Countercyclical Loan Loss Provisioning in Asia

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1. Introduction

Banks in Asia and the Pacific were strikingly resilient in the aftermath of the global financial crisis that began in 2007. While many banks in Europe and the Americas needed an infusion of public capital, assistance to Asian banks was limited to temporary liquidity support and guarantees of debt issuance to deal with market dysfunctions. Banks in Asia and the Pacific were far less likely to get downgraded than those in Europe and the United States. The profitable and well capitalized banks evident in much of Asia were a far cry from those that had characterized the region just a decade earlier (Mohanty and Turner (2010)).

It has been argued that one factor contributing to the resilience of Asian banks was changes in the regulatory environment from the late 1990s. In particular, most jurisdictions in Asia, spurred by the severe losses of the Asian financial crisis, adopted stronger risk management and more conservative loan loss provisioning standards (Angklomkliew, et al. (2009)). As a result, loan loss reserves and provisioning expense levels were generally higher in the run-up to the current financial crisis than they were before the Asian crisis. From a global perspective, they were also higher than those of many countries outside Asia that were significantly affected by the crisis.

However, the degree to which provisioning practices have reduced financial system procyclicality in Asia has not yet been fully tested. In this paper, we consider two types of countercyclical loan loss provisioning practices. One is "leaning against the business cycle," i.e. loan loss provisioning tends to rise during periods of high GDP growth and fall during periods of low GDP growth (after adjusting for the credit quality of bank loans and other control variables). The other is "income smoothing," i.e. banks put aside more provisions when their profits are high. Both practices can be used to dampen financial system procyclicality.

Based on a final sample of 238 banks in 11 Asian economies spanning more than a decade (2000-2013), we examine whether banks in Asian jurisdictions have in fact been provisioning in a fashion that reduces financial system procyclicality. The analysis of Asia's post-financial crisis experience should be of interest to the many national and international authorities that are now considering measures to promote more forward-looking provisioning practices (FASB (2012), IASB (2013))[2], so that banks enter periods of worsening credit quality with higher levels of reserves, providing a buffer to reduce the downward pressure on earnings and capital that would otherwise occur.

The main findings of the paper are as follows. First, countercyclical loan loss provisioning is a common practice in Asia. Second, the exact forms of countercyclical loan loss provisioning practices differ across countries. Our empirical analysis shows that "income smoothing" is adopted in China, India and Southeast Asia, while "leaning against the business cycle" is used in India and Japan. Lastly, there appears little cross-

bank differences in loan loss provisioning behavior (except during the 2007-2009 global financial crisis), suggesting that countercyclical loan loss provisioning is not driven by individual banks' decisions, but is more likely a result of stricter regulatory environments at the national level.

2. Literature Review

Research on loan loss provisioning used to focus narrowly from an accounting perspective on whether provisions were used by banks to smooth earnings (Greenawalt and Sinkey (1988)). More recently, work has focused on how provisions contribute to the procyclicality of financial systems by being lower when output and credit are expanding and higher in periods of contraction. In early work from this perspective, Borio et al. (2001) document a strong negative correlation of bank provisions with the business cycle for 10 OECD countries. Subsequent empirical studies have used bank-level information to investigate the procyclicality of loan loss provisions in more detail (Cavallo and Majnoni (2002), Laeven and Majnoni (2003), Davis and Zhu (2009), Bikker and Metzemakers (2005), Bouvatier and Lepetit (2008, 2012), Craig et al. (2006), Wong et al. (2011), Soedarmo et al. (2012); see Table 1). Researchers use regression analysis to explain annual provisioning expenses, usually scaled by the total stock of loans or assets of the bank. Some of the explanatory variables used in these studies are discussed below.

Credit Quality. Given that provisions are set aside as a buffer against credit losses, credit quality variables should be expected to be important determinants of loan loss provisions. Two variables are widely used in the literature to proxy (inversely) for credit quality: the non-performing loan (NPL) ratio and the loan/asset ratio. The latter is used as loans are generally considered to be riskier than other types of bank assets (e.g., cash, reserves, bonds) and therefore a high loan/asset ratio is associated with lower credit quality. Both the NPL and loan/asset ratios are found to be positively associated with loan loss provisions in the literature.

Another proxy for bank-specific loan portfolio credit quality is loan growth, which at higher levels may reflect higher levels of risk being taken on. However, in most of the studies examined in Table 1, provisioning expenses vary negatively with loan growth, consistent with provisions declining even as surges in new loans might indicate increased riskiness. One exception is Bikker and Metzemakers (2005), who found a significantly positive impact of loan growth on provisions.

GDP Growth. The most important variable in this study for examining whether provisioning practices might exacerbate the business cycle is (real) GDP growth. In six out of the eight prior studies reviewed in which real GDP growth is an explanatory variable, provisioning expenses are found to vary negatively with the business cycle (see Table 1). The latter result is consistent with the traditional view that loan loss provisions tend to be procyclical.

Earnings. If banks use provisions to smooth earnings, there should be a positive relationship between provisions and earnings. Evidence of the existence of earnings smoothing through provisions remains fairly strong, at least for industrialized countries (e.g., see Pérez et al. (2008)) for the case of provisioning in Spain). In a few papers, provisions are found to vary inversely with earnings when they are negative, which would contribute to procyclicality. Meanwhile, studies on emerging markets have not found evidence for earnings smoothing; in fact, earnings have been found to negatively affect provisioning in emerging Asia (Laeven and Majnoni (2003), Craig et al. (2006), Soedarmono, (2012)). It is worth noting that income smoothing is considered as a violation of the internationally accepted accounting standards (e.g., IFRS or IAS 39), which determined provisioning *solely* based on evidence of incurred losses or impairment.

Capital Ratio. Higher provisioning when capital is low is consistent with capital depletion being correlated with efforts to build up a greater reserve cushion. While the studies of Bikker and Metzemakers (2005) and Bouvatier and Lepetit (2008, 2012) are consistent with a negative relation of provisioning and capital levels, other studies do not document a strong association with capital constraints and provisioning. Both Davis and Zhu (2009) and Craig et al. (2006)) include capital as an explanatory variable, and do not find a significant impact on provisioning, while Soedarmono (2012) finds the impact to be positive.

Asset Prices. Provisioning may be lower when asset prices are rising, if the latter are reflected in collateral valuations (changed expectations about future fundamentals are another channel). Davis and Zhu (2009) find that provisions are lower when commercial property prices are rising. This suggests that provisioning may amplify credit cycles through the collateral channel.

The first major study focusing on provisioning of Asian banks was that of Craig et al. (2006), who investigate the provisioning decisions of 242 Asian banks between 1996 and 2003. Their findings are consistent with the view that provisioning practices in Asia exacerbated financial system procyclicality more than in other regions. Higher real GDP, loan growth, asset prices and earnings led to lower provisions. To be sure, these results were probably driven by the collapse in many variables during the Asian financial crisis, when provisions needed to be increased.

Angklomkliew et al. (2009) also explored the degree to which provisioning has been countercyclical in eight Asian countries, but using national data only, over 1998–2008. Regressions using annual data incorporating fixed country effects are reported. Like Craig et al. (2006), they also found over the full period that GDP and credit growth, earnings and capital were related to provisioning in a way that may exacerbate financial system procyclicality. However, when estimated over the more recent period only (2003–08), while GDP growth is statistically significant, the other variables lose their significance. This suggests that many of the earlier results may have

been driven by the behavior of the variables around the Asian financial crisis of the late 1990s, and may not represent current provisioning practice. However, the paucity of observations, the limitations to system-wide data and the lack of a full cycle in either sub-period of the paper limit the strength of any inferences to be drawn from the comparison.

Subsequent research on the procyclicality of provisioning in Asia has produced mixed results. Bouvatier and Lepetit (2012) estimated the determinants of loan loss provisions for more than 900 banks from Japan and Southeast Asia, as well as thousands of banks in other regions between 1995-2008. They found bank provisions used to smooth income in Japan as well as Southeast Asia, varying positively with earnings, while at the same time moving negatively with GDP growth, or in a procylical fashion. However, Soedarmono et al. (2012), focusing on 686 banks in Asia over a slightly longer period found contrasting results, with provisioning varying negatively with earnings and having an insignificant relation to GDP growth. The empirical exercise of this paper represents the first attempt to use the large numbers of observations since the global financial crisis to assess the procylicality of provisioning in Asia. It also carefully documents the changes in the regulatory environment over the past 15 years with a view towards assessing whether they may have contributed to ameliorating the procyclicality of provisioning practices in a time period inclusive of the global financial crisis.

3. Loan Loss Provisioning Regimes in Asia

In the aftermath of the Asian financial crisis of the late 1990s, many Asian central banks and supervisory authorities tightened their prudential supervision to ensure that banks established reserves at a level commensurate with the level of risk in the loan portfolio in a timely manner (Figure 1). Many of these moves involved convergence with internationally accepted accounting regimes (such as IFRS) or improvements to loan grading and provisioning schemes. Importantly, the general principles of the IFRS, including IAS 39, required reserves to be established for specific loans only if there is objective evidence of impairment. Such requirements can give provisioning a backward-looking focus.

Two things are worth noting here. First, significant heterogeneity remains. Not all jurisdictions are converging with IAS 39. The treatment of collateral differs, as does the tax deductibility of provisions or the inclusion of reserves in capital.

Second, even among those jurisdictions that have adopted IAS 39, most impose additional provisioning and reserve requirements. Indeed, some authorities in the Asian region have adopted measures on a discretionary basis to encourage the build-up of loan loss reserves in good times, for instance by increasing the level of reserves required in cyclical sectors. Such departures from the incurred loss approach to provisioning can be viewed as consistent with the more forward-looking perspectives recently proposed as one of the guiding principles for provisioning by the Basel Committee on Banking Supervision.[3]

What follow are country-specific descriptions of the salient features of loan loss provisioning regimes in 10 Asian jurisdictions.

China. Banks in China have been required to set aside general reserves of at least 1% of loans outstanding since 2005. Effective 2002, as part of a broader convergence with international practices, loan classification rules were revised such that specific reserves were mandated for the four lowest grades. Prudential guidelines allow banks to establish specific reserves for loans graded either substandard or doubtful that are 20% greater or less than the prudential norm. Factors considered when determining the appropriate level of reserves include specific risk scenarios (which may vary by region or industry), probability of losses and historical experience. In 2009, in response to rapid loan growth, the China Banking Regulatory Commission (CBRC) raised loan loss reserve requirements to 150% of NPL. This recommendation was intended to provide sufficient coverage not only for currently identified problem loans but also for a potential increase in NPLs in the aftermath of the credit boom. In 2011, the CBRC further required that loan loss reserves should be above 150% of NPLs or 2.5% of total loans, whichever is higher.

Hong Kong SAR. Hong Kong SAR (hereinafter Hong Kong) implemented IAS 39 in 2005. As a result, loan provisions are made when objective evidence of impairment occurs. As an additional measure, to ensure that the level of protection for expected credit losses does not decline, financial institutions are expected to maintain a "regulatory reserve" of approximately 0.5–1% of total loans to cover losses which may occur in the future. The regulatory reserve is an "earmarked" amount in retained earnings and is therefore distinct from loan loss reserves. The Hong Kong Monetary Authority expects that the regulatory reserve should approximate the difference between the sum of general and specific reserves that would have been established prior to the implementation of IAS 39 and the level of reserves required after its implementation.

India. Over the past decade, loan classification standards in India have become more conservative and have moved closer to international norms. To this end, India has raised its benchmark general provision level for standard loans (from 0.25% to 0.40% in 2005), noting the need "to build up provisioning to cushion banks' balance sheets in the event of a downturn in the economy." Required reserve levels also consider collateral. Compared to other central banks, the Reserve Bank of India (RBI) applies a sector-specific approach to general provisions based on the riskiness of the sector and public policy objectives, and the adjustment is more frequent. For instance, required reserve levels for performing personal loans, residential housing loans above INR 20 million, and credit card, capital market-related and commercial real estate loans were increased from 0.4% to 1% in 2006. In 2007, the RBI further raised general provisions for personal loans, capital market exposures and commercial real estate loans from 1% to 2%, and increased provisioning requirements for banks' exposure to systemically important non-deposit-taking non-banking finance companies from 0.4% to

2%. In 2012, the RBI raised the provisions for restructured standard accounts from 2% to 2.75%, and in 2013 it was further increased to 5% in cases of new restructurings but in a phased manner over a two year period for the existing standard restructured accounts. Conversely, provisioning requirements for performing loans to the agricultural and SME sectors are exempted from the additional provisioning requirements enacted in 2005.

Indonesia. Bank Indonesia adopted a prudential loan classification scheme with five grades in December 1998, and later tightened the definition for each grade in 2005. Provisions are allowed to be made net of collateral, with the appraised value of collateral reduced according to the age of the appraisal (i.e. older appraisals result in a greater discount to the appraised value of the collateral). General provisions of no less than 1% of loans are required, though the requirement can be waived if the loan is secured by high-quality collateral such as cash or gold. With regards to the adoption of IAS 39 in 2010, banks in Indonesia are required to provide provisions for accounting purposes on the basis of incurred losses. For prudential purposes, banks are also required to calculate the expected loan losses based on prudential loan classification matrices. Whichever results in the higher provisions among the two approaches will be used in capital adequacy ratio calculation.

Japan. The accounting standards board in Japan aimed to achieve convergence between Japanese GAP and IFRS by 2011. Japan has long had general provisions in addition to specific provisions. Required provisions have been a function of the past three-year loss experience in each category. General and specific provisions are tax-deductible and, as in many other countries, have been allowed to be included in Tier 2 capital up to a certain fixed percentage (Table 2). The main regulatory changes which affected provisioning were changes in loan classification standards, which were particularly intense in the late 1990s and early 2000s, when Japan tightened its guidelines on loan classification, which had come under attack for its overly slow recognition of problem loans (Packer (2000), Ueda (2000)). However, provisioning requirements in Japan are not subject to discretionary changes or different sectoral treatments.

Korea. Korea has tightened provisioning norms on numerous occasions over the past decade. The general reserve requirement for corporate loans was increased to 0.5%, 0.7% and 0.85% in 1999, 2005 and 2007, respectively. The minimum reserve levels for other categories of loans were also raised. Sectoral differences in provisioning requirements are also enforced, with higher provisioning requirements for residential housing and credit card loans relative to corporate loans in place since December 2006. In addition to the sectoral differences, Korean prudential authorities explicitly incorporate "expected loss" considerations into their guidance on provisions: local banks, when assessing the loan classification, are required to apply "forward-looking criteria", including future cash flow projections, when determining an appropriate level of reserves.

Malaysia. With the effective adoption of IAS 39 in 2010, all banking institutions in Malaysia were expected to put in place sound provisioning policies that are supported by a robust impairment assessment methodology to identify, monitor, and measure the quality of the loan portfolio on an ongoing basis. To ensure a smooth transition to IAS 39, the Central Bank of Malaysia has required all banking institutions to maintain a minimum collective impairment provision of 1.5% for the first two years of implementation. The Central Bank of Malaysia also retains the power to require additional regulatory reserve where the impairment assessment methodology of the banking institution are not sufficiently robust or supported by adequate historical loss data.

Philippines. The Philippines adopted new accounting standards in 2005 in line with IFRS and the loan impairment criteria contained in IAS 39. For financial institutions, however, the Bangko Sentral ng Pilipinas (BSP) requires that reserve levels be maintained in accordance with IAS 39 or BSP guidelines, whichever results in a higher reserve. The BSP requirements include a general provision for loans without heightened credit risk characteristics of 1% and 5% for those that were previously restructured. Specific reserves are determined based upon the particular loan grade assigned.

Singapore. As in Hong Kong and the Philippines, IAS 39 became effective in Singapore in 2005. Banks that are not yet compliant with IAS 39 must maintain a minimum specific reserve level based upon the supervisory loan grade. Though there is no specific guidance on general provisions, the Monetary Authority of Singapore states that as a "transitional arrangement" the level should be maintained at not less than 1% of loans net of collateral values. All minimum provision levels are net of collateral.

Thailand. In 1998, Thailand significantly increased the minimum loan loss reserves required for the various supervisory loan grades, with the requirements applied net of collateral value. In 2006 and 2007, in order to mitigate the impact of convergence with IAS 39, which has taken place since 2007, the Bank of Thailand (BoT) further tightened provisioning standards for all loans graded substandard or below such that they are consistent with IAS 39. As a result, for these loans, a reserve equalling 100% of the difference between the balance sheet amount of the loan and the present value of expected cash flows from the debtor or the sale of collateral must be established. It is worth noting that the BoT has not yet fully applied IAS 39 to performing and so-called special mention loans, where provisions of 1% and 2% are required against loans net of collateral, respectively. All banks are expected to be fully compliant with IAS 39 by 2013.

In summary, a number of measures taken by supervisors in Asia after the Asian financial crisis have resulted in banks maintaining higher levels of loan loss reserves in relation to total loans during a period when many jurisdictions have been experiencing economic growth and declining levels of NPLs.

In three of the countries discussed above, authorities adopted measures on a discretionary basis to respond to increasing levels of risk (Table 2). Authorities in India and Korea, for example, increased their loan loss reserve requirements on several occasions in sectors experiencing rapid credit growth. China's recommendation that banks maintain a loan loss reserve-to-NPL ratio of 150% was another measure that has resulted in the establishment of reserves in advance of an identifiable deterioration in credit quality.

The process of convergence with international accounting standards has been managed so as to ensure increased provisioning standards ahead of the full implementation of IAS 39. But when the process has threatened to reduce loan loss reserve levels, a number of authorities have instituted additional provisioning requirements, maintained existing measures on a provisional basis (Philippines) or created a special regulatory reserve account (Hong Kong).

The shifting regulatory environment described could have affected Asian banks' provisioning practices in at least two ways. For one, it may have led to banks' provisioning practices being more conservative across the board, and thus invariably higher than they would have been once the values of all other determinants were accounted for. The evidence reported in Angklomkliew et al. (2009) suggests that provisioning did tend to be higher subsequent to regulatory changes. For another, the new environment may have made Asian banks' provisioning practices more countercyclical, and thus higher mainly in good times, and lower than they otherwise would have been in bad times. The empirical analysis that follows tests this second proposition. Since many of the new measures in Asia were adopted on a discretionary basis to build up loan loss reserves in good times, to be drawn upon in the event of an economic or earnings downturn, even without the emergence of rule-based countercyclicality measures indicated by regimes such as those in Spain, they could have encouraged banks to behave in a manner consistent with countercyclical provisioning.

4. Methodology

The baseline model specification adopted in this study follows the existing literature:

$$LLP_{i,t} = \beta_1 LLP_{i,t-1} + \beta_2 NPL_{i,t} + \beta_3 LOANASSET_{i,t} + \beta_4 CAR_{i,t} + \beta_5 DLOAN_{i,t} + \beta_6 EBTPTA_{i,t} + \beta_7 DGDP_{i,t} + \delta\ COUNTRY_i + \gamma\ YEAR_t + \varepsilon_{i,t} \quad (1)$$

The key objective is to investigate the determinants of loan loss provisions. Explanatory variables include the (inverse) proxy variables for credit quality (NPL ratios, loan/asset ratios, bank loan growth), as well as capital adequacy ratios, GDP growth and earnings before tax and provisions (as a percentage of total assets). In addition, country and year dummies are also included.

The key results of interest in our analysis are the two coefficients on GDP growth and earnings, ie β_6 and β_7 in equation (1). We interpret both coefficients as indicative of the important question whether bank provisioning is countercyclical or not. In particular, the two coefficients could reflect two different forms of countercyclical (or procyclical) provisioning practices. One form of countercyclical provisioning is contingent on bank-specific accounting results, in particular bank earnings. A positive coefficient (β_6) implies that banks put aside extra provisions when profits are high ("income smoothing"). The other form of countercyclical provisioning is related to the state of macroeconomic conditions. A positive coefficient (β_7) implies that banks accumulate provisions during economic upturns, which will be used in economic downturns ("leaning against the business cycle"). In practice, the statistical provisioning method adopted in Spain is such an example of countercyclical provisioning, although it is imposed by the regulatory authority rather than self-motivated by banks.[4] Throughout this paper, we will distinguish between these two possible sources of countercyclical (or procyclical) provisioning behavior, one micro-oriented and the other macro-oriented.

Two points are worth noting here. First, the correlation of two key explanatory variables, GDP growth and bank earnings, might cause a multicollinearity problem in the econometric analysis. Investigation into the data suggests that this is not a huge issue. While these two variables are generally positively correlated (except for Indian banks), their correlation is not overly high. Importantly, earnings also exhibit substantial differences across banks even within the same country, thus including both variables in the regression can yield evidence of whether countercyclical (or procyclical) provisioning is linked to the macroeconomic cycle, which is typically due to additional requirements imposed by supervisors/regulators, and/or linked to bank-specific performance cycles, which is typically driven by individual banks' incentives.

Second, we chose the list of explanatory variables to be consistent with previous studies, so that readers can compare the provisioning practices in Asia after the Asian financial crisis with the results found in studies of other experiences. Separately, we also analyzed the impact of numerous other explanatory variables. Some of the results are reported in this paper (see Section 6.4) but others are omitted for space reasons. For instance, we included asset prices (house prices and equity prices) in unreported specifications, but as they turned out to be insignificant, they were excluded from our final reported specifications.

5. Data

Our empirical analysis covers 12 economies in Asia and the Pacific, namely Australia, China, Hong Kong, India, Indonesia, Japan, Korea, Malaysia, New Zealand, the Philippines, Singapore and Thailand. Data come from two sources: bank-level balance sheet and income statement information, taken from the Bankscope database; and macrofinancial variables in each jurisdiction, taken from the national data maintained by the BIS.

We retrieve balance sheet and income statement information on individual banks in the 12 economies during the period 2000–13. The data are available on an annual basis. Following the practices in earlier studies, such as Cavallo and Majnoni (2002) and Davis and Zhu (2009), we clean up the data in the following steps.

First, our analysis covers only commercial banks and excludes other types of financial institution (such as government-sponsored financial institutions, investment banks, investment and trust corporations, finance companies, savings banks and cooperative banks). We choose to use unconsolidated bank balance sheet data, to distinguish between parent and subsidiary banks which are located in different jurisdictions and thus may follow different provisioning practices. There are in total 779 banks from the 12 economies with reported data at some point during our sample period.

Second, we eliminate those banks with outlier observations to minimize the bias related to measurement errors. In particular, we calculate the 1st and 99th percentile values of the following five variables: returns on assets, growth rates of bank assets, growth rates of bank loans, loan-to-asset ratios and NPL ratios. For any of the five variables, if a bank has an outlier observation that is smaller than the 1st percentile or larger than the 99th percentile value, the whole record of the bank will be removed from our sample. This outlier filtering procedure leaves 489 banks with reported data from 11 economies (no Australian bank remained in sample after this round of filtering).[5]

Third, and lastly, we eliminate those banks that have fewer than four consecutive years of financial statements, in order to control for the quality of bank reports. Imposing such a requirement is also motivated by our desire to explore the determinants of loan loss provisioning not only from a cross-sectional but also from a dynamic perspective.

The final sample that satisfies the above criteria includes 238 banks from 11 economies. Table 3 summarizes the distribution of sample banks. By jurisdiction, Japanese banks represent half of the sample, followed by Indian (18%) and Chinese (12%) banks. Southeast Asia, which includes Indonesia, Malaysia, the Philippines and Thailand, has 35 banks (15% of the total). Surprisingly, Hong Kong and Singapore, the two leading global financial centres in the region, each have only one bank that survives the filtering process. By rating, only about 30% of sample banks are rated by one of the three major agencies (Standard & Poor's, Moody's and Fitch); the vast majority of these are investment grade.

Table 4 reports the summary statistics of key variables. For each bank-specific variable, our sample has between 2,543 and 2,788 bank-year observations, that is, on average 10 to 11 annual observations for each bank during 2000–13. Loan loss provisioning averages 0.43% of total assets, despite the occurrence of negative values for numerous bank-years when loan loss provisions were run down rather than accumulated. In terms of stock, loan loss reserves average 1.52% of total assets, and the ratio ranges between 0.047% and 20.16%. Across countries, the levels of loan loss provisions and reserves are at comparable levels in China, India and Japan, although

they are higher on average in Southeast Asian economies (Indonesia, Malaysia, the Philippines and Thailand).

The NPL ratio averages 3.28%, though it is as high as 24% for certain bank-year observations. The occurrence of the Asian financial crisis, as well as the large-scale disposal of NPLs in China and Japan in the early 2000s, contribute to the high levels and large variation of NPL observations in our sample.

Asset growth and loan growth average about 8–9%, but exhibit substantial cross-country differences. The growth rates are much lower in Japan, which was consistently troubled by banking system distress, sluggish economic performance and weak bank lending over the sample period. This is also reflected by the much lower earnings for Japanese banks. By contrast, emerging Asian economies, especially China and India, were experiencing waves of financial liberalization and financial deepening over the sample period. Accordingly, banks in these economies reported on average double-digit growth rates in total assets and total loans, with the highest annual increase of nearly 50% in our sample.

In addition, we also retrieve a number of macroeconomic and financial variables for each jurisdiction. The list of variables includes real GDP growth, inflation and growth rates in national house prices. The house price data, which are updated from the study by Glindro et al. (2011), are collected from national sources, though definitions of house prices vary somewhat across jurisdictions. The coverage of residential properties varies from those in a single major city (e.g., in Thailand) to nationwide (e.g., China, Korea and Malaysia). The methodologies of constructing house price indices also differ. Some series are derived using a hedonic pricing method and others are based on floor area prices collected by the authorised land registration authorities or the private sector, for which no quality adjustment was done. Another important caveat is that house price data have become available in most Asian economies only since the late 1990s, and are still not available in some countries (e.g., Indonesia).

6. Empirical Findings

Following the methodology described in Section 4, we examine the determinants of loan loss provisioning of Asian banks. There is clear evidence for countercyclicality in provisioning when banks in Asia and the Pacific are examined in aggregate; at the same time differences in provisioning practices in response to earning and business cycle across banking systems are also noticeable. We find evidence of countercyclical income smoothing practices in China, India and Southeast Asia. On the other hand, Japanese and Indian banks tend to be more likely to provision in a countercyclical way over the business cycle.

6.1 Preliminary Analysis

As a starting point, a panel OLS regression based on equation (1) is estimated and the results are reported in Table 5.[6] Country and time dummies are included in the

regression, and the t-statistics are calculated based on clustered standard errors grouped by banks following the method proposed by Peterson (2009).

The coefficients for both the NPL ratio and the loan-asset ratio both have the expected positive signs, and both are statistically significant. This finding suggests that Asian banks put aside higher provisions when the credit risk of bank assets is higher, which is consistent with standard accounting principles as well as the results found in previous studies. The coefficient for loan growth is negative and statistically significant, indicating that provisioning tends to be low even when rapid loan growth is suggestive of increased credit risks.

The coefficients for other standard control variables also have the expected signs. First, the coefficient for the lagged dependent variable is positive and statistically significant, suggesting a certain degree of persistency in the time series of loan loss provisions. Second, the coefficient for the capital adequacy ratio is negative and statistically significant. To the extent that provisions and bank capital are two differing forms of protection against credit losses – albeit one for expected losses and the other for unexpected losses – it is possible that banks with a strong capital base may have less incentive to provision as the two forms of protection are viewed as substitutable.

Of the two key coefficients with regard to procyclicality of provisioning, one for EBTPTA and the other for DGDP, only the former is statistically significant. The coefficient for EBTPTA is positive and statistically significant, supporting the income-smoothing hypothesis and suggesting that Asian banks have been loan loss provisioning in a countercyclical fashion by setting aside extra buffers in high-earning years. Using the sample statistics reported in Table 4, we estimate that a one-standard-deviation increase in EBTPTA (0.93%) increases loan loss provisions by around 14.0 basis points.

The coefficient for DGDP has the expected positive sign, but is only borderline statistically significant, suggesting (weakly) some countercyclical provisioning over the business cycle.

As a check on the econometric specification, we also estimate equation (1) with the dynamic panel data Generalized Methods of Moments (GMM) approach developed by Arellano and Bond (1991).[7] Variables are in differences to control for unobserved bank-specific effects. To mitigate the endogeneity issues associated with the joint determination between loan loss provisions and the list of bank-specific explanatory variables, we use as instruments two- and three-year lags of the explanatory variables. Results are reported in Table 5; while they are in most respects similar to those using the panel OLS regression, there are some differences. The importance of capital adequacy, loan growth and the non-performing loans are even stronger than in the earlier regression. The two coefficients proxying for cyclicality of bank provisioning behavior are again positive, though the one for DGDP becomes statistically insignificant.

6.2 Baseline Analysis: Country-specific Regressions

The empirical results in Section 6.1 should be treated with caution. A major concern is that the pooled regression implicitly assumes that loan loss provisioning practices are the same for banks from different countries, which is highly debatable. As described in Section 3, accounting and regulatory regimes in Asia have differed quite a bit across countries. Reflecting this, we revisit the issue by dividing the sample into four groups: China, India, Japan and Southeast Asian economies (Indonesia, Malaysia, the Philippines and Thailand).

Table 6 reports the results of various country/region-specific regressions, each using the observations of the banks of one country/regional group. The coefficients for the conventional control variables, including lagged dependent variable, NPL ratios, capital adequacy ratios and loan growth, remain very similar to those in the pooled regression, although statistical significance varies across countries.

Nevertheless, the most remarkable finding is that the coefficients for EBTPTA and DGDP differ considerably across the four groups. In particular, the country-specific analyses provides clear evidence that bank provisioning tends to be countercyclical in earnings in emerging Asia (China, India and Southeast Asia), and against the business cycle in India and Japan.

In both China and Southeast Asia, it is the coefficient on EBTPTA that is significantly positive, consistent with countercyclical provisioning in these regions being attributable to income-smoothing behavior on the part of banks. Banks in these economies contribute additional loan loss provisions when their profits are high. This countercyclical provisioning can be used to reduce the volatility of reported bank profits, but it can also reduce the possibility that a bank may have to eat into its capital when actual losses exceed expected losses. By contrast, there is little evidence that banks in these economies provision against the business cycle (the coefficients for DGDP are negative, though insignificant in China). Therefore, countercyclical provisioning in these economies arises from additional provisioning when the performance of individual banks is better, but not necessarily when their economies are expanding.

In India, countercyclical provisioning originates not only from income-smoothing behavior but also from additional loan loss provisions during economic upswings. In particular, a one-standard-deviation increase in bank earnings is estimated to result, other things equal, in an Indian bank making an additional 0.11–0.12% of provisions (as a percentage of total assets). Similarly, a one-standard-deviation increase in India's economic growth rate (2.37%) is associated with an increase in loan loss provisions of slightly higher magnitude (0.27–0.28%). The economic significance of these impacts of earnings or economic growth shocks on provisions is thus rather large, given that Indian banks report on average 0.52% provisions/total asset ratios with a sample standard deviation of 0.37% (Table 4).

The finding that Indian banks provision against the economic cycle probably reflects, at least in part, the shifts in regulatory practice with regard to loan loss provisioning. India not only raised its benchmark general provision level for standard loans from 0.25% to 0.40% in 2005, but the RBI also increased the reserve levels for sectors deemed risky, such as residential housing and commercial real estate loans, from 0.4% to 1.0% in 2006, and again from 1.0% to 2% in 2007. Mortgages provided by banks declined considerably after these new requirements (Patnaik et al. (2011)). However, in November 2008, in response to the global financial crisis, the RBI lowered its provisioning requirements for real estate lending again to 0.4%. Clearly, to the extent that individual banks provisioning decisions' were constrained by the existing regulations, the timing of the regulatory changes would appear to have guided provisioning to be countercyclical, i.e., higher in good times, and lower in downturns.

Japan is also a case in which bank provisioning is countercyclical over the business cycle, in that the coefficients for EBTPTA and GDP growth are both positive, and at levels of statistical significance for the latter coefficient. It may be a sign that the Japanese banking system within the sample had recovered from the severest of the banking crisis of the 1990s in that they could afford to provision more in good times. We will examine other explanations for the provisioning behavior of Japanese banks with additional empirical specifications in the next section.

In sum, the distinct findings regarding loan loss provisioning practices in different jurisdictions help to explain the mixed results in Section 6.1. Reflecting this, we will focus on country/region-specific results in the remainder of the analysis.

6.3 Extended Analysis with Interactive Terms

In addition to cross-country differences in the coefficients as described above, we are also interested in whether certain bank characteristics within any of the countries under investigation might affect the determinants of bank provisioning, in particular the impact of earnings and GDP growth. We address this issue by extending the above country-specific baseline analysis, by adding additional interactive terms between bank earnings or GDP growth and a number of other variables. The results are reported in Tables 7 to 10.

6.3.1 Bank Size

We first examine whether bank size matters for the cyclicality of the provisioning decision. Here we define large banks as any bank that belongs to the list of the top 1,000 banks globally ranked by *The Banker* magazine in 2012 (the ranking is based on total equity).

The results, reported in column 1 in Tables 7 to 10, show little evidence that large and small banks have different provisioning strategies over either the earnings or economic cycles except China. The coefficients for the interactive terms are all

insignificant in India, Japan and Southeast Asia. As an exception, in China small and mid-sized banks tend to be more likely to provision in a countercyclical way over the earning cycle, while large banks tend to move in a countercyclical way over the business cycle.

6.3.2 High Asset Growth Years

We also examine whether the cyclicality of bank provisioning is affected by whether or not their assets are growing rapidly. To start with, we define a dummy variable that indicates a high asset growth year for a bank, which equals one if the year-on-year asset growth exceeds 15% (which is about the 80th percentile for asset growth within the entire sample of bank-years).

Whereas in China there is no difference in the provisioning pattern in banks' high-growth years, in South-East Asia the coefficients for the interactive terms are statistically significant, with the signs suggesting that banks tend to use provisions for income-smoothing more in high asset growth years. In Japan, banks with high asset growth tend to go against the grain in terms of provisioning more with GDP growth.[8] The results for India are rather mixed, with banks with high asset growth adopting more countercyclical income smoothing, but leaning less against the business cycle.

The two effects seem to cancel each other out.

6.3.3 Bank Loan Quality

Banks with high NPL ratios might also adopt different provisioning strategies in relation to credit and economic cycles. We construct a dummy variable that equals one if the NPL ratio exceeds 5%, and introduce an interactive term between this dummy variable and earnings as well as GDP growth. As shown in Tables 7-10, there is no evidence that banks with different quality have adopted different provisioning strategies.

6.3.4 Bank Capitalization

Due to the close relationship between bank capital and loan loss provisions, we also examine whether capital adequacy affected the cyclicality of banks' provisioning behavior. Two dummy variables are constructed for this purpose, one equalling one if the capital adequacy ratio is higher than 12% (well-capitalized banks) and the other equalling one if the ratio is below 8% (low-capitalized banks).

The results are reported in column 4 in Tables 7 to 10. In general, capital adequacy seems to have little impact on banks' choice between the two possible countercyclical provisioning methods, as most interactive coefficients are statistically insignificant. The exception is in India, in which well-capitalized banks tend to have more countercyclical provisioning over the income cycle while at the same time adopting a less countercyclical practices over the business cycle.

The Global Financial Crisis

Finally, we examine whether the occurrence of the global financial crisis has contributed to the cyclicality of Asian banks' provisioning behavior. A dummy variable indicating the period 2007–09 is introduced. The results, as reported in column 5 in Tables 7 to 10, suggest that the observation of the global financial crisis has contributed significantly to the empirical findings of the countercyclical loan loss provisions in earning cycle in India, as well as the countercyclical loan loss provisioning over the business cycle in Japan.

6.4 Robustness Check

As a robustness check, we use another variable as an alternative to GDP growth to investigate the procyclicality of provisioning practices. The substitute variable is the output gap, another metric of the economic cycle, which is calculated as the difference between GDP and its trend (as calculated by a one-sided HP filter). Borio and Lowe (2001) document a negative relationship between the output gap and bank provisioning expenses. We use the same regression method as in Table 6, i.e., dividing the sample by country/region. The results, as reported in Table 11, do not differ significantly from those of Table 6. The fit of the specification is virtually identical.[9]

7. Conclusion

In the wake of the Asian financial crisis, many jurisdictions in Asia adopted stricter provisioning practices and began the process of converging with international accounting standards. Under certain circumstances, convergence with international standards could increase the procyclicality of provisions. However, a number of regimes overlaid additional prudential provisioning requirements, and adopted discretionary measures to increase provisioning in good times in response to rising levels of risk. Based on a final sample of 238 banks in 11 Asian economies since the Asian financial crisis of the late 1990s, this paper examines whether banks in Asian jurisdictions have in fact been applying loan loss provisions in a countercyclical fashion.

The main findings of the paper show that countercyclical loan loss provisioning is a prevalent practice in Asia, which has arguably increased the resilience of Asian banking system. Evidence of "income smoothing" is strong in China, India and Southeast Asia, which is consistent with previous findings in industrialized economies. In addition, provisioning expenses are found to vary positively with the business cycle in India and Japan. Such "leaning against the business cycle" behavior is absent in earlier studies. The evidence is consistent with the conclusion that in Asia, loan loss provisioning did not simply become more conservative at all points in time subsequent to the Asian financial crisis, but actively leaned in a fashion that ameliorated swings in earnings and the macroeconomy. The degree to which the numerous policy initiatives that followed the Asian financial crisis were responsible for this, relative to independently more prescient behavior on the part of banks, remains a subject for future investigation.

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Table 1: Literature Review: Determinants of Loan Loss Provisions (LLP)

	Sample	Sample Period	Impact of				Memo
			GDP Growth	Loan/ Asset Ratio	Loan Growth	Bank Earnings	
Cavallo and Majnoni (2002)	1,176 banks, 36 countries	1988–99		+ve	-ve	+ve	(1) Per capita GDP and public debt/GDP ratio also have significantly negative impact on LLP; (2) No evidence of income smoothing for non-G10 banks (the opposite); (3) Legal systems affect provisioning behavior
Laeven and Majnoni (2003)	1,419 banks, 45 countries	1988–99	-ve		-ve	+ve	Japanese and Asian banks have less procyclical LLP behavior than in other countries
Bikker and Metzemakers (2005)	8,000 bank-year obs, 29 OECD countries	1991–2001	-ve	+ve	+ve	+ve	Capital/asset ratios are negatively associated with provisioning; there exist significant cross-country differences
Craig et al. (2006)	242 Asian banks, 11 Asia-Pacific economies	1996–2003	-ve	+ve	-ve	-ve	Property prices are negatively related to provisioning levels; short-term funding/ asset ratios (a proxy for liquidity risk) have a negative impact on provisioning levels
Bouvatier and Lepetit (2008)	41 banks, 8 European countries	1995–2001	-ve			+ve	NPLs are positively related to provisioning levels, while the capital/ asset ratio are negatively related to LLP
Davis and Zhu (2009)	904 banks 15 OECD countries	1989–2002	Insig	+ve	-ve	+ve	Property prices are negatively related to provisioning levels

Table 1: Literature Review: Determinants of Loan Loss Provisions (LLP)

	Sample	Sample Period	Impact of				Memo
			GDP Growth	Loan/ Asset Ratio	Loan Growth	Bank Earnings	
Wong et al. (2011)	192 banks, 11 Asia-Pacific economies	1996-2009	-ve				Negative coefficient on GDP growth for 69-100% of banks in 11 Asia-Pacific economies. Loan growth and earnings variables included in model but coefficients not reported.
Bouvatier and Lepetit (2012)	12,623 banks, 8 European countries, US, 12 Central and South American countries, 7 Asia-Pacific economies	1995-2008	-ve	+ve		+ve	Lagged dependent variable, loans to asset ratio not significant for Asia-Pacific banks. Total capital ratio negative and significant for European, US, Asian banks.
Soedar-mono et al. (2012)	686 banks, 12 Asian economies	1992-2009	insig	insig		-ve	NPLs, capital-asset ratio positively related to LLP; GDP growth positively related to provisioning for small bank subsample only.

+ve = positive; -ve = negative; insig = insignificant.

Table 2: Provisioning Practices in Selected Jurisdictions

	CN	HK	ID	IN	KR	MY	PH	SG	TH
Convergence to International Standards									
General Provisions†	✓	✓ 1	✓	✓ 2	✓	✓	✓	✓	✓
Adoption of IAS 39	✓ 3	✓ 4	✓ 5		✓ 5	✓ 5	✓ 4	✓ 4	✓ 5
Strengthening Loan Classifications			✓ 6	✓ 6					
National Discretion									
Increase in Specific Provisions	✓ 7				✓				✓ 8
Increase in General Provisions	✓ 7			✓	✓				
Differences by Industry Sector				✓	✓				
"Expected Loss" Considerations	✓	9	✓		✓ 10				
Issues of Capital And Incentives††									
Tax Deductibility	✓ 11	✓ 12	na	✓ 12	✓ 12	✓ 12		✓ 13	✓ 12
Capital Allocation	✓	✓ 14	na	✓ 15	✓ 15	na	✓ 16	✓ 14	✓ 14

CN = China; HK = Hong Kong SAR; ID = Indonesia; IN = India; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand.

✓ = yes; blank space = no; na = not available.

Taken from Angklomkliew et al (2009).

1. The Hong Kong Monetary Authority established a Regulatory Reserve without imposing a minimum level but stated that banks are expected to maintain a regulatory reserve of between 0.5% and 1% of total loans.
2. In addition to general provisions, prudential norms require banks to create a "floating provision" which can only be used for predefined contingencies and under extraordinary circumstances as determined by the board; moreover, it may only be used for specific provisions and with prior approval from the Reserve Bank of India.
3. IAS 39 was implemented by all listed banks on 1 January 2007, and in 2009 for all other all other banks.
4. Effective since 2005.
5. Full implementation occurred in 2010 for Indonesia and Malaysia and in 2011 and 2013 for Korea and Thailand respectively.
6. Reducing the number of days past due to assign an adverse supervisory loan grade (i.e. substandard or worse).

7. Raising the NPL coverage ratio to a minimum of 150% by end-2009.
8. Tighter rules for provisioning against NPLs introduced in preparation for the implementation of IAS 39.
9. Reflected in the Regulatory Reserve for loan losses which is part of retained earnings and is in addition to the reserves established under IAS 39.
10. Based on forward-looking criteria which consider the borrower's business and operational environment, financial condition and future cash flow projection.
11. General provisions are tax-deductible.
12. Specific provisions are tax-deductible.
13. General provisions are tax-deductible up to a maximum of 3% of qualifying loans and investments.
14. Aggregate of regulatory reserves and collective impairment allowance is allowed to be included in Tier 2 capital up to a maximum of 1.25% of risk-weighted assets.
15. General provisions may be included in Tier 2 capital up to a maximum of 1.25% of risk-weighted assets.
16. General provisions are allowed to be included in Tier 2 capital up to a maximum of 1% of risk-weighted assets.

† Enhancements for prudential requirements for general provisions.

†† Information in this section is drawn from World Bank, bank loan classification and provisioning practices in selected developed and emerging countries (a survey of current practices in countries represented on the Basel Core Principles Liaison Group), June 2002; and J. Barth, G. Caprio and R. Levine, bank regulation and supervision database, World Bank, 2008.

Source: National Data.

Table 3: Distribution of Sample Banks

By Jurisdiction	Number of Banks	By Rating	Number of Banks
China	29	Aa	4
Hong Kong SAR	1	A	36
India	44	Baa	18
Indonesia	9	Ba	9
Japan	115	Unrated	171
Korea	9		
Malaysia	12		
New Zealand	4		
Philippines	8		
Singapore	1		
Thailand	6		
Total	238	Total	238

Table 4: Summary Statistics of Key Variables

	LLP	LLR	CAR	NPL	DASSET	DLOAN	LOAN ASSET	EBTPTA
Whole Sample	0.43	1.52	11.73	3.28	8.01	8.55	60.59	1.13
	(0.45)	(1.27)	(3.62)	(2.59)	(10.2)	(11.68)	(10.79)	(0.93)
	2,733	2,690	2,643	2,677	2,543	2,543	2,788	2,733
China	0.46	1.34	12.82	2.22	19.47	18.16	51.73	1.71
	(0.37)	(0.99)	(6.1)	(3.26)	(11.94)	(11.72)	(8.68)	(0.74)
	250	257	206	219	233	233	265	250
India	0.52	1.27	12.68	2.58	17.39	20.95	53.71	1.81
	(0.37)	(0.74)	(2.01)	(1.78)	(8.08)	(9.51)	(9.54)	(0.85)
	544	482	554	555	516	516	560	544
Japan	0.35	1.27	10.30	3.59	1.60	1.01	65.79	0.50
	(0.42)	(0.78)	(2.23)	(2.15)	(3.95)	(4.04)	(7.34)	(0.36)
	1415	1430	1429	1428	1314	1314	1430	1415
South-East Asia[1]	0.55	3.13	15.19	4.66	10.71	11.48	56.51	2.05
	(0.61)	(2.21)	(4.97)	(3.91)	(9.75)	(12.3)	(12.37)	(1.02)
	365	366	339	336	331	331	369	365

LLP = ratio of loan loss provisions over total assets; LLR = ratio of loan loss reserves over total assets; CAR = ratio of total capital over risk-weighted assets; NPL = ratio of non-performing loans over total assets; DASSET = growth rate of total assets; DLOAN = growth rate of bank loans; LOANASSET = ratio of bank loans over total assets; EBTPTA = ratio of earnings before tax and provisions over total assets. The unit of scale is in percentage points for all variables. In each cell, the first number represents sample mean and the second number (in parenthesis) its standard deviation, and the third number represents the number of bank-year observations.

1. Indonesia, Malaysia, the Philippines and Thailand.

Table 5: Determination of Loan Loss Provisions: Panel-Data Regression

Explanatory Variables	Dependent Variable: LLP		Dependent Variable: ΔLLP	
	OLS		Dynamic GMM	
	Coefficient	t-statistics	Coefficient	t-statistics
LLP(-1)	0.21	6.12	-0.07	-4.54
NPL (%)	5.51	5.86	8.08	10.99
LOANASSET (%)	0.23	2.27	0.27	2.04
CAR (%)	-1.07	-3.23	-1.25	-5.06
DLOAN (%)	-0.90	-6.01	-0.56	-7.73
EBTPTA (%)	15.00	7.50	16.75	10.63
DGDP (%)	0.87	1.87	0.23	1.46
Adjust-R^2	0.41			
Country Dummies	Yes		No	
Year Dummies	Yes		Yes	
Number of Observations	2,350		2,112	

The dependent variable (LLP) is defined as the ratio of loan loss provisions over total assets. Explanatory variables include lagged dependent variable, the ratio of non-performing loans over total assets (NPL), the ratio of bank loans over total assets (LOANASSET), capital adequacy ratio (CAR, the ratio of total capital over risk-weighted assets), the growth rate of bank loans (DLOAN), the ratio of earnings before tax and provisions over total assets (EBTPTA) and the growth rate of real GDP (DGDP). All variables are scaled in per cent except for LLP (in basis points). Two estimation methods are used. The first method is to use panel OLS regression, with country dummies and time dummies (by year) as additional variables. The t-statistics are calculated based on clustered standard errors grouped by banks (Peterson (2009)). The second method is to use the dynamic GMM approach proposed by Arellano and Bond (1991), using first differences. Period fixed effects are included and instruments for the endogenous variables use lags 2 to 3 for explanatory variables. The t-statistics are calculated based on a White period weighted covariance matrix.

Table 6: Determination of Loan Loss Provisions (Baseline Analysis): By Country/Region

Explanatory Variables	Dependent Variable: LLP							
	China		India		Japan		South-East Asia	
LLP(-1)	0.29	***	0.31	***	0.03		0.30	***
NPL (%)	5.33	***	6.56	***	7.97	***	4.75	***
LOANASSET (%)	0.08		0.28		-0.08		0.07	
CAR (%)	0.11		-3.16	***	-2.07	***	-0.05	
DLOAN (%)	-0.42		-0.89	***	-2.42	***	-0.47	
EBTPTA (%)	16.47	***	13.85	***	4.93		21.22	***
DGDP (%)	-1.64		11.47	**	21.58	***	-4.34	*
Adjust-R^2	0.42		0.59		0.44		0.38	
Year Dummies	Yes		Yes		Yes		Yes	
Number of Observations	176		492		1,291		290	

The dependent variable (LLP) is the ratio of loan loss provisions over total assets. Explanatory variables are defined in Table 5. Estimation method: panel OLS regression with time dummies. The t-statistics are calculated based on clustered standard errors grouped by banks (Peterson (2009)). The subgroup "Southeast Asia" in the last column includes all banks from Indonesia, Malaysia, the Philippines and Thailand.

*, ** and *** represent statistical significance at 90%, 95% and 99%, respectively.

Table 7: Determination of Loan Loss Provisions in China

Explanatory Variables	Dependent Variable: LLP									
	(I)		(II)		(III)		(IV)		(V)	
LLP(-1)	0.26	***	0.26	***	0.28	***	0.27	***	0.29	***
NPL	4.12	***	4.53	***	5.10	**	4.77	***	4.76	***
LOANASSET	-0.14		0.09		0.10		0.01		0.08	
CAR	0.36		0.12		0.18		0.23		0.27	
DLOAN	-0.54		-0.72	*	-0.63	*	-0.66	*	-0.65	*
EBTPTA	21.52	***	8.82		13.82	*	18.65	**	18.20	***
DGDP	-0.54		-0.08		-1.06		-1.22		-2.05	
EBTPTA*LARGE	-20.43	***								
EBTPTA*HIGH_GROWTH			9.04							
EBTPTA*HIGH_NPL					27.81					
EBTPTA*HIGH_CAP							-6.16			
EBTPTA*LOW_CAP							4.30			
EBTPTA*2007-09 CRISIS									-10.01	
DGDP*LARGE	2.93	***								
DGDP*HIGH_GROWTH			-1.33							
DGDP*HIGH_NPL					-3.57					
DGDP*HIGH_CAP							0.87			
DGDP*LOW_CAP							-0.43			
DGDP*2007-09 CRISIS									4.87	*
Adjusted-R^2	0.39		0.37		0.35		0.34		0.36	
Year Dummies	Yes		Yes		Yes		Yes		Yes	
Number of Observations	154		154		154		154		154	

LLP is the ratio of loan loss provisions over total assets. Explanatory variables are defined in Table 5 with additional interactive terms with earnings (EBTPTA) and GDP growth (DGDP). The additional variables included in the interactive terms are: a dummy for large banks (ranked as one of the top 1,000 in The Banker's global ranking in 2012) in model I, a dummy for high asset growth (year-on-year asset growth exceeding 15%) in model II, a dummy for high NPL ratios (exceeding 5%) in model III, two dummies representing well-capitalized (capital adequacy ratios exceeding 12%) and low-capitalized banks (below 8%) in model IV, and a dummy variable indicating the period of the global financial crisis (2007–09)

in model V. Estimation method: panel OLS regression with time dummies; the t-statistics are calculated based on clustered standard errors grouped by banks (Peterson (2009)).

*, ** and *** represent statistical significance at 90%, 95% and 99%, respectively.

Table 8: Determination of Loan Loss Provisions in India

Explanatory Variables	Dependent Variable: LLP									
	(I)		(II)		(III)		(IV)		(V)	
LLP(-1)	0.31	***	0.32	***	0.31	***	0.32	***	0.32	***
NPL	6.33	***	6.60	***	9.23	***	6.61	***	6.20	***
LOANASSET	0.20		0.30		0.25		0.28		0.40	**
CAR	-3.32	***	-3.04	***	-3.04	***	-3.70	***	-3.13	***
DLOAN	-0.92	***	-0.85	***	-0.83	***	-0.90	***	-0.87	***
EBTPTA	13.58	***	11.33	***	14.53	***	10.79	***	10.42	***
DGDP	12.73	***	11.44	**	9.74	*	13.50	**	10.87	**
EBTPTA*LARGE	2.23									
EBTPTA*HIGH_GROWTH			4.49	*						
EBTPTA*HIGH_NPL					1.21					
EBTPTA*HIGH_CAP							5.52	*		
EBTPTA*LOW_CAP							-0.79			
EBTPTA*2007-09 CRISIS									11.47	**
DGDP*LARGE	0.09									
DGDP*HIGH_GROWTH			-1.27	**						
DGDP*HIGH_NPL					-3.76					
DGDP*HIGH_CAP							-1.24	*		
DGDP*LOW_CAP							-2.72			
DGDP*2007-09 CRISIS									-8.04	***
Adjusted-R^2	0.59		0.59		0.59		0.59		0.60	
Year Dummies	Yes		Yes		Yes		Yes		Yes	
Number of Observations	492		492		492		492		492	

For an explanatory note, see Table 7.

*, ** and *** represent statistical significance at 90%, 95% and 99%, respectively.

Table 9: Determination of Loan Loss Provisions in Japan

Explanatory Variables	Dependent Variable: LLP									
	(I)		(II)		(III)		(IV)		(V)	
LLP(-1)	0.03		0.03		0.03		0.02		0.03	
NPL	7.62	***	7.64	***	7.75	***	7.49	***	7.68	***
LOANASSET	-0.07		-0.07		-0.06		-0.03		0.06	
CAR	-2.07	***	-2.25	***	-2.13	***	-2.36	***	-2.13	***
DLOAN	-2.51	***	-2.61	***	-2.51	***	-2.50	***	-2.53	***
EBTPTA	7.58		5.96	*	6.75		5.23		6.53	
DGDP	21.56	**	23.04	***	21.22	**	21.55	**	21.13	**
EBTPTA*LARGE	-3.07									
EBTPTA*HIGH_GROWTH			-1.52							
EBTPTA*HIGH_NPL					-3.99					
EBTPTA*HIGH_CAP							5.17			
EBTPTA*LOW_CAP							-0.92			
EBTPTA*2007-09 CRISIS									-2.88	
DGDP*LARGE	-0.24									
DGDP*HIGH_GROWTH			26.10	*						
DGDP*HIGH_NPL					1.98					
DGDP*HIGH_CAP							0.35			
DGDP*LOW_CAP							4.10			
DGDP*2007-09 CRISIS									-26.19	**
Adjusted-R^2	0.43		0.43		0.43		0.43		0.43	
Year Dummies	Yes		Yes		Yes		Yes		Yes	
Number of Observations	1,279		1,279		1,279		1,279		1,279	

For an explanatory note, see Table 7.

*, ** and *** represent statistical significance at 90%, 95% and 99%, respectively.

Table 10: Determination of Loan Loss Provisions in Southeast Asia

Explanatory Variables	Dependent Variable: LLP									
	(I)		(II)		(III)		(IV)		(V)	
LLP(-1)	0.29	***	0.29	***	0.29	***	0.30	***	0.28	***
NPL	3.68	*	4.07	**	3.50		3.90	**	4.12	**
LOANASSET	0.17		0.17		0.19		0.21		0.19	
CAR	1.35	*	1.01		1.07		1.29		1.44	*
DLOAN	-0.51		-0.65	*	-0.49		-0.48		-0.54	
EBTPTA	19.53	***	18.18	***	20.40	***	18.39	***	20.71	***
DGDP	-0.84		0.23		-0.61	*	3.74		-3.95	
EBTPTA*LARGE	-1.56									
EBTPTA*HIGH_GROWTH			7.65	***						
EBTPTA*HIGH_NPL					1.88					
EBTPTA*HIGH_CAP							2.83			
EBTPTA*LOW_CAP							-33.97			
EBTPTA*2007-09 CRISIS									-1.24	
DGDP*LARGE	0.58									
DGDP*HIGH_GROWTH			-3.29							
DGDP*HIGH_NPL					0.67					
DGDP*HIGH_CAP							-4.85			
DGDP*LOW_CAP							-29.76			
DGDP*2007-09 CRISIS									13.27	*
Adjusted-R^2	0.37		0.38		0.37		0.37		0.38	
Year Dummies	Yes		Yes		Yes		Yes		Yes	
Number of Observations	274		274		274		274		274	

For an explanatory note, see Table 7.

*, ** and *** represent statistical significance at 90%, 95% and 99%, respectively.

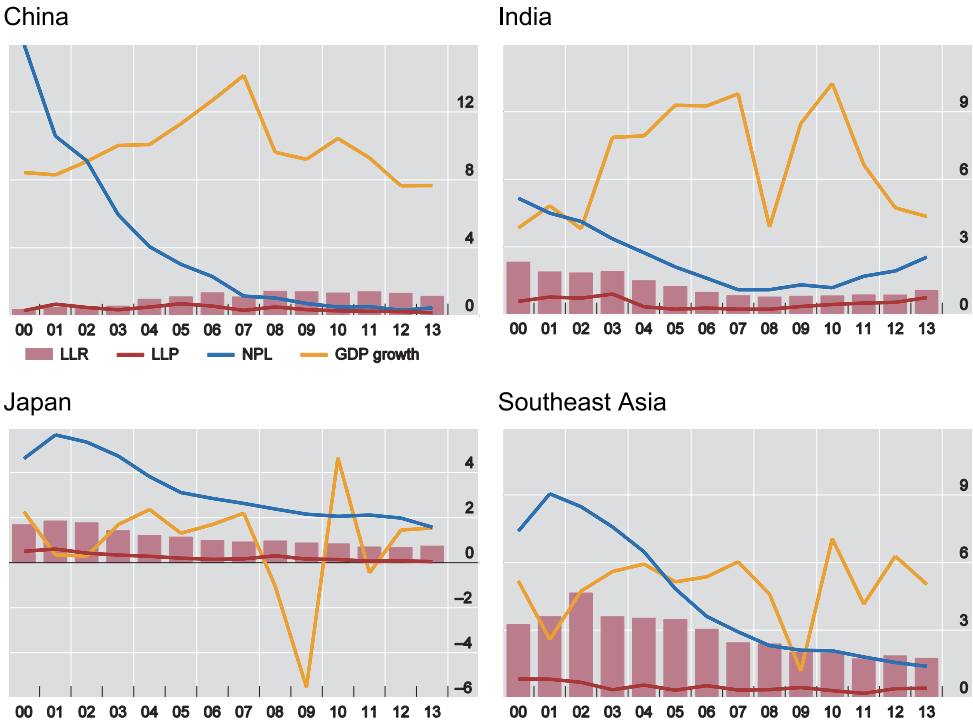
Table 11: Determination of Loan Loss Provisions: By Country/Region (Replacing GDP Growth with Output Gap)

Explanatory Variables	Dependent Variable: LLP							
	China		India		Japan		Southeast Asia	
LLP(-1)	0.29	***	0.31	***	0.03		0.30	***
NPL (%)	5.33	***	6.56	***	7.97	***	4.57	**
LOANASSET (%)	0.08		0.28		-0.08		0.20	
CAR (%)	0.11		-3.16	***	-2.07	***	0.01	
DLOAN (%)	-0.42		-0.89	***	-2.42	***	-0.49	
EBTPTA (%)	16.47	***	13.85	***	4.93		21.30	***
GAP (%)	-5.20		227.59	**	41.58	**	0.60	
Adjust-R^2	0.42		0.59		0.44		0.37	
Year Dummies	Yes		Yes		Yes		Yes	
Number of Observations	176		492		1291		290	

The model specification is the same as in Table 6, except that GDP growth is replaced by the output gap.

*, ** and *** represent statistical significance at 90%, 95% and 99%, respectively.

Figure 1: Banks' Provisioning Behavior By Country: 2000–13
in Percent



LLR = ratio of loan loss reserves over total assets; LLP = ratio of loan loss provisions over total assets; NPL = ratio of non-performing loans over total assets; GDP growth = annual growth rate of real GDP in each economy. LLR, LLP and NPL are calculated as the median of individual banks in each economy in each year. Southeast Asia includes Indonesia, Malaysia, the Philippines and Thailand, and GDP growth uses weighted averages based on 2005 GDP and PPP exchange rates.

Sources: IMF, World Economic Outlook; Bankscope; Authors' Calculations.

Endnotes

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2. Both the Financial Accounting Standards Board (2012) and IASB (2013) have issued proposals to move from accounting for credit impairment using "incurred loss" models, which delays recognition until the loss is probable or even incurred, to "expected credit loss" models, that recognize expected credit risks. Many experts have argued that "incurred loss" models are not forward looking enough to alert investors to expected credit losses.

3. Namely, that provisions should be based on methodologies that "reflect expected losses … over the life of the loans …". See BCBS (2009).

4. On the flip side, negative coefficients (β_6 and β_7) are evidence of procyclical loan loss provisions.

5. We use two alternative filtering criteria as robustness checks. In the first exercise, we change the percentile thresholds to the 5th and 95th percentile values of the same five variables, and the filtering results are the same. In the second exercise, we use filtering criteria defined in terms of absolute values: (i) the return on assets in absolute terms less than 10%; (ii) the growth rate of bank assets in absolute terms less than 50%; (iii) the growth rate of bank loans in absolute terms less than 50%; (iv) the loan-to-asset ratio in the range of 10% and 90%; and (v) the NPL ratio smaller than 100%. The filtering results are quite similar: 551 banks remain in the sample.

6. In addition to the list of explanatory variables in equation (1), we also examined the impact of other possible factors, eg growth rates of property prices (suggested by Davis and Zhu (2009)) and equity market returns. Neither of them has a significant impact on loan loss provisions.

7. There are two potential caveats associated with the dynamic panel data GMM approach. One is the degree of freedom issue, in that taking first difference and using lagged variables as instruments will significantly reduce the number of observations (our sample data have a relatively short time horizon). In addition, it is not easy to choose the right instrument variables. Therefore, we choose the panel OLS regression as the benchmark approach in this study.

8. However, there were only a few cases of high asset growth of Japanese banks over the sample period (5 out of 934 bank-year observations), so perhaps not too much should be read into this result.

9. Only when the adjusted R-squared is calculated at the three-digit level does there appear to be a slightly worse fit than those of the Table 6 regressions. Unreported regressions in which the credit gap is inserted in place of the GDP gap also have a slightly worse fit than those of Table 6.

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