses exceed expected losses and by increasing loan loss provisions in the opposite case. The advantage of this behavior is that it can reduce the volatility of reported bank profits, reducing the need to draw on capital in adverse times (see for instance Sinkey and Greenwald (1991); Laeven and Majnoni (2003)). Evidence of earnings smoothing has been reported by Packer et al (2014) for a group of Asian economies.

A second strand of the literature evaluates the intertemporal effects of credit growth on banks' performance indicators. These works highlight how individual risk-taking decisions of banks affect their financial performance. Foos et al (2010) study a group of developed economies and find that loan growth leads, in the following three years, to an increase in loan loss provisions, to a decrease in relative interest income, and to lower capital ratios. Amador et al (2013) evaluate these relationships for Colombian banks. They find that abnormal loan growth is positively and significantly associated with non-performing loans, and negatively and significantly related with bank solvency.

Finally, Bouvatier and Lepetit (2012) and Bushman and Williams (2012) have shown how backward-looking provisioning systems tend to amplify the procyclicality of loan market fluctuations. To the best of our knowledge, there are no studies in the literature that evaluate simultaneously the role of aggregate and individual risk-taking variables for explaining differences in the health measures of banking sectors based on a representative panel of EMEs.

3 Empirical analysis

In order to test for the effect of abnormal loan growth on the financial health of banks (ie on provisions for non-performing loan losses), we used micro-level bank balance sheet data from non-public banks for 18 EMEs [2] for the period 2002–13. This information was obtained from BankScope, a commercial database maintained by Fitch and Bureau van Dijk.

Our focus on EME banks is motivated by the fact that, so far, the literature has mainly evaluated the effects on credit growth on financial bank health indicators for advanced economies. In addition, financial systems in EMEs tend to be much more bank-oriented (see Kohlscheen and Miyajima (2015)), so that developments within this sector typically have larger macroeconomic effects when compared with advanced economies. Also, the procyclicality of the financial sector may deserve particular attention in these economies, which often exhibit larger macroeconomic volatility due to less diversified economic structures and greater exposure to capital flow reversals. Moreover, in the recent past, credit growth in EMEs has been much higher

[2] Our analysis includes data for Brazil, Chile, China, Colombia, the Czech Republic, Hungary, India, Indonesia, Israel, Korea, Malaysia, Mexico, Peru, Philippines, Poland, South Africa, Thailand and Turkey.

than in advanced economies. Between 2009 and 2014, for instance, annual credit growth in the EMEs considered in this study averaged 8.1% in real terms, compared with only 0.5% in the G7 economies. Taken together, these factors suggest that a systematic evaluation of the long-term effects of credit growth on the financial health indicators of EME banks is currently of special interest.

3.1 Effects on loan loss provisions and non-performing loans

To evaluate the effects of credit growth on loan loss provisions, we estimate an equation containing the main determinants of this variable. As we look at both aggregate and idiosyncratic factors as possible drivers of provisions, our baseline empirical model is specified as follows:

$$\begin{aligned} llp_{i,t} \quad = \quad & \alpha_0 + \alpha_1 \cdot llp_{i,t-1} + \sum_{s=1}^{n} \beta_{1,s} \cdot medianx_{i,t-s} + \sum_{s=1}^{n} \beta_{2,s} \cdot ALG_{i,t-s} + \\ & + \sum_{s=1}^{n} \beta_{3,s} \cdot \Delta GDP_{i,t-s} + \gamma \cdot earnings_{i,t} + \delta \cdot cap_{i,t} + \\ & + \zeta \cdot liq_{i,t} + \eta \cdot size_{i,t} + \theta_i + \tau_t + \varepsilon_{i,t} \end{aligned} \tag{1}$$

where $llp_{i,t}$ represents the ratio of loan loss provisions to the total volume of loans of institution i at time t (in logs) and $medianx_{i,t}$ the country-specific median bank loan growth rate in year t. $ALG_{i,t}$ is the difference between the annual loan growth rate of bank i and the median annual loan growth rate in the respective country. This variable has been used as an indicator of idiosyncratic behavior in loan concessions. $\Delta GDP_{i,t}$ denotes the annual economic growth rate of the host country. $cap_{i,t}$ represents the ratio between the capital and the total assets of the respective bank, whereas $liq_{i,t}$ captures differences in the liquidity positions of financial institutions. This is proxied by the ratio between bank holdings of securities and total assets. To evaluate the effect of earnings on loan provisions, we also include the ratio of total earnings before taxes and total assets as an additional control variable ($earnings_{i,t}$). Finally, $size_{i,t}$ captures eventual effects of the size of the respective financial institution. This variable is the log of the value of the loan book in USD millions in any given year. Summary statistics of the variables are presented in Table A1 in the appendix.

To address the issue of endogeneity of regressors, which is a common concern in this kind of exercise, we used the system GMM estimator developed by Arellano and Bover (1995). Our dynamic model specification allows for the tendency for bank variables to persist over time and be serially correlated. Lagged variables of explanatory variables were used as instruments in the GMM equation. Throughout, time and bank fixed effects to control for unobserved heterogeneities are included in the GMM specifications (but not in the pooled OLS specification).

Results of six different estimations are presented in Table 1 as follows: GMM estimation including the median loan growth per country as a regressor

Determinants of loan loss provisions and non-performing loans

Dependent variable: $Llp_{i,t}$ (columns I to III) and NPL (columns V and VI), Table 1

	I	II	III (OLS)	IV (DLPROV)	V (NPL)	VI (NPL)
Lagged dependent variable	0.8102***	0.7706***	0.8786***		0.5841***	0.5582***
	(0.0349)	(0.0386)	(0.00909)		(0.0524)	(0.0586)
$Size_{i,t}$	**0.0766****	**0.0511***	-0.0039	0.0311	**-0.00674***	**-0.01100***
	(0.0332)	**(0.0359)**	(0.0065)	(0.2709)	**(0.00365)**	**(0.00609)**
$Earnings_{i,t}$	**1.7141****	0.0789	**0.5162***	**1.9837****	0.06864	0.05861
	(0.7461))	(0.7979)	**(0.3069)**	**(0.6970)**	(0.06514)	(0.075091)
$Cap_{i,t}$	0.3566	0.7717	-0.1331	0.39055	-0.03463	-0.070399
	(0.6080)	(0.6860)	(0.1700)	(0.6257)	(0.05481)	(0.06820)
$Liq_{i,t}$	0.0520	0.3976	-0.03781	-0.3412	-0.02455	-0.022283
	(0.3215)	(0.2889)	(.0738)	(0.3392)	(0.02723)	(0.029524)
$ALG_{i,t-1}$		0.0000	0.00003			-0.000073
		(0.0004)	(0.0003)			(0.000104)
$ALG_{i,t-2}$		0.0000	-0.0001			0.000044
		(0.0006)	(0.0003)			(0.000101)
$ALG_{i,t-3}$		0.0002	0.0001			-0.000025
		(0.0003)	(0.0003)			(0.000059)
$Medianx_{i,t-1}$	-0.1295	-0.0297	0.0467	0.28628	**0.04340***	**0.045552***
	(0.2938)	(0.2955)	(0.1244)	(0.3276)	**(0.02451)**	**(0.026410)**
$Medianx_{i,t-2}$	**0.8264*****	**1.0927*****	**0.4668*****	**0.9381*****	**0.04079****	**0.032397***
	(0.2397)	**(0.2226)**	**(0.1230)**	**(0.2672)**	**(0.01913)**	**(0.018984)**
$Medianx_{i,t-3}$	-0.1434	-0.0082	0.0783	-0.19061	-0.00358	-0.008559
	(0.2264)	(0.2005)	(0.1124)	(0.24941)	(0.01792)	(0.019261)
$GDP_{i,t-1}$	-0.0423	-0.9580	-1.5771	0.8012	-0.10367	**-0.141597***
	(1.1024)	(1.0308)	(0.4898)	(1.1627)	(0.08363)	**(0.082528)**
$GDP_{i,t-2}$	**-4.6525*****	**-4.4581*****	**-2.2798*****	**-4.0246*****	**-0.25825*****	**-0.222081*****
	(1.1274)	**(0.9535)**	**(0.4842)**	**(1.2533)**	**(0.81019)**	**(0.080790)**
$GDP_{i,t-3}$	1.0092	0.7329	0.0447	1.3763	-0.084184	-0.081296
	(1.0044)	(1.1532)	(0.4782)	(1.0747)	(0.06688)	(0.07600)
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of banks	553	471	471	553	554	472
Number of observations	3013	2528	2528	3013	3029	2541
Wald chi-squared	6249.0	5967.2	541.76	314.60	1986.8	1271.9
AB test for AR(2)	0.566	0.766	NA	0.339	0.437	0.499
Hansen test Prob>chi-squared	0.169	0.105	NA	0.198	0.145	0.131

System GMM estimation using the Arellano-Bover dynamic panel estimator, except for the third column – which is based on a simple pooled OLS estimation. Robust standard errors are reported in parenthesis. ***, **, * indicate significance at the 1%, 5%, and 10% level, respectively.

(column 1); estimation adding the bank-specific deviations of credit growth (column 2); results for the same equation using pooled OLS (column 3) and results using the change in the level of loan loss provisions as the dependent variable (DLPROV), instead of the ratio of provisions to total loans (column 4). [3] Column 5 reports similar estimations using the delinquency ratio – which is defined as the ratio between non-performing loans (NPL) and total loans – as the dependent variable and aggregate credit and GDP growth on the right-hand side, always controlling for individual bank characteristics. Finally, results when bank-specific credit deviations is added as an explanatory variable for NPL ratio are shown in column 6.

The Hansen test validates the instruments used in all specifications. The p-value of the J-statistic is greater than 0.10 in all cases suggesting that we cannot reject the null hypothesis that the instruments can be considered exogenous.

The results indicate that loan loss provisions in EME banks are driven mainly by aggregate variables. Most notably, the level of provisions responds negatively to changes in GDP growth, which is in line with the conclusions of Bikker and Metzemakers (2005) for advanced economies. Provisions also respond positively to changes in the median loan growth rate in each country: an increase in aggregate loan growth leads to a significant increase in loan

[3] We included this specification since the dynamics of the LLP ratio can be explained by changes in provisions or variation in the total loans. To isolate this effect we also present the results using the level of provisions as the dependent variable.

loss provisions two years later. The magnitude of the negative coefficient on GDP growth however indicates that overall the behavior of banks in loan loss-provisioning is clearly procyclical. [4]

Another question of interest is whether loan loss provisioning depends on historical losses or future losses. If future losses are an important driver, it suggests that, when credit grows fast, expected losses would increase as well, so that general provisions could have countercyclical effects. As a first step to address this question, we evaluate the effect of the same right-hand side variables on actual losses – calculated as the delinquency ratio (NPL). The results are quite similar to those obtained before (Table 1, Columns V and VI) and support the idea that provisions in EMEs reflect mainly past credit risk losses.

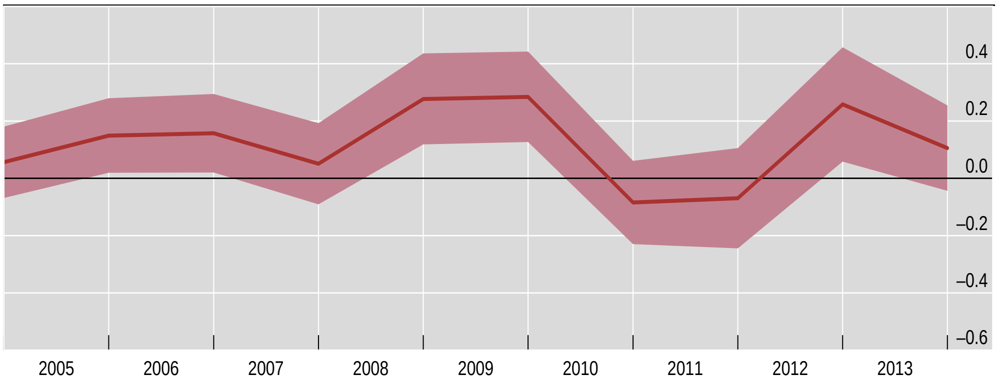
Looking at the bank-specific control variables, there is a significant effect of earnings on general provisions, which is in line with the earnings smoothing hypothesis: ie when earnings are higher, provisions tend to increase. This behavior is desirable in the sense that banks in EMEs tend to reduce the negative impact of asset volatility on bank capital.

In contrast to the results for advanced economies, however, idiosyncratic credit growth does not seem to affect individual provisions and reported

[4] While the pro-cyclicality is attenuated by the positive sign of median credit growth, the fact that estimated coefficients for growth are between four to six times larger than the coefficients for median credit growth at the same time that the standard deviation of growth is only about 37% of the corresponding figure for aggregate credit attests a pro-cyclical response.

Time effects of the determinants of loan loss provisions

Graph 1



Robust standard errors used when constructing 95% confidence interval.

credit losses in EME banks. The coefficients of ALG_i are never significant - irrespective of whether specifications include fixed effects or not. In other words, bank losses and provisions respond much more to aggregate data than to individual information. [5] This result would seem to indicate a certain degree of group behavior in provisioning. One possible conjecture is that individual banks may not want to deviate very much from the ratios applied by their peers in the same jurisdiction.

We did not find support for the capital management hypothesis. The capital ratio does not explain the variation of loan loss provisions in any specification. However, the size of the financial intermediaries does matter, since larger banks tend to have higher loan loss provisions. This result is broadly in line with some previous work which finds that larger banks tend to exhibit riskier behavior and more procyclical patterns than smaller banks (see Jopikii and Milne (2008); García-Suaza et al (2012); Carvallo et al (2015)).

Finally, the coefficients of time effects suggest that some aggregate patterns of loan loss provisions over time are related to global factors. In particular, since 2002, the highest level of provisions in EMEs was seen in 2009, when the global financial crisis was affecting international markets. (Graph 1).

[5] We also calculate the long-run coefficients of this variable. The effects of idiosyncratic loan growth on provisions are not statistically significant.

3.2 Backward and forward component of loan loss provisions

The previous subsection showed that loan loss provisions and effective delinquency ratios respond strongly to the same determinants, namely, GDP growth and aggregate credit growth. These results indicate that loan loss provisions in EMEs mainly reflect past losses and collective responses. To study 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. [6] To be more specific, we estimate the following equation:

$$\begin{aligned} llp_{i,t} \;=\;& \alpha_0 + \alpha_1 \cdot llp_{i,t-1} + \beta_1 \cdot \Delta NPL_{i,t-1} + \beta_2 \cdot \Delta NPL_{i,t} + \beta_3 \cdot \Delta NPL_{i,t+1} \\ & + \sum_{s=1}^{n} \beta_{4,s} \cdot medianx_{i,t-s} + \sum_{s=1}^{n} \beta_{5,s} \cdot \Delta GDP_{i,t-s} + \gamma \cdot earnings_{i,t} + \\ & + \delta \cdot cap_{i,t} + \zeta \cdot liq_{i,t} + \eta \cdot size_{i,t} + \theta_i + \tau_t + \varepsilon_{i,t} \qquad (2) \end{aligned}$$

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. The remaining variables in this exercise are equivalent to the ones already presented in Equation 1. Since the objective of provisions consists in covering expected losses (and assuming that the trend of loan losses is predictable to some extent), we

[6] Earlier, Bouvatier and Lepetit (2008) used a comparable specification for a sample of European banks.

Backward and forward component of provisions

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
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

System GMM estimation using the Arellano-Bover dynamic panel estimator. Robust standard errors are reported in parenthesis. ***, **, * indicate significance at the 1%, 5%, and 10% level, respectively.

should ideally observe a significant positive relationship between provisions and future losses.

The results of the exercise are presented in Table 2. In line with our previous findings, loan loss provisions are clearly related to macro variables – as the change of credit and the economic activity. In addition, we find that provisions mainly respond to current and past changes in reported credit losses – since the backward and contemporaneous effects are positive and significant. In contrast, the forward-looking component of provisions with respect to future losses is not positive, which suggests that provisions do not anticipate increases in credit losses.

One factor that may explain part of this predominantly backward looking behavior could be accounting practices that emphasize only events that have already materialized (see Borio and Lowe (2001)). A natural question that emerges in this context is whether our results could be sensitive to the type of provisioning regime in each country. Two recent experiences allow us to perform an additional indicative exercise. In 2007 and 2008, Colombia and Peru respectively changed their provisioning regulations to take countercyclical considerations into account, largely inspired by the Spanish experience. The idea was to smooth provisioning along the cycle, so that a buffer is generated during good times that can then be used when the cycle turns.

The evidence for the two countries above is shown in Table A2 in the Appendix. As the sample size is very small, the results should be read with caution. We report the estimations using GMM as well as pooled OLS. As one would expect, the standard deviations of the estimated coefficients are much larger, implying much less certainty. Provisions in these countries indeed seem to react less to economic growth, even though they continue to be affected by aggregate credit growth. Importantly, the idiosyncratic risk-taking variable, expressed as the abnormal credit growth, is significant for explaining the level of loan loss provisions. We also find that provisions in these economies respond not only to backward-looking loan losses, but also to the forward-looking component of provisions.

4 Conclusions

Episodes of excessive credit growth appear to be particularly prevalent in emerging economies. To assess possible risks to financial stability, this paper evaluated the effects of credit growth (and other relevant variables) on loan loss provisions and on the delinquency ratios of 554 banks for a representative group of EMEs.

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 – usually thought of as a measure of individual risk-taking – does not seem to explain the level of loan loss provisions at all. We do find some evidence that bank-specific earnings and the size of the intermediaries have an effect on provisions. First and foremost, however, the level of provisions and actual 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.

Importantly, the strong negative relationship between GDP growth and provisioning clearly points to procyclical behavior on the part of EME banks. When the economy is booming, provisions are reduced. They increase only when the cycle turns. This might in part be a reflection of the difficulty of assessing whether improvements in income are permanent or purely transitory. Typically, there is greater uncertainty about business cycle patterns in EMEs, as well as greater exposure to terms of trade shocks, which are often hard to anticipate. In other words, banks in EMEs may face a more challenging signal extraction problem than their advanced economy counterparts, which is then reflected in their provisioning behavior.

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 considerable space for EMEs to improve their respective systems of bank loan provisioning. In particular, the results of this paper suggest that the design of macroprudential policies based on simple aggregate indicators could be instrumental in smoothing credit cycles. Indeed, early indications from EMEs that have enacted regulation for dynamic provisioning suggests this may have reduced the procyclicality of banking provisions and increased the effectiveness of provisions as buffers for future losses.

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Appendix

Descriptive statistics

(3,232 observations) Table A1

Variable	Mean	Std Dev	Min	Max
LLP	–3.5330	1.1398	–9.2103	–0.5433
Cap	0.0921	0.0525	0.0016	0.7362
NPL	0.05065	0.0582	0.0000	0.5808
Size	8.7314	1.3005	6.8055	14.1574
Liq	0.2199	0.1189	0.0000	0.5970
ALG	0.0170	0.1624	–0.8471	0.9786
Medianx	0.1610	0.0902	–0.1015	0.5138
Earnings	0.0429	0.0352	–0.3278	0.6266
GDP	0.0529	0.0333	–0.0647	0.1415

Backward and forward component of provisions for countries with dynamic provisioning systems

Dependent variable: $llp_{i,t}$

Table A2

	I (GMM)	II (OLS)
Lagged dependent variable	0.9917***	1.00375***
	(0.0386)	(0.01543)
$dNPL_{i,t-1}$	0.00015	0.00015
	(0.0004)	(0.0359)
$dNPL_{i,t}$	**0.6552*** **	**0.64934*** **
	(0.1280)	**(0.13832)**
$dNPL_{i,t+1}$	**0.0386** **	**0.04950* **
	(0.01710)	**(0.02681)**
$Size_{i,t}$	0.003976	-0.00561
	(0.008921)	(0.00990)
$Earnings_{i,t}$	0.22619	0.33323
	(0.16029)	(0.28435)
$Cap_{i,t}$	-0.18963	-0.170880
	(0.14105)	(0.12765)
$Liq_{i,t}$	-0.074838	-0.043014
	(0.09733)	(0.14653)
$ALG_{i,t-1}$	**0.13156** **	**0.09245* **
	(0.06540)	**(0.0551)**
$ALG_{i,t-2}$	0.03452	0.03349
	(0.05051)	(0.04300)
$ALG_{i,t-3}$	-0.00058	0.00050
	(0.00883)	(0.0083)
$Medianx_{i,t-1}$	-0.03486	0.07554
	(0.47354)	(0.51760)
$Medianx_{i,t-2}$	**0.93277** **	0.87556
	(0.5225)	(0.60427)
$Medianx_{i,t-3}$	-0.61272	-0.42867
	(0.6983)	(0.76970)
$GDP_{i,t-1}$	-1.50562	-1.3899
	(1.8425)	(1.9096)
$GDP_{i,t-2}$	-0.76625	-0.4554
	(2.2471)	(2.5826)
$GDP_{i,t-3}$	3.37380	2.8191
	(2.5024)	(2.8211)
Time effects	Yes	Yes
Number of banks	34	34
Number of obs.	122	122
Wald chi-squared	98010	1134

System GMM estimation using the Arellano-Bover dynamic panel estimator and pooled OLS estimation. Robust standard errors are reported in parenthesis. ***, **, * indicate significance at the 1%, 5%, and 10% level, respectively.

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