3. Credibility, Communication, and Monetary Policy Procyclicality in Latin America

The inflationary impact of large and persistent exchange rate depreciation has prompted a reexamination of the monetary policy response of central banks in Latin America in the face of large external shocks. How monetary policy should respond to such shocks and how these decisions should be communicated publicly are key questions. This chapter argues that central bank credibility—reflected by the degree of anchoring in inflation expectations—plays a critical role in policy decisions in response to these shocks and can benefit immensely from transparency and clear communication. In this context, stronger transparency frameworks and communication strategies—that is, how openly and how well the central bank communicates in guiding markets—are found to be associated with more predictable policy decisions and a better anchoring of inflation expectations. This, in turn, can provide greater room to maneuver interest rate policy in the face of transitory inflation shocks through enhanced central bank credibility.

Following a series of terms-of-trade and other supply shocks, in the last five years the currencies of the LA5—*Brazil, Chile, Colombia, Mexico, and Peru*—were subject to some of the largest depreciations in decades.[1] This led to inflation rising above central bank targets amid weaker economic activity and wider output gaps. However, the rise in inflation was less than experienced in previous episodes, reflecting the strengthening of the monetary policy frameworks over the past two decades, which helped contain the exchange rate pass-through to consumer prices (see Chapter 3 of the April 2016 *Regional Economic Outlook: Western Hemisphere*). Nevertheless, tensions regarding monetary policy and trade-offs became evident. Central banks had to decide whether to increase policy rates to stop persistently high inflationary pressures and prevent inflation expectations from becoming unanchored, or to lower rates to offset negative income effects resulting from the reduction in purchasing power associated with weaker terms of trade (see Chapter 2 of the April 2016 *Regional Economic Outlook: Western Hemisphere*). LA5 central banks, with the notable exception of Chile, opted to increase policy interest rates (Figure 3.1). Raising rates when growth is weak amounted to some degree of procyclicality in the monetary policy response (Végh and others 2017).[2]

Several factors might have contributed to the procyclicality of monetary policy.[3] Central bank credibility—reflected by the degree of anchoring in inflation expectations—is likely at the top of the list. Specifically, this chapter argues that the strength of the anchor that held medium-term expectations to the target when these shocks hit was most influential in policy decisions. Among the LA5 economies, except for Chile, survey-based medium-term inflation expectations remained above the midpoint of the central bank targets for a prolonged period (Figure 3.2). Similar dynamics are observed when looking at inflation expectations obtained from financial instruments (Box 3.1).[4]

But even starting with well-anchored expectations does not ensure that they will stay that way once

This chapter was prepared by Yan Carrière-Swallow, Etibar Jafarov, and Juan Yépez (team leader), with contributions from Andrea Pescatori, and a Banco de España team composed of Alberto Fuertes, Ricardo Gimeno, and Jose Manuel Marques. Henrique Barbosa, Genevieve Lindow, and Adrián Robles provided excellent research assistance.

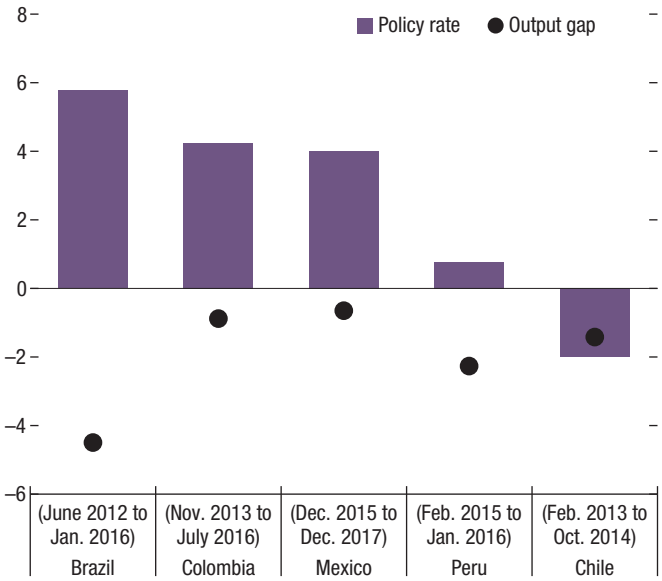
[1]The analysis focuses on these economies, which are the largest in the region, with close to two decades of implementing an inflation-targeting monetary policy framework. This in turn allows the analysis to have the largest time coverage possible and to track the evolution of LA5 central bank frameworks.

[2]For an earlier look at the cyclicality of monetary policy, see Végh and Vuletin (2013) and Cordella and others (2014).

[3]Other factors include the degree of financial dollarization, central bank independence, and/or governance and institutional quality (Végh and others 2017). Delays in fiscal consolidation amid widening external imbalances could have also contributed to the procyclicality of monetary policy in some LA5 economies.

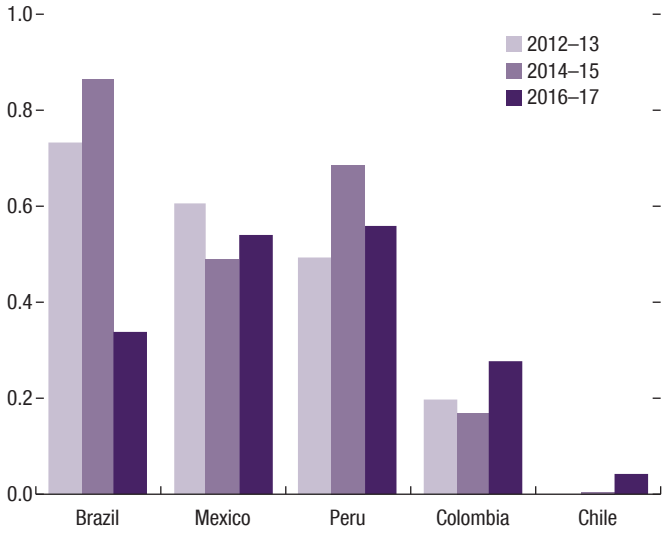
[4]Box 3.1 provides a comparison between survey-based and market-based inflation expectations.

Figure 3.1. Changes in Policy Interest Rates and Output Gap
(Percentage points; inflation trough to peak)



Sources: Haver Analytics; IMF, World Economic Outlook database; national authorities; and IMF staff calculations.

Figure 3.2. Absolute Deviation of Medium-Term Inflation Expectations from Target
(Percentage points)



Sources: Consensus Economics; Haver Analytics; and IMF staff calculations.

inflation is outside the central bank's target range for an extended period. This raises the question of whether effective communication by central banks would help offset the need for monetary policy tightening when inflation and/or inflation expectations are outside the central bank's target range. This chapter argues that instrumental to implementing a sustained countercyclical policy response is a sound communication strategy by helping anchor inflation expectations. Specifically, central banks should provide clear public guidance about the conditional future direction of monetary policy and the balance of risks to inflation reaching the target within the central bank's policy horizon.

Against this backdrop, this chapter presents evidence on the link between central bank credibility and the implementation of countercyclical monetary policy. Comparing the behavior of inflation expectations across a sample of 20 economies with an inflation-targeting framework in response to protracted terms-of-trade shocks, the chapter highlights that monetary policy is less procyclical in economies with more stable inflation expectations. It then explores the role of transparency and communication in boosting central bank credibility, and shows that there is a clear link between how openly and clearly central banks communicate and the anchoring of inflation expectations. Finally, using text-analysis tools, the chapter analyzes the content of central banks' communications—for example, what they communicate in press statements and minutes—and assesses their effect on central bank credibility and predictability.

Central Bank Credibility and the Cyclicality of Monetary Policy

The private sector's expectation formation process, including the degree of volatility in these expectations, is strongly influenced by the perceived credibility of a central bank policy action. In principle, policymakers could have "looked through" the price-level impact of recent terms-of-trade shocks and allowed these to work their way through headline inflation. However, the protracted effect of these shocks on inflation could

impact the public's expectations, depending on the degree of anchoring, giving rise to second-round effects on inflation. Central banks concerned about poorly anchored inflation expectations damaging the credibility of the inflation-targeting monetary policy regime would be compelled to take policy action.

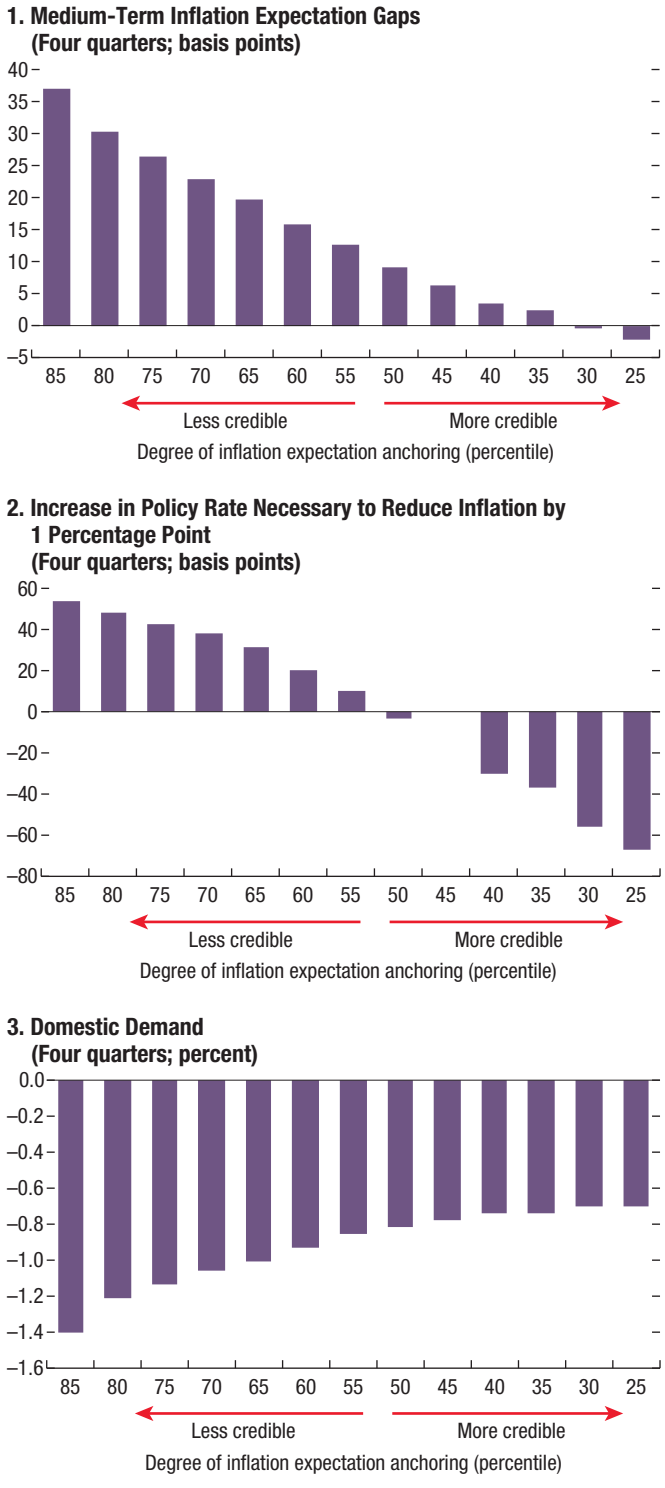
In this context, there are high costs to allowing inflation expectations to drift away from the target for a prolonged period. To illustrate the generality of this observation, the response of gaps in medium-term inflation expectations is estimated—that is, the absolute difference between inflation expectations and the central bank target—for a large and protracted inflationary shock in a sample of 20 inflation-targeting economies (Figure 3.3, panel 1). Each bar shows the average cumulative gap in inflation expectations over four quarters in response to a 20 percent decline in the terms of trade. These responses are based on the estimation of a panel vector autoregression with interaction terms (IPVAR), and vary depending on the size of the inflation expectation gap—a measure of central bank credibility (Demerzis, Marcellino, and Viegi 2012)—in the year before the shock.[5]

Results suggest that in an economy with less-anchored expectations, inflation expectation gaps widen substantially following the terms-of-trade shock. For example, an economy with an initial distance between medium-term inflation expectations and the central bank target that is above the 75th percentile of the distribution saw a widening of the expectation gap of 30 basis points following a terms-of-trade shock.[6] In contrast, economies with the most credible central banks (that is, inflation gaps below the 50th percentile) saw no significant widening of inflation expectation gaps following the same shock.

[5]As discussed in Towbin and Weber (2013), the use of interaction terms in panel vector autoregressions (PVARs) is a simple way to allow for deterministically varying coefficients across time and countries. The framework thereby provides an alternative to the stochastically time-varying coefficient frameworks often employed in single-country VARs. See Annex 3.1 for technical details.

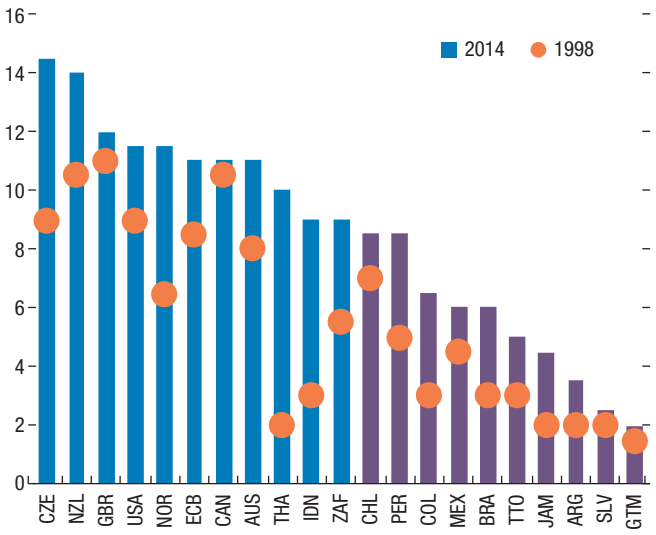
[6]This result is in line with Gelos and Ustyugova (2017), who find that when inflation is already relatively high, commodity price shocks have a substantially higher pass-through to domestic inflation.

Figure 3.3. Cumulative Response of 20 Inflation-Targeting Economies to a 20 Percent Reduction in the Terms of Trade, 2000–17



Sources: Consensus Economics; Haver Analytics; IMF, International Financial Statistics database; national authorities; and IMF staff calculations.

Figure 3.4. Central Bank Transparency Index
(Index)



Source: Dincer and Eichengreen (2014).
Note: Purple bars refer to Latin American and Caribbean countries. For International Organization for Standardization (ISO) country codes used in data labels, see page 115.

The degree of central bank credibility at the onset of the shock also appears to influence the policy response (Figure 3.3, panel 2). Where the deterioration of inflation expectations is greater, this is accompanied by a more aggressive increase in policy rates. On the other hand, economies with better initial anchoring of inflation expectations lowered their policy rates despite higher observed inflation. The response of domestic demand obtained from the IPVAR framework illustrates that the higher degree of procyclicality in countries with lower central bank credibility exacerbated the effect of the terms-of-trade shock on economic activity (Figure 3.3, panel 3).

If well-anchored expectations are crucial to determining the way central banks respond to transitory inflationary shocks, how should they go about anchoring them more solidly? A large body of literature has found that expectations get anchored gradually as central banks gain credibility by delivering price stability (Bordo and Siklos 2015). In addition, the next section presents evidence that suggests a strong relationship between central bank transparency and credibility.

Against this backdrop, the analysis will show that a credible and transparent policy framework is essential for conducting countercyclical monetary policy.

Central Bank Transparency and Credibility

In terms of policy frameworks, the move toward inflation-targeting regimes in Latin America over the past three decades has coincided with better-anchored inflation expectations, but as the previous section showed, there is still scope for improving these frameworks. Another aspect of these evolving frameworks has been the degree of central bank transparency that, despite significant improvements, falls below that of comparator countries (Figure 3.4).[7] Transparency provides the public with a better understanding of the central bank's objectives and the factors that motivate its monetary policy decisions. This in turn enables public accountability of independent central banks, and greater credibility over time (Blattner and others 2008). This section shows empirically that strong transparency frameworks have gone hand in hand with greater central bank credibility.

While there is no agreement on what constitutes a best-practice transparency framework, the following are thought to form essential elements: (1) a formal policy objective such as price stability (including an explicit quantification of the objective); (2) an assessment of the current state of the economy; (3) an explanation of policy decisions; (4) a forward-looking analysis; and (5) publication of the economic data and forecasts used in the central bank's assessment.

The transparency frameworks of LA5 central banks are characterized by policy rate decisions

[7]This chapter employs the Dincer and Eichengreen (2014) index of central bank transparency, which covers five categories, including the political, economic, procedural, policy, and operational aspects of central bank transparency. This index does not control for the quality of central bank publications, which creates some degree of uncertainty around the reported transparency scores. In this context, rankings based on this index reflect relative (and not absolute) performance, and results are presented relative to the range of transparency scores across peers.

accompanied by *press releases* that explain the decision and provide an assessment of the balance of risks for inflation. Further, the baseline scenarios and balance of risks are delineated in *monetary policy reports* published quarterly. Alongside these reports, central banks release the data used for their monetary policy decisions (output gaps, inflation, inflation expectations, wages, employment, and GDP). All the LA5 central banks, except the Central Reserve Bank of Peru, release *minutes* of their policy meetings before the subsequent meeting. Names are not assigned to transcribed comments, and votes are attributed only in the case of Chile and Brazil. As part of the accountability component of transparency frameworks, central bank governors are summoned to periodic *parliamentary hearings* (Brazil, Chile, Colombia, Mexico), and some central banks have started to publish *transcripts* of monetary policy decision meetings with a long lag (Chile).[8] Deficiencies in the frameworks arise as a result of gaps in operational transparency (due to the lack of assessments of the central bank's forecasting and operational performance).

Transparency about monetary policy objectives, outlook, past policy misses, and possible future policy responses reduces policy uncertainty and enhances the ability of central banks to manage expectations (Blinder and others 2008). This in turn implies that central bank transparency is associated with higher central bank credibility and lower monetary policy procyclicality. The responses of medium-term inflation expectation gaps (the measure of central bank credibility used here), policy rates, and domestic demand to a terms-of-trade shock can be examined within an IPVAR framework, akin to the one employed in the previous section. Conditional impulse responses are obtained by allowing the coefficients of the IPVAR to vary with the degree of central bank transparency.[9]

While admittedly this framework does not allow for establishing a causal relationship between transparency and credibility, results point toward a strong link between the two. Figure 3.5 (panel 1) displays the response of medium-term inflation expectation gaps conditional on central bank transparency. Among a sample of 20 inflation-targeting economies, lower transparency is associated with inflation expectation gaps that widen significantly in response to inflationary shocks. In line with the literature, the analysis finds that the gains from increasing central bank transparency display diminishing returns.[10] The largest benefits accrue mainly at low levels of transparency. This suggests that many of Latin America's central banks, characterized by lower levels of transparency, stand to benefit from expanding their transparency frameworks.

Do better-anchored inflation expectations tied to more transparent central banks allow central banks to implement countercyclical monetary policy? The analysis here shows that the degree of transparency is associated with the procyclicality of monetary policy following a terms-of-trade bust (Figure 3.5, panel 2). Specifically, a more sizable and protracted policy rate tightening in reaction to the shock occurs in economies with less-transparent central banks. Central banks with the current average transparency score of LA5 central banks increased the policy rate by 50 basis points for each 100 basis point increase in inflation following the decline in the terms of trade. In contrast, a country with Australia's current level of transparency kept the policy rate unchanged.[11] This monetary tightening increases macroeconomic volatility, since inflation

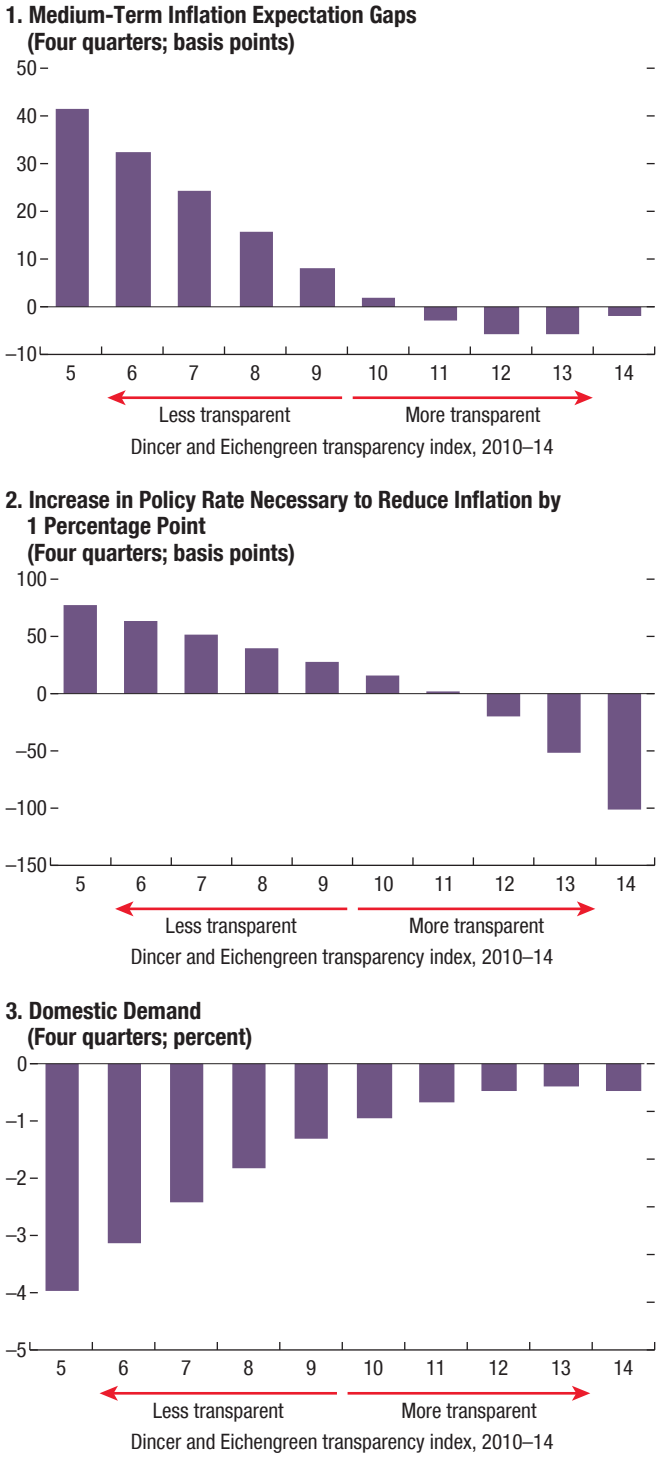
[8]Box 3.2 provides a detailed description of the transparency framework of the Central Bank of Chile, one of the most transparent central banks in the region.

[9]See Annex 3.1 for details.

[10]Looking at a different measure of credibility allows for extending this analysis to a broader sample. Brito, Carrière-Swallow, and Gruss (2018), in a sample of 44 countries, show that there is a strong relationship between central bank transparency and disagreement among professional forecasters of inflation—another common proxy for central bank credibility. Raising transparency from low levels was associated with large reductions in forecast disagreement even in countries that never adopted an inflation-targeting framework.

[11]Unless otherwise noted, transparency scores refer to 2014, the latest year for which the Dincer and Eichengreen (2014) transparency score is available. This could provide an outdated view for some central banks, and would not capture recent improvements in transparency frameworks.

Figure 3.5. Cumulative Response of 20 Inflation-Targeting Economies to a 20 Percent Reduction in the Terms of Trade, 2000–17



Sources: Consensus Economics; Dincer and Eichengreen (2014); Haver Analytics; IMF, International Financial Statistics database; national authorities; and IMF staff calculations.
Note: Dincer and Eichengreen transparency index ranges from 1 to 15, with 15 being the most transparent.

and output move in opposite directions after a terms-of-trade decline (Figure 3.5, panel 3).

While there is scope for LA5 economies to continue strengthening their transparency framework, there may be more to gain from focusing on the quality of their communication, rather than on the quantity. The next section presents an analysis that tries to identify a causal relationship between transparency and credibility by focusing on the communication components of central bank transparency and measuring their impact on market expectations about the future path of interest rates and medium-term inflation.

Central Bank Communication: From Quantity to Quality

Within a given transparency framework, a sound communication strategy by the central bank should strengthen the signal-to-noise ratio. In this regard, it is not a matter of how much information is disseminated, but of the quality of the information provided to the public. This section looks at the communication strategies pursued by LA5 central banks and their effects on central bank predictability and credibility in the last eight years, a period characterized by a series of large terms-of-trade and other supply-side shocks.[12]

What constitutes an effective communication strategy? Blinder (2009) posits that " . . . successful central bank communication efforts should make policy more predictable, and market expectations about future short-term rates more accurate." To examine this empirically, short-term central bank predictability can be measured using surveys of financial market analysts that are gathered the day before each monetary policy decision. Analysts are asked about their expectations regarding the outcome of the upcoming monetary policy decision. The difference between the expectation and the outcome could be viewed as a forecast error or monetary policy surprise. Large forecast

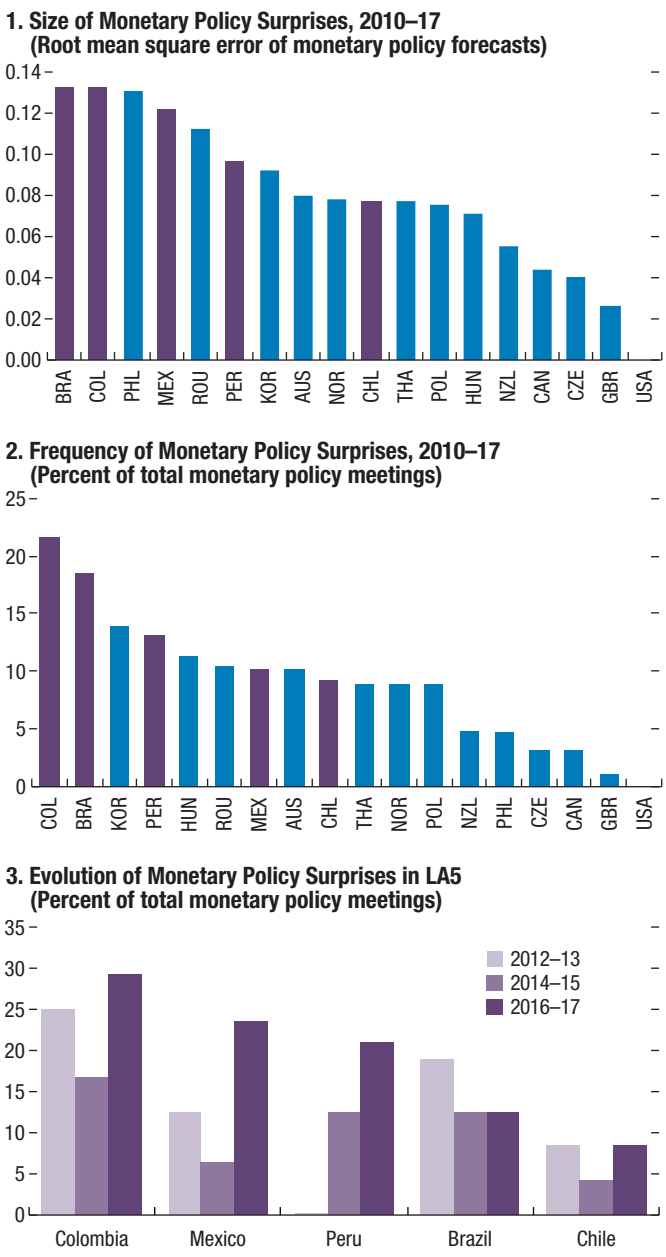
[12]More specifically, the section looks at the structure and content of press releases communicating policy decisions and the minutes of the monetary policy meeting.

errors about future short-term rates could be a sign of deficiencies in the communication framework.[13]

Short-term predictability of interest rate decisions is low in Latin America (Figure 3.6, panel 1), with the notable exception of Chile. Forecast errors for Colombia and Brazil are the largest in a sample of 18 inflation-targeting economies. Monetary policy surprises are also most frequent in Latin America. Since 2010, for example, the Central Bank of Colombia "surprised" markets once every five meetings (Figure 3.6, panel 2). Low policy predictability could reflect greater volatility of inflationary shocks affecting the region. However, the frequency of monetary policy surprises has increased in recent years for all LA5 central banks except that of Brazil, despite previous inflationary shocks having mostly dissipated (Figure 3.6, panel 3). As will be argued below, the quality of central bank communication could bear some blame for the low policy predictability of some central banks in the region.[14]

An important measure of central bank communication centers around what it publishes. The length of the central bank documents is a quantifiable characteristic that may reflect both the level of detail that they want to transmit to the public and their efforts to increase procedural transparency (Taborda 2015). Figure 3.7 depicts the trends in recent years in the length of press releases that accompany policy decisions in LA5 economies. Mexico and Brazil exhibit big changes in recent years, with both central banks devoting more text to the explanation of policy decisions and to the assessment of risks to the inflation outlook. In both cases, longer press releases came as result of a push to improve policy transparency. In the case of Brazil, statements prior to 2016 did not provide an explanation about the factors influencing the decisions of the Monetary Policy Committee.[15]

Figure 3.6. Monetary Policy Predictability



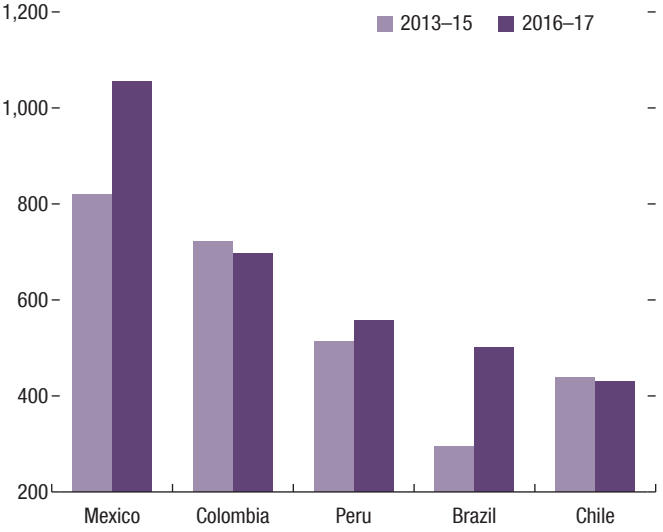
Sources: Bloomberg Finance L.P.; and IMF staff calculations.
Note: For International Organization for Standardization (ISO) country codes used in data labels, see page 115.

[13]While short-term predictability is important and certainly forms part of a central bank's objectives, predictability of monetary policy decisions should be seen in a broader context and over extended periods.

[14]Fracasso, Genberg, and Wyplosz (2003) develop a number of indicators of the quality of inflation reports for 19 countries and find that higher-quality reports are associated with smaller policy surprises. In particular, three subjective indicators—how convincing the report is judged to be, how well it reflects the expertise of the staff, and the quality of the writing style—increase the predictability of interest rate decisions.

[15]The explanation for policy decisions was presented in the minutes of the monetary policy meetings, which are published with a two-week lag.

Figure 3.7. Text Length of Central Bank Press Releases, 2013–17
(Average word count)



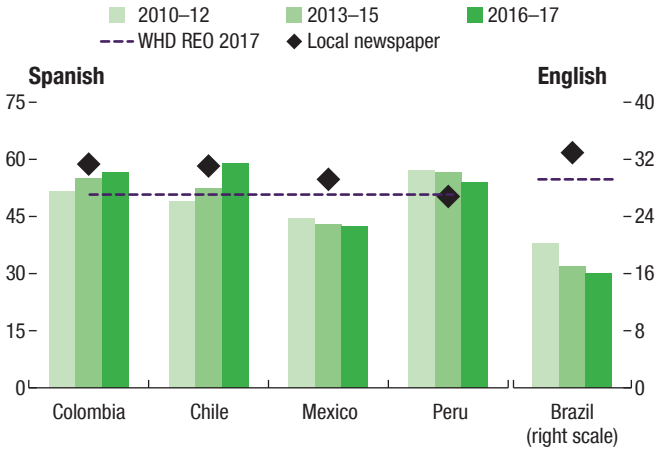
Source: IMF staff calculations.

Of course, more words does not necessarily mean clearer communication. Central banks could be verbose without providing any meaningful information. Language complexity can have significant bearing on whether or not the text is readable or comprehensible. Figure 3.8 (panel 1) reports average readability scores for LA5 central bank press releases.[16] The press statement scores are shown against benchmarks to compare clarity of communication. It is apparent that an improvement in the clarity of communication has taken place in Chile, and to a lesser extent in Colombia. These indices suggest that press statements in Chile, Colombia, and Peru use the same language complexity as the business section of local newspapers, while press statements from the central banks in Brazil and Mexico use more

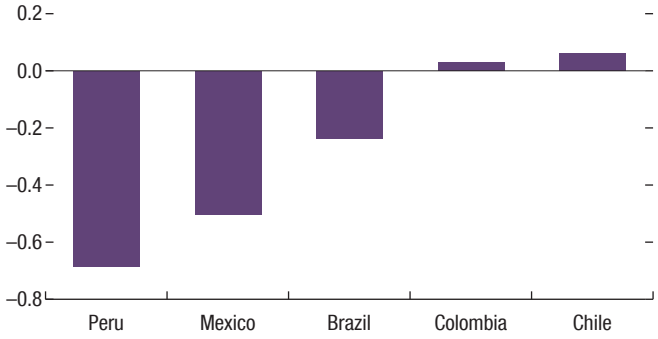
[16]The Spanish press releases for Chile, Colombia, Mexico, and Peru and the English translations for Brazil are used. The Flesch reading ease (RE) index is used for Brazil, which is defined as RE = 206.835 – (1.015 x ASL) – (84.6 x ASW), in which ASL = average sentence length, and ASW = average number of syllables per word. Following Taborda (2015), the Flesch-Szigriszt index for documents in Spanish is used for the other LA5 economies. That index is defined as RE = 206.835 – (ASL) – (84.6 x ASW).

Figure 3.8. Clarity of Central Bank Communication

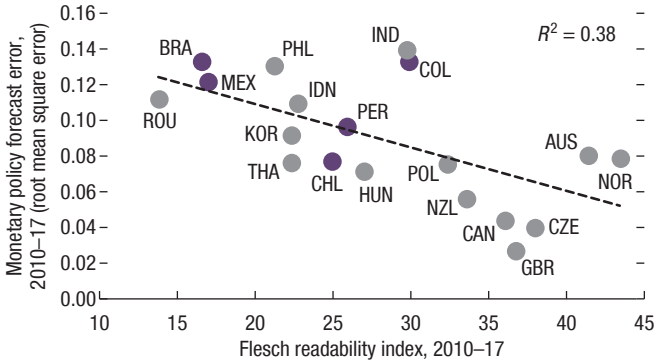
1. Readability Indices of Central Bank Press Releases[1] (Index)



2. Correlation between Text Length and Readability Scores, 2011–17 (Correlation coefficients)

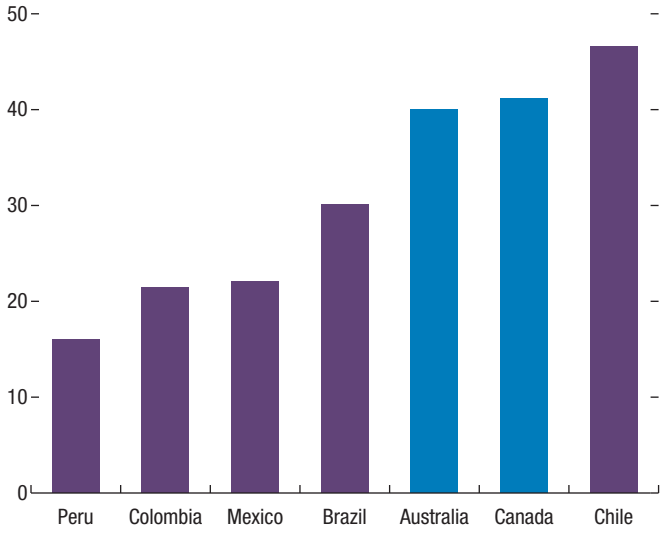


3. Clarity of Central Bank Communication and Monetary Policy Predictability[2]



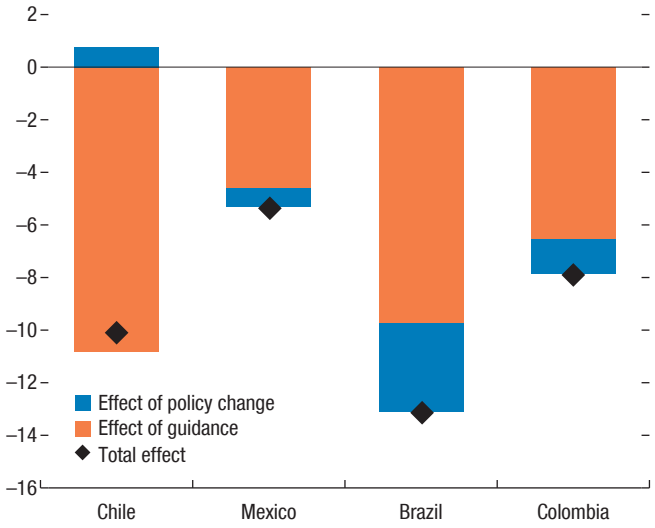
Sources: Bloomberg Finance L.P.; and IMF staff calculations.
Note: WHD REO = Western Hemisphere Department *Regional Economic Outlook*.
[1]Local newspapers correspond to the articles from the business section of *Folha International* (Brazil), *El Mercurio* (Chile), *El Espectador* (Colombia), *El Universal* (Mexico), and *El Comercio* (Peru).
[2]The chart shows the Flesch readability index for press releases in English. For Mexico, the English version of the monetary policy discussion of the inflation report was used.

Figure 3.9. Frequency of Explicit Policy Guidance in Central Bank Press Releases, 2011–17
(Percent of total press releases)



Sources: Central bank websites; and IMF staff calculations.

Figure 3.10. Effect of Unanticipated Increase in Policy Rate on Breakeven Inflation, 2011–17
(Basis points; one-day change in difference between yield on 10-year nominal and inflation-linked government bonds)



Sources: Bloomberg Finance L.P.; central bank websites; and IMF staff calculations.

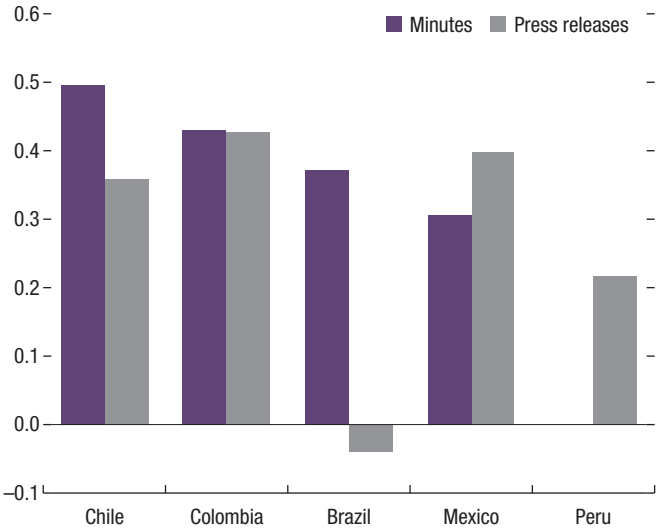
complicated language.[17] A longer central bank statement is not only more difficult to read, but also could reduce the ability of market participants to make informed judgments—highlighting the difference between the quantity and the quality of communication (Figure 3.8, panel 2). More readable press statements are also associated with lower monetary policy forecast errors (Figure 3.8, panel 3).

In terms of content, central banks can also enhance the effectiveness of monetary policy by including forward-looking language in their communications. Figure 3.9 displays the frequency of press releases with explicit guidance on the likely future direction of monetary policy. During 2011–17, with the notable exception of the Central Bank of Chile, explicit policy guidance by Latin American central banks was used infrequently. The Central Bank of Chile, on the other hand, has included a policy "bias" at a rate of once every two meetings. The use of this forward-looking language appears to be associated with higher transmission from policy rates to inflation expectations. As Figure 3.10 reports, monetary policy decisions appear to have a larger effect on long-term inflation compensation measures when accompanied with announcements that contain an explicit policy "bias." This analysis allows for a more direct identification strategy about the effects of transparency on credibility. Results suggest higher policy transparency helps build credibility, confirming the results presented in the previous section.

Guiding market expectations requires not only forward-looking communication, but also consistency between words and deeds. This track record of monetary policy communications and decisions supports the central bank's predictability and credibility. Using computational linguistic measures, first the tone in the policy discussion section in minutes can be summarized as being "hawkish" or "dovish," depending on word choice

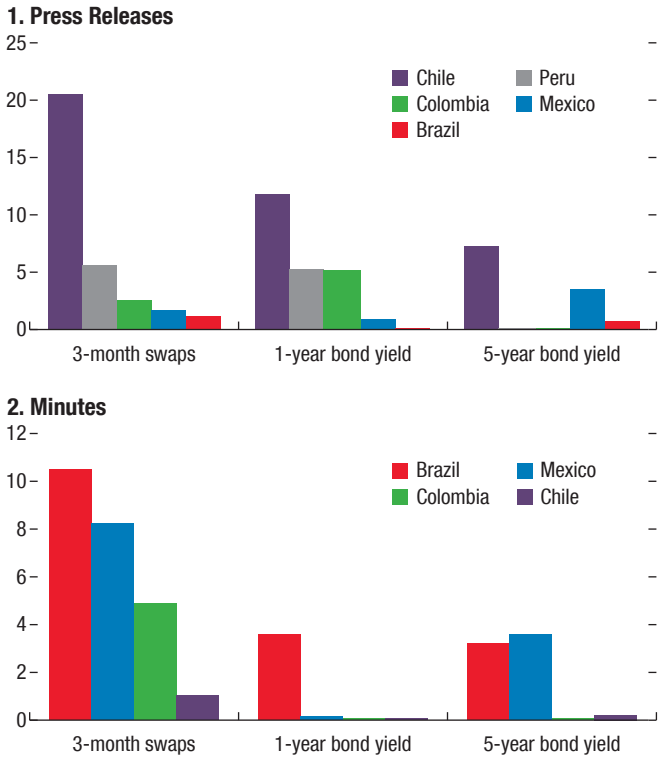
[17]Minutes are also an important central bank communication tool to shape market expectations. However, this analysis focuses on press releases, as these tend to receive more media attention, allowing central banks to reach a wider audience and not just financial market participants (Berger, Ehrmann, and Fratzscher 2011). In particular, it is the general public whose inflation expectations eventually feed into the actual evolution of inflation.

Figure 3.11. Correlation between Tone Index and Changes in Future Policy Rates, 2011–17
(One month ahead)



Sources: Central bank websites; and IMF staff calculations.

Figure 3.12. *R*-Squared from Regressions of Daily Changes in Market Rates and Tone Index, 2011–17
(Percent)



Sources: Haver Analytics; and IMF staff calculations.
Note: Panel 1 shows the difference in the adjusted *R*-squared between a regression of daily change in market rates on the unexpected monetary policy change and a regression in which the tone index of communication is included. Panel 2 shows the adjusted *R*-squared of a regression of the daily change in market rates on the tone index from minutes.

and context.[18] Second, the tone of communication can be compared to central bank policy action. Figure 3.11 displays the correlations between the tone indices and future policy rate changes. LA5 central banks tend to back up their words with deeds. More "hawkish" ("dovish") tones tend to result in a tightening (loosening) of the policy rate in subsequent meetings. The tone in central bank documents in Colombia and Mexico are reliable predictors of future policy changes. As mentioned above, this is particularly important when central bank credibility is not fully established.

Finally, markets appear to listen to the central bank, as the tone of press releases and minutes affects not only the short end of the yield curve but also medium- and long-term interest rates (Figure 3.12). In Chile, the tone in central bank press releases explains a significant share of the variation in market rates (particularly for short-term rates), while the tone in minutes has a negligible effect. This difference is due to minutes being closely aligned with the statements and the lag in their publication (Box 3.2). Market sensitivity to the tone in press releases is more muted in the other LA5 economies. However, market rates appear to be somewhat sensitive to the tone in minutes in Brazil, Mexico, and to a lesser extent in Colombia. These results indicate that, for a given level of central bank credibility, effective use of communication can provide greater room to maneuver interest rate policy in the face of transitory inflation shocks.

[18]See Annex 3.2 for a discussion of how this tone index is constructed.

Policy Takeaways

The credibility of a central bank—as measured by the absolute difference between medium-term inflation expectations and the midpoint of the central bank targets—has significant implications

for policy decisions in response to short-term inflationary shocks. Latin America's central banks present a mixed picture in this regard. Credibility, in turn, is strongly related to transparency and communication. In Latin America, central banks are at different stages of development in their transparency frameworks and communication strategies, which continue to evolve.

Based on the analysis presented in this chapter, there is scope for increasing central bank transparency in the region to enhance credibility. This would help the public better anticipate central bank decisions, and align their medium-term inflation expectations with the central bank's objective, and thus strengthen the effects of monetary policy changes. These changes, in turn, could help reduce (increase) the procyclicality (countercyclicality) of monetary policy and potential costs of policy changes depending on the shocks hitting the economy.

For transparency to increase predictability, the communication strategy plays an important role. It does not only matter what type of information central banks publish, but also how this information is communicated to the general public. The analysis in this chapter argues that central banks that communicate clearly and unambiguously tend to also be among the most predictable. In this context, it is evident that central banks that explicitly provide policy guidance (for example, an easing or tightening "bias") in the run-up to monetary policy decisions, with such statements explicitly conditional on current forecasts, considerably improve the transmission of policy rates to long-term inflation compensation measures.

While there have been significant improvements in transparency and communication frameworks in recent years, Latin America's central banks score relatively poorly across different transparency measures. Against this backdrop, the region should continue strengthening these frameworks. Steps include filling current data gaps, for example, by increasing the horizon of survey-based expectations. LA5 central banks could consider publishing the votes and comments of individual committee members, and central banks that do not publish minutes of policy meetings should consider publishing them.[19] The lag in the publication of minutes can also be reduced.[20] However, transparency and communication are not a panacea, and central banks have to tailor strategies aligned to their policy objectives.

[19]Minutes play a crucial role in central bank communication, particularly for those central banks making policy decisions by voting in a monetary policy committee, as is the case for many in the region. In particular, the minutes provide a more comprehensive explanation of the reasons for the committee's decisions and its views of the risks to the outlook; hence, they provide additional information beyond other communication tools. In this regard, Ehrmann and Fratzscher (2007) find that more active communication by committee members improves the predictability of monetary policy decisions significantly.

[20]Since August 2015, the Bank of England has published minutes alongside its interest rate decisions.

Box 3.1. Inflation Expectations from Financial Instruments in Latin America

Agents' inflation expectations are key to the decision-making of households and firms about consumption and investment. However, they are difficult to observe. One approach to obtaining inflation expectations is based on the consensus view of specialist economic forecasters, such as the surveys of professional forecasters published by central banks.

Surveys have the drawback that they are released relatively infrequently and the information is received with some time lag. Moreover, they only cover a small range of time horizons and, as identified in the literature (Ang, Bekaert, and Wie 2007; Chan, Koop, and Potter 2013), there is some bias and inertia in the responses. Instead of using surveys, the purpose of this box is to present the results of obtaining inflation expectations using prices of financial assets for a set of Latin American countries.

Inflation expectations are typically obtained by looking at the spread between conventional and index-linked bonds.[1] In Latin America, only a few countries issue inflation-linked bonds, and there is no market for inflation options at all. Due to the relatively low liquidity of inflation-linked securities in Latin American markets,[2] an alternative approach developed by Gimeno and Marqués (2012) is used here to obtain inflation expectations using standard nominal bonds in an affine framework that takes as factors the observed inflation and the parameters generated in the zero coupon yield curves. Government bond data from four countries (Brazil, Chile, Colombia, Mexico) are used here to estimate the affine model.[3]

Figure 3.1.1 shows inflation expectations computed from the model for the one-year, five-year, and ten-year horizons, as well as the inflation-targeting level established by the central bank in each country. One can see the different degree of anchoring by comparing the evolution of expectations for the one-year horizon with those for the five-year and ten-year horizons. Inflation expectations in Brazil and Colombia show a similar pattern for all horizons, while expectations in Chile and Mexico are more volatile over the one-year horizon, showing little change over longer horizons.

Regarding the inflation-targeting levels established by central banks, most countries currently show inflation expectations at long horizons within the window limits, although Brazil and Colombia have experienced recent periods when inflation expectations were well above these limits. In fact, both countries showed inflation expectations above the upper limit of the central bank targets before the large decrease experienced since the beginning of 2016. On the other hand, Mexico shows long-term inflation expectations slightly above the window limit of 4 percent, mainly due to the recent movement of the peso because of increasing uncertainties about trade relations with the United States. For Brazil, the deep recession of 2015–16 has affected expectations, which have seen a large decrease since the beginning of 2016. The behavior of inflation expectations began to change for Brazil at the end of 2016, with expectations increasing for longer horizons. In the case of Colombia, a series of policy hikes in 2016 appear to have anchored inflation expectations, which are now closer to the central bank target. Chile has experienced a decreasing trend in short-term expectations implicit in debt markets since mid-2014. Although short-term inflation expectations remain below the inflation target, expected inflation at long-term horizons has been broadly aligned with the medium-term target.

Finally, the forecasting accuracy of the inflation expectations obtained from the model here are compared with those provided by surveys. Table 3.1.1 shows the ratio of the mean square error (MSE) obtained using expectations from surveys, as well as from the model used here, to the MSE computed using current inflation

This box was prepared by Alberto Fuertes, Jose Manuel Marques, and Ricardo Gimeno from the Banco de España.

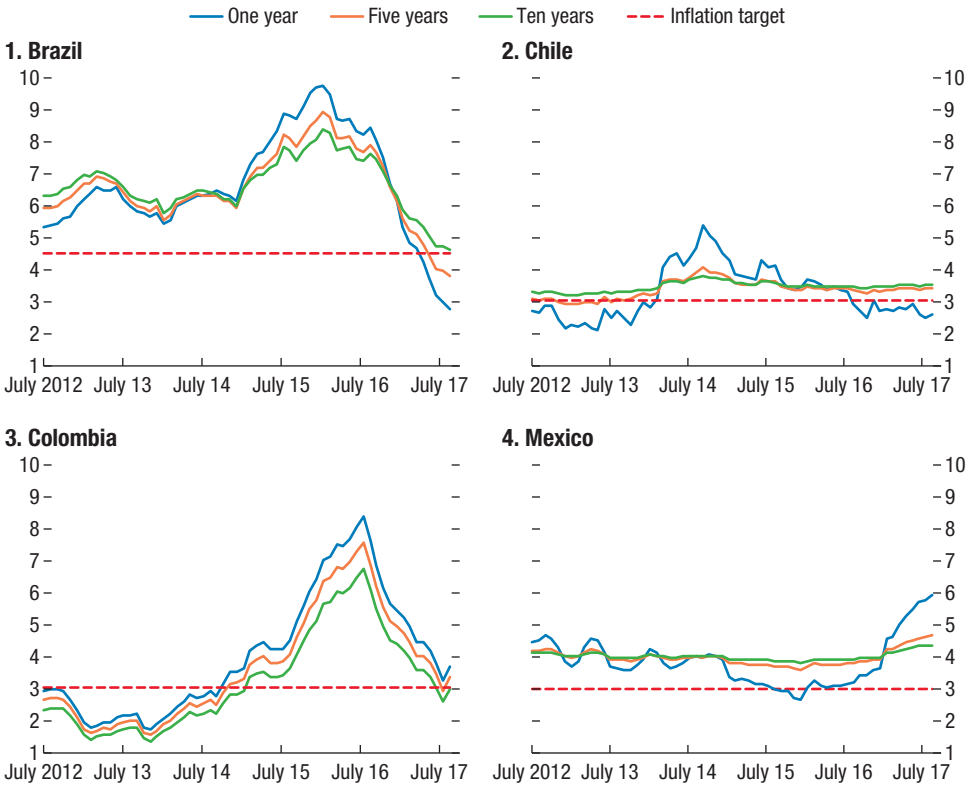
[1]These inflation compensation measures tend to be biased due to the liquidity premium in the market for inflation-linked bonds.

[2]With the notable exception of Chile, where inflation-indexed bonds account for most of long-term government bonds outstanding.

[3]Also, this approach makes it possible to obtain a measure of inflation expectations free of any risk premiums, given that the model allows the decomposition of nominal interest rates as the sum of real risk-free interest rates, expected inflation, and the risk premium.

Box 3.1 *(continued)*

Figure 3.1.1. Inflation Expectation from Financial Instruments at Different Horizons
(Percent)



Sources: Bloomberg Finance L.P.; and authors' estimates.

as the predicted future value (as in a unit root process). If the ratio is lower than 1, it means that the expected values provide a better prediction of future inflation than assuming inflation will remain the same as today. Both measures—inflation expectations from surveys and from the model used here—show lower MSE than the unit root prediction. Comparing the two measures, expected inflation from surveys shows lower MSE for Brazil, Colombia, and Mexico. The opposite happens in the case of Chile. Interestingly, a simple average of the two different expected values provides lower MSE for all countries except Brazil, which shows that inflation expectations obtained from the model used here complement those obtained from surveys and provide additional forecasting information.

Table 3.1.1. Expected Inflation Forecast Errors

Country	Sample	Survey[1]	Model[1]	Survey-Model[1]
Brazil	February 2007–October 2016	0.5833	0.8812	0.6178
Chile	July 2012–December 2016	0.7813	0.6344	0.6187
Colombia	February 2005–November 2016	0.7956	0.9356	0.7898
Mexico	May 2011–November 2016	0.6350	0.7078	0.6349

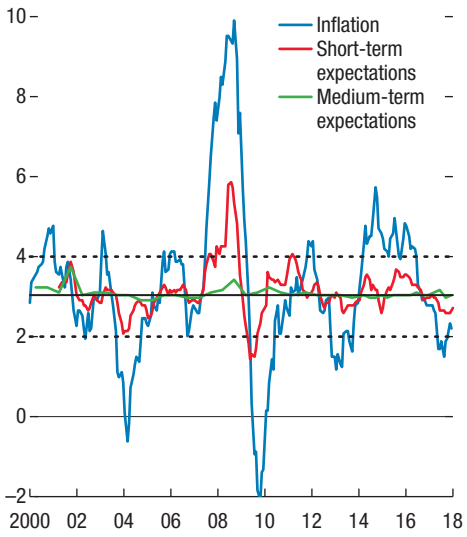
Source: Authors' calculations.
[1]Ratio of mean square error (MSE) of expected inflation from surveys and our model with respect to the MSE of prediction using current inflation as the predicted value. Survey-Model uses as predicted values the average of the expected inflation from the survey and our model. Expected inflation is 12 months for Brazil, Colombia, and Mexico; 11 months for Chile.

Box 3.2. Central Bank Communication Frameworks: The Case of the Central Bank of Chile

After a period of convergence in the 1990s, Chile adopted a free-floating exchange rate and an inflation-targeting regime in September 1999. Since then the Central Bank of Chile (CBC) has put significant emphasis on its communication with the public, transforming the CBC into one of Latin America's most transparent central banks (see Figure 3.4 in the main text). A well-defined mandate, spelled out in the CBC's monetary policy report, has helped communicate its policy intentions clearly.[1]

The combination of a clear mandate and a premium on transparency has helped Chile maintain low average inflation and build strong credibility. Despite realized inflation being highly volatile—due to Chile being a small and open economy and the peso a commodity currency (Cashin, Céspedes, and Sahay 2004)—inflation since 2000 has averaged 3.2 percent, almost exactly in line with the CBC's point target. Consequently, inflation expectations have been well anchored around the central bank's target, with medium-term expectations rarely deviating by more than a few basis points even when actual inflation has spent long periods above target—as was the case following the strong depreciation of the peso in 2013–14 (Figure 3.2.1).[2]

Figure 3.2.1. Realized and Expected Inflation in Chile
(Percent)



Sources: Consensus Economics; and IMF staff calculations.
Note: Expectations correspond to average—that is, "Consensus"—forecast. Short-term expectations refer to synthetic 12-month-ahead forecasts. Medium-term expectations refer to expected inflation two calendar years ahead.

Despite these achievements, the CBC is striving to further increase its predictability and ability to manage private sector expectations. In September 2017, it implemented a series of changes to its communication and decision-making processes, with the aim of improving the quality of the information made available to the public (CBC 2017).[3] The changes include reducing the frequency of monetary policy meetings; aligning the meetings with the release of the Monetary Policy Report; including additional information in the statements (that is, the vote tally, the main arguments given by the members of the Board of Directors, and the macro context); and introducing the publication of full meeting transcripts with a 10-year lag. Taken together, these changes will reduce the number of major communication events—meeting statements and report releases—from 16 to 8 a year, and will increase the informational content of each event.

The Central Bank of Chile's current monetary policy transparency framework features the following key outlets:

This box was prepared by Yan Carrière-Swallow and Andrea Pescatori.

[1]Upon adopting inflation targeting in 2000, the CBC adopted a band of 2 to 4 percent for consumer price index (CPI) inflation over a 12- to 24-month horizon. Since 2007, the CBC has stressed more clearly that "its explicit commitment [is] to keep annual CPI inflation at around 3 percent most of the time, within a range of plus or minus 1 percentage point. To meet this target, the Bank focuses its monetary policy on keeping projected inflation at 3 percent annually over a policy horizon of around two years." (CBC 2017, 5).

[2]It is worth noting that the CBC is inserted in a context of a generally sound institutional framework that has limited capital flow instability and has shielded the economy from global financial market turmoil.

[3]Following the implementation of these reforms, it can be estimated that the CBC's transparency score has reached 11.5 on the Dincer and Eichengreen (2014) scale.

Box 3.2 *(continued)*

- A ***Monetary Policy Report***—the Board of Directors' main vehicle for explaining the rationale behind policy decisions—is released in Spanish and English each quarter, or at every other policy meeting. Importantly, each report clearly states that the policy objective is to return inflation to target within the policy horizon of two years, and the document sets out to explain how the board intends to meet this target. The report is also the outlet for communicating key forecasts, such as growth and inflation fan charts, and providing (infrequently) estimates of unobservables such as the potential growth rate.
- ***Statements*** are published in Spanish following each monetary policy meeting that report the decisions taken and explain recent developments and expected future trends of key variables and risks.[4] Almost half the statements issued since 2011 have included clear and concise guidance about the likely future path of monetary policy (see Figure 3.9 in the main text), with such statements explicitly conditional on current forecasts. Since September 2017, statements have also included information on the arguments made by board members and their votes. The statement issued February 1, 2018, was the first to implement the new format and was 3.5 times longer than the average statement in 2017. Despite the additional length, the complexity of the statement's language remained broadly unchanged and remains in line with the business section of *El Mercurio,* a local newspaper (see Figure 3.8 in the main text).
- ***Minutes*** of the monetary policy meeting have been released with a two-week delay since 2006, in line with many central banks in other regions (for example, Israel, New Zealand, Sweden), and more rapidly than those of some major central banks (for example, European Central Bank, US Federal Reserve, Bank of Japan). With respect to the statement, minutes have traditionally included additional information about the details of the meeting discussion, including the outlook, the policy alternatives that were considered, the arguments presented by board members, and the balance of votes. Minutes have usually had only a very small market impact (see Figure 3.12 in the main text), which suggests that their content is closely aligned with the statements. Following the changes that were recently implemented, the amount of additional information contained in the minutes has been reduced substantially, further reducing their likely impact on markets.

A forward-looking policy organized around a medium-term objective has been crucial in enabling the CBC to communicate the case for implementing monetary accommodation despite persistent deviations of actual inflation from the target. Given its importance, future refinements to the CBC's communication framework should be considered. Currently, statements and reports provide qualitative guidance on the decisions that are likely to be needed to return inflation to target over the policy horizon. They also frequently refer to whether the board's view is broadly aligned with market expectations inferred from financial instruments.

In many central banks that score highest in transparency (for example, the Czech Republic, New Zealand, and Sweden), communication is aided by the publication of the forward path for the central bank's policy interest rate under the board's baseline scenario. The inclusion of a fan chart around the baseline helps illustrate the uncertainty associated with the outlook. Such a strategy would offer additional information and precision that may help prevent misinterpretations of verbal statements in some cases. However, care must be taken to avoid confusion about the nature of the central bank's commitment to the path, which should remain conditional on the future state of the economy. As Woodford (2012) describes in detail using the recent experience of Sweden's Riksbank, such an explicit strategy can also expose the central bank to concerns about lack of credibility if market expectations do not align with the published forward path.

[4]An English translation is released in parallel, but a note makes clear that the content in the Spanish version takes precedence.

Annex 3.1. Panel Vector Autoregression Model and Methodology

The empirical strategy to estimate the effect of terms-of-trade shocks on inflation expectation gaps and monetary policy procyclicality is based on a panel vector auto regression (PVAR) framework that captures the dynamic response of the policy interest rate, domestic demand, the nominal effective exchange rate, consumer price index (CPI) inflation, and two-year-ahead inflation expectation gaps to a terms-of-trade shock, akin to the one experienced by the region during the last six years.

Simultaneity issues are addressed in the identification of the empirical model by assuming that countries in the chapter's sample take the terms of trade as exogenously given—that is, variations in the terms of trade can be regarded as an exogenous source of aggregate fluctuations. This assumption is common in existing related literature (Schmitt-Grohé and Uribe 2018).

As mentioned in the main text, the PVAR is augmented to include interaction terms as in Towbin and Weber (2013) in order to allow the coefficients of the "domestic" variables to vary deterministically with structural country characteristics: the degree of anchoring when the shock hits and levels of central bank transparency. Both of these variables are lagged by one year to avoid endogeneity issues.

Denoting the vector of "domestic" variables as y_t and the vector of exogenously given variables as y_t^*, the model can be specified as follows:

$$\begin{pmatrix} y_t^* \\ y_t \end{pmatrix} = \begin{pmatrix} A_{11,i,t}(L) & 0 \\ B_{21,i,t}(L) & B_{22,i,t}(L) \end{pmatrix} \begin{pmatrix} y_{t-1}^* \\ y_{t-1} \end{pmatrix} + \begin{pmatrix} 0 & 0 \\ 0 & C_{22} \end{pmatrix} \begin{pmatrix} I_i \\ X_{i,t} \end{pmatrix} + \begin{pmatrix} R_1 & 0 \\ R_2 & R_3 \end{pmatrix} \begin{pmatrix} \varepsilon_{i,t}^* \\ \varepsilon_{i,t} \end{pmatrix} \quad \text{(A3.1.1)}$$

$$B_{pq,i,t} = A_{pq,i,t} + D_{pq,i,t} X_{i,t} \quad \text{(A3.1.2)}$$

The coefficients for the domestic variables, B, can vary with country characteristics $X_{i,t}$ (that is, credibility and transparency). $\varepsilon_{i,t}^*$ and $\varepsilon_{i,t}$ are vectors of *iid* shocks. L is the number of lags. The matrix R is computed using a Cholesky factorization of the estimated covariance matrix of reduced-form VAR residuals. The block-zero restriction is imposed a priori, and external shocks are identified using a small open economy assumption. The assumption implies that the external variable does not depend on domestic conditions. Because the analysis of the chapter focuses on the effects of terms-of-trade shocks, the ordering of the variables in the domestic variables vector, y_t, in the structural VAR is immaterial. The IPVAR is estimated using ordinary least squares and allows for country fixed effects. Two lags are chosen following the Schwartz criterion.

The dynamic response of inflation expectation gaps to terms-of-trade shocks is illustrated using cumulative, conditional impulse-response functions at a four-quarter horizon. In order to capture the strength of transmission of policy rates and the procyclicality of monetary policy, the cumulative impulse response of the policy rate is divided by the cumulative response of CPI inflation, both at the four-quarter horizon.

The vector y_t^* is given by

$$y_t^* = (ToT_{i,t}). \quad \text{(A3.1.3)}$$

$ToT_{i,t}$ denotes the log first difference of terms of trade, defined as the relative price of exports in terms of imports.

The vector of domestic variables y_t is given by

$$y_t = \begin{pmatrix} MPR_{i,t} \\ DD_{i,t} \\ NEER_{i,t} \\ CPI_{i,t} \\ Gap_{i,t} \end{pmatrix}. \quad \text{(A3.1.4)}$$

The variable *MPR* denotes the first difference of the monetary policy rate. The variables *DD*, *NEER*, and *CPI* denote the log first differences of real final domestic demand, the nominal effective exchange rate, and the headline CPI for country *i*, respectively. *Gap* is the first difference of the absolute difference between the two-year-ahead inflation expectations gap and the central bank's

target.[1] National accounts and financial data were obtained from Haver Statistics, the *NEER* measure was obtained from the IMF's Information Notice System, and inflation expectation forecasts were obtained from Consensus Economics long-term forecasts. Central bank transparency is measured using the Dincer and Eichengreen (2014) augmented transparency index.

The panel contains the following 20 economies under an inflation-targeting monetary policy framework: Australia, Brazil, Canada, Chile, Colombia, Czech Republic, Hungary, India, Indonesia, Korea, Mexico, New Zealand, Norway, Peru, Philippines, Poland, Romania, Russia, Thailand, and Turkey. The panel covers the period 2000–17 at a quarterly frequency.

Selection of countries in the sample was based on whether a country was classified as being under an inflation-targeting framework based on the IMF's 2016 *Annual Report on Exchange Arrangements and Exchange Restriction* (AREAER) and on the availability of long-term inflation forecasts from Consensus Economics. Sweden was excluded because its policy rate has been negative since 2014.

[1]The results from this exercise are robust to the use of forecasts at a five-year horizon, also from Consensus Economics.

Annex 3.2. Construction of the "Tone" Index

The methodology used to construct a "tone" index that captures central bank sentiment about the state of the economy closely follows Hansen and McMahon (2016). This chapter makes use of Latent Dirichlet Allocation (LDA) to capture the content of central bank policy discussions and measure the tone of the discussion of a certain topic based on word counting (also known as dictionary methods). This analysis is done for press releases about monetary policy decisions as well as minutes of monetary policy meetings, both stored as document-term-matrices using the text-mining package in the programming language R.

Before the LDA analysis, "stop words" (such as "the," "a," and "and") are removed and the remaining words are reduced to a common linguistic root ("economy" and "economic" both become "economi"). The LDA algorithm will form, in our case, eight topics that are probability distributions over words, and illustrate the words that tend to go together in central bank communication. The algorithm also forms document distributions that contain probabilities that capture the fraction of words policymakers devote to the different topics in their communications. For example, it might suggest that a sentence in a statement (our level of LDA analysis) is very likely (say, above 75 percent) related to domestic demand conditions (one of the eight topics) and less likely to be related to external factors (another one of the eight topics).

Once sentences about economic situation topics are identified, only these relevant sentences are used to create the time series of the "tone" index of central bank communication by counting the number of "hawkish" and "dovish" words that appear in each sentence of the central bank documents. The analysis was done for the Spanish version of the press releases and minutes, except for Brazil, whose English versions of the publications were analyzed. The list of English "hawkish" words used includes increase*, accelerat*, fast*, strong*, high*, gain*, and expand*. The list of English "dovish" words includes decreas*, decelerat*, slow*, weak*, low*, loss*, and contract*.

The "tone" index is then defined as:

$$Tone = \frac{\#hawkish - \#dovish}{TotalWords}. \qquad \text{(A3.2.1)}$$

The words in each sentence are scored in this way, and aggregated for the entire document, and the normalized series of this score is the index used in this analysis.

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