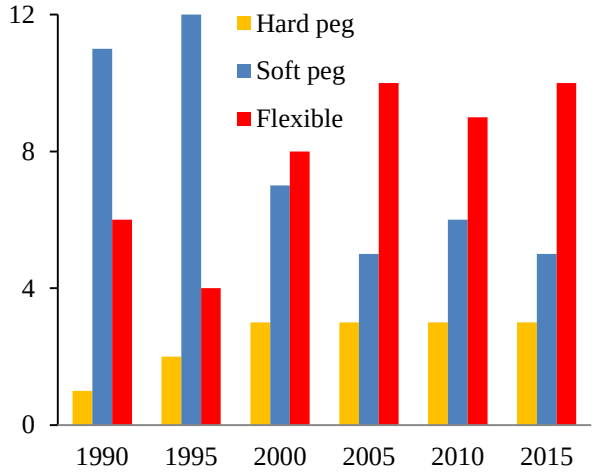
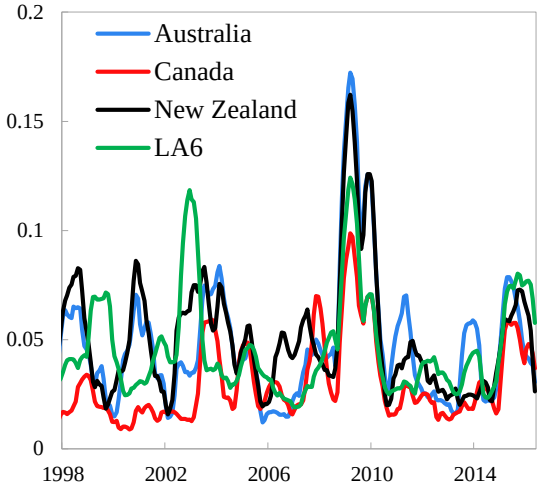
Figure 2: Exchange rate regimes in Latin America
(Number of countries)



Sources: Central bank websites; IMF, *Annual Report on Exchange Arrangements and Exchange Restrictions*.

Figure 3: Volatility of nominal exchange rates
(12-month coefficient of variation)



Note: LA6=Brazil, Chile, Colombia, Mexico, Peru, and Uruguay.
Sources: IMF, *Information Notice System*; IMF staff calculations.

A new policy framework

Central bank independence was not viewed as a precondition for adopting an inflation-targeting framework, but rather as necessary for reducing inflation and durably achieving price stability. In fact, during the early phases of their autonomy a number of central banks in the region targeted the exchange rate using a crawling peg or crawling band to reduce inflation. It was the advent of currency crises in some countries (like Brazil, Colombia, and Mexico) and the impact of intellectual developments in monetary policy and central banking on others (Chile), that made floating the most prevalent exchange rate regime in the region by the early 2000s and opened the door for the implementation of fully fledged inflation-targeting regimes (Figure 1).

With the turn of the century, a rising number of countries in the region introduced greater exchange rate flexibility. By 2015, ten of the 18 countries in the region had adopted a flexible regime, up from six in 1990, while five countries still kept a soft peg and three countries used the U.S. dollar as legal tender (Figure 2). Exchange rate flexibility in Latin America was initially met with significant skepticism, however, as countries repeatedly intervened in the foreign exchange market to restrict that flexibility and build up international reserves.[10] But as hedging markets developed and nominal uncertainty declined, the costs of exchange rate volatility declined and the variability of Latin America's exchange rates converged to that of advanced small and open economies (Figure 3).

[10] Calvo and Reinhart (2002) called these phenomena "fear of floating" and questioned the countries' commitment to floating the exchange rate.

Table 3: Inflation targets, decision making, communication, and transparency

	Inflation target	Frequency of policy meetings	Issue press release	Issue minutes	Publication of votes	Inflation report
Brazil	4.5% (+/-2)	8 per year	Yes	Yes	Balance of votes	4 per year
Chile	3% (+/-1)	Monthly	Yes	Yes	Balance of votes	4 per year
Colombia	3% (+/-1)	Monthly	Yes	Yes	Majority/ consensus	4 per year
Mexico	3% (+/-1)	11 per year	Yes	Yes	No	4 per year
Peru	2% (+/-1)	Monthly	Yes	No	No	4 per year

Sources: Central banks' websites and Hammond (2009).

Strengthening international reserves was a more consistent and common trend, as countries aimed at creating a buffer against recurrent real and financial shocks. Remarkable examples are Bolivia and Peru, where international reserves—measured by gross reserves minus gold—were brought to more than 30 percent of GDP by 2015 from less than five percent in 1990. By 2015, Brazil and Mexico had also boosted international reserves to 20 and 15 percent of GDP, respectively. In most countries, reserve accumulation benefited from the favorable external conditions associated with the supercycle in global commodity prices.

As exchange rates became more flexible, inflation targeting also became more prevalent in the region. With a clear mandate on price stability and after having already reduced inflation—often via exchange rate targeting—an increasing number of central banks adopted inflation targeting to preserve price stability gains. In most cases, the adoption of inflation targeting followed a gradual path in which the main elements of transparency and accountability were introduced in piecemeal fashion. Brazil, however, followed a "cold turkey" approach in the midst of its currency crisis in early 1999. Chile and Colombia also introduced inflation targeting that year, whereas Mexico and Peru did so in 2001 and 2002, respectively.[11]

Inflation targeting provided an anchor for inflationary expectations while allowing for enhanced monetary policy flexibility. To monitor policy success, the LA5 countries (Brazil, Chile, Colombia, Mexico, and Peru) chose a point target with a certain tolerance band for inflation (see Table 3), using the consumer price index as the measure of price stability. Central banks also enhanced communication and transparency to strengthen the effectiveness of monetary policy. Policy rates are decided during pre-announced monetary policy meetings, mostly held on a monthly basis (Table 3). All LA5 central banks issue a communique announcing the policy decision and, except for Peru, later issue minutes of the policy meetings. Information about how votes were cast is provided in Brazil and Chile. In addition, all central banks issue a quarterly inflation report explaining the rationale of the monetary policy stance in the context of the broad internal and external macroeconomic environment, and stressing the upside and downside risks for the inflation forecast.

[11] For a detailed description each of the country cases see Schmidt-Hebbel and Werner (2002) for the cases of Brazil, Chile, and Mexico; Gómez and others (2002) on Colombia; and Armas and Grippa (2005) on Peru. Costa Rica, Dominican Republic, Guatemala, and Paraguay adopted inflation targeting later.

Central banks in Latin America also revamped their operational frameworks. When they introduced their inflation targets, Brazil, Chile, and Colombia all established a short-term interest rate as their operational target. The Bank of Mexico adopted a policy rate as its operational target only in January 2008, after having followed some steps to replace its previous quantity-based operational target (a borrowed reserves target, the so-called *corto*).[12] In Peru, where the financial system is highly dollarized, the central bank moved to a policy rate as an operational target in late 2003, after going through a gradual transition away from the use of monetary aggregates. Peru also used reserve requirements as a capital flow management measure and to discourage financial dollarization. The LA5 central banks all chose a target for a market-based overnight interest rate as their policy rate.[13]

Achieving low and stable inflation, and some reversals

The institutional and policy reform of central banks paid off, as inflation plunged across the region by the mid-1990s. After decades of very high inflation, most Latin American countries brought inflation down to single digits and eventually achieved low and stable inflation during the mid-2000s (Figure 4). This outcome allowed a number of central banks—particularly those that had adopted inflation targeting as their monetary policy regime at the beginning of the century—to build credibility by keeping inflation within their target band most of the time.

Yet, average inflation in Latin America remains above that recorded in other regions with similar levels of development, largely due to recent increases in inflation in a small number of countries. In particular, inflation has surged to triple digits in Venezuela, while in Argentina it is estimated to have averaged more than 30 percent since 2014. As of mid-2016, these two countries hold the dubious distinction of displaying the highest rates of inflation in the world. These developments reflect a significant deterioration in public finances and fiscal dominance, as governments pressure central banks to finance fiscal deficits. In turn, inflation in Brazil and Uruguay has recently hovered around ten percent. There are many causes behind this outcome that apply to one or both countries, including institutional weaknesses in central banks, lax fiscal policies that place downward pressure on the exchange rate and upward pressure on inflation expectations, and wage indexation.

Against this backdrop, Latin American central banks face important challenges ahead. In high-inflation countries, central bank independence must be consolidated while governments strengthen their fiscal frameworks, thus laying the basis for achieving price stability. And despite having successfully stabilized inflation in their economies, Latin America's inflation targeters confront important challenges of their own, which we turn to in the following sections.

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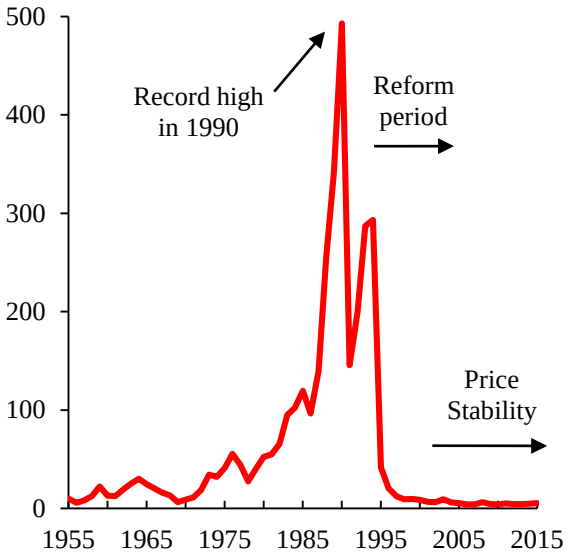
[12] See Carstens and Werner (1999).

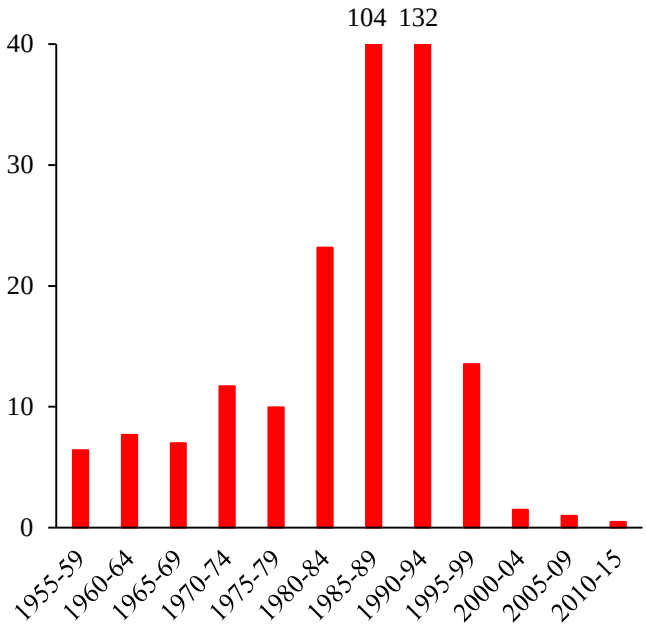
[13] Central banks also set up standing facilities offered for liquidity provision and for liquidity absorption, thus creating an interest rate corridor around the policy rate to help keep market interest rates close to the target.

Figure 4: Inflation in Latin America
(Percent)

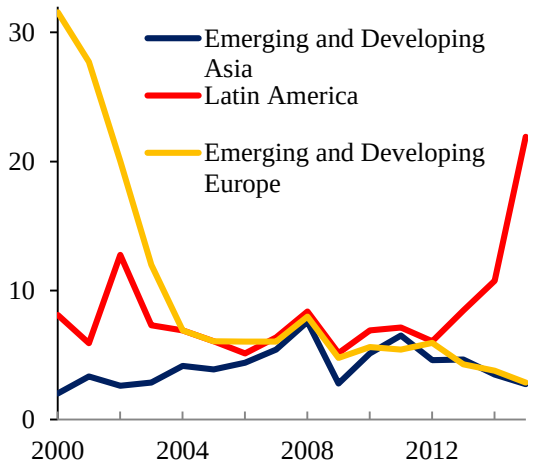
a. Regional inflation



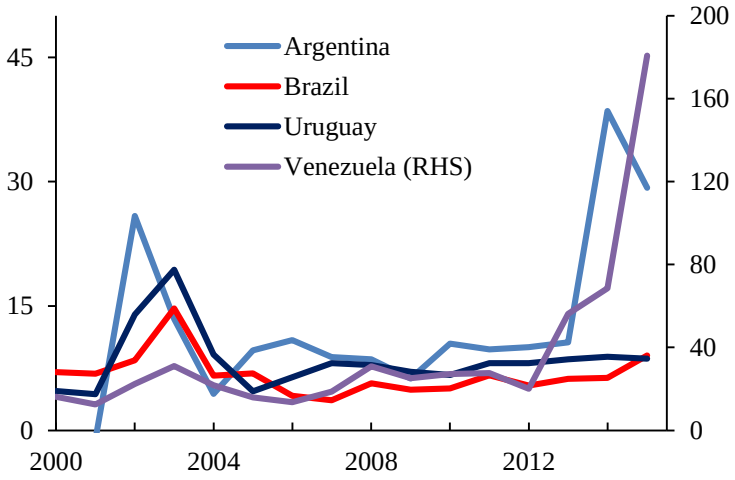
b. Volatility of regional inflation



c. Inflation in Latin America and other regions



d. Inflation rates of selected Latin American countries



Sources: IMF, International Financial Statistics and World Economic Outlook.
Note: Data refer to period average consumer price inflation. Starting in 2007, inflation for Argentina correspond to IMF staff estimates.

III. Making Inflation Targeting More Effective

Assessing the right stance for monetary policy has become an even harder task for central banks in the region in the face of a very uncertain international environment that has coincided with significant changes on the domestic front. Unusually accommodative global financial conditions, falling commodity prices, and a lower natural rate of interest in advanced economies are key external sources of uncertainty. Meanwhile, on the domestic front, the level and growth rate of potential output are being reassessed. These external and domestic sources of uncertainty complicate determining the appropriate monetary policy stance, as policymakers try to determine the new equilibrium levels of the real exchange rate, the neutral interest rate, and the level of slack in the economy. Amidst these challenging developments, the inflationary impact of a large and persistent exchange rate depreciation has prompted a difficult discussion regarding the appropriate monetary policy response from Latin America's central banks, and how these decisions should be communicated.

Improving assessments of economic slack and the policy stance

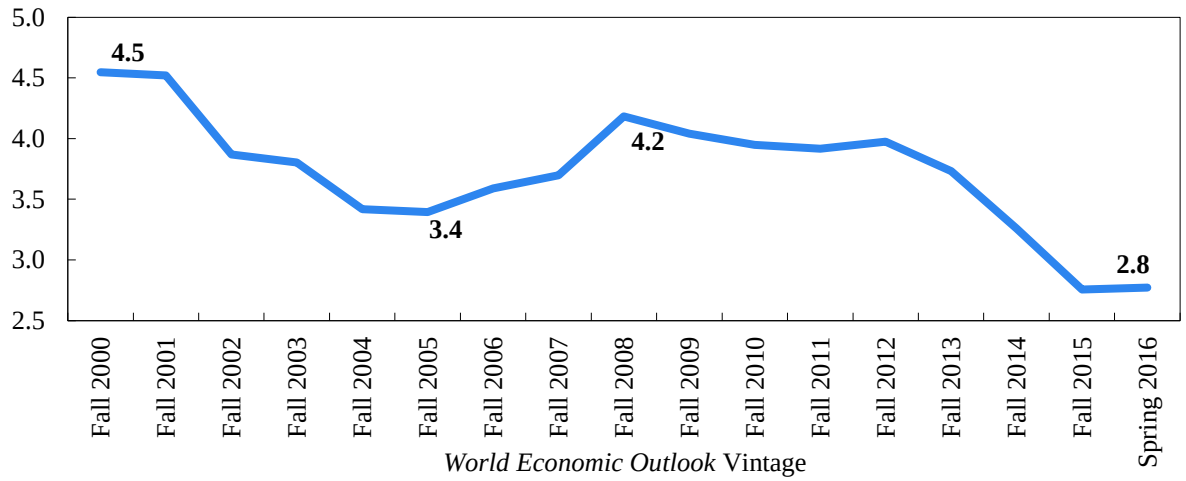
Clearly communicating the central bank's estimate of the output gap has been shown to improve the effectiveness of inflation-targeting regimes. It provides market participants with information on the assumptions underlying monetary policy, thus allowing them to better anticipate the future path of policy decisions. But before the output gap can be clearly communicated, central banks around the world—including in advanced economies—face an operational challenge: the output gap must first be reliably estimated. Since an economy's potential output is unobservable, assessing it is inevitably subject to uncertainty and relies on judgment. At the core of the exercise is being able to distinguish whether the shocks hitting the economy and driving inflation are transitory or permanent.

As Orphanides and van Norden (2002) document for the United States, and Grigoli and others (2015) extend for a large sample of countries using the IMF's *World Economic Outlook* vintages, real-time estimates of the output gap tend to suffer substantial revisions. With the benefit of hindsight, there seems to be a bias toward overestimating economic slack in real time, with initial diagnoses of slack often revised to overheating in subsequent years. Estimation errors stem from two main factors. First, initial data releases for economic output tend to be substantially revised in subsequent periods. Second, it is difficult to distinguish transitory from permanent shocks, which introduces errors in assessments of potential output. Surprisingly, revisions to output gap estimates happen long after the initial data release.[14]

Across countries, output gap revisions are significantly smaller among advanced economies than emerging market economies, and are smaller among inflation-targeting countries. Even among the established inflation-targeting economies of Latin America, the size of historical revisions to output gap estimates suggest that it has been extremely difficult to assess excess capacity in real time with any degree of precision. Given these large revisions, policy interest

[14] During the first year, the median revision reaches 0.9 percentage points, and even after two years additional revisions are almost 0.5 percentage points. This bias is larger during recessionary periods.

Figure 5: WEO forecasts of medium-term growth in Latin America and the Caribbean
(Percent)



Source: IMF, *World Economic Outlook*.

rate decisions often deviate substantially from those that might have been chosen with the benefit of hindsight.

Over time, the difficulties associated with measuring the output gap, and the size of the policy missteps that can result, are heightened in periods when potential output—usually a slow-moving variable—is itself subject to substantial revisions. As Figure 5 shows, the end of the commodity price supercycle has led to very large downward revisions to the outlook for medium-term growth in Latin America and the Caribbean. In this context, recent assessments of economic slack have been subject to considerable uncertainty.

A recent literature has argued that variables with a longer cycle, such as world commodity prices or global financial variables, can lead output to deviate from its sustainable potential for prolonged periods without necessarily generating inflationary pressures, further complicating estimates of the output gap.[15] Promisingly, Borio and others (2013 and 2016) show that adjusting for the financial cycle generates real-time estimates of the output gap that are less prone to subsequent revisions. Alberola and others (2016) estimate that the recent supercycle in global commodity prices caused real-time estimates of the output gap in Latin America to be excessively procyclical, leading monetary policy to follow suit in some cases. But while adjusting output gap estimates for these lower-frequency factors may be conceptually appealing under certain conditions, it is unclear how such decisions should be communicated within a coherent monetary policy framework. In particular, doing so may require lengthening the horizon at which monetary policy is expected to return inflation to its target, further testing the limits of central bank credibility.

[15] For instance, Rabanal and Raheri Sanjani (2015) illustrate how the presence of financial frictions amplifies measures of the output gap in the European context.

Of course, the challenge intrinsic in making policy decisions based on imperfect real-time data and estimates does not mean that central banks should abandon the use of the output gap. Rather, they should strive to improve measurement of the output gap and, above all, supplement their information with more detailed studies and indicators, especially of the country's labor market and capacity utilization. While estimation of economic slack based on each of these indicators is subject to similar limitations as estimation of the output gap, the use of a wider information set may help in making a more accurate real-time assessment. Central banks must focus on improving their reading of tightness in product and factor markets. This could be achieved through better understanding of labor markets and capacity utilization, with less of a focus on univariate estimates of the output gap.

A related issue is the assessment of the monetary policy stance. Since 2013, central banks in Latin America have kept their policy rates on hold or implemented relatively modest hikes in response to prolonged inflationary pressures largely attributable to exchange rate depreciations. The stated intention of this policy has been to maintain accommodative monetary policy conditions in order to support weak aggregate demand amid rapidly slowing growth rates. But how accommodative have policy rates been? The answer depends crucially on the level of the neutral rate of interest.

Highly accommodative global financial conditions since the 2009 crisis and the trends that have contributed to the global savings glut are estimated to have systematically and substantially lowered the neutral real interest rate in Latin America (see Magud and Tsounta, 2012). But in standard models, the neutral rate of interest is expected to be an increasing function of the growth rate of potential output and the international neutral rate. As such, rapidly slowing potential growth rates largely related to the end of the commodities boom and a declining neutral rate in advanced economies may be further reducing neutral interest rates throughout Latin America.[16] If this is the case, a seemingly accommodative policy of steady policy rates may in fact correspond to a gradually tightening monetary stance.

Strengthening nominal anchors

Along with the reduction of inflation and its volatility since the adoption of inflation-targeting regimes in the region, market expectations about future inflation have come to reflect an increased credibility of central banks' commitment to their targets. This hard-earned asset is thought to be a crucial determinant of monetary transmission and efficiency.[17]

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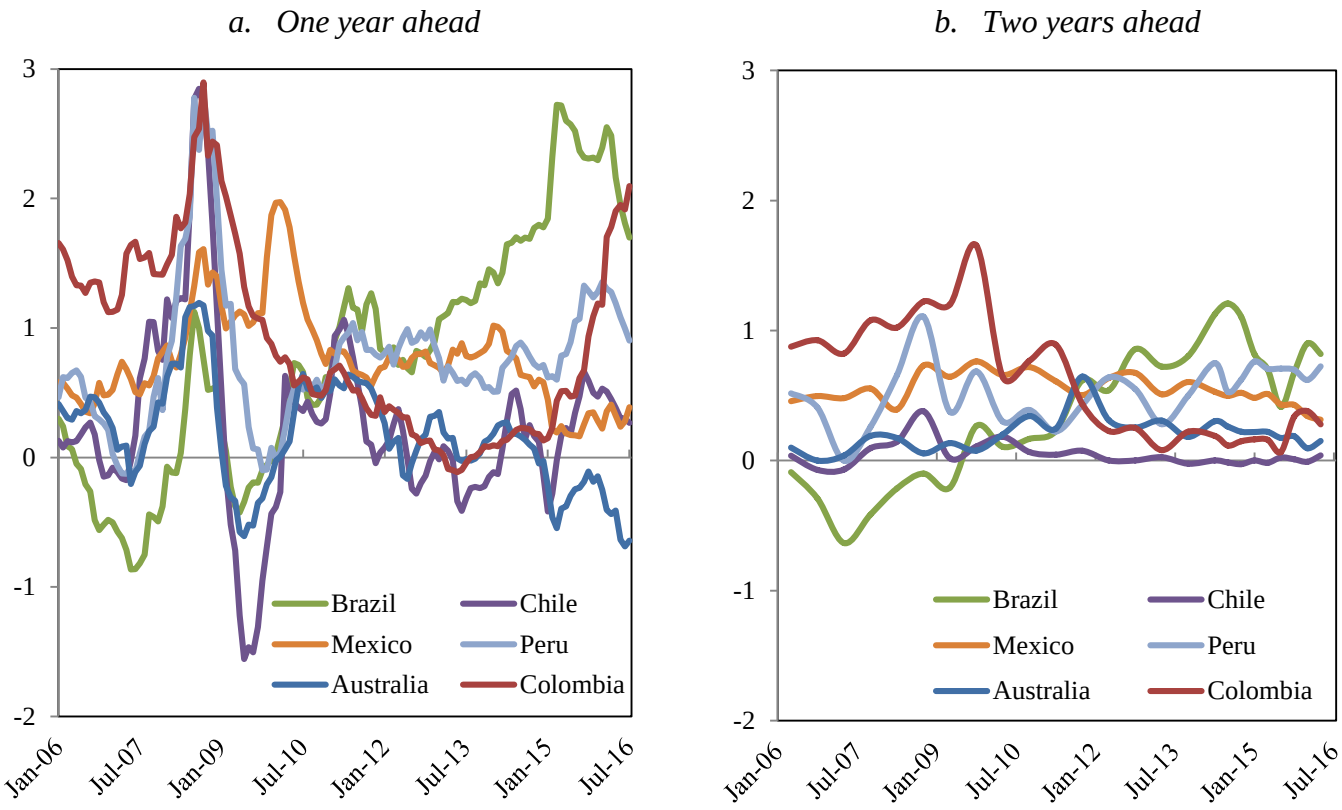
[16] Magud and Sosa (2015) show that potential output in emerging market economies has been affected by decelerating commodity terms of trade and slow investment growth, which in turn reduce the growth rate of the capital stock. Moreover, Adler and Magud (2015) document that Latin American commodity exporters saved little of the large and unprecedented windfall income accrued during the recent boom, lowering their prospects for medium-term growth.

[17] See Woodford (2003) for a comprehensive discussion. Citing experience from Chile, Céspedes and Soto (2007) describe how gains in credibility associated with the transition to inflation targeting increased the efficiency of the central bank's monetary policy, in part by allowing decisions to become more forward-looking.

Figure 6: Deviations of short-term inflation expectations from central bank targets
(percent)

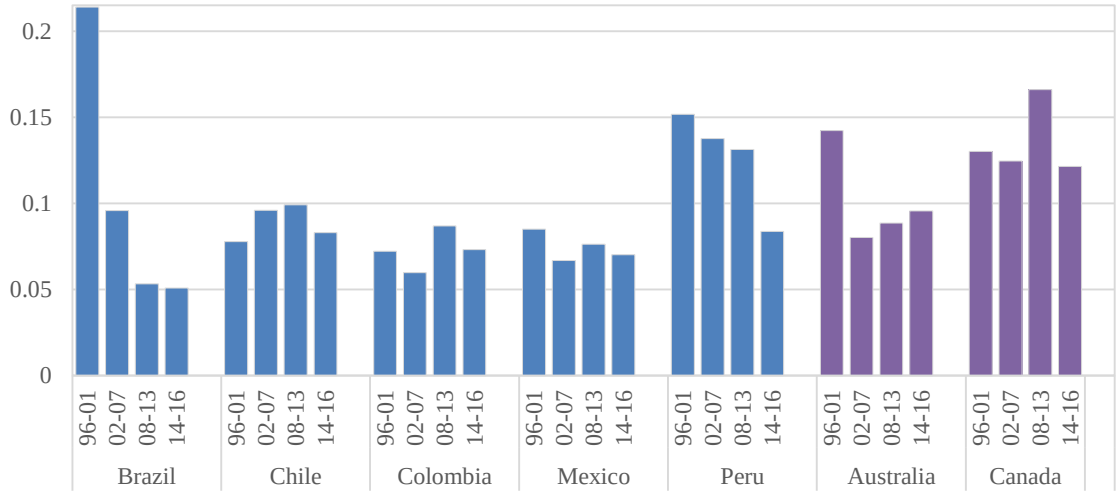


Source: Authors calculations using data from Consensus Economics and national central banks.
Notes: One-year-ahead forecasts are monthly and are computed as the linear combination of current and following year fixed-event forecasts. Two-year-ahead forecasts are quarterly and correspond to expected annual inflation during the calendar year two years hence.

But the task of anchoring expectations is not complete, and ensuring that inflation expectations converge with the central bank's inflation target remains a challenge in some countries.

At least two aspects of inflation forecasts are thought to provide relevant information about the credibility of the central bank's nominal anchor. First, to what extent do forecasts of inflation tend to *agree with the central bank's target*? Figure 6 displays the deviations of inflation expectations from central bank targets since January 2006 in selected economies, at short and medium-term horizons. Panel A is based on expectations at a short-term horizon of 12 months. Strong central bank credibility does not necessarily imply that short-term forecasts remain equal to announced targets, since they capture the inflationary effects of transitory shocks. But where expectations are well anchored, short-term inflation expectations are expected to fluctuate more or less symmetrically around the inflation target, as they do in Australia and Chile. In turn, Panel B shows deviations of inflation forecasts at a

Figure 7: Disagreement among forecasters of inflation at a 12-month horizon



Source: Authors' calculation based on data from Consensus Economics.
Note: Bars correspond to average normalized disagreement within each period, equal to the ratio of the standard deviation across forecasts to the mean inflation forecast.

medium-term horizon of two years, which are expected to fluctuate far less on account of transitory shocks. A problem may arise when deviations of expectations persist in one direction, since this suggests a bias in the perceptions of the central bank's commitment to the inflation target.

In some cases, inflation expectations have spent prolonged periods well above the midpoint of the central bank's target. In Brazil, inflation expectations have exceeded the central bank's target for the past six years, reaching deviations of up to 250 basis points at a one-year horizon during 2015. In Peru, inflation expectations have also been above the target since early 2010, and seem to have settled around 75 basis points above the midpoint of the range. In Mexico, market participants have not expected inflation to reach the central bank's target in a two-year horizon since early 2006. Even amid strong deflationary pressures from low global oil prices since early 2015, inflation expectations still have not reached the midpoint of the central bank's target. Achieving greater convergence between inflation expectations and the central bank's target can be facilitated—at least in part—by improving the central bank's communication of monetary policy and clarifying the primacy of the price stability objective.

Another relevant aspect of inflation expectations is the degree to which market participants *agree with each other* about the future path of inflation. In this respect, progress has been more even in Latin America. A growing literature has documented that disagreement about inflation is correlated with the level and volatility of inflation.[18] But as Dovern, Fritsch, and

[18] See, for instance, Mankiw, Reis, and Wolfers (2003).

Slacalek (2012) argue, even for a given level and variability of inflation, disagreement among forecasters contains additional information about the degree to which a credible monetary policy has anchored expectations about nominal variables, and they document how disagreement has been greater where central banks face constraints to their independence.[19] Among developing economies, Capistrán and Ramos-Francia (2010) find that the adoption of inflation-targeting regimes reduces forecast disagreement, reflecting better-anchored inflation expectations. This work suggests that disagreement among forecasts of inflation captures the degree to which the central bank's reaction function is well understood.

Figure 7 shows the evolution of normalized disagreement among professional forecasters of inflation over the next 12 months, using monthly surveys compiled by Consensus Economics. Since the early 2000s, the degree to which private agents agree on the future evolution of inflation is in line with advanced economies such as Australia and Canada, which represents an important achievement. That is to say, even in those countries where forecasters do not anticipate that future inflation will coincide with the central bank's announced target, they do seem to agree among themselves about what future inflation will be. Carrière-Swallow and Gruss (2016) estimate that disagreement among inflation forecasters has been closely related to a central bank's ability to implement an autonomous monetary policy, and to the degree of exchange rate pass-through to inflation.

IV. Revisiting the Role of the Exchange Rate

When characterizing the policy frameworks of Latin American inflation targeters, care should be taken to incorporate the specific features that distinguish these emerging small and open economies from their advanced economy counterparts, such as less-developed and shallower financial markets, higher intrinsic volatility, and weaker institutions. As a result, policymakers in Latin American inflation targeters have displayed considerable flexibility in the face of these challenging situations. As Céspedes, Chang, and Velasco (2014) document, recent monetary policy decisions taken by the region's central banks have gone considerably beyond standard interest rate movements, involving a good dose of currency intervention, capital account measures, and the use of unconventional policies. These measures have been deployed to deal with booms—during which capital inflows lead to currency appreciation and generate fears of financial vulnerability—and also during times of crisis, when the interest rate instrument has been deemed insufficient to support domestic demand and meet inflation objectives.[20]

During the prolonged period of high commodity prices and strong capital inflows that followed the global financial crisis, many Latin American countries deployed a plethora of

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[19] These results are estimated for G7 economies. See Brito, Carrière-Swallow and Gruss (2016) for an exploration of forecast disagreement in a large set of countries, and relationships between this metric and alternative indicators of monetary performance.

[20] See also Calani, Cowan, and Garcia-Silva (2011) for an account of unconventional policy measures deployed by Latin American central banks following the global financial crisis, and De Gregorio (2014) for a comprehensive account of economic policymaking in the region before, during, and after the crisis.

tools to mitigate the impact of global push factors on their capital accounts and exchange rates. More recently, the past few years have seen a sudden correction of global commodity prices and the start of the uncertain process of normalization in global financial conditions, which have been important determinants of the deterioration in Latin America's medium-term outlook discussed above (Figure 5). These developments have revived the traditional challenge of setting appropriate interest rate policy in the midst of large exchange rate movements.

Monetary policy following large external shocks

For Latin America's inflation targeters, recent shifts in global commodity prices and financial conditions have triggered substantial exchange rate depreciations. This change in relative prices helps the economy adjust to a less favorable external environment and helps avoid the accumulation of imbalances that could otherwise lead to balance of payment crises. By allowing a flexible exchange rate to play a critical role as a shock absorber, monetary policy can remain oriented toward the objectives of stabilizing domestic demand.[21] But these developments pose a test for the inflation-targeting regimes, since they have led to a prolonged increase in inflation—though more modest in size than during past episodes of large depreciations—despite weak domestic demand.

A depreciation of the exchange rate places upward pressure on inflation by raising the price of tradable goods and inputs in domestic currency. However, in the absence of widespread indexation practices, this adjustment of relative prices is expected to generate only a one-off increase in the price level. Monetary policy should overlook the short-term effects on inflation and clearly explain the shock's transitory nature. Policy decisions should be accompanied by a forward-looking communication strategy that emphasizes the need to set monetary policy according to underlying demand pressures—which are a better predictor of future inflation—rather than realized inflation.

Consistent with these arguments, the region's inflation targeters initially met recent depreciations by keeping monetary policy accommodative to support weak domestic demand. However, two characteristics of the exchange rate adjustments have created tension for monetary policy. First, recent depreciations against the U.S. dollar have been large. Panel 1 of Figure 8 plots 18-month episodes of depreciation against the U.S. dollar over a fan-chart constructed using the historical trajectories of this variable since 1995. For oil producers Brazil, Colombia, and Mexico, the current episode corresponds to a start date of June 2014, coinciding with the steep fall in global prices. For metals producers Chile and Peru, the terms-of-trade shock hit earlier, such that the window of interest begins in March 2013. In all cases, with the exception of Peru, the recent exchange rate depreciation is among the largest since the shift to more flexible exchange rate regimes.

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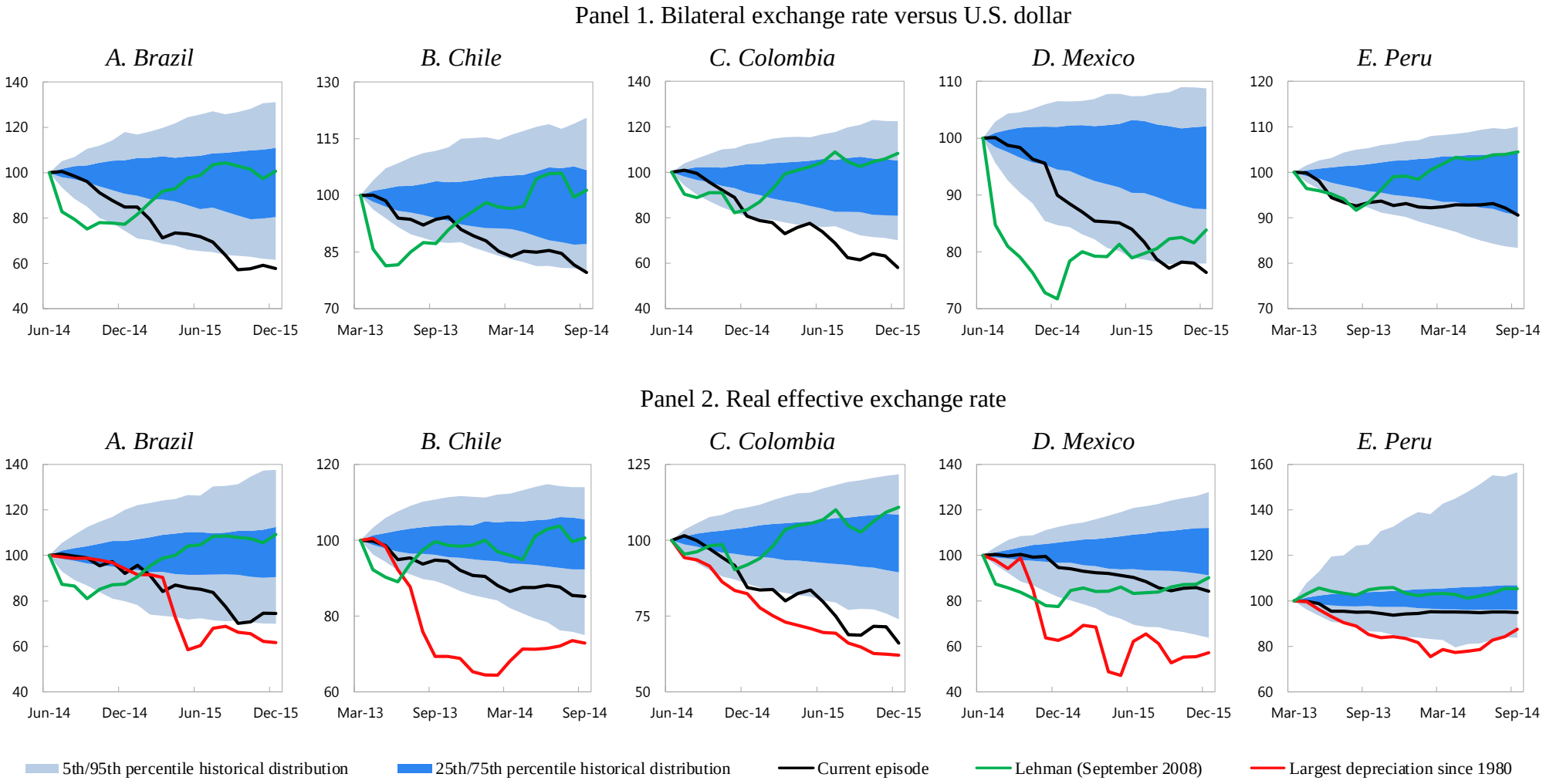
[21] Recently, Rey (2015) has questioned the extent to which a flexible exchange rate allows central banks to implement an autonomous monetary policy in the face of global financial shocks. See Carrière-Swallow and Gruss (2016) for a discussion of these issues as they apply to Latin America.

Figure 8: Recent exchange rate depreciations in historical context
(Index; episode start date = 100; increase corresponds to appreciation)



Sources: IMF, *Information Notice System*; IMF, *International Financial Statistics*; and IMF staff calculations
Note: Confidence bands report the empirical distribution of changes in the exchange rate, based on all 18-month trajectories for the given country since January 1995 (NER) and January 1980 (REER). Largest episode corresponds to the largest year-on-year real effected exchange rate depreciation since January 1980, with start date varying by country: March 1998 (Brazil), March 1982 (Chile), March 1985 (Colombia), October 1981 (Mexico), and September 1984 (Peru).

Second, recent depreciations have been prolonged, likely reflecting a sequence of shocks in the same direction. In comparison, the response of Latin American exchange rates following the bankruptcy of Lehman Brothers—which triggered the global financial crisis in September 2008—was equally sharp on impact but much more short-lived. In Brazil, Chile, Colombia, and Peru, large initial depreciations had completely reverted to their pre-shock levels within one year. This is in stark contrast to the current episodes, in which currencies continuously lost value against the dollar for a period of over two years.

The size and duration of the recent depreciations have pushed inflation above central bank target ranges for a sustained period. This has left central bankers with the task of justifying how a particular constellation of shocks led them to miss their inflation objectives repeatedly. Policymakers have faced a tension between either (i) keeping policy supportive of weak domestic demand and admitting that inflation may remain above target for some time, thus exposing themselves to allegations that they lack commitment to their price stability mandate; or (ii) implementing procyclical monetary tightening to offset the inflationary pressures from the currency, thus worsening economic slack.

A credible monetary policy that keeps inflation expectations well anchored at the relevant policy horizon is crucial to the successful implementation of the first strategy. This has been more challenging to accomplish in countries where the policy horizon is shorter, since one-off inflationary shocks move expectations at short horizons. Going forward, central banks may need to be more flexible regarding the horizon to which they commit to return inflation to target when confronted with a multiplicity of shocks that move inflation in the same direction, thus preserving their credibility. A useful example is the Bank of England, which commits to returning inflation to its target "within a reasonable time period without creating undue instability in the economy."[23] The Monetary Policy Committee normally interprets this horizon as two to three years, allowing it to tolerate relatively lengthy deviations from the target in the face of particular circumstances. Between 2008 and 2011, this flexibility allowed the Monetary Policy Committee to communicate the need for aggressive expansionary policy in spite of a prolonged period of above-target inflation, basing its argument on the transitory nature of price shocks facing the economy, the underlying degree of economic slack, and the fact that longer-term market expectations remained anchored.

While inflation has been running above inflation targets for the past few years in several Latin American countries, two mitigating factors have helped to keep the size of these deviations small and inflation expectations well anchored in most cases. Indeed, when compared to episodes of large currency depreciations in previous decades, the current increases in inflation have been smaller in magnitude.

The first mitigating factor is that the sensitivity of domestic prices to the exchange rate has fallen throughout Latin America over the past few decades. Carrière-Swallow and Gruss

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[23] See "Monetary Policy Framework," available at bankofengland.co.uk/monetarypolicy.

(2016) estimate that exchange rate pass-through coefficients have declined substantially, and particularly among the region's inflation targeters. Exchange rate pass-through partly reflects an economy's openness: the larger the share of imports in the domestic consumption basket, the greater the impact of a given depreciation on consumer prices. On this score, the gradual opening of Latin American economies over the past few decades would be thought to increase the sensitivity of inflation to the exchange rate. Crucially, however, the degree of pass-through also appears to be endogenous to the monetary policy framework and its credibility. Where inflation expectations are well anchored, such that private agents agree on the future evolution of inflation, exchange rate pass-through has been lower. In contrast, where expectations start becoming unanchored, exchange rate pass-through can rise.

As we have argued, Latin America's inflation targeters have made considerable progress in anchoring inflation expectations. These gains have coincided with substantial reductions in exchange rate pass-through, which in Chile, Colombia, Mexico, and Peru has fallen to levels that are in line with advanced economies. But in many countries in the region that continue to struggle with delivering price stability, pass-through estimates are much higher than can be explained by their openness to imports. In these cases, there is scope for reducing pass-through by lowering inflation and better anchoring private agents' expectations through clear communication of a monetary policy that is committed to delivering price stability.

A second mitigating factor has come from the fact that the region's trade partners have also seen large depreciations of their exchange rates, in the context of a strong U.S. dollar. Bilateral depreciations are relevant for a number of aspects of monetary policymaking, including the formation of *expectations about future inflation* and the health of balance sheets. However, multilateral exchange rates are important drivers of *actual inflation*. Panel 2 of Figure 8 plots the evolution of real effective exchange rates over the same period, and compares it to the distribution of their historical trajectories since 1980. The global strength of the dollar has meant that multilateral exchange rates in Latin America have weakened somewhat less than the bilateral rates against the dollar, which has limited external adjustment in some cases. But in Brazil and Colombia, recent movements remain large with respect to each country's historical experience.

While these mitigating factors have limited pressure on inflation in the region, they both underscore the risks associated with the formation of inflation expectations. Central banks must be extremely attentive to the evolution of inflation expectations, since exchange rate pass-through can rise when these become unanchored. Meanwhile, the technical difference between multilateral and bilateral exchange rates is not widely understood by the general public. As a result, the large magnitude of the depreciation against the dollar can generate excessive concerns about rising inflation, inflation expectations, and, potentially, financial stability risks. If the short-term inflationary effects are large and persistent enough, or experience with historical depreciations against the dollar continue to shape inflation expectations, a forward-looking communication policy may need to be supported by interest rate actions. Indeed, concerns that inflation expectations may become unanchored have motivated recent policy rate increases in Colombia and Mexico.

Foreign exchange intervention and international reserves

Why do countries intervene in foreign exchange markets?

Foreign exchange intervention is typically aimed at achieving either one, two, or all of the following: (i) price stability; (ii) financial stability; and (iii) buffer building. To achieve these objectives, monetary authorities deem foreign exchange intervention to be more effective and/or complementary to the interest rate instrument in certain circumstances. Containing excessive depreciation of the exchange rate makes it easier to achieve the price stability objective by avoiding inflationary pressures from pass-through, thus preserving the credibility of the central bank. Limiting excessive exchange rate volatility contributes to preserving financial stability by mitigating risks from currency mismatches, in turn supporting economic growth by avoiding the financial market disruptions and elevated uncertainty associated with episodes of financial instability. Finally, accumulating international reserves helps to build stronger buffers to respond to external shocks and to reduce the possibility of multiple equilibria driven by foreign currency liquidity shortages.

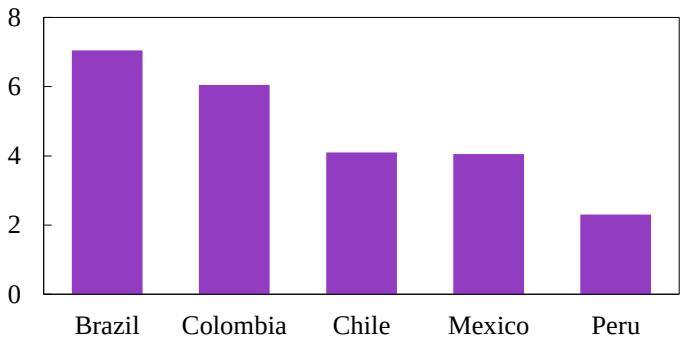
From a theoretical perspective, the literature has suggested the following four channels through which foreign exchange intervention may affect the exchange rate:

- *Signaling.* Central banks may want to signal their future monetary policy intentions by conveying information to the market. Specifically, banks may want to signal the exchange rate that would be consistent with the future monetary policy stance (Mussa, 1981).

- *Portfolio balance channel.* To the extent that domestic assets are not perfect substitutes for foreign assets, domestic assets carry a risk premium. Thus, a central bank intervening by selling domestic assets to buy foreign assets (i.e., a sterilized intervention) would increase the (domestic assets) risk premium given higher relative stock of such assets (and vice versa when buying domestic assets to appreciate the currency). Portfolio arbitrage implies that domestic assets will be worth less, depreciating the domestic currency (Khouri, 1976).

- *Market microstructure.* The microstructure-exchange rate literature has documented the positive relationship between market volume trading and exchange rate volatility (Frankel and Froot, 1990). News, external shocks, and liquidity problems usually result in a larger volume of trading, increasing exchange rate volatility. This could dislocate financial markets and asset allocation and pricing. Moreover, Aghion and other (2009) show that higher exchange rate volatility reduces growth by lowering total factor productivity growth. The transmission channel is as follows: higher exchange rate volatility increases uncertainty, thus reducing investment (given nonfinancial firms' credit constraints).

Figure 9. Change in Gross International Reserves, 2010-15
(Percentage points of GDP)



Sources: IMF, *World Economic Outlook* database; and IMF staff calculations.

- *Precautionary saving channel.* The Asian financial crises in the 1990s and the effects of the global financial crisis pushed central banks to build international reserves to build larger buffers against external shocks.[24]

Focusing on the region, inflation-targeting central banks in Latin America use foreign exchange intervention to react to large movements in exchange rates and excessive exchange rate volatility. The intervention is subordinated to the traditional interest rate policy, aimed at achieving the inflation target through an aggregate demand channel while also affecting inflation expectations.

Intervening to limit excessive exchange rate volatility or excessive depreciations can support the main role of the central bank—inflation targeting—if the mechanism used to form those expectations puts greater emphasis on these movements than what is warranted by the underlying structural price formation process. Also, when intervention is associated with the financial stability objective, central banks can intervene to mitigate exchange rate volatility (as has been done, for example, by Colombia, Mexico, and Peru) to address currency mismatches in assets and liabilities, as well as liquidity problems. For its part, Chile added a liquidity facility in 2009 to smooth the effects of the global financial crisis. It is worth mentioning that, although financial stability is not the aim of many central banks in the region, a lack of it could de-anchor inflation expectations.

An additional motive for foreign exchange intervention is buffer building via the accumulation of international reserves. Countries usually prefer to have stronger buffers against unexpected shocks, following the precautionary motive channel mentioned above. For small and open economies, higher international reserves serve that purpose—despite the fact that pure floating exchange rate regimes would not theoretically require a high level of

[24] See Heller (1966) and Frenkel and Jovanovic (1981) for early models, and Jeanne and Rancière (2011) and Bianchi and others (2013) for more recent contributions.

reserves. In fact, during the period of 2010 to 2015, LA5 central banks accumulated a substantial amount of international reserves, including up to about 7 percentage points of GDP in the case of Brazil (Figure 9). In some cases, there were explicit objectives, as in the case of Chile during 2011, which aimed at pairing its level of reserves-to-GDP with countries of similar development and policy frameworks. However, the accumulation of international reserves should be sterilized to avoid higher inflation that can potentially de-anchor inflation expectations.

Looking into recent evidence of the objectives of foreign exchange intervention, Adler and Tovar (2014) survey intervention motives in 15 economies in Latin America between 2004 and 2010. They document that reducing excess volatility is typically the main stated motive for foreign exchange interventions, while the most frequently argued reasons for intervening are building reserves for self-insurance purposes and containing exchange rate volatility.

How do central banks intervene?

To look into how foreign exchange intervention is actually implemented, we need to focus on several aspects. The first is the intervention framework, as some countries operate under a rules-based framework, while others operate based on discretionary decisions—with potential pros and cons. In turn, countries can change over time in terms of whether they use rules or discretion. Another aspect is the actual instrument. Some countries intervene in the spot market; others do so using swaps in futures markets. We discuss below how the choice of instrument is mostly dictated by the objective. The frequency of interventions, in turn, is affected by the choice of framework in most cases. Finally, we focus here on sterilized foreign exchange intervention. We look into each of these issues below, examining when different instruments would better serve the objectives of the central bank.

It is worth highlighting that for Latin America, foreign exchange intervention has been mostly concentrated in achieving the objectives of financial stability and prevention (i.e., building buffers). The objective of price stability has been the focus only in episodes of large exchange rate depreciations—even in countries with low pass-through of exchange rates to domestic prices, given the sheer size of the fall in the exchange rate.

In terms of the framework for foreign exchange intervention, some Latin American countries follow a rules-based approach. Those rules can specify the size of the intervention and its modality, as well as contingent triggers. For example, Colombia and Mexico used rules that conditioned the intervention on a sufficiently large daily change in the exchange rate, but these were discontinued in May and February 2016, respectively. For a short period, Brazil also employed a rules-based foreign exchange intervention policy. Following the so-called "taper tantrum," Brazil's central bank started a program of pre-announced interventions in August 2013 involving daily auctions of foreign exchange swaps and repos equivalent to US$ 3 billion per week. While the initial program was set to expire at the end of 2013, it was extended repeatedly—though with lower auction volumes—before ending in March 2015. At its peak, the foreign exchange outstanding balance was about US$ 110 billion.

Table 4. Foreign exchange intervention frameworks and main instruments, and gross sales and purchases

a. Intervention frameworks

Country	Rules vs. Discretion		Spot vs. Swaps	
	Rules	Discretion	Spot	Swap
Brazil	✓	✓	✓	✓
Chile		✓	✓	
Colombia	✓	✓	✓	
Mexico	✓	✓	✓	
Peru		✓	✓	✓

b. Gross sales and purchases (Billions of U.S. dollars)

	Gross FX Sales						Gross FX Purchases					
	2010	2011	2012	2013	2014	2015	2010	2011	2012	2013	2014	2015
Brazil	0	6.7	26.2	130.4	153.3	122.6	42.0	66.4	30.4	5.5	16.8	8.3
Chile	0	0	0	0	0	0	0	12.0	0	0	0	0
Colombia	0	0	0	0	0	0	3.1	3.7	4.8	6.8	4.1	0
Mexico	0	0	0.7	0	0.2	24.5	20.6	23.2	16.9	17.3	14.3	2.8
Peru	0.04	10.3	2.9	10.5	16.9	22.2	9.2	10.3	13.0	6.3	6.3	8.7

Source: National authorities.
Note: Gross sales and purchases include spot transactions and swap contracts.

Other countries in the region prefer discretionary foreign exchange intervention, including Brazil (with the exception of the program described above) and Peru, but also, more recently, Colombia and Mexico (see Table 4, panels A and B).[25] Under discretion, while market participants usually realize that the central bank is buying/selling dollars, they may only learn the actual size of that involvement after it has taken place.

There are pros and cons to the different approaches. Announcing the intervention should be preferable at least from a signaling perspective—an issue that is especially relevant for inflation-targeting central banks. Greater transparency helps alleviate fears that interventions will send mixed signals about the commitment to inflation targeting. To put Latin America in perspective, the Reserve Bank of New Zealand employs a transparent rule to determine when

[25] In Peru, for example, BCRP has a policy of moderating excessive exchange rate volatility to limit the negative effects of large exchange rate fluctuations. In general, the BCRP intervenes in three ways: (i) spot intervention, by directly buying or selling dollars in the market; (ii) certificates of deposits (CDs) indexed to the exchange rate. These CDs are denominated in domestic currency but adjusted for foreign currency price movements (aimed at providing the market with a hedging asset); and (iii) currency swaps, which are non-deliverable forwards settled in local currency. Foreign exchange swaps are settled in local currency, and any adjustment related to exchange rate movements (gains and losses from valuation) goes to an account called "Article 89".

to intervene, which is conditional on not affecting monetary policy objectives. Foreign exchange intervention is only triggered if its preconditions are met, and is aimed at limiting excessive exchange rate volatility as well as overly appreciated or depreciated levels of the exchange rate with respect to its fundamentals.[26]

Table 4, Panel A also summarizes the instruments that have been used for foreign exchange intervention in Latin America. Chile, Colombia, and Mexico intervene mostly through the spot exchange rate, especially owing to their financial stability objectives. Brazil and Peru intervene using both types of instruments. In the case of Brazil, as mentioned above, swaps are especially used owing to the signaling objective. For Peru, currency mismatches are particularly relevant for financial stability.

While spot interventions can help meet foreign exchange liquidity shortages, swap interventions are mainly useful to alleviate foreign exchange hedging demand. When a bank or firm has foreign exchange liabilities coming due, it needs actual spot dollars to pay those liabilities. In the presence of an economy-wide shortage of foreign exchange liquidity, intervention through swaps would be less effective than spot interventions. However, if the increase in the demand for foreign exchange is driven by hedging concerns (e.g., as foreign exchange risk is reassessed), then intervention through swaps could meet that need. That said, if forward and spot markets are not segmented, the choice of instrument for intervention might not be as important. Swaps, which are usually settled in domestic currency, are especially useful to mitigate changes in international reserves resulting from foreign exchange intervention. Whether swaps settled in domestic currency pre-commit the stock of reserves remains the subject of debate, since they do not in an accounting sense, but may do so from an economic point of view or from the perspective of market participants.

The frequency of the intervention depends on two things. On the one hand, whether interventions hinge on rules or discretion. If intervention is rules-based, only market outcomes would trigger the intervention, affecting its frequency, which can be at least partially assessed. Discretion-based interventions would tend to amplify instability, as the probability of intervention given the observed market developments is more difficult to estimate. As such, discretionary intervention is likely to exacerbate instability. On the other hand, the core fundamentals and credibility of the authorities could either increase or reduce how often foreign exchange intervention is used. In either case, increase in transparency and better communication would tend to mitigate both factors, therefore reducing the likelihood of the central bank actually intervening in the foreign exchange market.

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[26] For details, see *RBNZ Bulletin*, No. 68, issue 1 (January 2005). For a foreign exchange intervention to be triggered "… Bank will need to be satisfied that all of the following criteria are met: (i) the exchange rate must be exceptionally high or low; (ii) the exchange rate must be unjustified by economic fundamentals; (iii) intervention must be consistent with the PTA (inflation target); and (iv) conditions in markets must be opportune and allow intervention a reasonable chance of success. These conditions are defined precisely in the same volume to guide policymakers' decisions.

The case for using sterilized foreign exchange sales is usually stronger when the exchange rate clearly overshoots its equilibrium level, currency mismatches are large, and reserves are adequate. Overshooting may be a symptom of distress in foreign exchange markets, in which case the potential benefits from intervention may be large. Also, all else being equal, foreign exchange intervention against overshooting reduces its expected cost, because the monetary authority profits if the intervention succeeds.

Sterilized foreign exchange sales are costlier when the exchange rate adjusts gradually to a more depreciated equilibrium, without overshooting. Using foreign exchange intervention to smooth that adjustment can generate large expected losses for the central bank and delay fundamentally warranted adjustment. Thus, it should be considered mainly in the face of financial stability risks (such as in the presence of currency mismatches in balance sheets) and disorderly market conditions. An important consideration when deciding whether to intervene and how much to intervene is the adequacy of international reserves. If reserves are barely or less than adequate, foreign exchange intervention can be counterproductive, since further reserve losses would increase vulnerability.

What have been the effects of intervention?

The evidence on the effectiveness of foreign exchange interventions in reducing volatility is mixed, as is the case for its impact on the level of the exchange rate. One reason for limited effectiveness may be that the details of these policy decisions are not being clearly explained to markets. For instance, what is understood by volatility is rarely defined in policy announcements. Likewise, not a single country that implemented foreign exchange interventions surveyed by Adler and Tovar (2014) mentioned the level of the exchange rate as an objective of their policy. A lack of communication and transparency—key ingredients of strong inflation targeting regimes—may be limiting the effectiveness of foreign exchange interventions.[27]

The early empirical work on foreign exchange intervention focused on advanced economies, mostly consisting of portfolio balance models to identify changes in exchange rate levels. The studies found little evidence in favor of foreign exchange intervention's effectiveness.[28] This is not surprising given the limits of portfolio effects, since the size of the interventions was very small with respect to the depth of the bond markets in these economies.[29]

In contrast, the recent empirical literature on emerging markets has found some supportive evidence.[30] For instance, Adler and Tovar (2014) and Adler, Lama, and Medina (2016)

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[27] Recently, Adler and Lama (2016) study optimal foreign exchange interventions.

[28] See Sarno and Taylor, 2001, for a survey, or Fatum and Hutchison, 2003, where sterilized intervention in Japan systemically affects the exchange rate only in the short term.

[29] To put matters in perspective, the total amount of interventions in the Plaza Agreement was about $18 billion U.S. dollars, which even corrected for inflation is smaller than the amount of foreign exchange intervention done in the LA5 in recent years.

[30] See Menkhoff, 2013 for a recent survey, and the appendix for a list of papers and estimates.

examine cross-country evidence and find that sterilized intervention indeed had a meaningful economic impact, reducing the pace of appreciation when the intervention responded to capital inflows. Similar results are obtained by Daude, Levy-Yeyati, and Nagendgast (2014). Barroso (2014) and Chamon, Candido de Souza, and Garcia (2015) report that foreign exchange intervention had limited appreciation pressures in Brazil, with varying degrees of economic impact. These studies assess exchange rate levels, implicitly or explicitly testing for the portfolio balance approach. Fratzscher and others (2015) find that foreign exchange intervention works very well in terms of smoothing the path of exchange rates, and in stabilizing the exchange rate in countries with narrow band regimes.

IMF (2015) shows that foreign exchange intervention reduced volatility in Brazil during the 2013 "taper tantrum" event. Barroso (2014) also examines the exchange rate volatility issue, testing the effectiveness of foreign exchange intervention in achieving the financial stability objective. Likewise, Tashu (2014) finds that foreign exchange intervention was effective in reducing exchange rate volatility in Peru, while Domac and Mendoza (2004), Chamon (2015), and IMF (2015) find similar evidence in Mexico. Although there are fewer cases—and thus studies—covering foreign exchange intervention in Chile, Claro and Soto (2013) study the effectiveness of reserve purchases in 2008 and 2011. They find that, though successful, these interventions were not cost-free.

However, Disyatat and Galati (2005) find that in the Czech Republic intervention had weakly statistically significant impact on the spot rate and the risk reversal, but that this impact was small. They also find that intervention had an influence on short-term exchange rate volatility, and that Czech authorities appeared to intervene mainly in response to an acceleration of the speed of appreciation of the koruna.

In terms of instrument assessment, recent work by Nedeljkovic and Saborowski (forthcoming) compare the relative effectiveness of spot and non-deliverable futures in Brazil. They find both instruments to be effective in affecting the level and the volatility of the exchange rate, with a significant link between both instruments. They also document that Brazil's central bank tends to rely more on spot foreign exchange interventions to contain capital flows pressures, while using futures to impact the trend of the exchange rate.

Challenges for foreign exchange interventions: transparency is key

Going forward, what are the main challenges for enhancing inflation-targeting regimes in Latin America in relation to foreign exchange intervention? Given the apparent conflict between the use of standard interest rate policy and foreign exchange intervention, there is ample room for improving this aspect of monetary policy.

In part, the efficacy of inflation targeting strongly relies on the credibility that transparency and clear communication provide to coordinate and anchor inflation expectations. Transparency and proper communication enable economic agents to infer with minimal error the central bank's interest rate reaction function. In this sense, coordination is achieved, anchoring inflation expectations. But this clarity is lacking with regard to foreign exchange

intervention, including in those central banks operating under rules-based foreign exchange intervention. Clearer objectives (be they exchange rate levels, financial stability, or reserve accumulation) and operational frameworks (using rules or discretion) will be necessary to make the foreign exchange intervention process easier to unveil for the market. Eventually, the signaling objective should gain relevance on the back of central bank credibility. This is particularly relevant because in some cases foreign exchange intervention policies could actually amplify financial instability instead of mitigating it.

Once policies become more transparent, private sector actors will be better equipped to understand the foreign exchange intervention policy reaction function of the central bank. A better communicated, transparent, and thus more credible foreign exchange intervention policy could reduce the need to actually intervene, as market participants would anticipate the central bank's action in response to movements in the exchange rate. Market microstructure effects on exchange rates would be mitigated. In turn, this would strengthen the effectiveness of inflation targeting.

V. Central Banks and Systemic Financial Stability

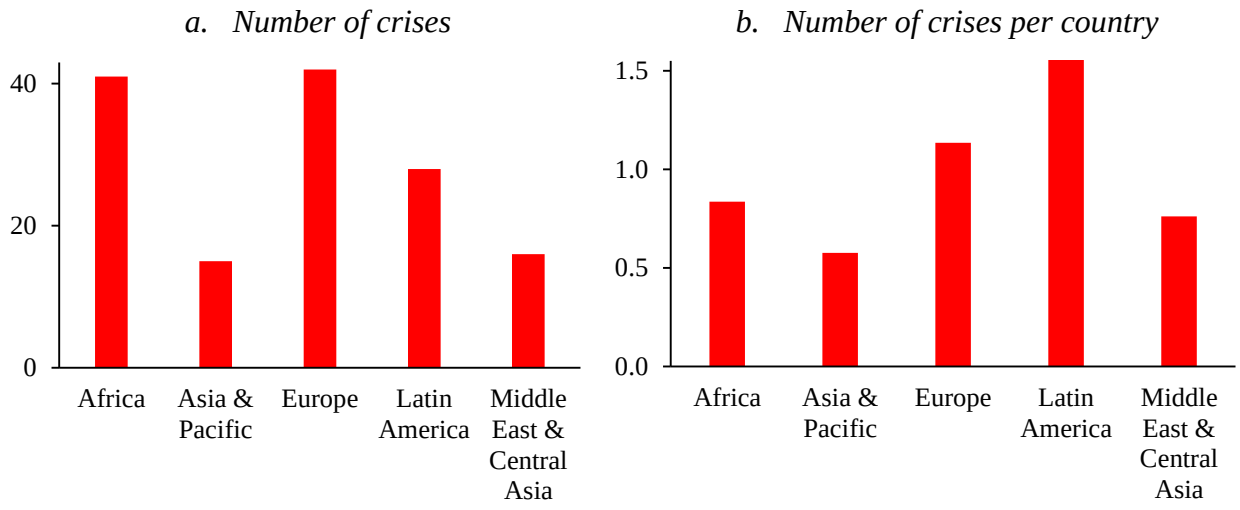
In line with a global trend, central banks in Latin America are rethinking their role in preserving financial stability. The depth and costs of the financial crisis have led to a global consensus about the need to develop a macro dimension for financial regulation—or macroprudential regulation—with the view toward preserving financial stability and avoiding another systemic crisis. This new approach to financial regulation has two elements: one that stresses the importance of looking at the financial system as a whole and not as the sum of individual institutions; and another that expands the perimeter of regulation to include the entire financial industry and not only banks. The consensus also suggests that central banks should play a central role in the formulation of macroprudential policy. In response, most advanced countries are already implementing macroprudential policies, while emerging markets are gradually moving in the same direction.[31] Yet, while macroprudential policy brings undeniable benefits, it can potentially induce costs if it is not appropriately designed. The challenge for central banks in Latin America is thus to design an effective macroprudential policy function that minimizes costs while avoiding undermining the independence of central banks in the conduct of monetary policy.

Macroprudential policy in Latin America: the state of play

Latin America has been prone to large and recurrent banking crises like no other region worldwide. During 1970 to 2012, as many as 28 systemic banking crises occurred in the region and no large country remained immune. Compared to other regions, Latin America

[31] The United Kingdom and the United States, as well as the European Union and several of its member countries, approved legal reforms to their financial stability framework to lay the groundwork for macroprudential policies. A number of emerging markets—like Malaysia, Thailand, and Turkey—did as well.

Figure 10: Systemic Banking Crises in Latin America and other Regions; 1970-2012



Source: Laeven and Valencia (2013) database of banking crises

ranks third in terms of total number of crises, but first on a crises-per-country basis (see Figure 10). Moreover, in some countries, banking crises occurred more than once in the same period, with Argentina leading this group with four episodes (1981, 1989, 1995, and 2002), and many countries suffering banking crises twice. In 14 of these episodes, a currency crisis took place simultaneously, and in nine of them sovereign debt crises occurred as well.[32]

Yet, Latin America weathered the adverse impact of the global financial crisis relatively well. For the first time in decades, disorderly conditions were largely averted despite the impact of a large external financial shock. The financial systems in the commodity-exporting countries also did well in resisting the impact of the strong external shock induced by the terms-of-trade deterioration associated with the end of the commodities' supercycle, and the large capital outflows that followed the possible normalization of monetary policy in the United States. These two shocks generated large currency depreciations, but financial systems have largely remained on solid ground.

This outcome should not lead to complacency, however, as no country is immune to financial crises. The global financial crisis has shown that vulnerabilities can develop with systemic connections and can move between different activities of the financial industry (banks, insurance companies, securities markets).

[32] See Laeven and Valencia (2013) for a database of systemic banking crises.

Box 1: Financial Stability Committees in Chile, Mexico, and Uruguay

There is increasing interest in Latin America as to how to design an effective macroprudential policy framework. Following the global crisis, some decisions have already been taken in that direction. Chile, Mexico, and Uruguay have already made progress towards improving financial stability frameworks, laying the ground for the implementation of macroprudential policies. Chile created the Financial Stability Council in 2011, Mexico the Financial System Stability Council in 2010, and Uruguay the Financial Stability Committee in 2011. These new institutional arrangements have a number of common features:

- They all have a mandate to prevent the buildup of systemic risks and, if necessary, recommend the implementation of macroprudential policies to the relevant agencies. They don't have decision powers and are not held accountable—although, in Mexico, the Council is required to prepare and publish a report assessing financial stability and the measures taken to this end. The three institutional arrangements are vested with powers to obtain information from all financial industries and their participating institutions and to play a coordinating role to secure the consistency of financial stability efforts.
- The financial stability committees in Mexico and Uruguay have explicit powers to manage financial crises. In Chile, the crisis management powers reside with the individual institutions and the Council operates as coordinating device. Crisis management is explicitly mentioned as a key consideration for establishing the Council. In all three countries the committee is presided by the Minister of Finance (MoF) and the other members are the heads of the financial supervisory agencies and the central bank (except in Chile, where the governor is invited to participate but is not formally a member of the Council). Thus, to a great extent, they mirror the structure of the Financial Stability Oversight Council (FSOC) in the United States. The Financial System Stability Council in Mexico is comprised of another eight members, including: the head of the National Commission of Banks and Securities; the National Commission of Insurances; National Commission for the Savings for Retirement; the Executive Secretary of the Institute of Banks Saving Protection; the Undersecretary of Finance; and the Governor of the Bank of Mexico and two Deputy Governors. The Financial Stability Committee in Uruguay also comprises the Governor of the Central Bank of Uruguay; the Superintendent of Financial Services; and the President of the Corporation for the Protection of Banks Savings. In turn, the Financial Stability Council in Chile comprises the head of the Superintendence of Securities and Insurances; the Superintendence of Banks and Financial Institutions; and the Superintendence of Pensions. The Governor of the Central Bank of Chile is not formally a member of the Council because this was seen to conflict with the independence and mandate of the central bank, as sanctioned in the Constitution.

Some of these committees have additional specific responsibilities. For instance, recommending criteria for the determination of the budget of the supervisory agencies in Chile, and coordinating with other international institutions on issues of financial stability in Uruguay. The three committees are required to meet regularly, at least every month in Chile, at least quarterly in Mexico, and at least once a year in Uruguay.

Latin America has taken a cautious approach with respect to macroprudential policy. The countries have made progress, although at a slower pace than in the advanced economies. Chile, Mexico, and Uruguay have formally established financial stability committees, which differ in some ways across countries (see Box 1). Brazil has also created a similar arrangement within the central bank as well as other committees with a view toward coordinating information with other regulatory agencies in the financial industry.[33] In the first three cases, the institutional arrangement for macroprudential policy mirrors the type of structure of the U.S. Financial Stability Oversight Council, although in Chile, the central

[33] See Jácome, Nier, and Imam (2012) for an explanation of the Brazilian institutional arrangement.

bank is not a formal member of the Financial Stability Committee, but rather participates only as an invited member.

The toolkit for macroprudential policy is comprised primarily of the same regulatory instruments that existed before the global financial crisis. Dynamic provisioning had already been in place in Bolivia, Colombia, Peru, and Uruguay, and a larger number of countries other instruments such as limits on net open positions and interbank exposures, although in general with a microprudential approach. The most active country in the implementation of macroprudential instruments is Brazil, where changes in loan-to-value ratios and risk-weight factors, and sometimes both, have also been used to cope with financial vulnerabilities.[34] Interestingly, imposing extraordinary capital requirements on systemic financial institutions is not common in Latin America, despite the fact that in most countries the two largest banks have a market share that together exceeds 40 percent.

The challenge of establishing an effective and balanced macroprudential policy function

While Latin American countries have in general made important strides over the last 15 years to increase the soundness of their financial systems and their resilience to real and financial shocks, additional efforts may be needed to cope with systemic vulnerabilities. Because of the large toll inflicted by banking crises in the 1980s and 1990s, most countries enacted new legislation to upgrade prudential supervision and regulations. Capital requirements are higher than Basel standards, and large liquidity buffers are in place. Regulatory agencies have moved from supervision based on compliance checking toward implementation of risk-oriented procedures. Countries have also modernized legislation to cope with bank failures and strengthened financial safety nets. Yet, Latin American countries still need to establish an effective macroprudential policy to monitor and tackle systemic vulnerabilities in a timely fashion and in terms of structural dimensions. The global financial crisis has shown us that the sources and level of systemic risk are likely to evolve over time, while the distribution of risks can shift quickly given the static nature of traditional prudential regulations. In addition, regulations must factor in that financial sector risks interact strongly with macroeconomic developments.

Progress is needed on the design of a macroprudential policy function in Latin America within the existing institutional environment—the Atlantic and Pacific models—and taking key aspects of these structures as given.[35] In the Atlantic model (Argentina, Brazil, Paraguay, and Uruguay) the central bank is responsible for both monetary policy and prudential regulation and supervision. In the Pacific model (Chile, Colombia, Mexico, Peru, among others), these two responsibilities are carried out by the central bank and by a separate

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[34] See Afanasieff and others (2015).

[35] These institutional arrangements have historical roots (Jácome, 2016) and are enshrined in law—in some countries in the constitution.

agency.[36] Depending on what model countries use, they present different starting points for establishing an effective macroprudential policy function. As for other areas of the financial industry that are relevant for macroprudential policy, the institutional structures vary across countries.[37]

The key issue for the countries under the Atlantic model is to clarify the legal mandate and to establish clear accountability. Countries should make a distinction between the objectives of macroprudential policy (financial stability) and monetary policy (price stability). This distinction is relevant for assigning the corresponding powers to take macroprudential policy decisions. Countries should also further coordination efforts to address systemic risks with other supervisory agencies. Holding policymakers accountable for the policy decisions they have taken is a difficult endeavor in itself. This is because accountability needs to be based on a clear and measurable objective against which the policy actions can be gauged. However, financial stability is inherently difficult to measure. What is more easily measured is instability—exactly what macroprudential authorities would hope to avoid—at which point the exercise of accountability is reduced to assigning blame rather than preventing negative outcomes in advance.

In countries where the starting point is the Pacific model, there are additional challenges to strengthening macroprudential policies. This is because the relevant information, expertise, and regulatory powers are distributed across the central bank and the banking authority—as well as across other regulatory agencies, like in the Atlantic model—making the success of macroprudential policy harder to achieve because it depends on cooperation across several agencies.[38] The response in some countries has been to enact a financial stability committee. However, these committees lack macroprudential policy effectiveness, so while they may recommend the adoption of macroprudential measures, their recommendations are not legally binding. Presumably, legislators tried to preserve the independence of the central bank and financial regulatory agencies by avoiding interference from the executive power—financial stability committees are chaired by the Minister of Finance—but at the cost of making accountability ineffective, since no agency is ultimately responsible for macroprudential policy. An alternative to strengthen the effectiveness of these committees is to vest them with "comply or explain" powers associated with the existing recommending provisions.

Regardless of which institutional arrangement model the Latin American countries employ, strengthening or establishing a macroprudential framework should be guided by the following criteria: (i) achieving effective identification, analysis, and monitoring of systemic

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[36] These two institutional models are discussed in Jácome, Nier, and Imam (2012).
[37] In Argentina and Brazil, insurance companies and securities markets are regulated by dedicated agencies, and in Chile by a single regulator. In Colombia, they are regulated by the banking supervision authority, in Mexico banks and securities are regulated jointly, in Peru banks and insurance companies are regulated together, while in Uruguay banks, insurance companies, and securities markets are all regulated under the central bank's roof.
[38] See Nier and others (2011).

risk; (ii) ensuring timely and effective use of macroprudential policy tools by creating appropriate mandates and assuring strong powers and accountability; and (iii) ensuring effective coordination in risk assessments and mitigation so as to reduce gaps and overlaps, while preserving the autonomy of separate policy functions.[39] This said, the institutional setup supporting macroprudential policy should not undermine the hard-won independence of central banks and their credibility. Since preserving financial stability inevitably involves government involvement—given that financial crises are paid for with taxpayers' money—it is important to keep monetary policy decisions insulated from government interference. One alternative is to maintain distinct decision-making bodies with clear and separate objectives, and different primary instruments (interest rates for monetary policy and macroprudential tools for financial stability). Enhancing communication to explain central bank's role in executing these responsibilities is also essential.

Countries in Latin America must also define how they can better coordinate macroprudential policies with other economic policies, especially monetary and microprudential policies.[40] It is widely accepted that monetary and macroprudential policies feature strong complementarities and interactions. However, there is no standard recipe to ensure effective coordination. Thus, it is essential to understand the interactions between these policies, their potential conflicts and synergies, and how best to deploy them to achieve the goals of price stability (associated with monetary policy) and financial stability (associated with macroprudential policy). As a principle of coordination the two policies should be used to complement each other—primarily assigning the use of interest rates to affect aggregate demand and achieve the objective of price stability, and using macroprudential instruments primarily to achieve the objective of financial stability. Macroprudential and microprudential regulation are even more closely interrelated. As in their relation with monetary policy, in principle macroprudential and microprudential policies have different objectives (stability of the financial system as a whole and protection of depositors, respectively) and, although they have complementary features, the two objectives can be mutually conflicting at certain times. For example, a country might need to introduce a macroprudential measure, such as the release of special provisions in banks to maintain credit flows in the downswing of the business cycle. In contrast, the microprudential authority may recommend a more conservative policy and believe macroprudential regulation could endanger the security of deposits or the solvency of institutions. The challenge is to design an institutional framework that can effectively coordinate the two policies, keeping in mind that their mutual boundary is unclear, as the two types of regulation use similar instruments.

VI. Concluding Remarks

Latin America's independent central banks have made substantial progress in delivering an environment of price stability that supports sustainable economic growth. We have reviewed the underpinnings of these achievements and discussed remaining challenges facing central banking in the region.

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[39] See a discussion of these principles in Nier and others (2011).
[40] See IMF (2013b).

For those countries where inflation remains high and volatile, achieving durable price stability will require not only addressing fiscal imbalances but also strengthening the independence of central banks. In countries where inflation-targeting regimes are well established, remaining challenges involve assessing economic slack and the policy stance, further anchoring inflation expectations, communicating monetary policy in a context of long-lived transitory shocks, and clarifying the role of the exchange rate in the monetary policy framework. Finally, the role of macroprudential policy in preserving financial stability must be coordinated with existing objectives, and care must be taken to preserve the independence of central banks and the primacy of the price stability objective.

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Appendix. Some empirical evidence on foreign exchange interventions

Study	Impact
	Cross country
Adler and Tovar (2014)	0.1 of GDP FXI slows down the pace of domestic currency appreciation by 0.3 percent.
Adler, Blanchard, and Carvalho (2015)	0.25 percent of GDP FXI reduces appreciation on impact by 1.5 percent.
Adler, Lisack, and Mano (2015)	1 percentage point of GDP FXI depreciates the nominal and real exchange rates by [1.7–2.0] percent and [1.4–1.7] percent, respectively.
Daude, Levy-Yeyati, and Nagengast (2014)	1 percent increase in FXI weakens the domestic currency by 0.18 percent.
	Brazil
Barroso (2014)	US$ 1 billion buy intervention=>0.45–1.18 percent depreciation. US$ 1 billion selling intervention=>0.46–0.66 percent appreciation. Average: 0.5 percent change in domestic currency valuation
Chamon, Garcia, and Sousa (2015)	Appreciation in excess of 10 percent following the 2013 Swap Program Announcement
	Peru
Tahu (2014)	FX sales effective in reducing volatility and depreciation. FX purchases not effective.
	Mexico
Domac and Mendoza (2004)	FX sale of US$ 100 million strengthens the peso by 0.08 percent.
Chamon (2015)	Appreciation of about 2½ percent following 2015 FX Intervention Announcements.
	Turkey
Domac and Mendoza (2004)	FX sale of US$ 100 million strengthens the lira by 0.2 percent.