Macroprudential Regulations in Central America

Alejandro Izquierdo, Rudy Loo-Kung, and Liliana Rojas-Suarez

Abstract

In recent years, and especially in the aftermath of the global financial crisis, a number of emerging-market economies have been reforming their regulatory frameworks to adopt recommendations of the macroprudential approach. This paper discusses the potential usefulness of implementing this approach in Central America. Two major results support serious consideration of this type of policy in the region. First, credit booms in Central America are not only as pronounced as in other emerging economies, they are also associated with significantly lower economic growth during downturns. Regulations that minimize the eruption of credit booms and busts are therefore warranted. Second, simulation exercises involving two of the most popular instruments under the macroprudential approach—reserve requirements and dynamic provisioning—suggest significant potential benefits for the stability of financial systems in the region.

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Alejandro Izquierdo
Inter-American Development Bank

Rudy Loo-Kung
Inter-American Development Bank

Liliana Rojas-Suarez
Center for Global Development

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Center for Global Development
1800 Massachusetts Ave., NW
Washington, DC 20036

202.416.4000
(f) 202.416.4050

www.cgdev.org

Contents

I. Introduction

In the aftermath of the global financial crisis of 2008-09, the design and implementation of macroprudential financial regulations, an approach that underscores the importance of containing systemic risks, has taken center stage in the agendas of policymakers around the world. The key reason is that the crisis made it clear that focusing on indicators of the financial strength of individual financial institutions (a micro approach) is insufficient to prevent the build-up of excessive risk affecting the financial system as a whole, which in turn results in severe systemic banking crises, credit crunches, and contractions in economic growth.

Limiting systemic financial risk translates into avoiding the build-up of asset price bubbles and unsustainable credit booms. In a nutshell, the goal of the macroprudential approach is to minimize the macro (output) costs arising from the behavior of the *aggregate* financial system by containing excessive risk-taking in the overall financial system in *good* times while avoiding sharp contractions in the provision of credit in *bad* times. At the core of the macroprudential approach is the recognition that: (a) the interconnectedness of the activities of financial institutions and markets generates risk that goes beyond the risk profile of individual entities; and (b) aggregate risk varies over time (the *time dimension* component of the macroprudential approach, as termed by Borio (2009)).[1]

In contrast to the microprudential approach, where there is consensus about the ratios of financial soundness that supervisors need to monitor,[2] there is no agreement regarding the full list of tools that need to be part of the regulators' macroprudential toolkit. To a certain extent, this is because some of the recommendations advanced under the macroprudential approach overlap with instruments that are used for the conduct of other types of policies. The use of reserve requirements, a typical instrument of monetary policy, is a case in point. And differences in the degree of financial sector development imply that some of the recommendations are not applicable to countries with a low degree of financial depth. An example is the implementation of minimum margins on secured lending in cases where the repo markets are underdeveloped.[3] Notwithstanding, there are regulations that enjoy wide support from advocates of the macroprudential approach. The use of countercyclical provisions and capital requirements is the best example.

Other regulations considered under the macroprudential approach include: maximum loan-to-value ratios for mortgages, countercyclical liquidity requirements, and countercyclical

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[1] Points (a) and (b) correspond to Borio's (2009) two-dimensions of the macroprudential approach: the cross-sectional dimension and the time dimension.

[2] Typical indicators of financial soundness are capital and liquidity ratios, the ratio of nonperforming loans to total loans, profitability, and efficiency ratios.

[3] In the United States, before the crisis, an important share of financial transactions among large financial institutions (including those with a lower level of regulation than banks—so-called "shadow banking") took place through repurchase agreements (repos). This type of instrument is much less developed in a large number of developing countries.

constraints on currency mismatches. The implementation of administrative caps on aggregate lending is controversial. Even more controversial is the use of capital controls for macroprudential purposes.[4]

An increasing number of emerging market economies, including in Latin America, have started to incorporate the recommendations of the macroprudential approach. For example, while a number of Asian countries (China; Hong Kong SAR, China; Korea; Malaysia; and Singapore) have in place caps on loan-to-value ratios for property lending, the number of Latin American countries adopting countercyclical provisioning requirements (Bolivia, Colombia, Peru, and Uruguay) is expanding. Indeed, it is fair to say that emerging market economies, as opposed to developed countries, are taking the lead in the implementation of these types of policies. Given the current state of financial weaknesses in the latter set of countries, this is not surprising.

This paper examines the potential benefits that a group of Central American countries could derive from implementing (or deepening the use of) macroprudential financial regulations. In particular, we focus on two macroprudential tools that other Latin American countries have begun to use actively with significant success: reserve requirements as a tool to smooth the cycle behavior of bank credit, and countercyclical provisioning. These two instruments center on the *time dimension* component of the macroprudential approach. In this context, the key questions that the paper aims to answer are: What are the lessons for Central American countries from the recent implementation of the macroprudential approach in other Latin American countries? And, based on this experience, is there any indication that the recommendations from the macroprudential approach could be useful for regulators and supervisors in Central America?

Over the past decade, Central American countries have initiated a process to reform their regulatory and supervisory frameworks. Therefore, consideration of the new proposals under the macroprudential approach is not only timely for the region but essential for supporting the authorities' ongoing efforts to improve the strength of their financial systems.

The analysis in this paper includes six countries: Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, and Nicaragua. The extent of discussion of the different issues considered varies significantly by country due to data availability. Further analysis at each country level is therefore needed to complement the results presented here.

To reach our objectives, the rest of the paper is organized as follows. Section II describes the characteristics of credit cycles in Central America and compares them with cycles in other emerging markets. It provides important information on the relevance of the use of macroprudential regulations in Central America as mechanisms to prevent the damaging effects of credit booms and crunches. Sections III and IV consider the potential benefits of implementing two of the most popular macroprudential regulations in Central America:

[4] A list of macroprudential tools can be found in Elliott (2011).

reserve requirements, when used for countercyclical purposes, and dynamic provisioning. Section III documents the use of reserve requirements in Central American countries and discusses the factors that condition its effectiveness. In doing so, it highlights the potential merits of this instrument if used as a macroprudential tool. Section IV briefly discusses the key features of some dynamic provisioning schemes currently in place in South America. Simulations of the behavior of loan-loss provisions in El Salvador under the assumption that formulas used in Peru and Bolivia are adopted shed light on the potential usefulness of this regulation. Section V concludes.

II. Credit Cycles in Central America

The fundamental role of macroprudential regulations is to minimize the macroeconomic costs of a financial crisis by avoiding bubbles in asset prices and limiting credit crunches and their potential effects on economic growth. Thus, when analyzing the relevance of macroprudential regulations to Central American countries, it is important to determine the characteristics of these countries' credit dynamics. More specifically: Are there boom-bust credit cycles in Central America? If so, does their magnitude warrant the use of macroprudential regulations?

Recent empirical research has made important methodological progress in identifying credit booms systematically and analyzing their anatomy as well as their interaction with business cycles.[5] This literature shows that credit booms in emerging markets tend to be larger than in developed economies. Moreover, evidence shows that credit booms that end up in a financial crisis produce more severe credit crunches and higher output losses in emerging markets. We use the set of tools developed by this literature to analyze credit dynamics in Central American countries, which have been largely excluded from the analysis. More precisely, we follow the methodology developed by Mendoza and Terrones (2008), MT hereafter, to identify credit booms in Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, and Nicaragua. This *threshold method* splits per capita real credit into its cyclical and trend components, and defines credit booms as episodes in which credit exceeds its trend by more than a given threshold.[6] Unlike other methodologies, thresholds are proportional to each country's credit volatility (as opposed to the credit volatility of the whole sample). Therefore, credit booms reflect country-specific "unusually large" cyclical credit expansions.

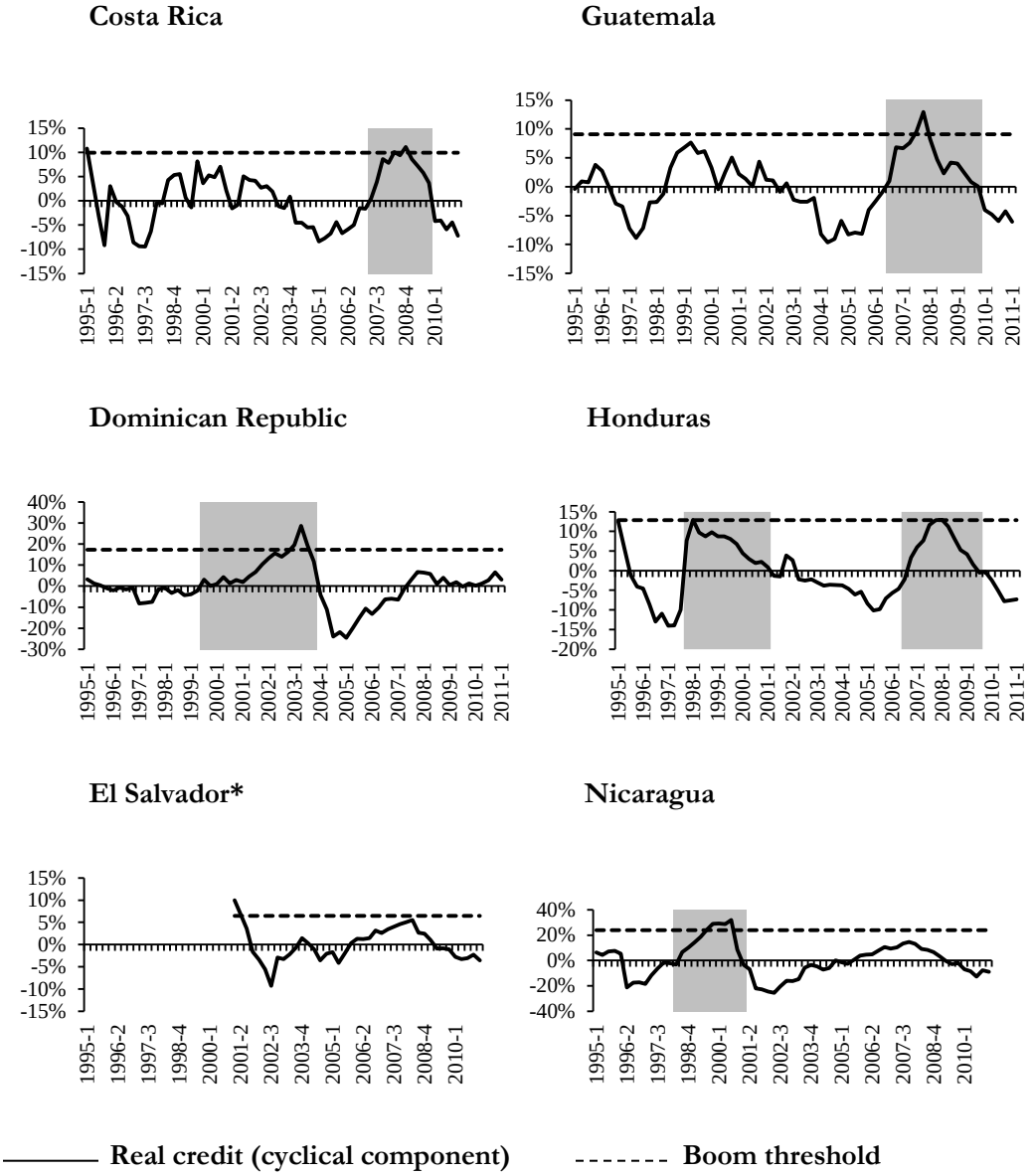
We apply the MT methodology to a sample of 23 emerging economies using quarterly data from 1995Q1 to 2011Q2. In addition to the six Central American countries, we consider emerging countries from Latin America (7), Asia (5), and Europe (5). Our measure of real credit is constructed as the stock of bank credit to the private nonfinancial sector from the IMF International Financial Statistics Database (line 22d) deflated by the Consumer Price

[5] See Claessens et al. (2011) and the references therein.

[6] The threshold used by MT is set at 1.75 times the standard deviation of the cyclical component.

Index (line 64).[7] We find 23 credit booms in our sample (see Appendix 1), six of which occurred in the Central American countries. These episodes are shown in Figure 1.

Figure 1: Credit Cycles in Central America



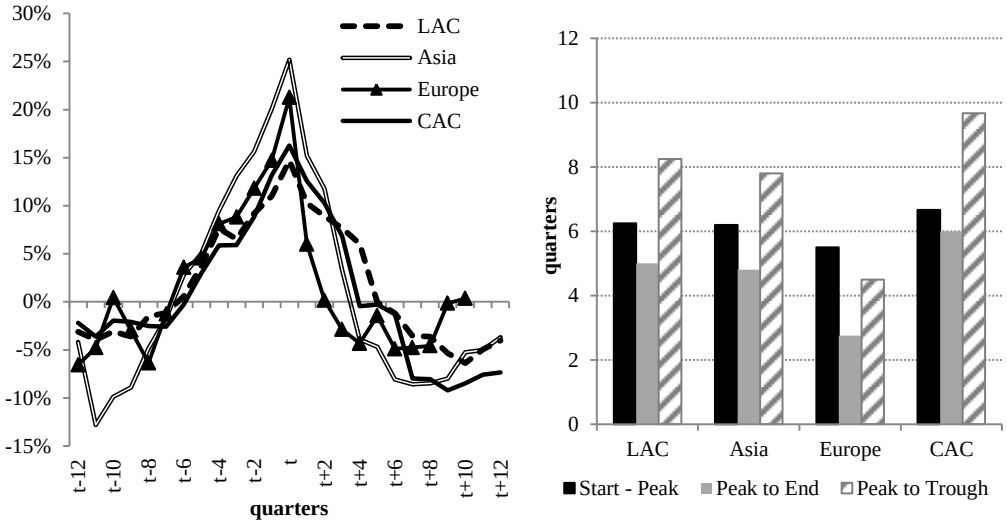
Note: *In the case of El Salvador, we only consider the post-dollarization period. Shaded areas indicate the duration of the boom.
Source: Own calculations.

[7] In some cases, data from the IFS were complemented with data from official sources. Unlike MT, we use quarterly data, rather than annual data, to better identify the timing of these episodes. Since population data are not available at a quarterly frequency, we do not analyze per capita figures like MT.

To provide a summary view of the credit booms identified, we plot the cross-country mean of the cyclical components of real credit in a six-year event window centered at the peak of the credit booms for each of the regions considered. As shown in Figure 2A, credit booms in the Central American countries display similar features as those observed in other emerging regions. At the peaks of the booms, the average deviation in real credit above trend reached almost 16 percent, similar to Latin American countries (15 percent) but smaller than the deviations observed in Emerging Europe (21 percent) and Asia (25 percent). The size of subsequent adjustment (that is, the difference between the deviations at the peak and the trough that follows) in the Central American countries is 28 percent, higher than in the Latin American countries (23 percent), but smaller than in the European (32 percent) and Asian (38 percent) countries included in the sample.

Figure 2: Credit Booms

(A) Average (log) Deviations from HP-trend (B) Duration of Credit Booms



Note: Simple averages within regions. Central American countries (CAC): Honduras, Costa Rica, Guatemala, Nicaragua, Dominican Republic, and El Salvador. Latin American countries (LAC): Argentina, Brazil, Colombia, Mexico, Peru, and Venezuela. Asia: Thailand, Malaysia, Indonesia, Korea, and the Philippines. Europe: Poland, Czech Republic, Hungary, Russia, and Turkey.
Source: Own calculations.

We also find some similarities across regions in terms of the duration of credit booms. We define the "start" of the boom episode as the date prior to the peak in which real credit surpasses its long-term trend. Similarly, we set the "end" date as the one on which real credit returns back to trend. Figure 2B shows the average length of the upturn and downturn phases of these episodes defined according to these dates. In general, we find that credit booms in our sample tend to be asymmetric: the upturn phase (from the start to the peak) tends to be longer than the downturn (from the peak to the end) – consistent with the

findings in MT. However, the asymmetry is lower in the Central American countries. The results show that the duration of the upturn phase is strikingly similar across regions. In the case of the Central American countries, this phase lasts 6.7 quarters, slightly longer than in the Latin American countries (6.3 quarters), Asia (6.2 quarters), and Europe (5.5 quarters). However, the dynamics of the adjustment show more marked differences. The results indicate that the duration of the downturn phase of the episodes tends to be longer in the Central American countries (6.0 quarters) than in Latin America, Asia, and Europe, where this phase lasts for 5.0, 4.8, and 2.8 quarters, respectively. A similar result is observed if one considers the adjustment between the peak and trough of these episodes.

We next analyze the relation between credit and output dynamics. For this purpose, we compare the average year-on-year growth rate of quarterly real gross domestic product (GDP) during the two years ending at the peak date of the identified credit boom in the Central American countries (which roughly corresponds to the average duration of the upturn phase) with the average growth rates observed during the first and second years after the peak of the credit booms. Table 1 shows that credit booms in the Central American countries are associated with periods of economic expansion, at rates that are typically higher than the long-term growth rate (column 2 vs. column 1), with Dominican Republic being the only exception.

Table 1: Growth Rate Differences before and after the Peak of Identified Credit Booms in the Central American Countries

Episode	Average real GDP growth 1960-2010	Average real GDP growth 2 years prior the peak	Average real GDP growth after the peak	
			1st year after	2nd year after
	(1)	(2)	(3)	(4)
Honduras (98-I)	4.0%	7.8%	1.6%	2.9%
Honduras (08-I)	4.0%	7.0%	0.8%	-1.7%
Costa Rica (08-IV)	4.8%	5.4%	-1.3%	4.2%
Guatemala (03-IV)	3.9%	5.9%	3.3%	0.5%
Nicaragua (00-III)	2.7%	5.1%	2.8%	2.9%
Dominican Rep. (03-II)	5.4%	4.3%	-0.6%	5.4%

Notes: Dates in parentheses indicate the date of the peak for each episode. In the case of Honduras, the Indicator of Economic Activity was used instead of GDP due to lack of quarterly GDP figures. Source: Own calculations.

In addition, the data show that these upswings are followed by a sharp decline in GDP growth rates that, with the exception of Nicaragua, remain below the long-term trend (columns 3 and 4). For instance, in the case of Honduras in 2008, the difference between the average GDP growth recorded two years prior to the credit boom peak and during the following year was 6.2 percentage points. During the second year, this difference widened as

GDP growth rates entered negative territory. In the episode identified in Nicaragua (which exhibited the lowest growth deceleration on impact in absolute terms), average real GDP growth during the first year after the peak declined to almost half the rate observed during the boom.

In sum, we find evidence that suggests that credit booms in Central America are not only as pronounced as in other emerging economies, but also they are associated with significantly lower economic growth in the downturn. Considering the implementation of financial regulations aimed at minimizing the eruption of credit booms and credit busts (crunches) is, therefore, warranted in these countries. We now turn to the analysis of two of these types of regulations: (a) reserve requirements as a macroprudential instrument, and (b) countercyclical provisioning.

III. Reserve Requirements as a Macro-prudential Instrument

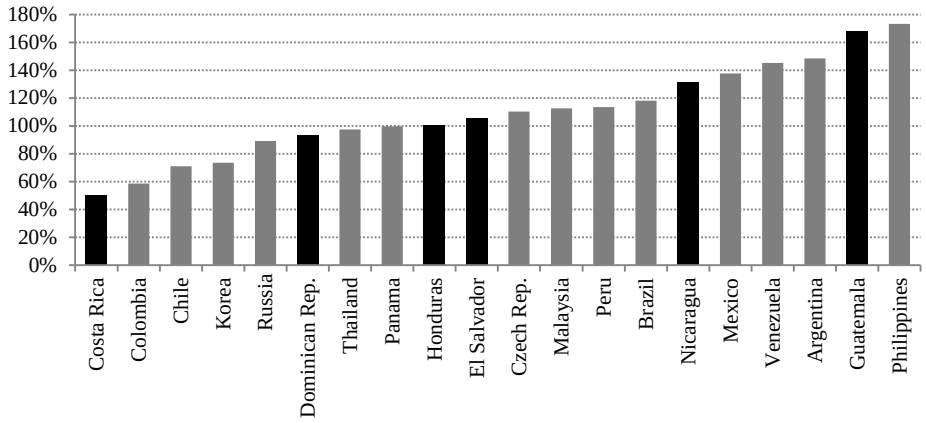
The attractiveness of using reserve requirements as a macroprudential tool is that this instrument directly impacts credit supply. By requiring banking institutions to hold a fraction of their deposits (in the form of either cash or deposits at the monetary authority remunerated at below-market rates), reserve requirements act as an implicit tax on financial intermediation. Thus, by altering the cost of funding, this policy instrument may be useful to reduce the volatility of credit. Increasing reserve requirements can restrain credit growth during expansions, while reducing them during downturns can provide additional resources to limit credit contractions.

As noted by León and Quispe (2010), reserve requirements may be particularly useful in situations when the traditional mechanism of using the policy rate to influence the behavior of credit (through its effect on the term structure of market-determined interest rates) is weak because of financial stress, which leads to significant increases in risk aversion and unusual increases in the demand for liquidity. In their search for liquidity, banks might significantly reduce their provision of credit to the private sector. In these situations, central banks can lower reserve requirements, freeing funding resources that banks can use to supply credit. At the opposite end, when credit is growing rapidly, fueling the formation of a credit boom, reserve requirements may be used to complement conventional monetary policy to maintain financial stability. For instance, during episodes of strong capital inflows and high inflationary pressures, interest rate hikes could restrain inflation but they may also attract more capital, which in turn can fuel further credit expansion. This counterproductive effect can be partially offset by an increase in reserve requirements, which induces banks to increase their intermediation spreads through higher lending rates, lower deposit rates, or both.[8]

[8] Reinhart and Reinhart (1999) find that increases in reserve requirements in emerging markets tend to raise lending rates and reduce deposit rates.

In order for changes in reserve requirements to affect credit dynamics, at least two *necessary* conditions need to be in place. First, bank liabilities subject to reserve requirements need to be an important source of funding for credit. If not, changes in reserve requirements are likely to produce only marginal changes in interest rate margins and, hence, in credit. This precondition holds for the countries analyzed in this paper, with the exception of Costa Rica where deposits only represent 50 percent of the stock of credit to the private sector (see
Figure 3).

Figure 3: Deposits/Credit to the Private Sector



Source: Own calculations based on IMF-IFS data.

Second, changes in reserve requirements are likely to have a small effect on credit if banks are able to circumvent reserve requirements or if financial systems are well developed. For instance, in the case of the United States, the proliferation of *sweep accounts* has significantly reduced the ability of this instrument to constrain banks. This financial innovation allows depository institutions to shift customers' funds out of checkable accounts that are subject to reserve requirements into highly liquid money market deposit accounts that are not. Furthermore, deep financial systems imply that bank borrowers have alternative sources of funding. Thus, in these cases the presence of reserve requirements would just induce a larger proportion of borrowing transactions taking place through nonbanking financial institutions.

After a period in the 1990s when the use of reserve requirements lost popularity, in recent times the use of this instrument as a macroprudential tool has gained the favor of many central banks in emerging markets. The most important reason for this shift in sentiment was the perception that the benefits for financial stability associated with the use of this

instrument outweigh the potential distortionary effects of this tax on financial intermediation.[9]

Among large emerging markets, Brazil, China, and Turkey have been actively using reserve requirements. These countries lowered rates during the Lehman crisis and increased them again in the period of large capital inflows that emerged in 2010 to mid-2011. Other Latin American countries, such as Colombia and Peru, have also been heavy users of this instrument over the past years. Rojas-Suarez (2011) discusses recent dilemmas faced by Latin American central banks and their use of reserve requirements in the aftermath of the global financial crisis.

Much like these countries, some of the Central American countries actively used reserve requirements to manage liquidity during the 2007-09 financial crisis. As shown in

[9] Research on financial deepening in emerging markets includes a large number of explanatory factors other than reserve requirements.

Figure **4**, three of the six countries considered actively lowered reserve requirements during the crisis.

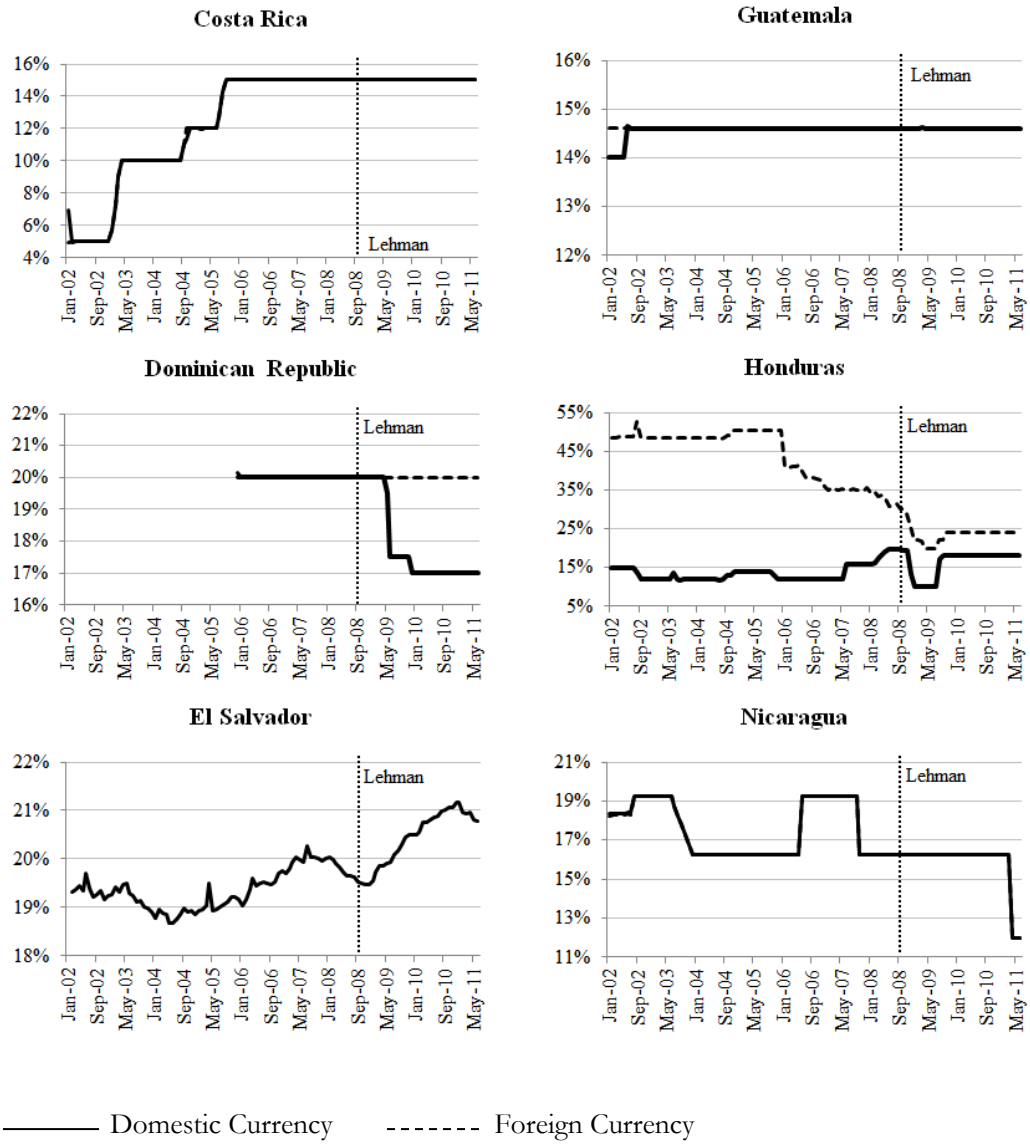
Monetary authorities in the Dominican Republic lowered reserve requirements on local-currency-denominated deposits of the banking system by 250 basis points (from 20 to 17.5 percent) in May 2009. This reduction was followed by an additional 50 basis points cut in December 2009. By contrast, reserve requirements on deposits in foreign currency were unaltered. According to the official statements, this policy was permanent, as envisioned in the Recapitalization Plan of the Central Bank.[10]

In Honduras, the Central Bank lowered reserve requirements in December 2008. However, unlike the Dominican case, the monetary authorities cut reserve requirements differentiating not only according to the currency denomination of deposits, but also according to the structure of the loan portfolios of financial institutions. Reserve requirements on deposits denominated in local and foreign currency for financial institutions providing at least 60 percent of their credit to productive activities were reduced by 500 and 300 basis points, respectively. Moreover, in an effort to increase the incentives to provide credit to these activities, reserve requirements were raised for those institutions that did not meet the criterion (by 7 and 10 percentage points for deposits denominated in local and foreign currencies, respectively).

In October 2007, the Central Bank of Nicaragua (BCN) reduced the legal ratio of reserve requirements by 300 basis points (from 19.25 to 16.25) for both foreign and local currency deposits, reversing a previous increase in June 2006. Due to political uncertainty prior to the

[10] The Recapitalization Plan, approved in 2007, establishes a set of legal and financial mechanisms aimed at reducing the Central Bank's quasi-fiscal deficit, which originated during the banking crisis of 2003-04.

Figure 4: The Use of Reserve Requirements in Central America
Costa Rica



Note: The vertical line marks the date Lehman Brothers filed for bankruptcy. Source: Central Banks.

presidential elections in November 2006, the demand for BCN bonds was lower than expected, compromising the 2006 target for international reserves envisioned in the Monetary Program. In this context, the monetary authorities raised reserve requirements in June 2006 by 300 basis points to compensate financially for the lack of demand for BCN bonds. In October 2007, citing the achievement of macroeconomic and financial stability, the BCN reverted the legal reserve requirement back to the 2004 level.

In Guatemala, the monetary authorities took a different approach. Although the rate of required reserves was not reduced, banks were allowed temporarily to use a broader set of

assets to comply with minimum legal requirements. From November 2008 to April 2009, financial institutions could hold reserves in the form of Treasury bonds, mortgage-backed securities (*Cedulas Hipotecarias FHA*), and term deposits at the Central Bank, in addition to vault cash and demand deposits at the Central Bank.

In the case of El Salvador, domestic conditions precluded the use of reserve requirements as a mechanism to inject liquidity into the financial system in the midst of the financial crisis. Due to high political uncertainty prior to the presidential election (held in March 2009), the financial authorities started to increase reserve requirements in June 2008 to guarantee the availability of sufficient bank liquidity and avoid a possible bank run (Osorio, 2009). After the risk dissipated, reserve requirements were normalized in March 2009.

Finally, the Central Bank of Costa Rica decided to leave the reserve requirement unchanged; it has remained at 15 percent (the maximum value allowed by law) since 2005.[11]

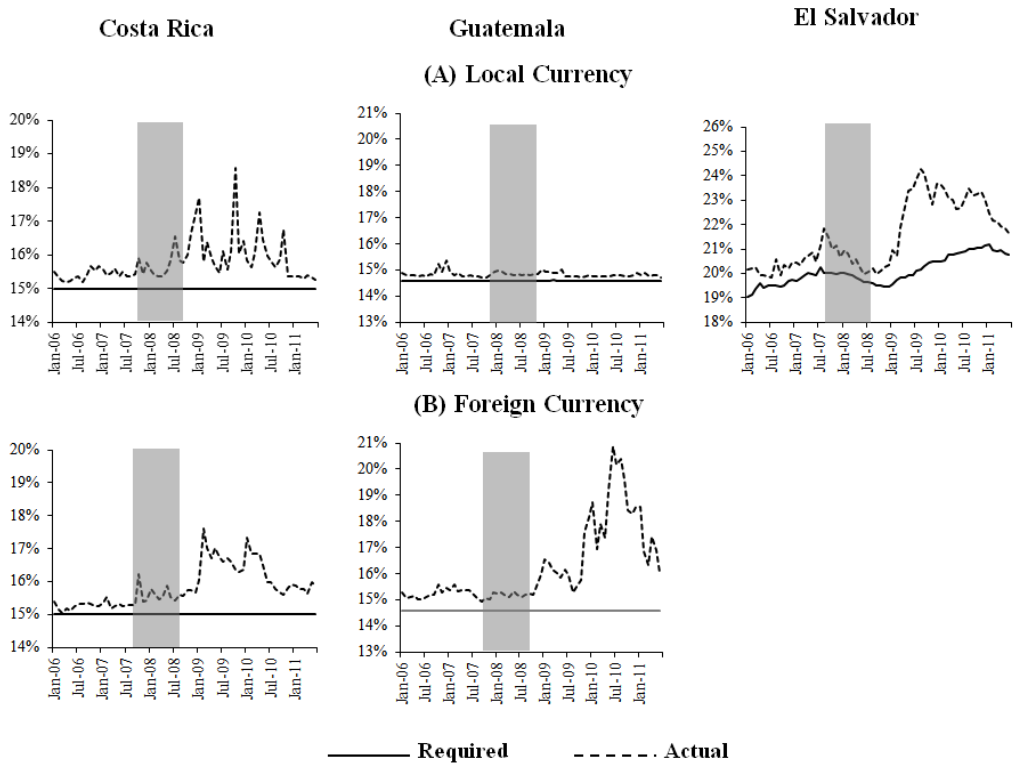
Were the reductions in reserve requirements successful in limiting credit contractions during the international financial crisis? To answer this question, we first look at the actual reserves held by banks to verify if reserve requirements were binding. Figure 5 reveals that the dynamics of actual reserves were heterogeneous not only across countries, but also through time. It is useful for the analysis to distinguish two periods of the financial crisis:

- The pre-Lehman Brothers stage (between August 2007 and August 2008), which was characterized by capital inflows toward emerging markets
- The post-Lehman Brothers stage, associated with a drain of international liquidity from emerging markets.

In Costa Rica, El Salvador, and Guatemala (countries that did not use reserve requirements to manage liquidity around the crisis period), the divergence between required and actual reserves began to widen during the first stage, albeit marginally. During the post-Lehman stage, excess reserves (defined as the difference between actual and required reserves) grew significantly as liquidity shortages in international financial markets intensified.

[11] Without a change in the law, Costa Rican authorities cannot increase reserve requirements. This places significant constraints on the use of the instrument as a countercyclical tool.

Figure 5: Required vs. Actual Bank Reserves

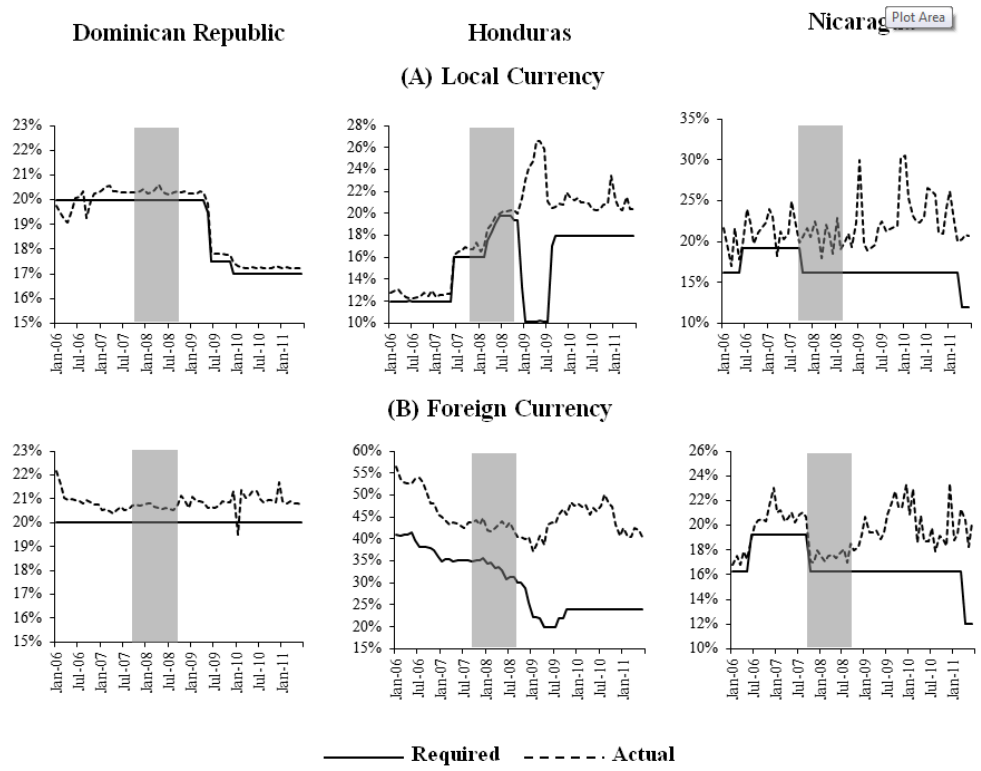


Note: The shaded area indicates the period from August 2007 to September 2008. Source: Central Banks.

A similar situation was observed in Honduras, where cuts in reserve requirements were introduced in the midst of the crisis. From August 2008 onward, banks' increased demand for liquidity translated into larger excess reserves.

In sharp contrast, reserve requirements in Dominican Republic were binding throughout the crisis. Moreover, excess reserves remained close to zero after the reduction in reserve requirements in local currency introduced in May 2009. Reserve requirements were also binding in Nicaragua until the collapse of Lehman. This included the period immediately after the reduction in reserve requirements (especially for deposits denominated in foreign currency). During the post-Lehman stage, however, excess reserves mounted.

Figure 5: Required vs. Actual Reserves (continued)



Note: The shaded area indicates the period from August 2007 to September 2008. Source: Central Banks.

The fact that reserve requirements were binding in both Dominican Republic and Nicaragua (at least during the first stage of the crisis) indicates that banks' demand for liquid assets that qualified as reserves did not increase, relative to deposits. However, this does not imply necessarily that the resources freed by the corresponding reductions in reserve requirements were channeled to credit (alternatively, banks could have increased their holdings of other assets). In order to pin down the destination of the freed resources, we look at the changes in the asset structure of banks right after the reduction of reserve requirements.

Let t be the month in which reserve requirements were cut. We calculate the difference in banks' assets between one month prior to the policy implementation (t-1) and three months after (t+3). Differences are then normalized by the amount of freed resources, denoted by f and defined as:

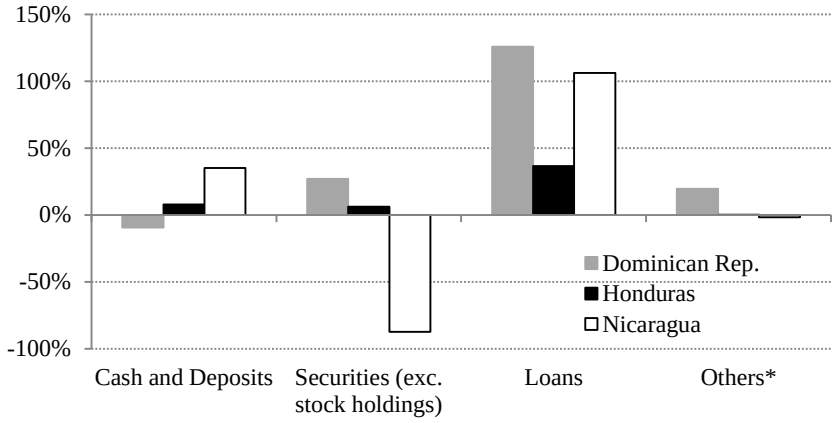
$$f = D_{t-1}\left(rr_{t+3} - rr_{t-1}\right)$$

where D is the stock of banks' liabilities subject to reserve requirements and rr is the rate of reserve requirements. The results are shown in

Figure 6.

Figure 6: Changes in the Asset Structure of the Banking System between *t-1* and *t+3*

(% of freed resources)



* "Others" include stocks, equity investments, other accounts receivable, and nonfinancial assets.
Source: Own calculations.

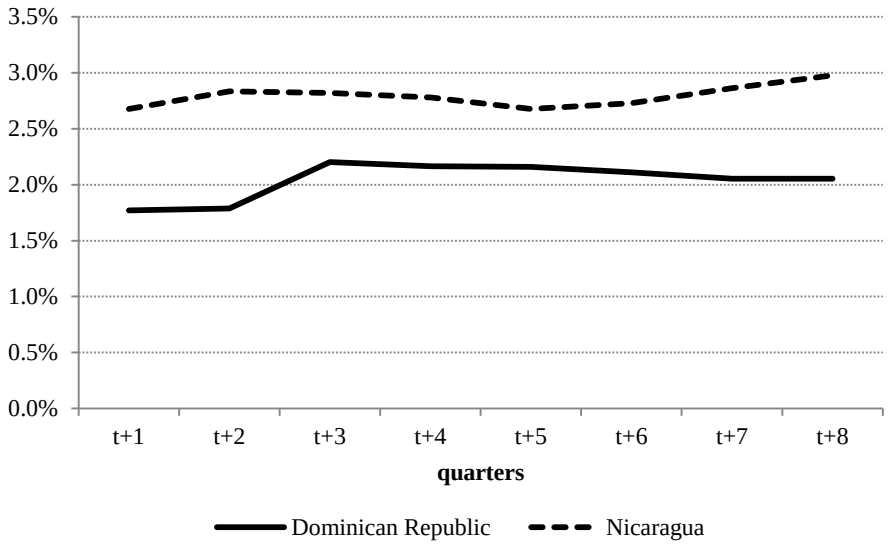
The calculations shown above suggest that lowering reserve requirements was very effective in increasing credit in Dominican Republic and Nicaragua. In contrast, the effectiveness of a similar policy was much lower in Honduras. In this latter case, the increase in bank loans as a proportion of resources freed by the reduction in reserve requirements was one-third of the ratio reached in Nicaragua and about one-fourth of the corresponding ratio in Dominican Republic.

To shed additional light on the potential usefulness of reserve requirements as a macroprudential tool in Central America, we conduct a counterfactual exercise for Dominican Republic and Nicaragua. Specifically, we follow Montoro and Moreno (2011) and simulate the path of credit *if reserve requirements had not changed*. In this counterfactual exercise, simulated credit equals actual credit less the resources freed by the reduction in reserve requirements. That is, we are assuming that all the resources released by the reduction in reserve requirements directly affected credit on a one-to-one basis.[12]

[12] As noted by Montoro and Moreno (2011), this assumption implies that we are calculating the upper bound estimate of the effects on credit.

Figure 7: Counterfactual Effects of Reserve Requirement Cuts on Credit

(% of observed credit)



Note: Period *t* denotes the date when reserve requirements were lowered.
Source: Own calculations.

Figure 7shows the percentage difference between the observed and the simulated stock of credit, where the latter assumes that reserve requirements were not lowered. Period *t* indicates the time when reserve requirements were actually reduced. The estimates indicate that in the Dominican Republic, the 250bp-reduction in reserve requirements (later followed by an additional 50bp cut in *t+2*) may have produced a 2.2 percent increase in the stock of credit one year after the policy was implemented (*t+4*). In the case of Nicaragua, the calculated impact is larger. One year after the BCN cut reserve requirements by 300 basis points, credit increased by 2.8 percent, relative to the counterfactual scenario of inaction.

As this analysis suggests, in Central America reserve requirements can indeed be a useful macroprudential tool that has the potential to contribute to avoiding the formation of credit booms and busts. However, the discussion has also shown that reserve requirements are no panacea. Successful experiences indicate that to have a meaningful impact on credit dynamics, they may need to be complemented with additional macroprudential tools. During episodes of high financial stress (like the 2007-2009 financial crisis), global liquidity shortage can make banks reluctant to extend credit. Before the crisis, ensuring the availability of liquidity (through the accumulation of international reserves and high liquidity requirements on banks) may allow central banks to complement cuts in reserve requirements during a crisis with measures (like reducing remuneration on reserves or expanding liquidity support) aimed at reducing banks' incentives to hold liquidity and increase the chances that freed resources are channeled to credit. The Peruvian experience is a case in point (see Box 1).

Banks' provisioning requirements designed to avoid pro-cyclicality (the so-called dynamic provisioning) are among other key macroprudential tools that can complement the role of reserve requirements. We now turn to the discussion of dynamic provisioning and its potential usefulness for the case of Central America.

Box 1: The Use of Reserve Requirements in Peru

Peru's economic resilience during the global financial crisis was a result of pro-active policy response and sound fundamentals (IMF, 2010). Prudent macroeconomic policies in prior years allowed Peru during the crisis to implement countercyclical policies that helped to avoid a credit crunch and sustain growth. Among the set of monetary instruments, reserve requirements constituted one of the principal instruments in the countercyclical monetary response.

During the first phase of financial crisis prior to the Lehman Brothers bankruptcy (August 2007 to August 2008), the Peruvian Central Bank (BCRP) raised reserve requirements and policy rates to deal with significant capital inflows and restrain rapid credit growth and economic overheating. Marginal reserve requirements were raised from 6 and 30 percent to 25 and 49 percent on domestic and foreign currency deposits, respectively. In addition, the rate of marginal reserve requirements for deposits of nonresidents was set at 120 percent.

With the collapse of Lehman Brothers, external financial conditions deteriorated and international liquidity became tighter. In this context, the BCRP quickly shifted toward a supportive stance. Previous increases in reserve requirements were reversed to the levels observed prior to the start of the global crisis. This measure was complemented with a set of policies that allowed the financial system more flexible liquidity management: policy rates were reduced, the amount and maturity of the Central Bank's REPO were increased, and a new swap facility was created.

This policy response prevented significant disruptions in credit dynamics. According to Montoro and Moreno (2011), the increase in reserve requirements in the pre-Lehman period may have reduced credit to the private sector by around 4 percent of GDP before the crisis, while the subsequent reduction allowed an expansion of a similar magnitude.

What are the key lessons that can be drawn from the Peruvian experience? The Peruvian case highlights the importance of preemptive policies to tackle downturns. The set of policies implemented during the first stage of the crisis provided appropriate levels of international liquidity and greater credibility for the intervention during the second stage (Quispe and Rossini, 2010). In addition, for reductions in reserve requirements to have a significant impact on credit, it is necessary to implement policies that lower banks' incentives to hold liquidity.

IV. Dynamic Provisioning: Applying South American Rules to Central America

Together with minimum capital requirements, loan loss provisioning requirements are supervisory tools aiming to serve as buffers for banks' loan losses. While capital requirements are designed to buffer the unexpected component of the loan-loss distribution, provisions aim to cushion expected losses. Until recently, the discussion of what constitutes adequate provisioning requirements was mostly based on the *static* (i.e., time-invariant) features of the regulation. In particular, typical recommendations are that loans and other assets need to be correctly classified according to their risk characteristics, and that higher provisioning requirements should be assigned to riskier assets. Since the eruption of the global financial crisis, however, emphasis has turned toward including an additional component in the design of the regulation, namely, the adoption of dynamic provisions whose main objective is to reduce the pro-cyclicality of the banking system. By requiring financial institutions to build a buffer (additional to the *static* buffer) during *good times* in anticipation of credit losses that materialize during *bad times*, dynamic provisions can potentially discourage excessive credit growth during the expansionary phase of the cycle. Similarly, allowing the usage of the accumulated dynamic loan-loss reserves in bad times (to meet static provisioning requirements), when nonperforming loans increase sharply, can help to minimize credit contractions. Dynamic provisions are, therefore, fully consistent with the macroprudential approach to financial regulation.[13]

Dynamic provisioning requirements are designed as a rule so that a well-specified trigger signals the beginning of the period of accumulation of additional reserves (above those required under the static component). An additional trigger lets banks know when these accumulated reserves can be used to meet traditional (static) provisioning requirements. By virtue of being a rule, these mechanisms can reduce policy uncertainties and increase the credibility of the regulatory and supervisory authorities, relative to a discretionary regime. However, as expected, the regulation's effectiveness depends critically on the quality of the ex-ante calibration of the rule according to the cyclical properties of credit and the associated historical rates of loan losses. An inaccurate calibration bears the risk of imposing an unnecessary and costly adjustment on banks and/or generating an insufficient buffer to cover bank losses during downturns.

Dynamic provisioning requirements were first implemented in Spain in 2000. Since then, a number of Latin American countries – Uruguay (2001), Colombia (2007), Peru (2008), and Bolivia (2008) – have implemented this type of regulation, albeit with important differences in the specification of the rule. Dynamic provisioning rules differ not only in how cycles are

[13] Galindo and Rojas-Suarez (2011) assess the quality of provisioning requirements in a number of Latin American countries. Elements from both the microprudential and the macroprudential approaches are considered.

identified (based on systemic or bank-specific factors), but also in the speed at which cyclical provisions are accumulated and used.[14]

To illustrate the potential usefulness of dynamic provisioning for Central America, in what follows we provide simulations for the path of the stock of loan-loss reserves in El Salvador, assuming that two alternative rules are followed: the Peruvian dynamic provisioning rule and the Bolivian rule. In these exercises, we take the path of credit in El Salvador as given; that is, we abstract from the effects of the simulated changes in regulation on credit dynamics.

Like in other Central American countries, the regulation in El Salvador features a time-invariant (static) provisioning mechanism. It specifies constant provision rates that range from 0 to 100 percent depending on the risk category of the loan, which is in turn determined based on the number of days the loan is in arrears.[15] The specific provisioning rates are shown in Table 2.

Table 2: Provisioning Rates in El Salvador

Loan Status	Risk Classification	Provisions
Performing (normal)	A1	0%
	A2	1%
Underperforming	B	5%
Deficient	C1	15%
	C2	25%
Difficult to Recover	D1	50%
	D2	75%
Unrecoverable	E	100%

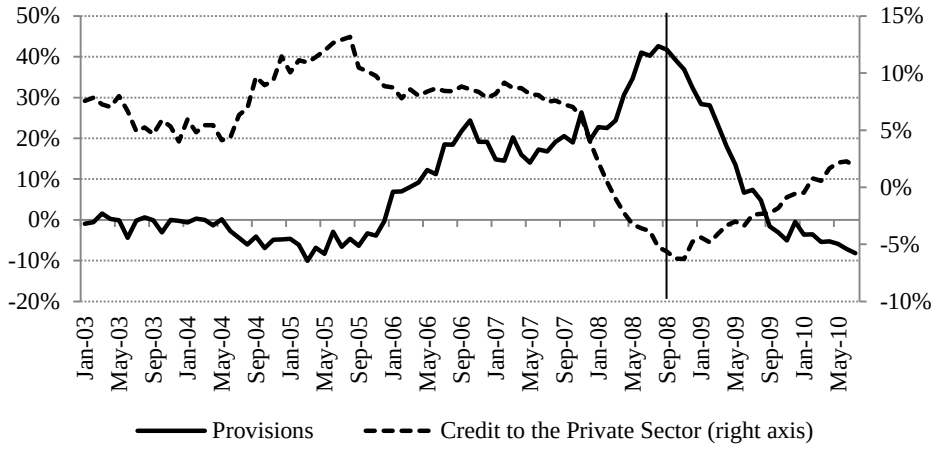
As noted by Fernandez de Lis and Garcia Herrero (2010), traditional static provisioning (not complemented with a dynamic provisioning component), like the framework in El Salvador, can be a source of pro-cyclicality. Traditional loan-loss provisions are tied to loan delinquency. This implies that during good times, banks' need to provision would likely be low, while they would need to step up provisioning as soon as delinquencies appear. This reduces their available capital and, thus, their lending capacity when it is most needed. As shown in Figure 8, the provisioning regulation in El Salvador seems to display this undesirable feature. During the global financial crisis, the significant growth in provisions was associated with a sharp deceleration in credit to the private sector.

Figure 8: Bank Credit to the Private Sector and Loan Provisions in El Salvador

[14] See Wezel (2010) for a discussion of alternative dynamic provisioning rules in Latin America.

[15] Thresholds for the number of days in arrears used for loan classification depend on the type of loan (i.e., consumption, commercial, etc.).

(year-on-year growth rates)



Note: The vertical line indicates the collapse of Lehman Brothers.

a. The Peruvian Rule: A Simulation Applied to El Salvador

The Peruvian regulation requires banks to accumulate additional dynamic provisions during the expansionary phase of the economic cycle in anticipation of expected loan losses that typically increase during slowdowns. This cyclical regime is activated when GDP growth surpasses a threshold associated with potential output growth. During these episodes, general provisions are increased between 0.3 and 1.0 percentage points, depending on the type of credit. When the rule is deactivated, banks are allowed to use the cyclical buffer to cover additional provisions required by the authorities (due to the deterioration of the credit portfolio). Appendix 2 presents details of the Peruvian rule, including the specified thresholds utilized to activate and deactivate the rule.

Application to El Salvador

As a first step, we identify the period in which the rule is activated by applying the Peruvian threshold to the dynamics of the monthly economic activity indicator *(Indicador Mensual de Actividad Economica, IMAE)* available for El Salvador. The Peruvian rule would have been activated in El Salvador during the period May 2006 to April 2008 when economic activity in the country grew above the Peruvian threshold. This period is identified by the shaded area in Figure 9.

To implement the Peruvian formula, we assume that the time-invariant provisioning requirements of the Salvadoran regulation remain as currently established and *add* the dynamic provisioning component as specified in the Peruvian rule. In calculating these additional provisions, we match the requirements of the Peruvian rule as closely as the data available in El Salvador allow. This procedure allows us to focus on the dynamic properties

of the rule.[16] The rates of additional dynamic provisions are set as follows: 0.40 percent for mortgages (as in the case of Peru), 1.25 percent for consumer loans (equal to the average of rates required for revolving and nonrevolving consumer loans in the Peruvian rule), and 0.43 percent for the rest of the loans (in the absence of a breakdown of loans to the productive sector by firm size, this parameter is set as the average of the dynamic rates applied to the remainder of loan types in Peru).

The results from applying this procedure indicate that by the end of the period when the rule would have been activated (April 2008), the stock of provisions would have been 14.5 percent higher than the actual stock. This buffer, however, would have been quickly depleted as the loan quality deteriorated over seven months (Figure 9B).

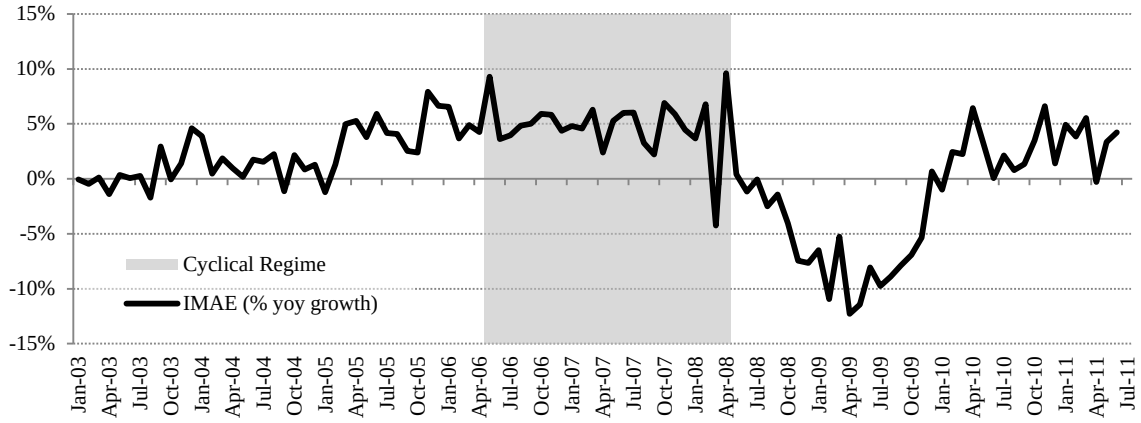
As noted in Figure 9C, which presents the year-on-year growth of the stock of provisions (actual and simulated), the results suggest that with a dynamic provisioning rule like the Peruvian rule in place, banks would have accumulated more provisions during the pre-Lehman period that could have been used in the midst of the financial crisis. This could have lowered banks' incentives to restrict credit.

The exercise highlights the need for adequate calibration of the rule ex-ante. Specifically, we have utilized the values of the parameters currently used in the Peruvian rule (both the value of the threshold parameters to activate and deactivate the rule and the provisioning ratios used for the different types of loans). Most likely, these are not the optimal values for El Salvador, since long-term growth rates as well as the volatility of economic activity in El Salvador differ from those in Peru. Indeed, in our exercise, the estimated cyclical buffer fell short of covering the sharp deterioration in loan quality that took place in El Salvador in the period after Lehman's collapse.

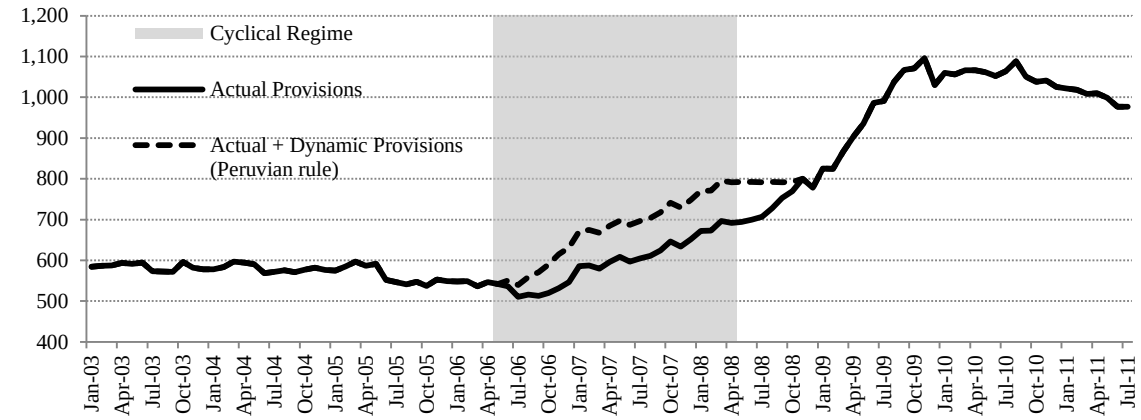
[16] A full-blown implementation would require recalibration of both the dynamic and the time-invariant provisioning rates.

Figure 9: The Peruvian Rule

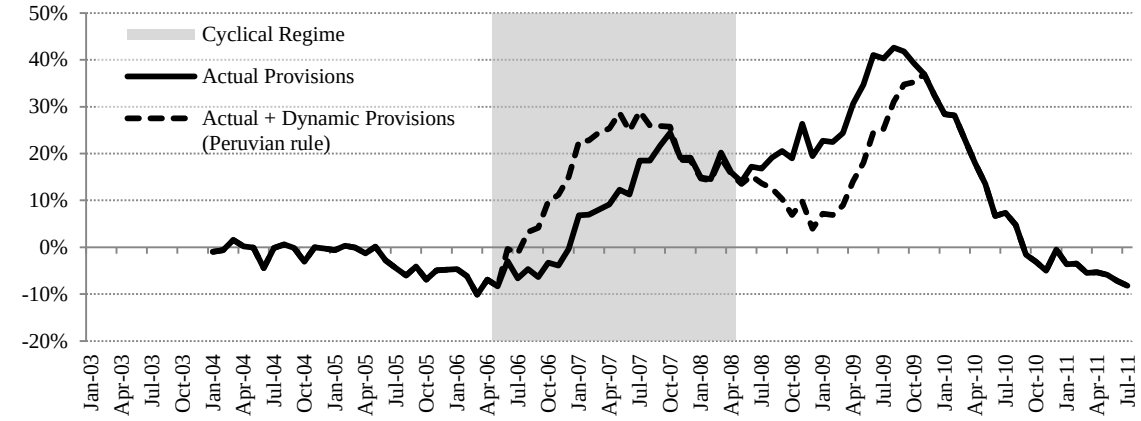
(A) Activation of the Cyclical Regime



(B) Stock of Provisions (millions of USD)



(C) Stock of Provisions (% year-on-year growth)



Source: Own calculations.

b. The Bolivian Rule: An Alternative Simulation Applied to El Salvador

In Bolivia, banks are required to *maintain* dynamic (cyclical) provisions that range from 1.05 to 5.80 percent, depending on the type of debtor and the currency denomination of the loan. Cyclical provisions can be used to cover additional, specific provisions when loan quality deteriorates significantly, provided that the dynamic provisioning has been phased in fully, and there are no objections by the regulator. More specifically, banks need to experience deterioration in the quality of their loan portfolio (measured by the average of specific provisions for loans in each risk category weighted by their corresponding shares in the loan portfolio) for six consecutive months to gain access to the cyclical buffer. On the flip side, banks are required to replenish the cyclical buffer when loan quality improves. Details of the Bolivian rule are presented in Appendix 3.

There are two important differences between the dynamic provision schemes in Peru and Bolivia that are worth stressing. First, the Bolivian regulation features a cumulative fund, unlike the Peruvian case in which additional cyclical provision requirements come into effect only when growth exceeds its long-term value. Second, the accumulation and use of the cyclical buffer is determined at the bank level, in contrast to the systemic approach of the Peruvian formula.

Application to El Salvador

To focus the analysis on the dynamic aspect of the Bolivian formula, we follow a similar approach to the one used when applying the Peruvian rule to El Salvador. Time-invariant rates of provisioning currently in place in the Salvadoran framework are maintained, whereas additional cyclical provision requirements are set to match the Bolivian parameters according to data availability. More specifically, these are set at the values in Table 3.

Table 3: Dynamic Provision Rates

Type of Loan	Risk Category in El Salvador	Dynamic Provisioning Rates (added to static rates)[17]
Consumer loans	A1, A2	1.45%
Mortgages	A1, A2	1.05%
Others	A1, A2	1.90%
	B, C1, C2	3.05%

In addition, it is assumed that the regulation is implemented at the beginning of our sample period (January 2003, based on data availability). Under this set of assumptions, the simulation results (shown in Figure 10) indicate that 100 percent of the cyclical buffer would have been accumulated by March 2007. The sharp deterioration of the loan portfolio

[17] Additional provision requirements correspond to loans in local currency.

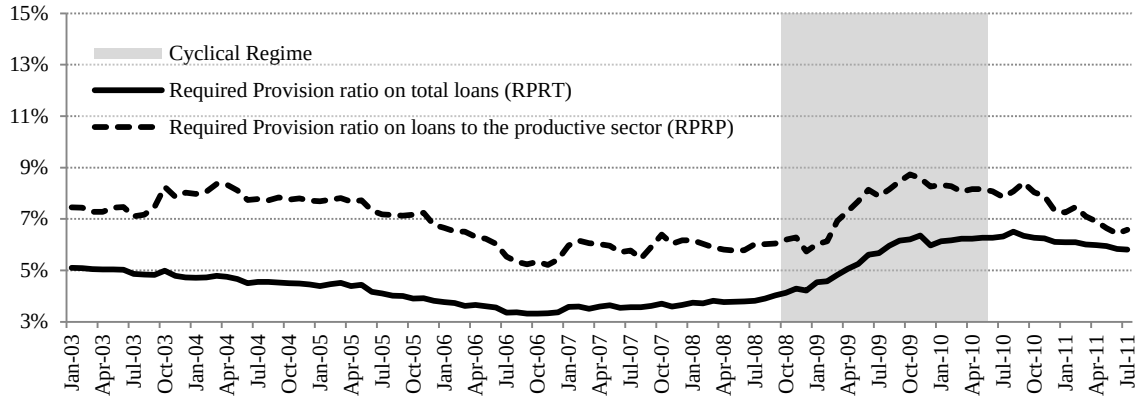
associated with the global financial crisis would have made cyclical provisions available to banks from October 2008 to May 2010 to cover rising specific provisions. The period when banks would have had access to these funds is marked by the shadowed area in the figure. Despite persistent loan deterioration, cyclical provisions would not have been completely depleted during the crisis, in clear contrast with the results obtained with the Peruvian formula (see figure 10B).

However, from a qualitative perspective, the application of the Bolivian formula to the Salvadoran case yields a broadly similar result to that of the Peruvian rule: banks would have accumulated a larger stock of provisions over the first stage of the global financial crisis (prior to Lehman Brothers' fall) that could have been used afterward to support credit.

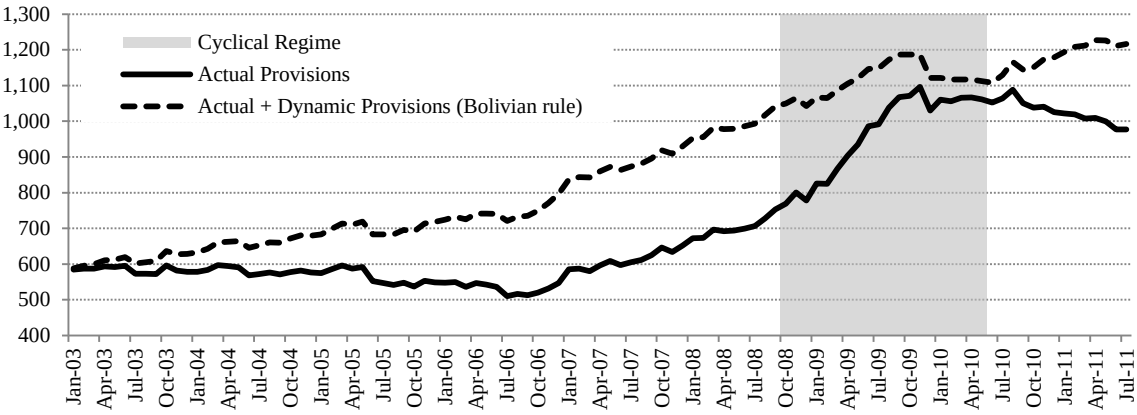
Using the case of El Salvador, this section has highlighted that implementation of dynamic provisioning can be highly useful for the stability of financial systems in Central America. However, the exercise has also made apparent the imperative need for timely and adequate statistics regarding the quality of the loan portfolio. For example, implementation of the Bolivian rule would be meaningless if changes in loan classification according to risk characteristics occur with significant delays. Moreover, the exercise has shown that implementation of dynamic provisioning rules requires a deep understanding of the cyclical behavior of credit, which varies across countries. This knowledge is essential for the determination of country-specific rule parameters. If the Peruvian rule is to be considered, authorities also need to gain full familiarity with the particular characteristics of the economic cycle in order to determine the relevant thresholds for activation and deactivation of the rule. Clearly, once authorities decide on the type of rule that best fits their needs, stress tests are in order for appropriate calibration of the parameters.

Figure 10: The Bolivian Rule

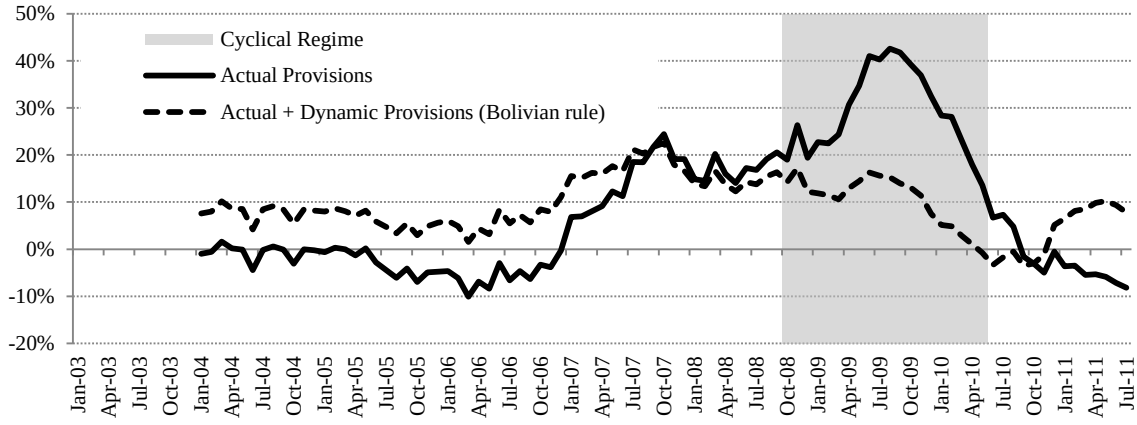
(A) Activation of the Cyclical Regime



(B) Stock of Provisions (millions of USD)



(C) Stock of Provisions (% year-on-year growth)



Source: Own calculations.

V. Conclusions

This paper has explored the potential benefits of implementing macroprudential regulations in Central America. The results of the study support the conclusion that this type of regulatory tool deserves serious consideration by policymakers in the region. An analysis of the anatomy of credit cycles in Central America shows that credit booms in the region are not only as pronounced as in other emerging market economies, but are also associated with significantly lower economic growth during downturns. In this context, regulations that contain the eruption of credit booms and limit the extent of credit crunches—the goal of the macroprudential approach—are highly desirable.

The paper dealt with two well-known macroprudential tools: reserve requirements and dynamic loan-loss provisioning. While reserve requirements are used in Central America as a policy tool, they have not been used consistently in a macroprudential fashion, namely, increasing requirements in periods of credit booms and cutting rates when the potential of a credit crunch is in sight. Simulation exercises conducted for the cases of Dominican Republic and Nicaragua suggest that this macroprudential policy has the potential to contribute to financial stability in the region. However, the analysis also highlights that to have a meaningful impact on credit dynamics during periods of high financial stress, reserve requirements often need to be complemented with additional macroprudential tools to reduce banks' incentives to hold liquidity, rather than extending loans.

The analysis also suggests that implementing dynamic loan-loss provisioning in Central America could bring important benefits in financial stability. Simulation exercises that apply the Peruvian and Bolivian dynamic provisioning rules to El Salvador indicate that if either of these rules had been in place, Salvadoran banks would have accumulated more provisions during the pre-Lehman period. These reserves could have been used in the midst of the financial crisis to support credit. An important qualification of the analysis is that in considering the application of alternative methodologies to regulate dynamic provisioning, it is essential for policymakers to gain full understanding of the characteristics of credit dynamics, which are country-specific.

Finally, an important caveat is in order: The effectiveness of macroprudential regulations depends on the quality of a country's overall regulatory and supervisory framework. For example, without an adequate accounting system that allows for an appropriate classification of loans according to their quality and for a general provisioning system that follows internationally-accepted accounting standards, adding dynamic provisioning may not be very useful. If the base is not sound, additional layers cannot contribute to financial stability. Moreover, as with other types of regulations, macroprudential regulations require the independence of the supervisory authority. The presence of political interference can be extremely damaging to the credibility and sustainability of macroprudential tools. For example, lacking independence, supervisors might be pressured into lowering reserve requirements to produce credit expansions for political reasons. The presence of consolidated supervision is also very important for the effectiveness of macroprudential

regulations. In its absence, regulatory arbitrage may severely distort the objectives of the regulations. Existing deficiencies in these areas need, therefore, to be corrected if the macroprudential approach is to bear fruit in Central America.

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Appendix 1: Credit Booms - Sample of Countries

The sample of countries we analyzed is listed below. We included 23 emerging economies from four regions: Central America (6), Latin America (7), Asia (5), and Europe (5). The dates of the peaks of credit booms identified for each country are shown in parentheses.

Central America	**Latin America**	**Emerging Asia**	**Emerging Europe**
Costa Rica (08-IV)	Argentina	Indonesia (98-II)	Czech Rep.
Dominican Rep. (03-II)	Brazil (97-III, 08-I)	Korea (03-I)	Hungary (09-I)
El Salvador	Chile (98-III)	Malaysia (97-IV)	Poland (09-I)
Guatemala (03-IV)	Colombia (98-III, 07-IV)	Philippines (97-IV)	Russia (98-III)
Honduras (98-I, 08-I)	Mexico	Thailand (97-IV)	Turkey (98-II)
Nicaragua (03-III)	Peru (99-I, 08-IV)		
	Venezuela (07-IV)		

Appendix 2: The Peruvian Rule for Dynamic Provisioning

In November 2008, the Supervisory Authority (*Superintendencia de Banca, Seguros y AFP*, SBS) established a dynamic (cyclical) provisioning regime that requires banks to accumulate additional generic provisions during the expansionary phase of the economic cycle to be used during downturns. In this appendix, we briefly describe the main features of this regulation.

1. *Rule activation.* Cyclical provisioning is activated if any of the following occurs:
   a. The average year-on-year (yoy) GDP growth over the last 30 months goes from a level below 5 percent to one equal to or above this threshold.
   b. The average yoy GDP growth over the last 30 months is already above 5 percent, and the 12-month yoy average GDP growth is 2 percent greater than the value registered one year earlier for this indicator.
   c. The average yoy GDP growth over the last 30 months is already above 5 percent, and the rule has been deactivated for at least 18 months by situation (2.b) described below.
2. *Rule deactivation.* Cyclical provisioning is deactivated if any of the following occurs:
   a. The average yoy GDP growth over the last 30 months goes from a level above 5 percent to one equal to or below this threshold.
   b. The average yoy GDP growth over the last 12 months is 4 percentage points lower than the value registered one year earlier for this indicator.
3. *Build-up of the cyclical buffer.* When the cyclical provisioning rule is activated, required generic provisions (that is, provisions on performing loans) increase depending of the type of debtor, according to the following table:

Type of Credit	Cyclical Component
Credit to corporations	0.40%
Credit to large firms	0.45%
Credit to medium firms	0.30%
Credit to small firms	0.50%
Credit to micro firms	0.50%
Consumer credit, revolving	1.50%
Consumer credit, not revolving	1.00%
Mortgages	0.40%

   Banks are required to comply with additional provisions within 6 months after the activation of the rule is officially communicated by the SBS.
4. *Use of the cyclical buffer.* Once the cyclical rule is deactivated, the stock of cyclical provisions can be used to cover additional, specific provisions (that is, provisions for loans with overdue payments–arrears).

Appendix 3: The Bolivian Rule for Dynamic Provisioning

The dynamic provisioning framework was established in December 2008. Under this regime, the Supervisory Authority (*Autoridad de Supervisión del Sistema Financiero, ASFI*) requires banks to *maintain* a dynamic provision fund that can be accessed during episodes in which loan quality experiences significant deterioration.

The loan quality is measured by the Required Ratio of Provisions (*Ratio de Prevision Requerida, RPR*) of the total loan portfolio (RPR_T) and of the loan portfolio to the productive sector (RPR_P) defined as:

$$RPR_T = \sum_{k=A}^{F} \alpha_k C_k \qquad RPR_P = \sum_{k=A}^{F} \beta_k CP_k$$

where k is the risk category ranging from A (performing loans) to F (defaulted loans)

C_k is the share of loan k in total loans

CP_k is the share of loan k in the loan portfolio to the productive sector[18]

α_k and β_k are the actual rates of specific provisions applied to loan category k.

1. *Build-up of the cyclical buffer*. Banks should maintain cyclical provisions that range from 1.05 to 5.80 percent, depending of the type of debtor and the currency denomination of the loan, according to the following table:

Loan classification	Mortgages		Consumer loans		Loans to micro enterprises		Other loans	
	LC	*FC*	*LC*	*FC*	*LC*	*FC*	*LC*	*FC*
A	1.05%	1.80%	1.45%	2.60%	1.10%	1.90%	1.90%	3.50%
B	-	-	-	-	-	-	3.05%	5.80%
C	-	-	-	-	-	-	3.05%	5.80%

Note: LC and FC denote local and foreign currency denominated loans.

Banks need to replenish dynamic provisions starting at the time when the 6-month moving averages of both RPR_T and RPR_P start to increase. From this point onward, banks need to

[18] The Bolivian regulation defines the productive sector as activities in agriculture and livestock; hunting, forestry, and fishing; crude oil, natural gas, and mineral extraction; manufacturing, production, and distribution of electricity; and construction.

add provisions at a constant rate to reach 100 percent of the required level within a time period proportional to the fraction of the buffer used.[19]

2. *Use of the cyclical buffer*. Banks are allowed to access the cyclical buffer when either the loan quality of the total portfolio or that of the productive sector (as measured by RPR_T and RPR_P, respectively) deteriorates for six consecutive months, provided that the cyclical buffer has been phased in fully. The stock of cyclical provisions can be used to cover up to 50 percent of additional specific provisions during the first 12 months and up to 100 percent thereafter.

[19] More specifically, the time period is determined as (% share of buffer utilized)*51 months.