Inflation Targeting and Financial Stability

Inter-American Development Bank

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A Perspective from the Developing World

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Luiz A. Pereira da Silva

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Cataloging-in-Publication data provided by the
Inter-American Development Bank
Felipe Herrera Library

Agénor, Pierre-Richard.

Inflation targeting and financial stability : a perspective from the developing world/ Pierre-Richard Agénor, Luiz A. Pereira da Silva.

p. cm.

Includes bibliographical references.

ISBN 978-1-59782-171-1

1. Inflation targeting. 2. Monetary policy. 3. International finance—Developing countries. I. Silva, Luiz A. Pereira da. II. Inter-American Development Bank. III. Centro de Estudios Monetarios Latinoamericanos. IV. Title.
HG230.3.A34 2013

Contents

Boxes

Figures

Tables

Acknowledgments

This monograph dwells in part on several of our previous papers, some of which were prepared jointly with Koray Alper of the Central Bank of Turkey. We are grateful to him and to George Chouliarakis, Luiz Fernando Figueiredo, Alessandro Flamini, Carlos Kawall, Eduardo Loyo, Jonathan Ostry, Adriana Soares, Eduardo Lima, Joon Myung Woo and Fernando Tenjo Galarza—as well as to participants at the BCB-IADB Seminar on Managing Capital Flows (São Paulo, December 14–15, 2012)—for helpful discussions and comments on a previous draft. The opinions expressed in this publication are those of the authors and do not necessarily reflect the views of the Inter-American Development Bank, its Board of Directors, or the countries they represent. Financial support from the Inter-American Development Bank (IDB) is gratefully acknowledged as well as the collaboration of the Centro de Estúdios Monetários Latino-Americanos (CEMLA).

Abstract

This study discusses recent experiences with inflation targeting (IT), the challenges that it faces since the global financial crisis, and ways to address them. The discussion is conducted from the perspective of upper middle-income countries. As background for the analysis, the study first provides a review of financial systems in middle-income countries or MICS (with a focus on the role of bank credit), the extent to which exposure to capital flows affects economic stability in these countries, and the link between excessive credit growth and financial crises. Then the study reviews the main features and evidence of the performance of inflation-targeting regimes in middle-income countries. It discusses a number of challenges that IT faces, including fiscal dominance, fear or floating, imperfect credibility, and with respect to an explicit financial stability objective assigned to monetary policy. The issue of complementarity between macroprudential regulation and monetary policy, in the context of an "integrated" IT (or IIT) regime, is taken up next. The nature of monetary policy rules in an IIT regime, and their practical implementation, is also discussed. The analysis suggests that there are robust arguments to support the view that under an integrated inflation-targeting regime, monetary policy should react in a state contingent fashion to a credit gap measure—and possibly to the real exchange rate—in order to address the time-series dimension of systemic risk. However, monetary policy and macroprudential policy are largely complementary instruments. They must be calibrated jointly, in the context of macroeconomic models that account for the type of credit market imperfections observed in middle-income countries and for the fact that macroprudential regimes may substantially affect the monetary transmission mechanism.

Executive Summary

Since the recent global financial crisis, there has been an ongoing debate over whether monetary policy should incorporate a financial stability objective. It has been therefore questioned whether monetary policy should be more proactive in response to perceived risks to financial stability and/or whether macroprudential policy should be used to mitigate financial systemic risk. Along these lines, the role of macroprudential policy and monetary policy in achieving and maintaining macroeconomic and financial stability came high on the agenda of policymakers. This debate has brought the inflation targeting (IT) regime under scrutiny since it has been the monetary regime of choice for many central banks, including those in middle-income countries (MICs). Therefore, in considering the role of monetary policy in addressing financial stability, the debate has evolved into evaluating the relevance and performance of the IT framework in the aftermath of the global financial crisis.

One shortcoming of IT (whether strict or flexible) is that it may neglect important information about the build-up of financial imbalances, given that these developments do not materialize rapidly into consumer price pressures. By ignoring asset bubbles and other financial developments, IT could pose serious risks to economic stability. Nonetheless, several researchers have argued that IT should continue to focus on price stability but, at the same time, policymakers could use macroprudential regulation and other policy tools to ensure financial stability. This is because it can be difficult to stabilize asset prices since the factors leading to changes in those prices combine fundamentals and cyclical effects and can be hard to disentangle and pin down. Under such conditions, it will therefore be more prudent for central banks to focus on the implications of asset price movements for credit growth and aggregate demand, and thus inflationary pressures.

This study provides a brief review of the financial system in middle-income countries (MICs), the domestic effects of capital flows and the link between credit and financial crises. It also discusses the features of the IT regime and highlights the challenges

the framework has faced in recent years. The study then goes on to discuss the role of monetary policy in achieving financial stability in the context of a proposed "integrated" IT regime. The focus is mainly geared towards upper MICs, specifically the larger economies in Asia and Latin America, as well as Turkey and South Africa. The focus on these economies is for two key reasons. First, IT regimes in MICs face specific operational and credibility issues. Second, the financial systems in these economies are undergoing structural transformations that cause them to become more integrated into and open to global financial markets. Therefore, financial stability in MICs is more dependent on the financial conditions prevailing in the advanced economies.

This study finds that MICs can benefit from an augmented policy interest rate rule that includes a measure of the private sector credit growth gap.[1] This will help the central bank contain excessively rapid credit growth and prevent surges in asset prices. In addition, the central bank may also need to intervene in the exchange rate market to mitigate exchange rate volatility and its adverse effects on both the real and financial sectors. It is important to note that monetary policy can be limited in itself, since it can only address the time dimension of systemic risk. In this light, monetary policy will need to be complemented with macroprudential policy.

The Financial System in Middle-income Countries

In most MICs, financial markets remain underdeveloped and commercial banks are the key intermediaries in the financial system. Therefore, commercial banks are the dominant source of credit to the private sector. Bank credit has grown significantly in MICs, primarily owing to a more stable macroeconomic environment and an associated process of financial inclusion over the last decade. This growth has been stronger in some of the major MICs of Asia and Latin America.

In most MICs, supervisory capacity is weak and the ability to enforce prudential regulations is also limited. In a weak regulatory environment, banks may find it beneficial to engage in overly risky activities, which can make them more susceptible to cyclical downturns that trigger high loan defaults. One exception among the larger economies in Latin America is Brazil, which has strong, sophisticated, and intrusive bank supervision and a robust regulatory environment.[2] Furthermore, in most MICs, there is limited

[1] Taking into account that there is no excessive distortion brought by administered public sector growth (e.g., an imbalance between credit growth extended by public development banks crowding out private sector credit growth).

[2] See Box 1 in the main text for more details on Brazil's financial system regulation and supervision, including the results of its 2012 Financial Stability Assessment Program (FSAP) with the International Monetary Fund.

enforceability of contracts primarily owing to weak property rights and inefficiency in the legal system. Moreover, credit market imperfections are prevalent in these economies. Therefore, because there is limited competition among banks, many of them possess monopoly or oligopoly power, which can translate into their pricing practices. These economies also have asymmetric information problems that make it difficult to screen out good from bad credit risks. In such an environment banks usually engage in collateralized lending and short-maturity loans to protect themselves.

Capital Flows, Credit Growth, and Financial Crises in MICs

Over the past two decades, more integration with world capital markets has been associated with an increase in private capital flows to MICs. Of these flows, foreign direct investment has been driven by longer-term growth prospects. On the other hand, short-term capital flows (portfolio equity flows and debt flows)—which are more volatile—respond mainly to changes in asset prices, interest rate differentials, and/or shocks in general.[3] In addition, the volatility of these short-term capital flows depends on domestic and international economic fundamentals, which can be magnified by domestic market distortions and the exceptional circumstances brought by the unconventional monetary policies applied by developed countries. This volatility is important to MICs because their financial systems are highly susceptible to small domestic or external disturbances.[4] Hence, although well-known benefits can be derived from an increase in capital flows, sudden stops have adverse consequences for MICs.[5] Finally, bank-related capital flows can be more detrimental because they can exacerbate the procyclicality of local credit markets.

Several researchers have tried to investigate the underlying factors that triggered the financial crisis and its relation with the macroeconomic conditions prevailing in advanced economies. As documented in the literature, one of the contributing factors to the recent financial crisis in advanced economies might have been a long period of low interest rates together with a relaxation of prudential regulations and supervision, which encouraged excessive risk-taking and caused banks to relax credit standards. This led to an increase in bank loans, especially among risky borrowers, and housing price inflation. However, in the context of MICs, there is no robust evidence to suggest that low interest

[3] Figure 7 in the main text shows that equity-related flows rose sharply in Brazil in response to the recent episodes of quantitative easing in the United States.

[4] See Box 2 in the main text for more discussion on the reasons for the volatility in capital flows and the macroeconomic effect.

[5] See Agénor (2012), who provides recent evidence on the benefits and costs of capital flows and financial openness.

rates have caused credit booms and asset price busts or financial crises. This could be because banks in MICs have maintained capital ratios above those required by international standards (Agénor and Pereira da Silva (2010)) and/or because of a more conservative regulatory environment. Indeed, many of these economies kept using a variety of microprudential tools. Also, because of the presence of credit market imperfections in MICs, low interest rates have been associated with higher bank spreads, higher profits, and possibly less risk-taking on loans.

Besides rapid credit growth, other factors such as political turmoil, a real estate crash, a sharp decline in the terms of trade, or contagion from other economies can lead to financial crises in MICs. In addition, there are a number of other financial variables that were found to be associated with financial crises. Variables that require policymakers' special attention when a country's asset growth pattern becomes excessive are the credit-to-GDP ratio, credit-to-deposit ratio (a measure of bank leverage), foreign liabilities of the private sector, the pace of external borrowing by banks and the nonbank private sector, banks' foreign liabilities as a fraction of domestic deposits, etc.

Key Features in Inflation Targeting

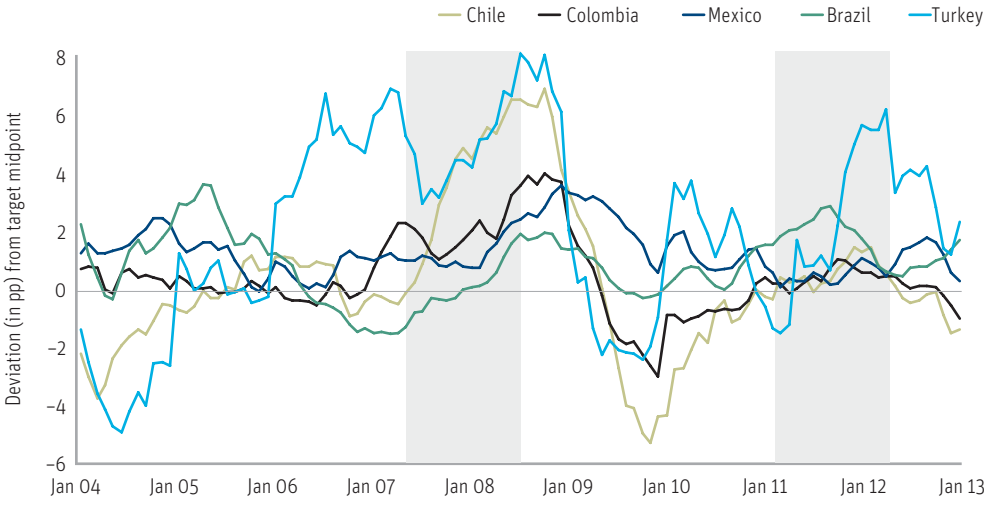
Inflation targeting (IT) can be defined as a framework containing an explicit target for future inflation and a commitment to price stability as the primary long-run goal of monetary policy. IT also requires transparency, since this framework fosters increased communication with the public about the plans and objectives of the monetary authorities, and accountability because the central bank is also fully responsible for attaining the predefined inflation target. IT generally is characterized by a) a public announcement of medium term target for inflation; b) an explicit policy decision framework to achieve the stated objectives; and c) a high degree of transparency concerning the course of action planned by the central bank.

Credibility plays a key role in the IT regime because it can help to anchor inflationary expectations and therefore, more importantly, affects the yield curve. To build credibility, the central bank must effectively communicate its policy actions and intentions to the public. Finally, when inflation outcomes show a significant deviation from the inflation target, the central bank usually has to provide an explanation, detailing its contributory factors and indicating a corrective course of action.

Evaluating the Inflation Targeting Regime

The performance of IT regimes in MICs can be evaluated by comparing inflation targets and inflation outcomes since the framework was implemented. Figure A identifies

FIGURE A
Deviation (percentage points) from Inflation Target: Brazil, Chile, Colombia, Mexico, and Turkey, 2004–13



Source: Banco Central do Brasil.
Note: Shaded areas indicate periods of intense capital inflows.

episodes in Brazil, Chile, Colombia, Mexico, and Turkey when positive external commodity price shocks and/or intense capital inflows (shaded areas) have contributed to increasing inflationary pressure and deviations from the countries' respective targets. In some cases, large increases in inflation were followed by significant jumps in expected inflation. This indicates that large positive shocks to inflation can adversely affect central bank credibility. It is important to note that comparisons of this sort on an individual country basis do not take other factors into account. Therefore, gauging the performance of the IT regime requires empirical examination of a multi-country context.

Two main methodological approaches have been developed to review the evidence of the performance of IT. The first approach examines the macroeconomic outcomes of IT versus non-IT countries following the adoption of the regime. An assessment has revealed that IT has been successful in MICs since both expected inflation and its volatility fell, and inflation persistence declined after the regime was adopted. These results indicate that IT has led to improved credibility of monetary policy. Notably, although the regime has been criticized for its negative impact on economic growth, there does not appear to be any significant reduction in output growth rates when the regime is adopted.

The second approach focuses on central bank behavior under IT and non-IT regimes, mainly in response to inflation and output gaps. In most cases, the methodology has involved estimating simple and augmented Taylor-type rules. The findings from the policy reaction functions indicate that in many MICs, central banks that target inflation have become more responsive to deviations in actual inflation from target. This has led to significant improvement in the prospects for macroeconomic stability.

Except for periods of severe external shocks, IT countries have been successful in meeting their targets. Therefore, in comparison to countries that use other monetary policy regimes, MICs that use IT regimes have had lower average inflation, reduced both the volatility and persistence of inflation expectations, and in some cases lowered exchange rate pass-through. It should be mentioned, however, that despite the favorable outcomes IT regimes have had vis-à-vis some key macroeconomic variables, the credibility of central bank policy has remained weak in most cases.

Challenges to Inflation Targeting (IT)

IT was adopted in most countries in response to the failure of other monetary policy regimes (e.g., exchange rate targeting or monetary targeting). Although IT has been successful in that MICs did achieve lower inflation rates, the framework continues to face several challenges.

One challenge to the IT regime is fiscal imbalances. While in most advanced economies the global financial crisis has caused a substantial increase in the size of public debt, in most MICs the proportion of public sector debt as a share of GDP continues to fall. This trend is expected to continue in the medium term. Rapid economic growth, together with the successful implementation of explicit fiscal rules, were key contributors to reducing public debt ratios in MICs. For instance, both Brazil and Chile introduced laws that placed legal restrictions on fiscal expenditure. However, concerns about debt sustainability may affect the performance of some MICS, and this can lead to an increase in the risk premium due to structural and cyclical factors. As a result of the aging population in MICs, pension expenditure is expected to increase, creating pressure on fiscal accounts. Revenue fluctuation due to commodity price shocks might also affect fiscal performance in MICs. Finally, the unwinding of advanced economies' unconventional monetary policies could produce volatility that affects relative risk premia between advanced and developing countries.

In addition to their fiscal effects, commodity price shocks also pose a challenge for the IT regime in MICs. These shocks affect prices and inflation expectations, which are two key variables an IT regime seeks to control. The policy response to terms-of-trade shocks depends on whether core inflation or headline inflation is the explicit target of the

central bank. There has been much debate over which price level the IT regime should target. Those advocating the use of the headline Consumer Price Index (CPI) for the inflation target argue that core inflation measures that exclude volatile prices (like food and energy) may not be good indicators of future headline inflation. Furthermore, credibility can be enhanced when headline inflation is used, since the general public is more familiar with it. On the other hand, others argue that there is no need to explicitly target headline inflation because food and energy (noncore inflation) represent a large fraction of the consumption basket and will therefore affect core inflation anyhow through their pass-through effects (Agénor (2002); IMF 2011c).

In that light, others have argued that one alternative to CPI-based targeting (whether core or headline) is to use product price targeting (PPT). Under PPT, terms-of-trade shocks are accommodated by offsetting movements in exchange rates. For instance, in the case of a deterioration (an improvement) in the terms of trade, monetary policy intervention will take place in the form of an exchange rate depreciation (appreciation).[6]

In any event, one of the prerequisites for IT is the absence of any commitment to target the nominal exchange rate. Therefore, under such a regime, an economy must have a floating exchange rate. However, IT central banks ought to be concerned with nominal exchange rate movements because this can affect inflation and financial stability. Policymakers have therefore deliberately intervened, with varying degrees of publicity, to stabilize the exchange rate. Some argue that such interventions can be seen as a "fear of floating," which many MICs develop after adopting IT. But it has also been pointed out that besides the fear-of-floating considerations, it is optimal for IT central banks in financially vulnerable economies that are susceptible to large terms-of-trade shocks to pursue an interest rate rule that accounts for movements in the real exchange rate.

As mentioned previously, the credibility of an IT regime is important because it affects the behavior of economic agents and anchors expectations. A key challenge to IT central banks in MICs remains how to build and maintain credibility. The global financial crisis provided clearer evidence--if need be—that the financial systems of these countries are affected by the economic conditions prevailing in the advanced economies. The crisis and its aftermath revealed that some external disturbances are beyond the control of the monetary authorities in MICs and may cause inflation to deviate from its target, thus affecting the credibility of IT regimes in those countries.

[6] See Box 4 in the main text, which contains more details on CPI-based targets and PPI (Product-price-targeting) based targets.

Should Monetary Policy Incorporate a Financial Stability Objective?

In addition to the above mentioned but well-known challenges to IT, the global financial crisis has brought a relatively new and difficult challenge, explicitly questioning whether the IT regime is capable of addressing financial stability issues. Naturally, in order to develop and strengthen the financial system in MICs, banks should practice prudent lending at all times; especially when economic conditions are favorable and the banking system is highly liquid. But in the light of the more complex international environment with unprecedented level of liquidity and associated capital flows that exacerbate procyclicality, it has been argued that the traditional microprudential tools are insufficient and that for example capital requirements and/or other macroprudential instruments should increase in a countercyclical manner to smooth credit cycles. In so doing, regulators can adopt a proactive approach by preventing asset price bubbles before a crisis develops. The Basel Committee on Banking Supervision (BCBS), in its own learning from the crisis in advanced economies, suggested that stronger capital requirements are needed. Its recommendation was essentially (in what was dubbed the Basel III international accord) to implement across all jurisdictions a new requirement for a capital conservation buffer and a countercyclical capital buffer. Under this new framework, capital was expected to increase in good times and to be able to absorb unexpected losses in bad times, therefore responding to credit market fluctuations in a less procyclical way.

But was that macroprudential response enough to prevent future crises? In that context, the issue of using monetary policy and macroprudential policy to address financial stability has emerged and captured the attention of many academics and policymakers in recent years. Along these lines, two questions arise. First, would adding a countercyclical component (e.g., a capital buffer) to macroprudential regulation achieve financial stability? And second, should monetary policy be used to achieve financial stability?

Many began arguing that monetary policy must play a more active role in addressing financial stability because macroprudential policy alone may not be sufficient.[7] Whether this is true obviously depends on the relationship between the two policies. Put differently, it depends on whether macroprudential policy and monetary policy are complements or substitutes in achieving financial stability.

If central banks have two objectives (say, macroeconomic stability *and* financial stability), then according to Tinbergen's principle they must have two separate policy instruments—the policy interest rate and a macroprudential tool. Some argue that the policy interest rate, which is traditionally used to achieve macroeconomic (price) stability, may

[7] See Agénor and Pereira da Silva (2012b) for a discussion on the role of monetary policy in addressing financial stability.

not be successful in containing financial instability. For instance, under the IT regime, if there is a negative demand shock, the central bank will respond by lowering its policy interest rate. But at the same time, if the central bank is also interested in containing excessively rapid credit growth, then lowering interest rates in response to the demand shock could further stimulate credit growth beyond prudent levels. How long interest rates should remain low would depend on the degree of persistence of the shock. This course of action will therefore entail a trade-off between macroeconomic (price) stability and financial stability. This seems to suggest that monetary policy–using one instrument–cannot successfully achieve both macroeconomic stability and financial stability. Therefore it builds the case for utilizing also macroprudential tools.

It is however important to note that in cases where the central bank lacks (or has low) credibility, adding a financial stability objective to monetary policy can have implications for central bank' credibility. The central bank may have problems in conveying the dual nature of its objective to the public. This may trigger mixed policy signals to the market that will weaken the perceived commitment to price stability and might destabilize expectations. Therefore, a stabilization cost can be incurred if monetary policy is used in a proactive manner to achieve financial stability objectives and/or in combination with a set of macroprudential policies.

Using Sectoral and/or Macroprudential Instruments to Achieve Financial Stability

The effectiveness of sectoral instruments and macroprudential instruments in preventing financial imbalances is also an issue to consider. Under the IT regime, if the central bank increases the policy interest rate to address financial stability concerns, such as overheating of the housing market, mortgage rates are also expected to increase. But other lending rates will increase as well. Higher lending rates are likely to lead to a contraction in supply, given the importance of bank credit in financing working capital needs in MICs. Although credit growth is positively and directly related to house price inflation, using the central bank's policy rate in this case imposes a cost to the whole economy and can lead to costly macroeconomic volatility. Put differently, the policy interest rate may be too "blunt" of an instrument to address financial stability concerns, which often have a sectoral dimension. Therefore, sectoral prudential tools, such as changes in loan-to-value ratios, debt-to-income ratios and countercyclical capital requirements on real estate lenders may be more appropriate.

To complement sectoral tools, macroprudential tools can also be used to maintain financial stability. This requires a combination of "old" tools such as reserve requirements, liquidity or leverage ratios, loan-to-value and debt-to-income ratios, and "new"

tools such as countercyclical capital buffers mentioned above which are adjusted in response to excess credit growth. One can also use dynamic provisioning to slow down the pace of credit origination. All these instruments can help to mitigate excessive risk taking and strengthen the financial sector. For instance, reserve requirements were successfully used in several Latin American MICs in a countercyclical manner to smooth credit growth and manage capital flows. However, evidence on the effectiveness of the "new" tools is limited. For example, it has been pointed out that implementing countercyclical capital buffers in MICs may face operational and institutional challenges. This arises in these economies because supervisory capacity might be weak (as mentioned previously) and/or bank credit, albeit a dominant financing source, is still a small component of firms' funding. Finally, there is no clear consensus regarding which variables the buffers should be related to during the buildup and release phase. This important fine-tuning is still work in progress.

Can Monetary Policy Be Effective in Reacting to External Shocks?

Monetary policy has limited effectiveness in response to external shocks (resulting from changes in external financial conditions), such as a sudden flood of private capital. Why? Traditional monetary policy intervention can at times have unintended perverse collateral effects that adversely affect economic activity (Agénor, Alper, and Pereira da Silva 2012a). Sudden floods have led to macroeconomic instability in MICs by creating rapid credit growth and exacerbating asset price and inflationary pressures, among other things. The textbook response consisting in increasing interest rates to restrain credit growth and reduce inflationary pressures, can be self-defeating. Why? This course of action will by design increase domestic interest rates, but obviously stimulate even greater capital inflows. In such a case, a timely and more aggressive use of macroprudential tools as a complement to a well-calibrated monetary policy response can help to manage capital flows, smooth asset price movements and reduce inflationary pressure. Furthermore, it has also been suggested that under such conditions capital flow management (CFM) measures (such as imposing taxes on capital flows) can be used on a temporary basis.[8]

This study therefore suggests that macroprudential policy and monetary policy should be viewed as complements in achieving financial stability. However, as stated previously, the effectiveness of the new macroprudential tools (including the BCBS recommended buffers) is still unclear. Hence, during a transition phase where more is learned

[8] Box 6 in the main text features further discussion on the evidence regarding the effectiveness of capital controls on the volume of capital flows.

about these policies and their combination, we contend that monetary policy could be used to address financial stability concerns. More importantly, we also suggest that macroprudential and traditional monetary policy tools should be closely coordinated. In this vein, we propose that MICs' policy-makers consider a new regime, an integrated inflation targeting (IIT). *IIT* could be defined as a flexible IT regime in which the central bank's mandate is explicitly extended to include a financial stability objective, the policy interest rate is set to respond directly to a (well-defined) measure of excessively rapid credit expansion and monetary and macroprudential policies are calibrated jointly to achieve macroeconomic (price) *and* financial stability. The calibration should be conducted in macroeconomic models that account for the fact that macroprudential regimes may alter the monetary transmission mechanism.

Designing and Implementing Integrated Inflation Targeting

This section discusses two issues associated with the design and implementation of the IIT regime. The first issue is the importance of understanding how the monetary transmission mechanism works in the IIT context. Then, we consider the formulation and implementation of an augmented Taylor rule.

Understanding the Monetary Transmission Mechanism

Under the IIT regime, since multiple instruments will be used to achieve macroeconomic and financial stability, policymakers need to ensure that they understand the interaction of macroeconomic and financial stability in the context of the transmission process of monetary and real shocks. To investigate the transmission process in this context, macroeconomic models that account for the economic environment of MICs must be used. Since in MICs commercial banks dominate the financial system, the importance of banks and bank credit must be explicitly present and reflected in policy-based models to account for their macroeconomic role in the transmission of policy and exogenous shocks. Hence, the use of macroeconomic models that account for credit market imperfections is required to examine the effectiveness of monetary and macroprudential policies and how they interact.[9]

Therefore, it is important for these models to capture the channels through which macroprudential regulation affects the monetary transmission mechanism. This approach is necessary and will help to avoid biased inflation forecasts.

[9] Box 7 in the main text discusses the process of the monetary transmission mechanism in MICs with credit market imperfections and a cost channel.

Formulating a Credit-Augmented Interest Rate Policy Rule

To implement IIT, an augmented Taylor rule which, in addition to reaction to the inflation gap (*I*), the output gap (*O*), also responds to (some measure of) private sector credit growth gap ((*C*), defined as the difference between the actual growth rate of that variable and a "reference" growth rate) will need to be explicitly formulated. Then, the optimal interest rate rule should be derived from an optimization problem involving minimizing a loss function, subject to a (reduced form) model of the economy. The loss function may also take the exchange rate volatility into account as mentioned earlier, suggesting that a real exchange rate gap can be included in the augmented rule with or without other arrangements.

Augmenting the policy interest rate rule to react to a credit gap measure can be beneficial to MICs. IT frameworks have already evolved in the post-crisis policy world, as suggested in Table A from a standard IT to post-crisis IT (with some degree of concern vis-à-vis exchange rate volatility and the effects of capital flows). Under this IIT framework, the central bank will be able to estimate, monitor, react and mitigate the usual accelerator mechanism that, when left unchecked, can lead to excessive rapid credit growth and inflate asset prices, which are common manifestations of financial imbalances. Since credit booms, in most cases, are well-documented leading indicators of financial crises, it is of the essence of an IIT to react with its policy interest rate rule to any unsustainable private sector credit growth gap.

There are two key pre-conditions that must be fulfilled before an IIT with an augmented inflation gap (*I*) – output gap (*O*) – credit growth (*C*) policy rule is implemented. The monetary authority or central bank needs to:

First, decide on the credit gap measure to be used in the rule. That requires choosing whether considering a real or a nominal credit gap, and whether using a broad measure of aggregate credit or only a component of total credit (say, private sector credit).

Second, decide how the "reference" growth rate will be measured. This "reference" rate can obviously be calculated using statistical filters and/or as a trend. But given MICs process of financial deepening, the preferred way should be on the basis of an equilibrium credit-to-GDP ratio that is related to some fundamental determinants.

Finally and perhaps more importantly, the central bank will have to deal with the issue of credibility and expectations, which can both be affected by the introduction of the new policy regime. Put differently, the introduction of a modified reaction function can have implications for central bank credibility if its objectives are not communicated properly to the public and well understood. Not paying due attention to that can affect inflationary expectations. It will therefore be of the utmost importance for a central bank embarking into an IIT to clearly explain to the public, the reason(s) why there should be

TABLE A
From the Standard Inflation-Targeting Framework to Post-crisis Inflation-Targeting Frameworks

Institutional location	Macroeconomic issue	IT (1): Flexible infation targeting (before crisis)	IT (2): Flexible infation targeting (after crisis)	IIT: Integrated infation targeting (after crisis)
Monetary Policy Commitee	Inflation gap (I) Output gap (O)	Taylor-type rule on I and O	Taylor-type rule on I, O with FX factor	Augmented new CB rule on I, O and C
Financial Stability Commitee or Authority	Credit gap (C)	Microprudential tools (MiP)	Micro & macro prudential tools (MiP + MaP)	Timely coordinated - jointly calibrated Micro & macro prudential tools (MiP+MaP)
Forex intervention by CB or specific entity	Exchange rate volatility (FX)	Pure floating	Administered floating with FX intervention tools	Administered floating with FX intervention tools & capital controls

Source: authors

a more prominent focus on credit growth developments, the renewal of its commitment to macroeconomic (price) stability and the new format of its reaction function as well as its expected results.

Conclusion

In order to achieve macroeconomic and financial stability, monetary policy and macroprudential policy should be used as complements. Hence, monetary policy should use an interest rate rule that responds to deviations in inflation, output and credit, in the context of an integrated IT (IIT) framework. The IIT regime is a flexible IT regime in which the central bank has an explicit financial stability mandate and the interest rate responds to excessively rapid credit growth. Under the IIT framework, monetary and macroprudential policies are calibrated jointly to achieve macroeconomic and financial stability.

The analysis in this study shows that MICs can benefit from a policy interest rate rule that includes a measure of the private sector credit growth gap which will act as an intermediate target. Also, since in these countries there is a high degree of uncertainty about real time estimates of the output gap, the credit growth gap may produce a more

reliable and timely measure of excess demand. This modified reaction function can also assist monetary policy in MICs to be more proactive and address the time dimension of systemic risk.

To perform well, the IIT regime must have a strong fiscal position that maintains stable and low risk premia. Since public debt level and composition have improved in MICs, the remaining risk factor, as mentioned previously, is population aging and pension financing needs as well as the short-term effects of the financial crisis on MICs' fiscal position. All of those may put considerable pressure on fiscal accounts in many MICs in the coming years. Therefore, in addition to a strong medium-term fiscal framework, reforms should be implemented to mitigate the fiscal burden associated with these liabilities and reduce concerns about public debt sustainability. Also, strong public sector accounts that are capable of countercyclical accumulation of precautionary resources may provide some fiscal space for policymakers to act counter-cyclically without losing credibility and mitigate the risks associated with large and volatile capital flows when needed. In this vein, a comprehensive framework that comprises monetary, fiscal and macroprudential policies seems to emerge as the policy framework best suited to achieve price and financial stability in MICs.

There are also several other practical operational issues.

First, there are communication and transparency requirements. Naturally, considering adopting an IIT requires a careful examination of the communication ritual and rules associated with this approach and needs to address the specific credibility issues that might be present in some MICs with consequences for inflation expectations.

Second, there is the need to develop a proper methodology for estimating credit gaps, which should be addressed to make an IIT regime operational.

Third, a decision needs to be taken on which the macroprudential tools will be used in coordination with monetary policy.

Fourth, another issue is the institutional setup that would best promote the coordination between monetary and macroprudential policies. It has been pointed out that if monetary and macroprudential policies must indeed be determined jointly, there must be very close coordination between the central bank and the macroprudential authority; they might operate under separated institutions or inside the same framework but in two distinct committees (e.g., a traditional IT's Monetary Policy Committee, and newly created Financial Stability/Policy Committees as in the case of the Bank of England).

Fifth, there is the issue of the target horizon for price or macroeconomic stability, on the one hand, and financial stability, on the other is also important. Since in several IT-MICs, inflation targets are set on an annual basis, there is a temporal dimension which provides some flexibility to the central bank to react to anticipated changes in the process driving inflation or the nature of shocks that may affect it. However, since financial

stability is a continuous target, a critical question is whether such a dichotomy should be maintained in an IIT regime, and if not how costly would be the loss of flexibility that countries would face by moving to two continuous targets.

The final issue relates to how credibility should be measured in an IIT framework. In a standard IT regime credibility is measured based on the volatility of inflation expectations and the degree of persistence in (actual and expected) inflation over time. However, if financial stability is also an objective of the central bank, an adequate measure of credibility should involve also a measure of progress (or lack thereof) with respect to financial stability. In addition, if the financial stability objective is hierarchical as opposed to concurrent with the objective of macroeconomic stability, a proper set of weights should be developed to measure overall credibility.

These issues are not trivial but many MICs have been, implicitly or explicitly, using some form of the proposed IIT when facing the challenges posed by the post-crisis environment. This study aims to contribute to a more formal and organized discussion of those efforts and the challenges ahead.

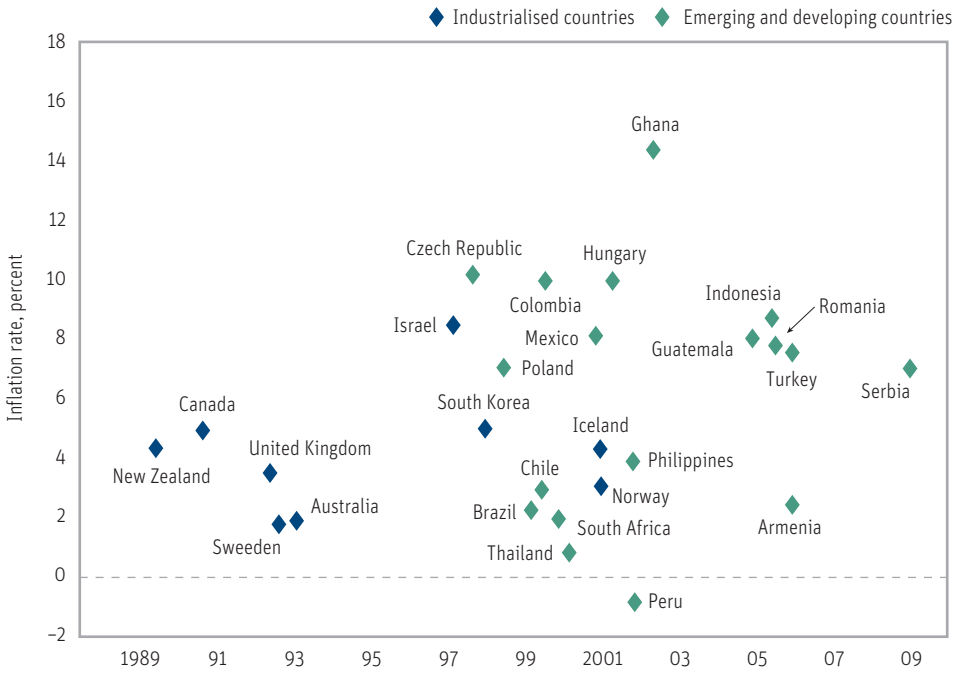
Introduction

The global financial crisis triggered by the collapse of the subprime mortgage market in the United States has led to a vigorous debate about the nature and effectiveness of financial regulation, and whether central banks should more explicitly consider financial stability objectives in the conduct of monetary policy. Indeed, several observers have argued that when setting interest rates, central banks should more systematically consider the potential trade-offs that may arise between the objectives of macroeconomic stability and financial stability. A common argument to support this view is that the very achievement of price stability may be associated with an increased risk of financial instability: by inducing excessively optimistic expectations about future economic prospects, or by increasing incentives to take on more risk, low and stable rates of inflation may foster the development of asset price bubbles. Thus, price stability—defined as maintaining a low and stable rate of inflation—may not be a sufficient condition for financial stability and monetary policy must internalize potential risks to economic stability and act preemptively, rather than "mop up" after a crisis has erupted.[1]

Because inflation targeting (IT) has been the monetary regime of choice in a growing number of countries during the past two decades (Figure 1), the debate over the role of monetary policy in the aftermath of the global financial crisis has naturally taken place in the broader context of the debate over the performance of these regimes. The risks that IT, even in its current flexible form, could pose if it implies that potential asset bubbles and the build-up of financial imbalances are ignored by central banks, are well described by Woodford (2012, p. 8) for instance:

[1] The debate actually predates the global financial crisis and initially focused on the extent to which monetary policy should respond to (or "lean against") perceived misalignments in asset prices, such as real estate and equity prices, as opposed to "cleaning up after." In this vein, Cecchetti et al. (2000) and Kontonikas and Ioannidis (2005) found that overall economic volatility can indeed be reduced with a (mild) reaction of interest rates to asset price misalignments from fundamentals; see Wadhwani (2008) for a review. As is made clear later, the focus here will be on monetary aggregates, not asset prices.

FIGURE 1
Countries Operating a Full-Fledged Inflation-Targeting Regime, 1989–2009
(Inflation rate in percent)



Source: Hammond (2012).
Note: The figure shows the dates of formal adoption of inflation targeting for the 27 countries operating a fullfledged regime at the start of 2009, and the inflation rate at adoption.

"...the [global financial] crisis does justify reconsideration of at least one aspect of the inflation targeting doctrine that had developed over the previous two decades. This is the thesis that a central bank with an inflation target need not pay attention to financial developments—such as a credit-financed real estate boom—except to the extent that such developments affect the outlook for inflation (or perhaps, either for inflation or for real activity). While this thesis is not, in my view, a central, definitional aspect of an inflation targeting regime, it was undoubtedly a common view among proponents of inflation targeting prior to the crisis. It is therefore important to reconsider both the extent to which such a view is defensible, and the extent to which it is a necessary element of a coherent approach to inflation targeting. Can this previously conventional view still be maintained, after recent experience? And if not, would this require abandonment of inflation targeting as well?"

In the same vein, Mishkin (2011, p. 32) writes:

> "Although the support for the flexible inflation targeting framework is not weakened by the lessons from the financial crisis, they do suggest, however, that the details of how flexible inflation targeting is conducted and what flexibility means need to be rethought."

At the same time, other observers have argued that IT has by and large delivered price stability and should continue to focus on that objective, but that central banks should use prudential (especially macroprudential) regulation and other policy tools to contain financial imbalances, prevent the emergence of asset price bubbles, and ensure the stability of the financial system as a whole. The view here is that trying to stabilize asset prices per se is problematic for a number of reasons—in particular because it is almost impossible to know for sure whether a given change in asset values results from changes in underlying fundamentals, nonfundamental factors, or both. Instead of getting into the tricky issue of deciding to what extent asset price fluctuations reflect changes in the economy's fundamentals, central banks should focus instead on the implications of asset price movements for credit growth and aggregate demand, and thus inflationary pressures.

This study provides a broad analysis of the challenges faced by IT regimes in the post-financial crisis world, and ways to address them. In doing the study goes beyond the debate over whether monetary policy should incorporate a financial stability objective, as discussed earlier, and address a host of other issues that have taken center stage in assessing the relevance and performance of IT regimes in the past few years. To conduct this analysis, and unlike other studies, this study focuses squarely on upper middle-income countries (MICs, for short), with a particular focus on the larger economies in Asia and Latin America, as well as Turkey and South Africa.[2] Among the reasons for this choice are that IT regimes in MICs face specific operational and credibility issues and that financial systems in these countries are undergoing significant structural transformations, which make them deeper and more integrated with the financial systems of advanced economies. At the same time, however, these transformations make financial stability in MICs more dependent on the financial conditions prevailing in advanced economies—especially in the aftermath of post-Lehman unconventional monetary policy actions that have led to a significant increase in global liquidity.

To preview the main policy lessons, the study finds that in the context of MICs, there is much merit in considering augmenting a conventional interest rate rule by

[2] Statistically, "upper middle-income countries" are defined in accordance with World Bank classifications by income groups, as given in http://data.worldbank.org/about/country-classifications. Although technically South Korea is a high-income country, it is included in some of the discussions. For simplicity of notation, the countries under analysis in this study are referred to as MICs.

adding a measure of the *private sector credit growth gap*, defined as the difference between the actual growth rate of that variable and a "reference" or "equilibrium" growth rate (which, as argued here, cannot be mechanically derived from the "observed trend" of credit growth). By doing so, monetary policy (which can address only the time dimension of systemic risk) would help to counter accelerator mechanisms that generate excessively rapid growth in credit and asset prices, which are common manifestations of financial imbalances. Indeed, a large body of evidence has documented that excessively rapid credit growth tends to go hand-in-hand with a deterioration in lending origination standards and credit quality. In turn, the weakening of lending standards tends to increase financial fragility during a downturn. To mitigate exchange rate volatility and adverse effects on both the real and financial sectors, the central bank may also need to react to large changes in the real exchange rate. However, because monetary policy cannot address the cross-section dimension of systemic risk, it is largely complementary to macroprudential policy. Both types of instruments must be calibrated jointly and carefully, in the context of macroeconomic models that account for the type of credit market imperfections observed in MICs and for the fact that macroprudential regimes may affect in substantial ways the monetary transmission mechanism. Finally, in countries where there is some degree of flexibility in budget outlays, a countercyclical response of fiscal policy might be an important complement to monetary policy in managing aggregate demand pressures and the adverse effects of abrupt changes in capital flows.

The remainder of the study proceeds as follows. To set the stage for the analysis, Section 2 provides a background on financial systems in MICs, the link between capital flows and (macroeconomic and financial) volatility, and the link between credit growth and financial crises in these countries. Section 3 considers the main features of IT regimes and the fundamental trade-off between credibility and flexibility that these regimes face. We then focus in Section 4 on the evidence, with a thorough review of the recent performance of IT in MICs. Section 5 considers what we consider to be the main challenges to IT at the moment: the risk of fiscal dominance related to future fiscal liabilities; the management of terms-of-trade shocks in a volatile international environment; exchange rate volatility and "fear of floating;" building and maintaining credibility; and more recently, the focus on financial stability, which has been related to the shift (as discussed earlier) from *ex post* resolution of financial shocks to prevention. Section 6 then focuses on how to address the financial stability challenge in an IT regime. It discusses whether reliance on macroprudential policy and capital controls is sufficient to mitigate systemic risk or if instead monetary policy should be more proactive in response to perceived risks to financial stability (above and beyond the conventional objectives of price and output stability), and whether these tools are complements or substitutes, that is, the extent to which regulatory rules and monetary policy should be combined to ensure

both macroeconomic and financial stability. We also discuss, assuming that a more proactive monetary policy is desirable, the nature of the financial indicators that it should be made responsive to. Section 7 addresses design and implementation issues associated with an "integrated" IT regime, with a particular focus on improving the understanding of the monetary transmission mechanism in MICs, and the practical formulation of a credit-augmented interest rate policy rule. The last section brings together the main policy lessons of the analysis and offers some concluding remarks.

Background

To set the stage for the analysis, it is important to understand the financial features of MICs and their international financial environment. This section begins with a brief review of the structure of financial systems and the experience of these countries with financial openness, capital flows, and volatility. We then discuss the link between credit growth and financial crises—an important connection to motivate the proposal for a new monetary policy rule in these countries.

Structure of Financial Systems

With some notable exceptions, financial markets in many MICs remain underdeveloped, compared to high-income countries. In most of these countries, commercial banks continue to dominate the financial system. Equity issues remain limited, despite recent progress in deepening local capital markets and changes in the ownership structure of firms. In some cases this has contributed to making the stock market highly volatile. Capital markets remain thin; local currency bond markets are still in their infant stages in many economies and do not represent significant alternatives to bank lending. As a share of GDP, stock market capitalization in 2011 amounted to 35 percent, private debt securities 122.8 percent, and bank assets 223.4 percent for the Euro Area, and 103.7 percent, 138.1 percent, and 97.1 percent, respectively, for the United States (IMF 2012a, Appendix Table 1). The corresponding figures for Latin America and the Caribbean were 39.6, 18.9, and 58.8 percent, and for Asia they were 43.3, 20.8, and 156.1 percent, respectively. Although these numbers are not specific to the major MICs in each of these two regions, they are fairly representative of their situation as well.

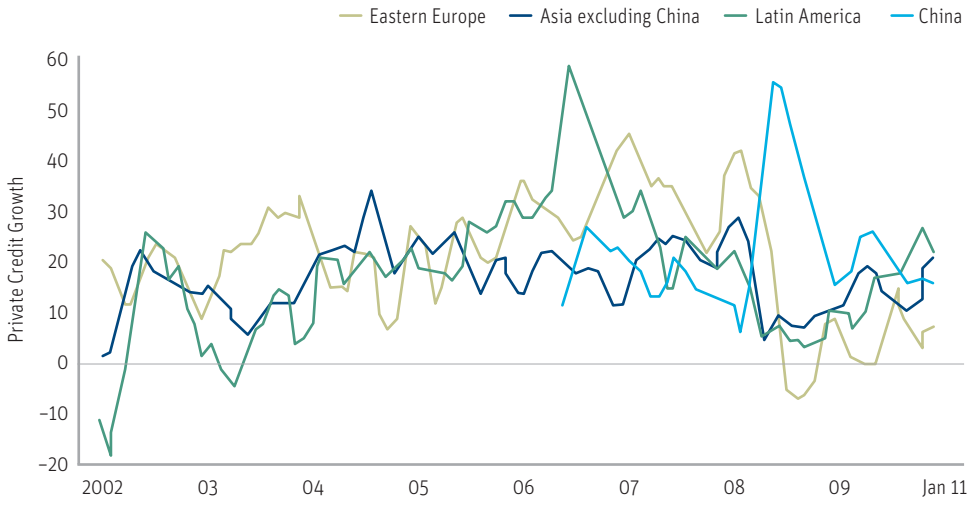
In part due to a more stable macroeconomic environment, credit has grown significantly in Asia and Latin America in the past decade both in real terms and as a proportion of GDP (Figures 2, 3, and 4). Despite a sharp deceleration in the immediate

TABLE 1
Exchange Rates during External Shocks, Selected Countries, 2007–11
(Percentage change)

	June 2007 to March 2009		March 2009 to August 2011		August 2011 to November 2011		June 2007 to November 2011	
	NEER	REEER	NEER	REEER	NEER	REEER	NEER	REEER
China	18.4	20.3	–8.6	–3.7	4.9	4.3	13.5	20.9
Hong Kong SAR	2.8	3.4	–15.7	–17.0	4.6	8.2	–9.3	–7.2
India	–17.5	–15.7	–0.1	17.4	–7.6	–7.0	–23.8	–8.0
Indonesia	–23.7	–16.0	18.2	24.2	–2.1	–2.1	–11.7	2.1
Korea	–37.5	–35.8	18.6	20.2	–2.8	–3.5	–28.0	–1.5
Malaysia	–4.7	–3.5	6.0	4.4	–2.4	–2.2	–1.3	–1.5
Philippines	–3.7	3.4	–2.2	1.9	0.8	1.3	–5.1	6.8
Singapore	4.3	7.4	9.2	11.8	–3.2	–3.1	10.2	16.3
Thailand	–3.3	–4.6	1.8	4.5	–1.3	–1.7	–2.8	–1.9
Argentina	–8.2	–2.3	–27.8	–17.9	4.0	5.3	–31.1	–15.5
Brazil	–11.6	–8.6	33.2	39.0	–7.5	–6.9	8.9	18.3
Chile	–7.6	–1.3	12.5	8.6	–5.1	–4.4	–1.3	2.5
Colombia	–18.2	–16.7	31.5	24.0	–3.7	–4.1	3.5	–0.9
Mexico	–24.8	–19.3	11.3	12.2	–9.2	–7.6	–23.9	–16.3
Peru	5.4	8.2	3.1	–0.7	5.1	5.5	14.2	13.4
Hungary	–15.3	–12.5	8.5	13.3	–12.2	–11.9	–19.3	–12.7
Poland	–15.5	–13.5	9.2	10.7	–7.5	–7.0	–14.6	–10.9
Russia	–22.2	–4.4	6.3	12.0	–2.4	–0.7	–19.2	6.4
South Africa	–25.8	–16.8	23.4	29.2	–9.7	–9.2	–17.4	–2.5
Turkey	–17.8	–9.6	–13.6	–5.8	1.6	6.6	–27.9	–9.2
Saudi Arabia	5.0	16.3	–12.6	–7.9	3.8	4.9	–4.8	12.4
United Arab Emirates	7.9	12.8	–12.3	–20.8	5.1	4.8	–0.5	–6.4

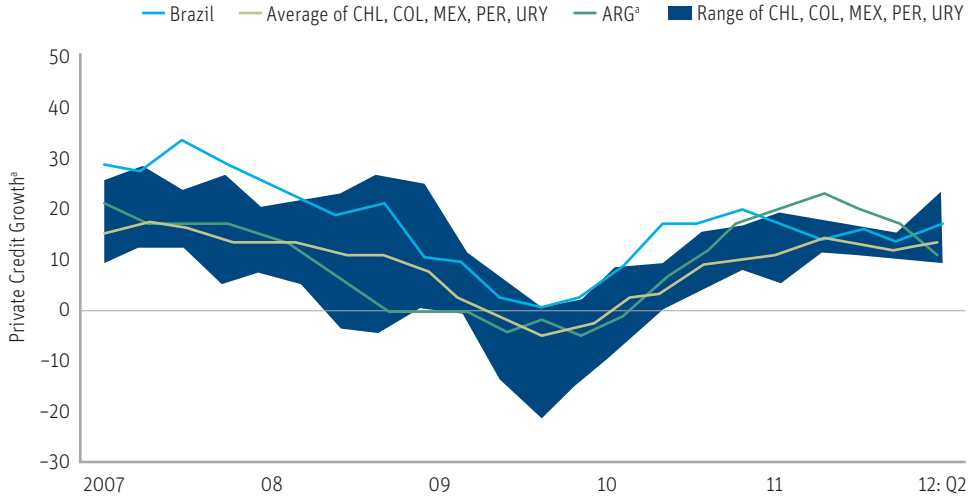
Source: Bank for International Settlements.
Note: NEER = nominal effective exchange rate; REER = real effective exchange rate. In both cases, an increase represents an appreciation.

FIGURE 2
Real Credit Growth to the Private Sector, 2002–11
(In percent)



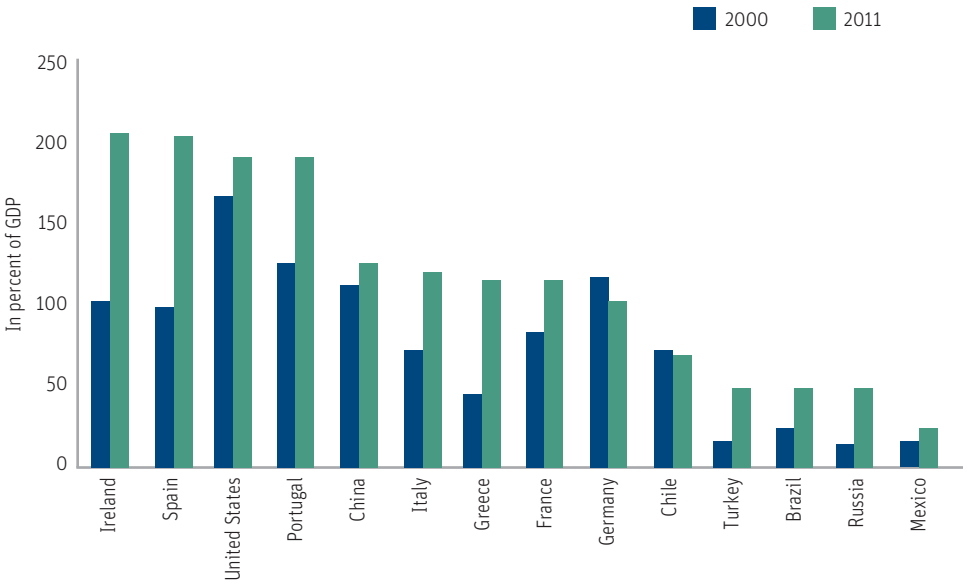
Source: International Monetary Fund, *World Economic Outlook* (April 2011).

FIGURE 3
Latin America: Real Private Credit Per Capita, 2007–12
(Year-on-year percent change)



Source: International Monetary Fund, *World Economic Outlook* (September 2012).

FIGURE 4
Domestic Credit to Private Sector, Selected Countries, 2000 and 2011
(In percent of GDP)



Source: Banco Central do Brazil.

aftermath of the global financial crisis, this growth has been particularly strong in some of the major MICs in both regions. In Brazil, for instance, the credit-to-GDP ratio rose from 26 percent in 2004 to more than 50 percent in 2012. This is partly a reflection of greater financial inclusion—that is, the rapid expansion of the middle class and the demand for financial services—but also the result of improved macroeconomic fundamentals, as well as progress in legislation and the reduction of information asymmetries (such as new foreclosure rules, the creation of credit bureaus, and so on). However, credit to the private sector in relative terms remains well below the levels observed in high-income economies (Figure 4). One factor that may have hampered the expansion of credit in MICs may be that disclosure and transparency requirements for corporate firms remain inadequate.[1] With poor regulation of corporate governance and weak financial accounting transparency, firms have limited incentives to consider equity issuance as an alternative source of funding—preferring instead either to rely on internal funds or to borrow from banks with which they have established close links.

[1] See Black, Carvalho, and Gorga (2010) for Brazil.

The nature of banking operations and their degree of sophistication in many MICs have been transformed in recent years by privatization and cross-border acquisitions. However, the financial systems in most of these countries continue to lag behind those in industrial markets. In particular, and despite some exceptions, the expansion of nonbank financial intermediaries (hedge funds, commodities funds, private equity groups, and money market funds), the shift toward the "originate and distribute" model of banking, and the development of off-balance-sheet instruments have not reached the same importance as they have in advanced economies. Indeed, apart from a few countries, nonbank financial intermediaries are not highly developed. Data compiled by Ghosh et al. (2012) for instance on the importance of shadow banking in MICs show that the sector is large only in a few countries, such as the Philippines and Thailand.[2] In Brazil, the sector comprising hedge funds, pension funds, and private equity funds is also quite large (representing about 53 percent of overall deposits) and continues to grow.

Another important feature of financial systems in MICs (although not all of them) is that supervisory capacity is often weak and the ability to enforce prudential regulations limited (Barth, Caprio, and Levine (2004), (2008); and Rennhack (2009) for Latin America). As noted by the Financial Stability Board (2011), in many MICs bank supervisors lack the ability to assess the effectiveness of banks' risk management practices, especially the adequacy of capital in relation to the risks that they undertake. The lack of expertise in the supervisory agency is especially problematic for those countries that have approved the use of the advanced approaches in Basel II, which allow banks to rely on historical data and internal models for the determination of credit risk estimates and capital requirements. Lack of supervisory capacity affects the ability to assess other risks as well, such as market and interest rate risks. A notable exception among major MICs is Brazil, as discussed in Box 1.

In some cases inadequate supervision and porous regulations are the legacy of heavy public sector involvement in the banking system, which weakens enforcement incentives, and an inadequate pay structure, which makes it difficult to lure well-qualified individuals away from more lucrative private activities. As documented by the Inter-American Development Bank (2005) and Dermirguc-Kunt, Detragiache, and Tressel (2008), the quality of bank supervision—as measured by the overall compliance index with the

[2] Shadow banking comprises a set of activities, markets, contracts, and institutions that operate partially (or fully) outside the traditional commercial banking sector, and, as such, are either lightly regulated or not regulated at all (See Pozsar et al. (2010) and Institute of International Finance (2012)). In industrial countries, alternatives to conventional bank finance include invoice factoring or discounting (where a business borrows money against its invoices), asset-based financing (where money is borrowed against assets such as a plant or machinery), peer-to-peer and consumer-to-business lending (in which individuals agree to lend money to each other or to businesses through an online money exchange). New lending models also involve providing cash advances to businesses (e.g., restaurants and hotels) that derive much of their income from credit card sales. However, most of these new lending models have not reached a mass of borrowers that is critical enough to be considered serious alternatives to bank finance.

Box 1. Financial System Regulation and Supervision in Brazil

Brazil's financial system has grown in size, strength, diversification and sophistication but has remained solid in all its essential dimensions (e.g., capital requirements, profitability, loan loss provisions and liquidity). The stress tests that have been recently conducted indicate strong resiliency to extreme shocks, including a severe global recession. The main findings were a) the system (through its provisions and capital base) would be able to absorb the deterioration of the main macroeconomic indicators; b) for three major risks (credit, foreign exchange and interest rate), there would be no cases of insolvency, even in situations of extreme volatility; and c) the failure of any individual bank would not lead to widespread failure of other banks, indicating low direct contagion.

The system has limited exposure to external risks: low bank foreign exposure in assets and funding, conservative prudential regulation, subsidiarization approach to foreign capital banks. There is also a strong, sophisticated, and intrusive bank supervision, equipped with adequate tools for prevention and intervention. The Brazilian supervision was one of the best evaluated among G-20 countries, in full compliance with the Basel Core Principles for Supervision compared with that of major MICs and high-income countries.

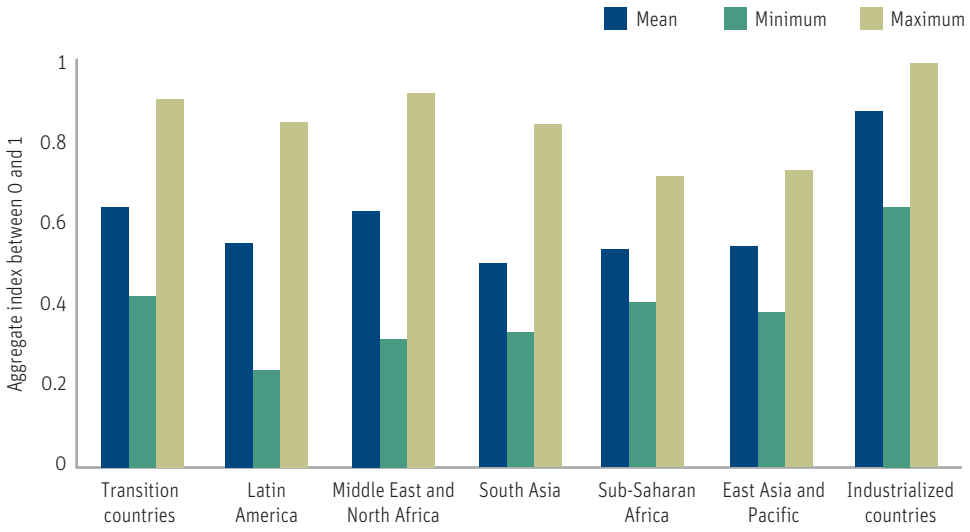
Financial regulation and supervision in Brazil is centralized at the central bank, which has at its disposal fairly extensive powers based on mostly infra-legal instruments. The system is converging to international standards (IFRS, Basel 2, 2.5 and 3, IOSCO). It has a strong minimum capital ratio: 11 percent of risk-weighted assets (well above the Basel minimum of 8 percent) with capital requirements for credit risk on trading book exposures and risk weights for residential property exposures conditioned to loan-to-value (LTV), forward-looking provisioning rules, mandatory organizational structure for management of each risk factor (credit, market, and operational risks), banks' board members personal accountability on risk management, and stringent limits on large exposures and foreign currency exposures. In addition, unlike high-income countries, there is a mandatory registration of over-the-counter derivatives.

The Brazilian system of comprehensive risk-based-approach supervision is organized around frequent on-site examinations, the central bank's rating of supervised institutions based on its own criteria (qualitative assessment of risk management and control, analysis of financial and economic indicators, identification of areas to be monitored), and contingency planning and assessment of organizational structures dedicated to risks. All credits above BRL1,000 (about US$500) need to be registered and reported to the central bank., which conducts specific monitoring of market and liquidity risks using information on assets and derivatives registered in clearing houses and reconciling this information with accounting information from all financial institutions. There the central bank is capable of monitoring the aggregate evolution of systemic risk over time and in addition conducts a periodic application of stress tests to all financial institution statements.[1]

[1] For further information, see the press release on the IMF and World Bank Financial Sector Assessment Program Mission to Brazil, March 21, 2012. Available at http://www.imf.org/external/np/sec/pr/2012/pr1297.htm.

so-called "Basel Core Principles for Effective Bank Supervision", which include a number of recommendations on prudential regulation and requirements—tend to be much lower in developing countries, especially those of Latin America (Figure 5), again with the notable exception of Brazil (Box 1). In turn, a weak regulatory environment may lead to regulatory capture and create perverse incentives for banks to engage in overly risky activities.

FIGURE 5
Compliance with the Basel Core Principles for Effective Bank Supervision
(Aggregate index between 0 and 1)



Source: Demirguc-Kunt, Detragiache, and Tressel (2008, p. 522).
Note: The document "Core Principles for Effective Banking Supervision" published in 2006 is available at http://www.bis.org/publ/bcbs129.htm. The revised version of the document published in September 2012 is available at http://www.bis.org/publ/bcbs230.htm.

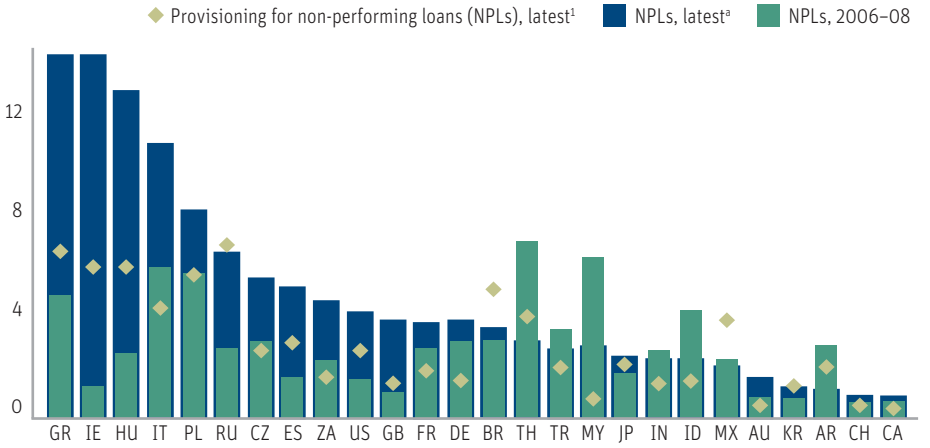
This in turn may lead to weak banking institutions, characterized by high proportions of nonperforming loans. As shown in Figure 6, while some countries (such as Brazil and Mexico) have banks that are well provisioned, others (including Chile, Indonesia, Turkey, and South Africa) are not. This makes banks in the latter countries highly vulnerable to a downturn, which in turn could considerably magnify the cost of adverse shocks.[3]

Finally, in many MICs property rights are weak and the legal system is highly inefficient, thereby making contract enforcement difficult. In particular, bankruptcy law typically provides little creditor protection, and bankruptcy procedures for liquidating the assets of firms in default are rarely enforced, which results in low recovery rates for creditors.[4] This in turn translates into weak intermediation, a high cost of capital, high rates of collateralized lending, and outright credit rationing—which disproportionately affects small and medium-size firms, whose ability to pledge collateral is often weak to begin with.

[3] Vazquez, Tabak, and Souto (2012) found a significant negative relationship between nonperforming loans and (lagged) GDP growth in Brazil.

[4] See Araújo and Funchal (2005) for the case of Latin America and Djankov et al. (2008) for a general review of debt insolvency procedures in developing countries.

FIGURE 6
Bank Provisioning and Nonperforming Loans, Selected Countries
(As a percentage of total loans)



AR = Argentina; AU = Australia; BR = Brazil; CA = Canada; CH = Switzerland, CZ = Czech Republic; DE = Germany; ES = Spain; FR = France; GB = United Kingdom; GR = Greece; HU = Hungary; ID = Indonesia; IE = Ireland; IN = India; IT = Italy; JP = Japan; KR = Korea; MX = Mexico; MY = Malaysia; PL = Poland; RU = Russia; TH = Thailand; TR = Turkey; US = United States; ZA = South Africa.

Source: Bank for International Settlements, *Annual Report* (June 2012).
[a] For Germany, Italy, Japan, Korea and Switzerland, 2010; for all others, 2011.

Credit Market Imperfections

Credit markets in MICs are often characterized by limited competition among banks. This has led to monopolistic or oligopolistic pricing practices, market segmentation, and efficiency losses. In recent years, there has been some improvement in that regard, in large part due to large-scale privatization and bank restructuring. In Latin American MICs, for instance, this has helped to promote competition and generate efficiency gains in banking (Williams (2012a).[5] Nevertheless, lack of competition continues to prevail in many countries and this has important implications for the monetary transmission mechanism, as will be discussed later.

[5] However, whether improved competition helps or undermines financial stability remains a matter of debate, in the region and elsewhere. See for instance Degryse and Ongena (2008) for a general review of the evidence on the link between competition and bank stability and Ariss (2010) for developing countries. Indeed, increased competition in banking may actually raise the risk of financial instability. First, it may raise systemic risk, as weak banks "gamble for resurrection" by increasing the riskiness of their loan portfolios. Second, rents created by imperfect competition may induce banks to better monitor their borrowers (because there is more at stake) and expand efforts to mobilize deposits (because there are rents to be earned on them). Both the quality and level of financial intermediation can therefore be higher than under financial liberalization. This view is in line with the "financial restraint" argument put forth by Hellman, Murdock, and Stiglitz (1997).

Asymmetric information problems in MICs tend to be more severe than in industrial countries. This makes screening out good credit risks from bad ones difficult, and fosters collateralized lending and short-maturity loans. Moreover, and despite recent trends toward privatization, governments in many countries continue to play a pervasive role in banking. While this involvement turned out to be useful in the aftermath of the global financial crisis, as it made it easier for some countries to implement countercyclical credit policies, it may exacerbate moral hazard problems, by promoting connected lending and regulatory forbearance.

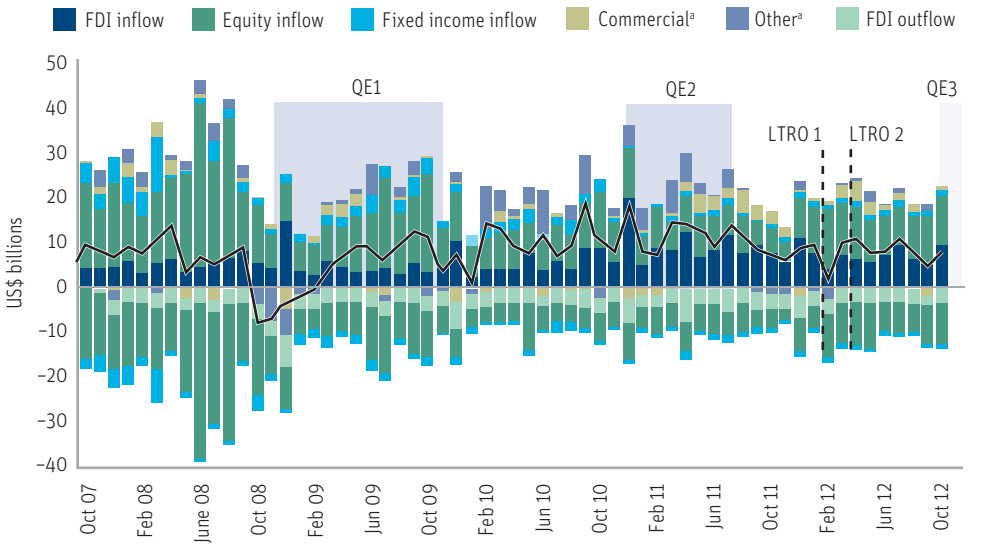
Related to the lack of financial diversification discussed earlier, bank credit plays an important role in many MICs. It serves to finance not only longer-term investment projects but also short-term working capital needs. As a result, it may have a large impact on the supply side of the economy. Firms often borrow short term to finance their acquisition of labor inputs, raw materials, etc. prior to the sale of output. But while an increase in the cost of loans for consumption or investment (induced by a contraction in monetary policy) tends to reduce both aggregate demand and inflationary pressures, an increase in the cost of working capital loans affects output and inflation in opposite directions. This makes the transmission of monetary policy shocks to prices highly uncertain and has important implications for the performance of IT regimes, as will be discussed later.

Financial Openness, Capital Flows, and Volatility

Over the past two decades, many MICs have continued to open their capital accounts, and greater integration with world capital markets has been accompanied by a substantial rise in private capital flows to these countries. The conventional distinction in terms of what drives capital flows to MICs is between "push" factors (macroeconomic and structural reforms that attract capital from abroad as a result of changes in regulation and improvements in the risk-return characteristics of assets issued by MICs) and "pull" factors (cyclical and structural factors that affect the risk-return characteristics of assets issued by advanced economies).[6] While foreign direct investment (FDI) has often been driven by longer-term prospects (push factors), short-term, cross-border capital flows are highly

[6] In addition to the growing trend toward integration of world capital markets and changes in policies and prospects in the recipient countries, global cyclical factors have also played an important role in explaining fluctuations in capital flows, especially short-term flows. See Agénor and Montiel (2008b, Chapter 14) for a review of the evidence on the determinants of capital flows; see Forbes and Warnock (2012), Ghosh et al. (2012), Ahmed and Zlate (2013), Herrmann and Mihaljek (2013), and Okada (2013) for an analysis of the role of global and domestic factors in explaining "waves" of international capital flows over large samples. See Fratzscher (2012) for a more specific study of the importance of push and pull factors before and after the global financial crisis.

FIGURE 7
Brazil: Gross Capital Inflows, 2007–12
(In billions of U.S. dollars)



Source: Banco Central do Brasil.
Note: QE1, QE2, and QE3 refer to the quantitative easing programs by the U.S. Federal Reserve Board. LTRO1 and LTRO2 refer to long-term repurchase operations by the European Central Bank. FDI = foreign direct investment.
[a] *Net flows.*

responsive to changes in relative rates of return, including movements in interest rates in advanced economies and changes in risk perception among global investors (pull factors).

Although there are substantial potential benefits associated with capital flows (especially foreign direct investment, as documented in a number of studies), the risk of volatility and abrupt reversals in short-term capital movements may represent a substantial cost. A wave of currency and banking crises over the past two decades, including most recently the global financial crisis (and the liquidity policies that were followed in its aftermath), have heightened concerns associated with such reversals.[7] Figure 7 for instance shows the behavior of gross capital flows, and various components thereof, in Brazil during the period 2007–12. While foreign direct investment flows have remained relatively stable, the data suggest that episodes of quantitative easing in the United States (especially QE1) have been accompanied by a sharp increase in equity-related flows.

[7] Using panel data covering the period 1975–97, Hutchison and Noy (2006) found that currency crises lead to reductions in output of about 5–8 percent over a two-to-four year period, whereas banking crises lead to output reductions of the order of 8–10 percent over the same period. Joyce and Nabar (2009) found that banking crises have a significant negative effect on domestic investment.

From the perspective of financial stability, the main source of concern is gross, rather than net capital flows, because of the risk that capital flows, intermediated directly or indirectly through the banking system, may lead to the formation of credit-fueled bubbles. Forbes and Warnock (2012) found that in recent years the size and volatility of gross flows in many countries have increased, while net capital flows have been more stable. Broner et al. (2012) also found that gross capital flows are very large and volatile relative to net capital flows. In addition, they found that gross capital flows are procyclical: during expansions, foreigners invest more domestically and domestic agents invest more abroad; during crises, total gross flows collapse and there is a retrenchment in both inflows by foreigners and outflows by domestic agents.

Among gross flows, bank-related flows are especially important because of their potential direct impact on credit expansion (as noted earlier) and their role in transmitting international shocks. For instance, deteriorations in the balance sheet of domestic banks can push them to sell external assets or recall external loans to comply with internal rules or with prudential regulations such as capital requirements or maximum leverage ratios.[8] In the recent wave of capital flows, bank-related flows have been particularly large. Using an index normalized to 100 in March 2003, Figure 8 shows claims of the BIS-reporting country banks on borrowers in selected MICs and industrial countries from 1999–2010. The data show that all of these countries experienced a significant boom in cross-border lending in the years preceding the global financial crisis. According to data from the Institute of International Finance, in 2011 net inflows of private capital associated with commercial banks accounted for almost 26 percent of total net private inflows to emerging Asia.[9]

The volatility associated with short-term capital flows is a major concern because the evidence shows that financial systems in MICs are often highly vulnerable to small domestic or external disturbances—and even more so now to global financial cycles as a result of increased international financial integration (Box 2). Bank-related and portfolio debt flows have been especially volatile in recent years. Abrupt reversals in short-term capital movements tend to exacerbate financial volatility, particularly in countries with relatively fragile financial systems, weak regulatory and supervision structures, and policy regimes that lack flexibility. A number of studies have indeed documented a positive relation

[8] Krugman (2008) refers to such international financial contagion as the "International Finance Multiplier;" changes in asset prices are transmitted internationally through their effects on the balance sheets of banks and other highly leveraged financial institutions. See Herrmann and Mihaljek (2013) for some formal evidence on the role of bank lending flows in transmitting financial shocks across borders.

[9] See also Hoggarth, Mahadeva, and Martin (2010). As argued by Bruno and Shin (2012a), these capital flows reflect the interaction of the supply and demand for wholesale funding between global and local banks. When local and global banks interact in the market for wholesale bank funding, the liabilities of local banks serve as the assets of the global banks, and the lending by global banks is the supply of wholesale funding, while the borrowing by local banks is its demand.

Box 2. Capital Flows: Sources of Volatility and Macroeconomic Effects

Recent research on the costs and benefits of international financial integration has highlighted the fact that access to resources on world capital markets may be asymmetric or procyclical: countries may be able to borrow only in good times, while facing credit constraints in bad times. As a result, agents may be unable to smooth consumption in the face of temporary adverse shocks— precisely when insurance is needed the most.[a]

There are essentially two sets of factors that may explain the procyclical behavior of short-term capital flows. The first is quite general in nature: asymmetric information problems may trigger herding behavior because partially-informed investors may rush to withdraw "en masse" their capital in response to an adverse shock whose economic consequences for the country are not fully understood. The second is more specific to MICs, where economic shocks tend to be larger and more frequent, reflecting their relatively narrow production base and their greater dependence on primary commodity exports. A common adverse shock to a group of countries may lead to a deterioration in creditworthiness as a result of abrupt changes in risk perception. This can lead to borrowers who are only marginally creditworthy being "squeezed out" of world capital markets. Moreover, perceived risk may increase more during a large adverse shock than it declines during a small adverse or a positive shock.

A key consequence of procyclicality is that it may exacerbate macroeconomic instability: by attracting large capital inflows, favorable shocks encourage consumption and spending at levels that are unsustainable in the longer term, forcing countries to over-adjust when an adverse shock hits and access to capital markets is curtailed.[b]

More generally, a high degree of financial openness may be conducive to a high degree of volatility in capital movements, resulting in large reversals in short-term flows associated with speculative pressures on the domestic currency. The possibility of large reversals of short-term capital flows raises the risk that borrowers may face costly "liquidity runs," as discussed for instance by Chang and Velasco (2000). The higher the level of short-term debt relative to the borrowing country's international reserves, the greater the risk of such runs. High levels of short-term liabilities intermediated by the financial system also create risks of bank runs and systemic financial crises. Large capital inflows and excessive liquidity can also lead to the development of bubbles, particularly in the real estate sector.

Volatility in capital inflows has also tended to translate into exchange rate instability (under flexible exchange rates) or large fluctuations in official reserves (under a pegged exchange rate regime), as well as greater volatility in domestic equity markets. Financial volatility may have costly real effects as well—nominal exchange rate volatility, in particular, may hamper the expansion of exports if appropriate hedging instruments are not available to domestic producers.

In general, the degree of volatility of capital flows is related to both actual and perceived movements in domestic economic fundamentals, as well as to external factors such as movements in world interest rates.[c] In turn, the volatility of capital flows can have sizable real effects.

The fact that investor sentiment (particularly that of highly leveraged, speculative trading institutions, such as hedge funds) is constantly changing in response to new information creates the potential for markets to overshoot on a scale that can generate financial crises with significant economic and social costs. Short-term portfolio flows, in particular, tend to be very sensitive to herding among investors and contagious factors. In turn, herding behavior often translates into large movements into and out of certain types of assets, which exacerbate fluctuations in asset prices and capital movements. Investor herding, however, is not evidence of irrationality. On the contrary, herding can be a rational response in the presence of several factors (Devenow and Welch (1996)).

(*continued on next page*)

Box 2. (*continued*)

Volatility of capital flows can also result from contagion effects.[d] Financial contagion may occur when a country suffers massive capital outflows triggered by a perceived increase in the vulnerability of a country's currency by international investors, or, more generally, a loss of confidence in the country's economic prospects, as a result of developments elsewhere. It may also occur through two other channels, with indirect effects on the volatility of capital flows: terms-of-trade shocks or competitiveness effects. An example of the former occurred when events that followed the Asia crisis in the late 1990s led to a sharp reduction in the demand for imports by crisis-stricken countries and a drop in world commodity prices. By increasing the degree of uncertainty regarding the short-term economic prospects of a country, terms-of-trade shocks may translate into financial contagion.

Finally, the volatility of capital flows may be the manifestation of a deeper problem of "underinsurance," which translates into a bias toward short-term borrowing. Caballero and Krishnamurthy (2004) found that underdeveloped domestic financial markets may lead to a distorted valuation of international resources, and this in turn may lead to external underinsurance. In their model, when domestic financial markets are underdeveloped—which they characterize as a situation where the domestic collateral value of projects is less than their expected revenues—then agents' external insurance decisions are distorted. Domestic agents in need of external resources cannot transfer the full surplus generated by these resources to other participants in domestic financial markets that do have access to scarce external funds. Thus, in equilibrium, the scarcity value of external resources is depressed and private decisions are biased against hoarding international liquidity, thereby insuring against these events. The underinsurance with respect to external shocks takes many forms, such as excessive external borrowing during booms and a maturity structure of private debt that is distorted toward the short term.

Several studies have examined the degree of volatility (or, conversely, persistence) of cross-border capital flows during the past decades. A common result of these studies is that foreign direct investment (FDI) tends to be less volatile than other forms of capital flows.[e] Sula and Willett (2009) for instance, in a study of 35 countries covering the period 1990–2003, found that indeed foreign direct investment is the most stable category of capital flows.[f]

Recent studies that have documented the macroeconomic effects of capital flows include Jongwanich (2010), Furceri, Guichard, and Rusticelli (2011), Ibarra (2011), Sá et al. (2011), Ben Naceur, Bakardzhieva, and Kamar (2012), Olaberría (2012), and Barroso, Pereira da Silva, and Soares Sales (2013). In a study of a group of Asian countries over the period 2000–09, Jongwanich (2010) found that capital inflows lead to a significant real appreciation. Using a broader sample of countries over the period 1970–2007, Furceri, Guichard, and Rusticelli (2011) found that in the two years following the beginning of a capital inflow shock, the credit-to-GDP ratio increases by about 2 percentage points. The study also found that the short-term effect of capital inflow shocks on domestic credit depends on countries' macroeconomic policy stances. In particular, it is lower in countries with a higher degree of exchange rate flexibility.

Ibarra (2011) analyzed the long-run determinants of the Mexican peso's real exchange rate from 1988 to 2008. Controlling for various standard determinants, he showed that all types of capital inflows tended to appreciate the peso. In contrast to recent multi-country studies, the paper finds no evidence of a less harmful effect from foreign direct investment (FDI)—on the contrary, the FDI's appreciation effect can be particularly strong—and interprets this finding. The paper showed as well that

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Box 2. (*continued*)

monetary policy, through changes in the short-term interest differential, can have persistent, level effects on the real exchange rate.

Sá, Tobin, and Wieladek (2011) also found that shocks to capital flows have a significant impact on private sector credit for industrial countries. In a study comparing the impact of six types of flows on real exchange rate behavior in a sample of 57 developing countries, Ben Naceur, Bakardzhieva, and Kamar (2012) found that portfolio investments, foreign borrowing, aid, and income lead to real exchange rate appreciation, while remittances have disparate effects across regions. Foreign direct investment has no effect on the real exchange rate.

Evidence that asset prices tend to be more vulnerable to large capital inflows is provided by Olaberría (2012). Using a panel of 40 countries from 1990 to 2010, Olaberría found that emerging countries are more likely to experience booms in asset prices during periods of large capital inflows. At the same time, financial development, the quality of institutions, and the exchange rate regime can potentially influence the association between capital inflows and booms in asset prices. In contrast, the monograph does not find evidence to support the view that capital controls help reduce this association.

Finally, Barroso, Pereira da Silva, and Soares Sales (2013) found that the quantitative easing policies adopted by the U.S. Federal Reserve in the aftermath of the global financial crisis had significant spillover effects on the Brazilian economy. These effects were mostly transmitted through excessive capital inflows (especially during the first episode, as documented in Figure 7 in the main text), which led to exchange rate appreciation, stock market price increases, and a credit boom. The effect on inflation was less robust, as it was partly mitigated by currency appreciation. These results are consistent with the model-based analytical predictions in Agénor, Alper, and Pereira da Silva (2012a), as discussed in Box 8.

[a] See Agénor (2012) for a review of the analytical literature and Park and Lee (2011) for evidence of increased financial integration in Asia during the past two decades.

[b] See Agénor (2006) for a formal analysis of the procyclical behavior of capital flows in response to adverse shocks to world interest rates.

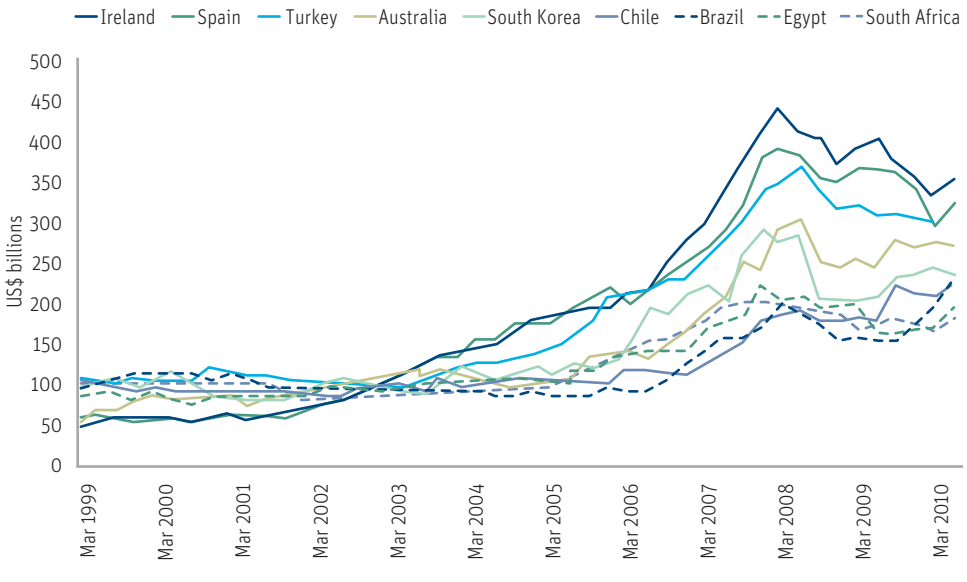
[c] Volatility can also be magnified by domestic market distortions. To the extent that private capital flows are channeled to the domestic economy through commercial banks, credit market inefficiencies can magnify the effect of changes in, say, external interest rates, and lead to fluctuations in domestic output that may have feedback effects on capital flows (Agénor and Aizenman 1999).

[d] See Pericoli and Sbracia (2003) for a review of the various channels through which cross-border financial contagion may occur. Razin and Sadka (2004) illustrate how an exogenous shift in market sentiment (taking the form of an extraneous change in credit ratings) can move a country from a good equilibrium with high investment to a bad equilibrium with low investment—even with stable macroeconomic fundamentals.

[e] It should be noted that, in practice, reversals in FDI flows can also occur, even though physical capital (such as buildings and heavy equipment) cannot be easily moved out of a country on short notice. Such reversals can be accomplished through financial transactions. For instance, the foreign subsidiary in the host country can borrow domestically against its local assets and then transfer (lend) the funds to its parent company abroad.

[f] However, the finding that FDI flows tend to be more stable than other types of flows may need to be taken with some degree of caution. First, because FDI as conventionally measured includes the retained earnings of all previous FDI flows, it tends to display more inertia. Second, the classification of direct and portfolio flows in balance-of-payments statistics is somewhat arbitrary. Foreign investment in the equity of a company above a critical proportion of outstanding equity (say, 10 percent) is usually classified as FDI, whereas that below the critical threshold is classified as portfolio investment. However, small differences above or below the threshold do not necessarily represent any significant difference in the intentions of investors.

FIGURE 8
External Claims (Loans and Deposits) of Bank for International Settlements Reporting Country Banks on Borrowers in Selected Countries, 1999–2010
(In billions of U.S. dollars)



Source: Bruno and Shin (2012a).
Note: The series' are normalized to 100 in March 2003.

between increasing international capital flows due to greater integration with world financial markets and vulnerability to sudden reversals in capital flows. For instance, Broto, Díaz-Cassou and Erce (2011) found that since 2000 global factors have become increasingly significant relative to country-specific drivers in determining the volatility of capital inflows into several MICs., whereas Dufrénot, Mignon, and Péguin-Feissolle (2011) found that stress indicators in U.S. financial markets in the aftermath of the subprime crisis caused abrupt changes in stock market volatility in several Latin American countries. Agosin and Huaita (2012) defined a sudden flood (or "capital boom," in their terminology) as an episode where (gross) capital inflows are larger than one standard deviation above the historical mean and represent at least five percentage points of GDP.[10] Sudden stops

[10] This is a rather stringent definition. IMF (2011a) for instance, a sudden flood (or capital inflow surge) is identified as a period when net inflows exceed the historical trend by one standard deviation and are larger than 1.5 percent of GDP only. In Balakrishnan et al. (2012), an episode of large net private capital flows is defined as a period of two or more quarters during which these flows (as a share of GDP) are larger (by one standard deviation) than their historical trend—taken to be an eight quarter moving average—or above the 75th percentile of their distribution over the whole sample.

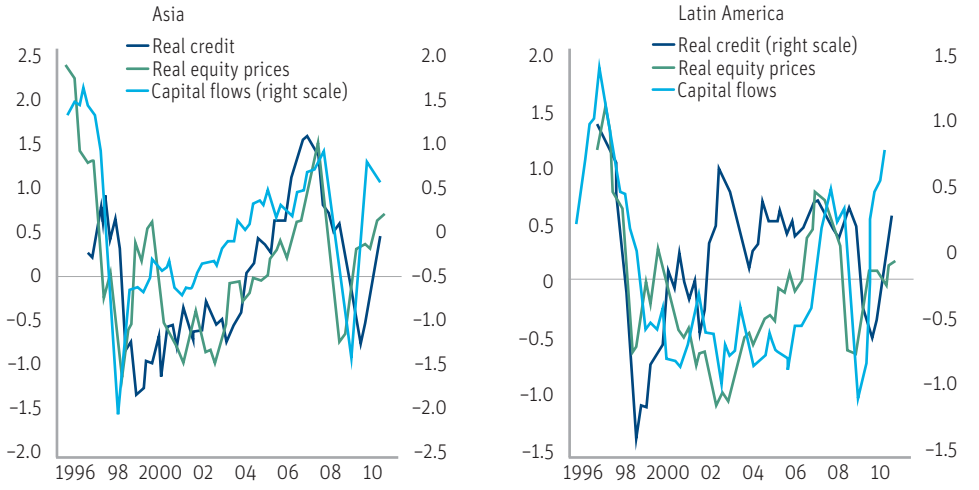
are defined in symmetric fashion. Using a sample of mostly MICs over the period 1976–2003, Agosin and Huaita found that sudden floods are good predictors of subsequent sudden stops. Moreover, the probability of a sudden stop increases dramatically the longer the preceding capital boom. Thus, sudden stops may not be due to a (current or expected) deterioration in domestic macro fundamentals, but rather could represent downward overreactions to previous periods of positive "overreaction" in capital flows.[11] Galindo, Izqueirdo, and Rojas-Suárez (2010), using a cross-country dataset covering 17 countries in Latin America between 1996 and 2008, found that financial integration, despite contributing to a deepening of domestic credit markets, amplifies the impact of international financial shocks on domestic aggregate credit and interest rate fluctuations.

What this evidence suggests is that the volatility associated with large capital inflows is the consequence of the rapid increases in liquidity, aggregate demand pressures, real exchange rate appreciation, and growing external imbalances that these flows generate. During the surge episode of the early to mid-1990s, for instance, this was particularly the case in the main recipient countries in Latin America (compared to those in Asia), as a result of various factors.[12] The deterioration in competitiveness weakened the credibility of the fixed exchange rate in some of these countries and raised doubts about their sustainability. The domestic liquidity expansion that resulted from these inflows may have been a factor behind the credit boom and the subsequent deterioration in banks' balance sheets that some of these countries experienced. The more recent surge in capital flows to MICs—caused in part by the post-crisis global excess liquidity generated by the expansionary monetary policies of advanced reserve currency-issuing countries—has also induced booms in credit and equity markets, real appreciation, and inflationary pressures in many of these countries and raised concerns about asset price bubbles and financial fragility. Some of these effects are illustrated in Table 1 and Figures 9 and 10. Between March 2009 and August 2011 for instance, Brazil, South Africa, and Colombia recorded real appreciations of 39, 29, and 24 percent, respectively. Figure 9 shows a relatively close link between capital inflows and the growth rates of real credit and equity

[11] A possible explanation for this effect is that large capital inflows bring about some adverse endogenous changes in macroeconomic fundamentals in some dimension (such as a deterioration of the current account deficit, an appreciation of the real exchange rate, an excessive rise in bank credit to the private sector, or a progressive mismatch in the balance sheets of firms and banks that borrow in foreign currency). These changes eventually trigger a massive withdrawal of capital. Put differently, booms create the seeds of their own destruction.

[12] See Fernandez-Arias and Montiel (1996). Chief among these factors was the greater reliance on pegged exchange rates in Latin America (which provide no "cushion" when residual inflation is high); the different composition of inflows (foreign direct investment flows accounted for a larger share of inflows to Asian countries); the allocation of these flows (with a more pronounced tendency to allocate flows to investment in Asia, as opposed to consumption in Latin America); and the better ability of Asian countries to sterilize and control the money supply. As it turned out, however, these differences did not prevent a costly financial crisis in East Asia.

FIGURE 9
Asia and Latin America: Capital Inflows, Real Credit, and Real Equity Prices, 1996–2010



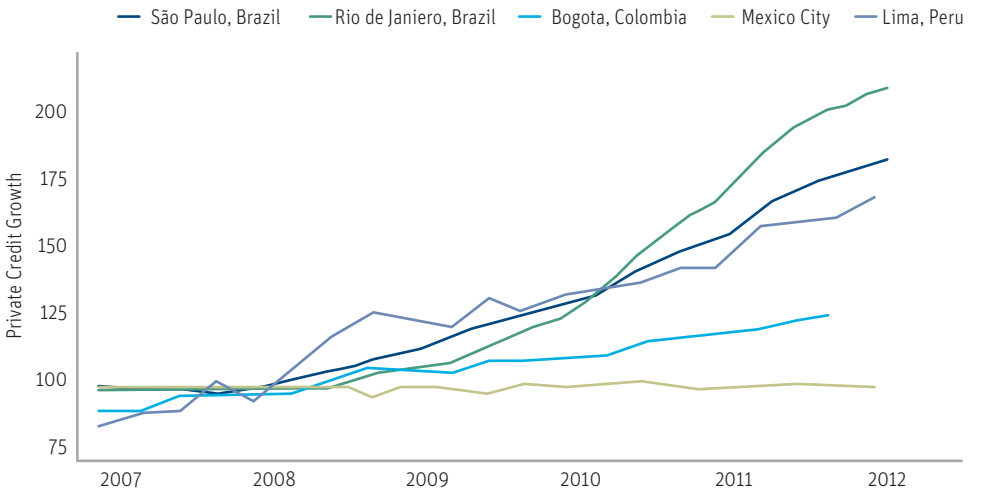
Source: International Monetary Fund, *Global Financial Stability Report* (April 2011).
Note: Portfolio and other investment are defined as a percentage of the size of financial markets. Real credit growth is year-on-year. Real equity prices are deviations from trend. All variables are transformed into a z-score (difference from average in terms of standard deviation). Asia includes India, Indonesia, Korea, Malaysia, and Thailand. Latin America includes Brazil, Chile, Colombia, Mexico, and Peru.

prices for a group of Asian and Latin American countries. Figure 10 shows that real property prices in some major cities in Latin American MICs have increased significantly since 2007. Balakrishnan et al. (2012) also provide evidence of sustained credit growth and pressures on property prices in Asian MICs during the recent inflow episode.

The evidence also suggests that the more open and integrated a country is to global financial markets, the deeper are the channels through which reversals in capital flows will impact both the real economy and the financial system—and the more critical the policy response becomes to ensure macroeconomic and financial stability. In addition, cross-border banking capital flows can be a potential source of instability, not so much because of their size but rather because they may amplify cyclical movements in domestic financial conditions and exacerbate domestic imbalances. Increased exposure to adverse shocks magnifies the possibility of default and the risk of bankruptcy by borrowers and lenders alike. The former tends also to foster collateralized lending.

[13] See Agénor and Montiel (2008b) for a review of the evidence on crises in MICs. The real cost of financial volatility is not necessarily limited to the risk of crises. As discussed by Bloom et al. (2012) for instance, firms may become more cautious in investing and hiring when financial uncertainty increases. Uncertainty may also hamper

FIGURE 10
Real Property Prices, Selected Latin American Cities, 2007–12
(January 2008 = 100)



Source: Bank for International Settlements, *Annual Report* (June 2012).
Note: Real house prices are defined as nominal prices deflated by national consumer price indices. Nominal prices are calculated on the basis of surveys conducted using posted property prices in newspapers.

Credit Booms, Capital Flows, and Financial Crises

Middle-income countries and developing countries in general have suffered many costly crises over the past decades, with large drops in output, persistent credit crunches, and sharp increases in unemployment and poverty.[13] Less extreme financial instability events also tend to be costly in terms of activity. Using an index related to banking, securities, and foreign exchange markets, Cardarelli, Elekdag, and Lall (2009) for instance found that when a slowdown or recession is preceded by financial stress, it typically is substantially more severe than during episodes that are not preceded by financial stress. In particular, slowdowns or recessions preceded by banking-related stress tend to involve two to three times greater cumulative output losses and tend to endure two to four times as long. In the same vein, Claessens, Kose, and Terrones (2011) found that recessions in MICs are longer and deeper when accompanied by financial disruptions—the average output decline in a recession rises from 5 percent if there is no concomitant credit crunch to 8.5 percent if there is one. Likewise, recessions associated with equity price

the economy's ability to reallocate resources following shocks. This, in turn, may have adverse effects on growth and employment.

busts result in a 6.8 percent decline in output, on average, versus a milder 3.3 percent fall in the absence of such busts. Other studies have found that recessions whose origin is the collapse of credit-fueled bubbles—periods during which banks make loans that appear to have abnormally low expected returns— also tend to be more severe and longer lasting than those generated by "normal" monetary policy contractions aimed at curbing inflationary pressures.

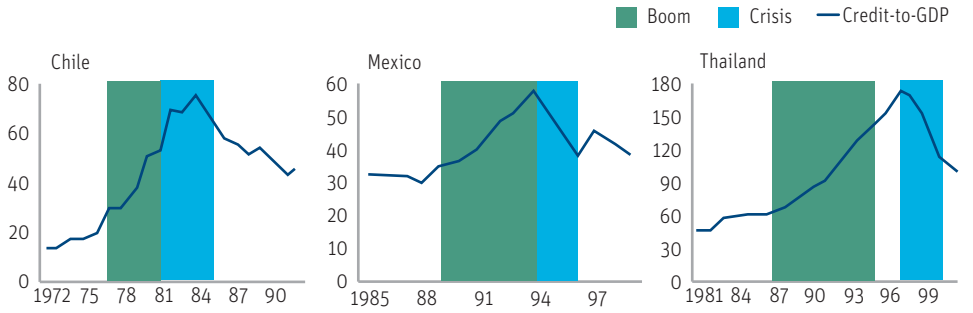
In addition, although credit and asset price cycles often exacerbate each other, several studies have found that credit growth is also a useful leading indicator of asset price busts. By contrast, there is no strong evidence that asset prices (in particular, equity prices) are good out-of-sample predictors (IMF (2009)). More generally, rapid credit growth—often associated with episodes of large capital inflows in MICs, as documented earlier—is often a warning sign of financial instability. Even though not all episodes of credit booms end up in crises, almost invariably crises are preceded by episodes of credit booms.

There is indeed robust evidence that credit booms significantly raise the likelihood of an asset price bust or a financial crisis in MICs. Mendoza and Terrones (2012) for instance, in a study of 61 developing and industrial countries over the 1960–2010 period, found a systematic relationship between credit booms and a boom-bust cycle in production and absorption, asset prices, real exchange rates, capital inflows, and external deficits. Banking crises, currency crises or sudden stops often follow credit booms, and they do so at similar frequencies in industrial and developing economies.[14] In the same vein, Dell'Ariccia et al. (2012) studying credit booms found that they are often triggered by financial reform, capital inflow surges associated with capital account liberalizations, and periods of strong economic growth; they tend also to be more frequent in fixed exchange rate regimes, when banking supervision is weak, and when macroeconomic policies are loose. In their sample, roughly half of the booms lasting longer than six years end up in a crisis. This is illustrated in Figure 11 for Mexico and Thailand, although not for Chile, where the 1981–84 crisis was preceded by a shorter period of credit expansion.

Financial variables other than credit growth have also been associated with financial crises. Based on a recent study by the International Monetary Fund, Figure 12 provides evidence on the behaviour of several of these variables. The nominal year-on-year rate of credit growth tends to be quite high in the periods leading up to a crisis. In addition, the change in the credit-to-GDP ratio also tends to be high before distress episodes. Both facts are consistent with other studies mentioned earlier. In addition,

[14] Mendoza and Terrones (2012) also found that credit booms often follow surges in capital inflows, gains in total factor productivity, and financial reforms, and are far more common with managed than flexible exchange rates.

FIGURE 11
Selected Middle-income Countries: Credit Booms and Financial Crisis



Source: Dell'Ariccia et al. (2012).

credit-to-deposit ratios (a measure of bank leverage) higher than 120 percent appear to be associated with financial crises within the next year. Foreign liabilities of the private sector also typically accelerate rapidly before a crisis, whereas external borrowing by banks and the nonbank private sector grows from around 10 to 25 percent in the run-up to a crisis. Following a crisis episode, these liabilities fall dramatically during the next 12 months. Finally, banks' foreign liabilities as a fraction of domestic deposits increase from about 32 to 38 percent two years before a crisis.

A more formal analysis of the impact of foreign liabilities on financial crises is provided by Ahrend, Goujard, and Schwellnus (2012), who found that the structure of a country's external liabilities, more than the overall level, is a key determinant of vulnerability to financial crises. Specifically, a bias in gross external liabilities toward debt (particularly short-term bank debt) raises crisis risk. The same holds in the presence of currency mismatch, that is, a situation where a country's foreign-currency denominated liabilities are large compared to its foreign-currency denominated assets.[15]

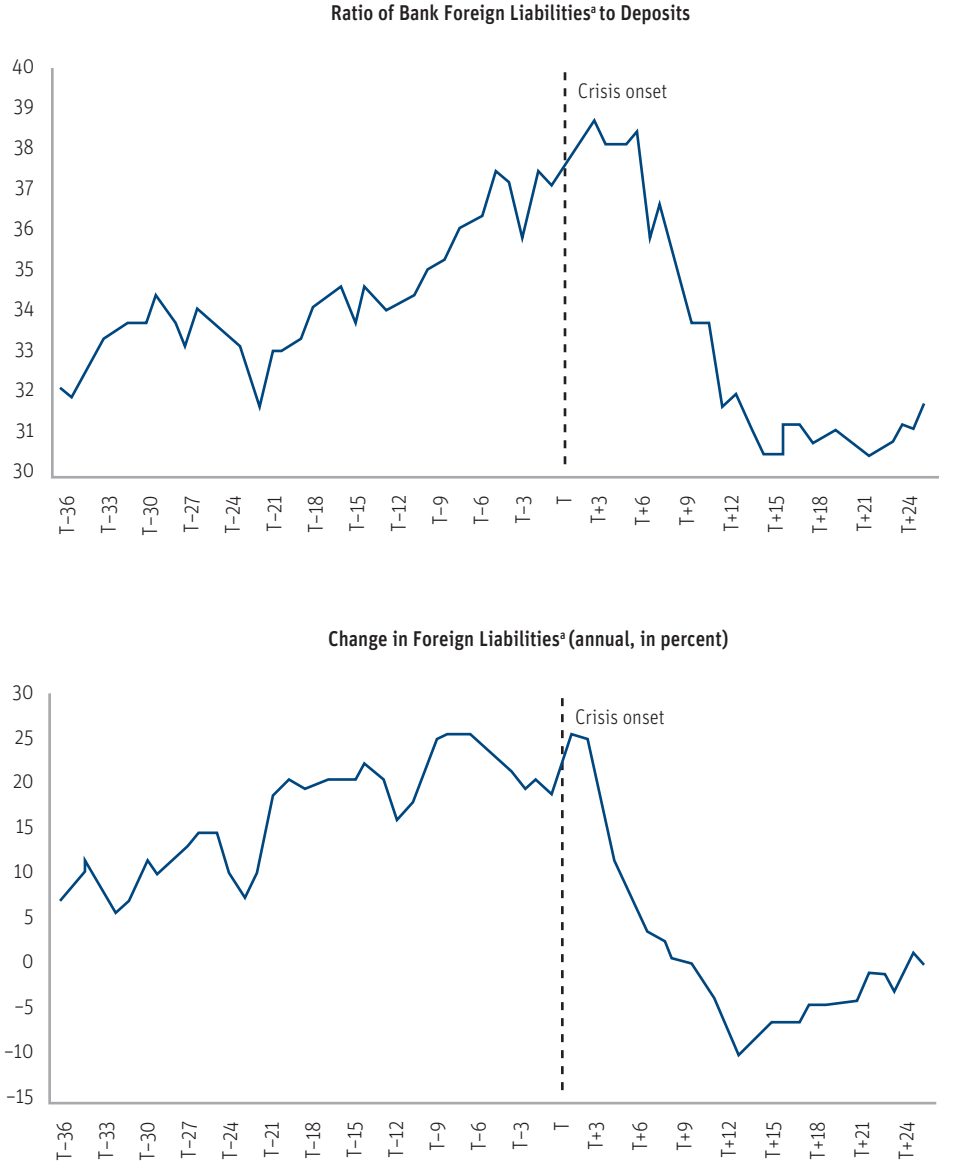
Another variable that has proved to be associated with financial crises is the real exchange rate. In an empirical study using data from 1973 to 2010 for both high- and middle-income economies, Gourinchas and Obstfeld (2012) found that the two factors that emerge consistently as the most robust and significant predictors of financial crises are a rapid increase in leverage and a sharp real appreciation of the currency.

[15] They also found no evidence that the share of overall short-term debt (maturity less than one year) in total external liabilities directly influences the risk of banking crises—a result that may reflect the fact that a substantial part of that debt takes the form of trade credit.

FIGURE 12
Financial Variables and Financial Crises

(*continued on next page*)

FIGURE 12
Financial Variables and Financial Crises (*continued*)



Source: IMF, *Global Financial Stability Report* (September 2011, Chapter 3, p. 11).
Note: *T* is month of crisis onset.
[a] *Foreign liabilities are measured in terms of bank and private sector loans, deposits, and currencies.*

Finally, it is worth noting that the recent evidence also stresses the role of credit booms as determinants of financial crises in industrial countries as well. Reinhart and Rogoff (2008) for instance found that systemic banking crises are typically preceded by asset price bubbles, large capital inflows and credit booms, in rich and poor countries alike. Schularick and Taylor (2012) provide evidence for 14 industrial countries for the period 1870–2008 showing that lagged credit growth turns out to be highly significant as a predictor of financial crises, but the addition of other variables adds very little explanatory power. At the same time, however, it is also possible that the link between credit growth and financial crises is weaker in countries with more developed financial markets.[16]

The key point that can be drawn from the foregoing discussion is that although the exact trigger of financial crises in MICs can be almost any event (including political turmoil, a real estate crash, a sharp decline in the terms of trade, or contagion from other economies), making it hard to predict their exact timing, such crises are often preceded by sustained imbalances—especially high rates of credit growth. Thus, measures that can help prevent these imbalances from emerging or developing and minimize the chances of a crisis occurring may have large welfare benefits. While the recent crisis made it painfully clear that this is equally true for middle- and high-income countries, MICs need to be particularly careful when assessing the risks faced by their financial systems. They also need to ensure that their prudential rules and regulations serve their purpose and are adjusted in a timely fashion. This may be one of the key lessons to be drawn from the Brazilian regulatory framework, as described earlier in Box 1.

[16] Gerdesmeier, Reimers, and Roffia (2010) found that credit aggregates also play a significant role in predicting asset price busts in industrial countries. However, Assenmacher-Wesche and Gerlach (2010) found that for these countries deviations of credit and asset prices from trend (viewed as measures of financial imbalances) contain little useful information for forecasting future economic conditions. This is consistent with the view that the link between credit growth and financial instability is weaker in countries with deep financial markets.

Main Features of Inflation Targeting

The adoption of IT—or, in Svensson's (1997, 2010a) words, inflation *forecast* targeting—is usually viewed as a shift away from discretionary monetary policy to an explicit commitment to price stability as a long-run goal, and motivated by the need to provide an anchor for inflation expectations and make the central bank more transparent and accountable.[17] Indeed, IT is generally characterized by a) a public announcement of targets (in the form of either single points or bands, symmetric or asymmetric) for inflation to be reached in the medium term; b) an explicit policy decision framework to achieve the stated objectives; and c) a high degree of transparency concerning the course of action planned by the central bank.[18]

Because of the existence of a control lag (between the change in the central bank policy rate and its impact on inflation) and a reaction function that relates the policy instrument to an inflation forecast, the credibility of an IT regime depends not on achieving a publicly observable, intermediate target that is viewed as a leading indicator of future inflation (as is the case under monetary or exchange rate targeting), but rather on the credibility of a *promise* to reach the inflation target in the future. This in

[17] See Agénor (2002) and Eichengreen (2004), and the references therein, for a detailed discussion of the process leading to the adoption of IT in MICs.

[18] A possible alternative to IT is price-level path targeting (PT). Both IT and PT can allow for a positive inflation rate in the long run. The crucial distinction between the two regimes is how the central bank reacts to unexpected changes in inflation. Under IT, the central bank acts to bring inflation back to its target rate. It treats the effect of the inflation shock on the price level as a bygone. This means that a temporary shock to the inflation rate has a permanent effect on the price level. Under PT, the central bank acts to return the price level to its original targeted growth path. See Ambler (2009) for a review of the academic literature that examines the costs and benefits of PT compared to IT. In practice, as of yet no country has used price-level targeting.

turn depends on whether the public believes that the central bank will stick resolutely to the objective of price stability, as summarized by the medium-term inflation target. Credibility and reputation of the monetary authorities therefore play a crucial role in dampening inflation expectations under IT. At the same time, because performance can only be observed *ex post*, the need for transparency and accountability becomes more acute under this regime, in order to help the public assess the stance of monetary policy and determine whether deviations from target are due to unpredictable shocks rather than to policy mistakes. Thus, in order for IT to be a credible commitment, the public must be informed of (and understand) the policy actions the central bank plans to take and must believe that these actions are consistent with the stated medium-term goals. As a result, transparency may reduce the volatility of inflation expectations. At the same time, transparency improves the incentive of the central bank to pursue the publicly announced long-term goals, making the stated commitment more credible (Faust and Svensson (2001)).

At the outset, central banks recognized that demand and supply shocks would create different challenges for them under flexible IT. Demand shocks tend to affect output and prices in the same direction and create no trade-off for monetary policy; a positive demand shock, for instance, calls for an increase in interest rates to mitigate the increase in activity and dampen inflationary pressures. By contrast, a supply shock creates trade-offs between stabilizing output and inflation. Consider for instance an increase in the price of imported intermediate goods (oil); this tends to reduce output, as the demand for oil falls, and to increase prices, as producers tend to raise the price of final goods to offset the increase in production costs. Suppose then that the increase in prices is such that it causes inflation to rise above target. How quickly then should the central bank aim to bring inflation back to target? There are two conflicting considerations. On the one hand, the quicker the disinflation, the shorter the period during which inflation is above target; on the other, the quicker the disinflation, the greater the potential fluctuations in output. The optimal length of the target horizon depends therefore in a fundamental way on policy preferences. The greater the relative importance attached to output stabilization relative to inflation stabilization, the longer the optimal length. At the same time, however, a longer targeting horizon may hamper the credibility of monetary policy, because agents may infer that the central bank's willingness to tolerate higher inflation has increased. Put differently, the trade-off between the cost of having inflation above target (which is reduced if disinflation is faster) and the cost of output fluctuations (which is increased if disinflation is faster) translates into a trade-off between credibility and flexibility, which can be partially resolved by altering the speed at which the central bank responds to shocks. This trade-off arises, fundamentally, because to reduce inflation the central bank must induce a (temporary) reduction in output.

At the same time, policy-makers also recognized that the extent and duration of the reduction in output depend themselves on the credibility of the commitment to the inflation target. The more credible the commitment becomes, the faster inflation expectations will fall, and the lower will be the output cost of reducing inflation—an important consideration for an economy with a history of high inflation. By providing a firm anchor to inflation expectations, a credible stance against inflation helps to mitigate the impact of inflationary shocks, preventing one-off shocks to the price level from transforming into sustained inflation. A credible IT regime may also affect the structure of the economy (the wage and price setting mechanism), thus further reducing expectations of future inflation. Conversely, a non-credible policy regime is likely to translate into higher inflation, without, in the end, achieving systematically higher output and employment.[19] High inflation may also be harmful for growth in the longer run.[20] Thus, in the face of particular shocks, limiting flexibility may be important to reduce the severity of the credibility problem—especially in countries where, to begin with, the degree of confidence in the central bank's commitment to low inflation is not well established.

The next section will examine the extent to which the goals of improved credibility, including lower inflation expectations and reduced inflation persistence, have been achieved under the IT regimes implemented by MICs over the past two decades.

[19] The classic reference on the "inflationary bias" of monetary policy is Barro and Gordon (1983). But importantly, Clarida, Galí, and Gertler (1999) showed that there is a gain from credibility even in the absence of an inflationary bias. The reason is that when agents are forward-looking, the level of current variables depends not only on the current policy but on the level of the policy instrument expected at future dates.

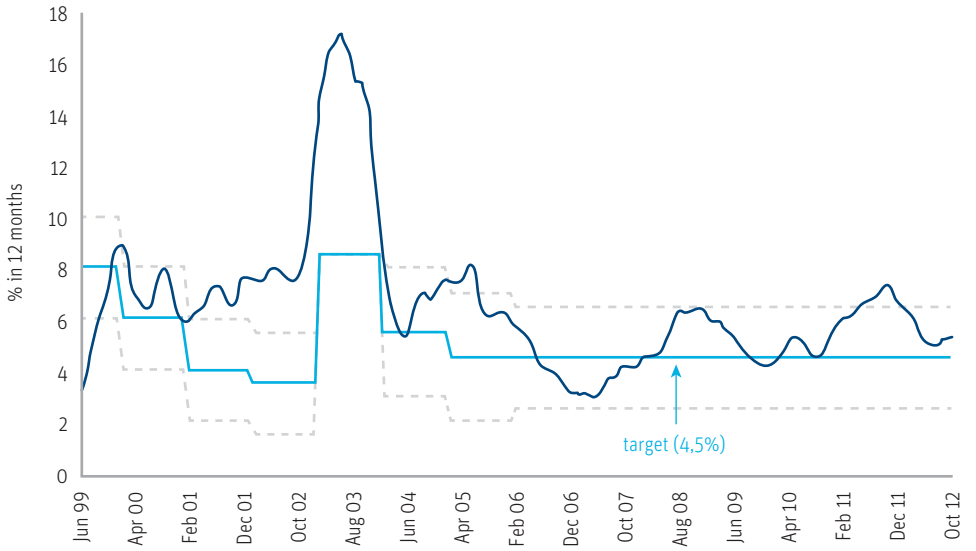
[20] Kremer, Bick, and Nautz (2011) found that for developing countries inflation rates exceeding 17 percent are associated with lower economic growth. However, below this threshold, the correlation is not significant.

Performance of Inflation-Targeting Regimes

A simple way to assess the performance of IT regimes in MICs is to compare inflation targets and inflation outcomes since the inception of these regimes. For instance, Figures 13 and 14 for Brazil, and Figure 15 for Turkey, suggest that since IT was adopted (June 1999 for Brazil and January 2006 for Turkey) there have been periods where the gap between actual inflation and the target value have been limited (well within the band for Brazil), but at other times there have been substantial deviations. In addition, even though inflation expectations have been less volatile than actual inflation (especially at a two-year horizon, for Turkey), there are periods when large increases in inflation, especially in the aftermath of the confidence crisis in Brazil in late 2002, were followed by significant jumps in expected inflation—an indication perhaps that, when positive shocks to inflation are large, they have an adverse effect on central bank credibility and tend to impart more "memory" to inflation expectations.

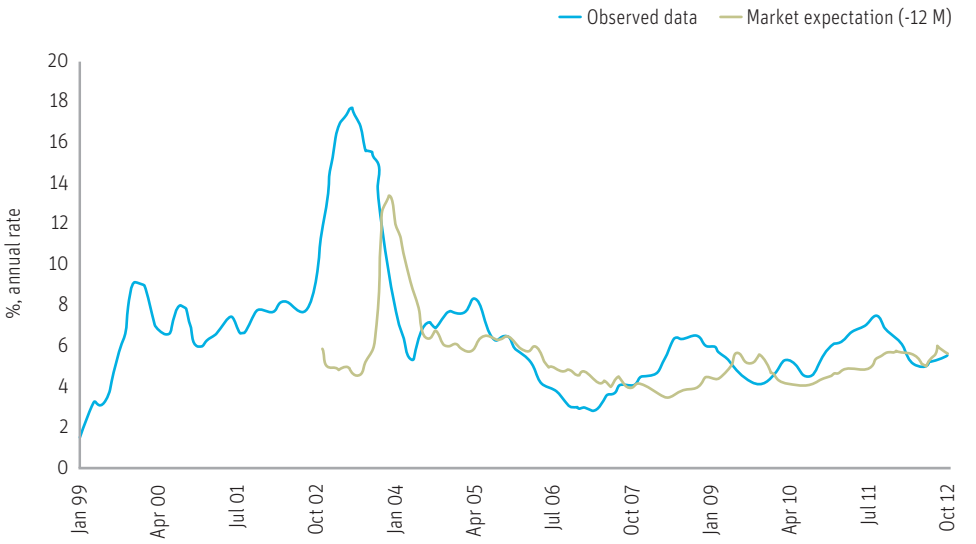
However, simple comparisons of this sort, at the level of individual countries, may be incomplete, to the extent that they do not control for various factors. For instance, a reduction in the volatility of inflation expectations (as indicated for instance in Figure 16 for Brazil from 2002–05) may reflect not necessarily improved credibility of monetary policy, but rather a more stable fiscal environment that has led to reduced risk premia over time. Conversely, the increase in volatility shown in Figure 17 for Turkey since early 2010 may have resulted from a weakening of the fiscal outlook. In both cases, the fact that volatility does not seem to converge to zero may reflect a lack of monetary policy credibility—for instance because markets understand that at times the central bank also has a high preference for minimizing fluctuations in the real exchange rate or output, as discussed later, concerns about the medium-term fiscal position, or simply intrinsic heterogeneity in the formation of expectations. In addition, it is also important

FIGURE 13
Brazil: Actual Inflation and Inflation Targets, 1999–2012
(Annual, in percent)



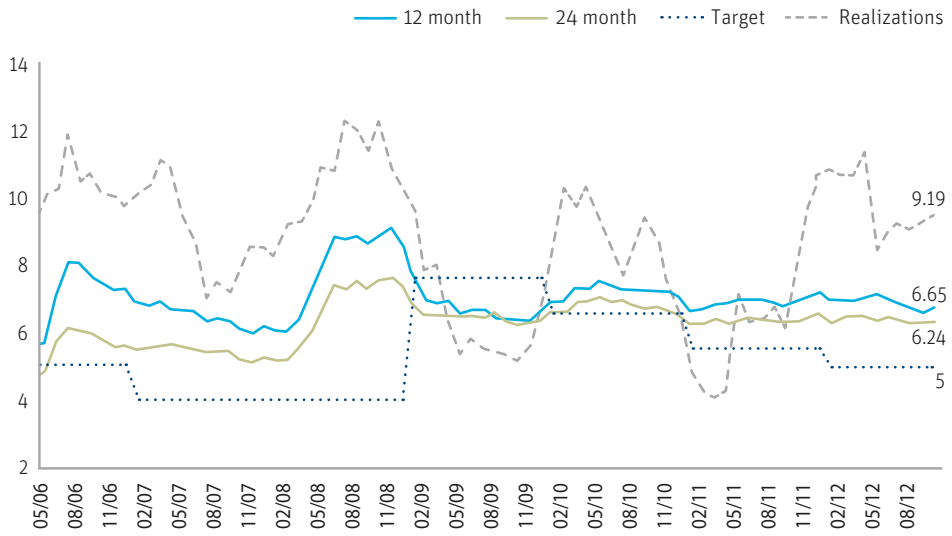
Source: Banco Central do Brasil.

FIGURE 14
Brazil: Actual and Expected Inflation, 1999–2012
(Annual, in percent)



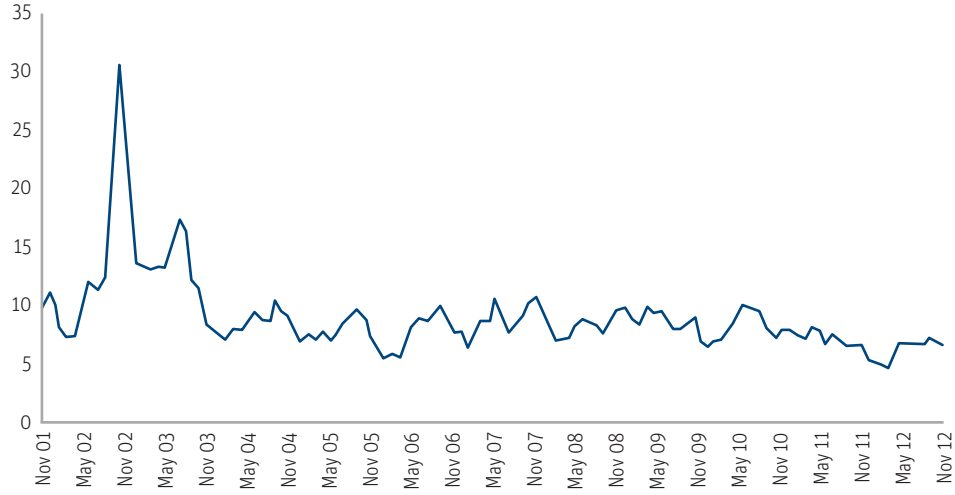
Source: Banco Central do Brasil.
Note: Expected inflation is the 12-month forward expectation compiled by the Banco Central do Brasil. Based on market date.

FIGURE 15
Turkey: Inflation Expectations and Actual Inflation, 2006–12
(In percent)



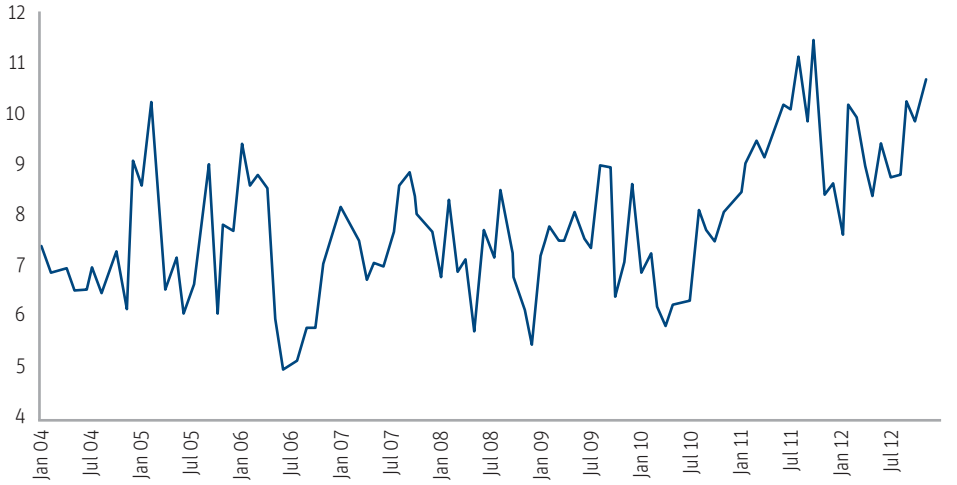
Source: Central Bank of the Republic of Turkey.
Note: Expectations are obtained from the Central Bank of the Republic of Turkey's Survey of Expectations, available at http://www.tcmb.gov.tr/ikt-yonelim/beklenti/beklentiengyeni.html.

FIGURE 16
Brazil: Dispersion of Inflation Expectations, 2001–2012
(Coefficient of variation)



Source: Banco Central do Brasil.

FIGURE 17
Turkey: Dispersion of Inflation Expectations, 2004–12
(Coefficient of variation)



Source: Central Bank of the Republic of Turkey
Note: Inflation expectations are based on a sample of market participants, with a typical response rate of 60 to 70 percent. Expectations are obtained from the Central Bank of the Republic of Turkey's Survey of Expectations, available at http://www.tcmb.gov.tr/ikt-yonelim/beklenti/beklentiengyeni.html.

to assess *relative* performance, and this is often best done in a multi-country context where larger sample sizes are available and a control group can be more easily defined. Addressing these issues requires the use of formal empirical methods.

The next section therefore turns to a more formal review of the evidence on the performance of IT regimes in MICs. In general, empirical research on the performance of these regimes has followed two main methodological approaches, both of which involve a before-after comparison. The first has focused on macroeconomic outcomes (including inflation expectations) and the second on changes in central bank behavior. These two types of evidence are examined and assessed in turn.

Macroeconomic Outcomes

The first approach to assessing the performance of IT regimes focuses on macroeconomic outcomes following the adoption of these regimes, compared to non-IT countries. In that context, the debate has focused mainly on whether the adoption of IT has contributed to substantial declines in average inflation, lower inflation volatility, and general macroeconomic stability, compared to those countries that have maintained a different

monetary policy regime. A key issue in that context is the extent to which, as noted earlier, increased credibility of the monetary policy commitment to low and stable inflation translates into reduced volatility of inflation expectations. Some recent studies have also discussed the implications of IT for fiscal discipline.

Box 3 summarizes some recent empirical studies focusing on outcomes. By and large, they suggest that IT regimes in MICs have been fairly successful—even more so in many regards than in industrial countries. Except for periods of severe external shocks, IT countries were successful in meeting their targets, and the output sacrifice ratio (the percentage fall in output resulting from a one percentage point reduction in inflation) was lower after the adoption of IT in these countries compared with other groups. Indeed, the level of expected inflation fell in many IT MICs (relative to the control group), and both the variability of expected inflation and the average absolute forecast error (controlling for the level and variability of past inflation) fell significantly. Inflation persistence also declined in IT countries—a result that is consistent with the view that IT has played a role in strengthening the effect of forward-looking expectations on inflation, hence weakening the degree of inflation inertia. The reduction in volatility and the degree of persistence of inflation expectations also suggests that IT has been associated with improved credibility of monetary policy. In addition, there does not appear to be any significant reduction in output growth rates when IT is implemented. However, there appears to be no consensus across studies on whether IT has contributed to a reduction in output volatility.

There is also limited evidence that IT may be associated with reduced fiscal imbalances— possibly because lower inflation expectations tend to reduce interest rates and weaken the adverse effects of debt service on the budget, or because IT has been associated with greater fiscal discipline—and a lower pass-through effect. However, the evidence on these two issues (especially the first) is less conclusive. In addition, even though the pass-through effect may have weakened, in many MICs it continues to play a central role in the monetary transmission mechanism.[1]

Central Bank Policy Reaction Function

The second empirical approach to evaluate IT regimes has focused on central bank behavior under IT and non-IT regimes. The key issue in that context has been the extent to which the adoption of IT has changed in a substantive way central bank behavior, and in

[1] See Minella and Souza-Sobrinho (2013) for evidence on the importance of the exchange rate channel for inflation dynamics in Brazil. In a broader study on Latin America, Ghosh (2013) documented the decline in the pass-through effect over recent decades and the effect of lagged inflation and trade openness on its magnitude.

Box 3. Recent Evidence on the Performance of IT Regimes in Middle-Income Countries

Empirical studies on IT performance have generally followed one of two approaches. The first measures the effects of IT on the level of inflation, inflation volatility, and other macroeconomic variables. The second focuses on characterizing central bank operating procedures, attempting to distinguish between policy functions of IT countries and countries not targeting inflation. Studies in the first strand of the empirical literature employ both individual country time series and multi-country panel methods, while the second strand of literature is almost exclusively focused on individual country time series.

Studies following the "outcomes" discussed in the text include Edwards (2007), Siregar and Goo (2010), Gonçalves and Salles (2008), Lin and Ye (2009), Schmidt-Hebbel (2009), Aleem and Lahiani (2010), Prasertnukul, Kim, and Kakinaka (2010), Pontines (2011), Broto (2011), Mollick, Cabral, and Carneiro (2011), Ferreira de Mendonça and de Guimarães e Souza (2012), Abo-Zaid and Tuzemen (2012), Maertens et al. (2012), Yamada (2013), and Hartmann and Roestel (2013). These studies have focused on the level and volatility of inflation, the mean and volatility of output, the volatility of exchange rates, the magnitude of the exchange rate pass-through, and the size of fiscal imbalances.

Gonçalves and Salles (2008) used data for 36 developing countries (of which 13 target inflation) from 1980–2005 and found that IT countries experienced greater drops in inflation and volatility of GDP growth rates. Their results suggest that IT may have more significant effects on the macroeconomic performances of developing countries than developed ones, simply because the latter do not suffer from severe inflation to begin with.

Lin and Ye (2009) and Ferreira de Mendonça and de Guimarães e Souza (2012) found that, on average, IT has large and significant effects on lowering inflation in developing countries. However in these studies the group that was compared to IT countries includes countries with various types of exchange rate regimes, ignoring for the most part past literature on the relationship between the exchange rate regime and the inflation.

Using a sample of 22 industrial and 52 developing countries over the period from 1985–2005, Pontines (2011) found that developing countries that target inflation have lower nominal and real exchange rate volatility than non-IT developing countries, whereas the opposite holds for industrial countries. Siregar and Goo (2010) found that in Indonesia and Thailand the adoption of IT was associated with a subsequent decline in pass-through. Similar results were found by Edwards (2007) for several MICs and Aleem and Lahiani (2010) for a group of six East Asian and Latin American MICs, in the latter case using a VARX methodology. For Brazil, for instance, they estimate that the pass-through coefficient fell from 0.24 prior to the adoption of IT to 0.14 following adoption. Using a simulation approach, Maertens et al. (2012) found that the adoption of IT reduced the pass-through effect in Peru. Similar results were obtained for South Korea and Thailand by Prasertnukul, Kim, and Kakinaka (2010). In both countries, as well as in Indonesia and the Philippines, exchange rate volatility also declined after the adoption of IT.

Broto (2011) studied the performance of inflation in five IT countries (Brazil, Chile, Colombia, Mexico and Peru) and three non-IT countries (Argentina, Ecuador and Uruguay) in Latin America. She found that the adoption of IT helped reduce the level of inflation and inflation volatility in Chile, Colombia, Mexico and Peru, although the results are not as conclusive for Brazil. Nevertheless, she also identified a reduction in volatility persistence of inflation in Brazil after IT adoption. IT adoption also reduced the persistence of inflation uncertainty in all countries but in Colombia, where the evidence is not conclu-

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Box 3. (*continued*)

sive. Gerlach and Tillmann (2012) also found that inflation persistence fell significantly following the adoption of inflation targeting in several Asian IT-MICs (Indonesia, Korea, the Philippines and Thailand).

Using a sample of 180 countries for the period from 1990–2007, Ferreira de Mendonça and de Guimarães e Souza (2012) found that the adoption of IT led to reduced inflation levels and volatility in developing countries, whereas the results are more mitigated for industrial countries. They conclude from their empirical results that the adoption of IT is useful for countries that must enhance their credibility for the management of monetary policy.

Abo-Zaid and Tuzemen (2012), using cross-country data for developed and developing countries over the period from 1980–2007, found that IT developing countries were able to achieve lower and more stable inflation rates, as well as higher and more stable GDP growth.[a] They also found evidence that IT improved fiscal discipline. Mollick, Cabral, and Carneiro (2011) also found evidence of level effects of IT on output growth, but these results are weaker.

Yamada (2013) found that in most cases IT combined with flexible exchange rates delivered lower inflation in developing countries than alternative exchange rate regimes over the period from 2000–07. In other cases, it does at least as well as a fixed regime in terms of maintaining inflation rates. However, the results are partly dependent on the classification used for exchange rate arrangements.

Using a sample of 34 developed and developing economies over the period from 1990–2010, Hartmann and Roestel (2013) found that both inflation and inflation uncertainty significantly reduce output growth. Economies with low inflation rates are particularly at risk to incur output losses from increasing inflation. Thus, to the extent that IT contributes to reducing inflation and its variability, it may have a sizable effect on output growth and output stability. However, the extent to which the IT regime itself contributed to these results is not clear; there is no "before-after" distinction in the sample and there is no breakdown between IT and non-IT countries.

Some studies have focused on the impact of IT on inflation expectations. The premise here is that although heterogeneous inflation expectations may lead to long memory in actual inflation, successful IT should decrease this persistence by guiding the public's expectations toward the announced target (Yigit 2010). At the individual country level, these studies include Cerisola and Gelos (2009), Nahon and Meurer (2009), Ferreira de Mendonça and de Siqueira Galveas (2013), and Montes (2013) for Brazil. Cerisola and Gelos (2009) examined the macroeconomic determinants of survey inflation expectations in Brazil since the adoption of IT in 1999. They found that the IT framework has helped to anchor expectations, with the dispersion of inflation expectations declining considerably. They also found that apart from the inflation target, the stance of fiscal policy, as proxied by the ratio of the consolidated primary surplus to GDP, had a strong impact on inflation expectations. The importance of past inflation in determining expectations appears to be relatively low—at least during the period under study—and the overall empirical evidence does not suggest the presence of substantial inertia in the inflation process. Nahon and Meurer (2009) identified the relationship between five credibility indexes of the Brazilian Central Bank monetary policy, the changes in the interest rate and the possibility that credibility reduces the costs of disinflation under IT. These credibility measures are calculated using survey data on expected inflation and the official inflation target. Using monthly data from January 2000 to December 2005, they found that the policy interest rate Granger causes the credibility indexes, and that there is a reduction in disinflation cost. A related result is obtained by Montes (2013), who found that improved credibility of the inflation target tends to reduce the variability of interest rates. In the same vein, Ferreira de

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Box 3. (*continued*)

Mendonça and de Siqueira Galveas (2013) found that transparency has helped to reduce the volatility of inflation expectations in Brazil since the adoption of the IT regime in 1999.

Capistrán and Ramos-Francia (2010) provide a cross-country study of the impact of IT on inflation expectations. They found that the dispersion of long-run inflation expectations is smaller in IT countries, especially so for developing countries.

Studies following the second approach discussed in the text (changes in central bank operating behavior) include Mohanty and Klau (2004), Civcir and Akcaglayan (2010), Teles and Zaidan (2010), Aizenman, Hutchison, and Noy (2011), de Mello and Moccero (2011), Fendel, Frenkel, and Rülke (2011), and Bleich, Fendel, and Rülke (2012).

Mohanty and Klau (2004) estimated modified Taylor rules for 13 countries. In addition to inflation and the output gap, the rules included lagged interest rates and current and lagged real exchange rate changes. They found that the coefficients on real exchange rate changes are statistically significant in 10 countries, with the significant contemporaneous effect ranging from 0.33 (Brazil) to 0.35 (Chile). The policy response to exchange rate changes is frequently larger than the response to inflation and the output gap. They conclude that this supports the "fear of floating" hypothesis (as discussed in the text). Mohanty and Klau do not directly address the issue of performance of IT, but their results for the MICs in their sample suggest that these countries, whether or not they profess to follow an IT regime, attempt to stabilize real exchange rates as well as control inflation and stabilize output.

de Mello and Moccero (2011) estimate interest rate policy rules for Brazil, Chile, Colombia, and Mexico—all characterized by IT and floating exchange rates in 1999. They estimated an interest rate policy function in the context of a New Keynesian structural model with equations for inflation, output, and interest rates. They found that IT was associated with stronger and persistent responses to expected inflation in Brazil and Chile. Mexico is the only country for which they found that changes in nominal exchange rates are statistically significant in the central bank's reaction function during the IT period.

Civcir and Akcaglayan (2010) used a generalized reaction function for the Central Bank of Turkey and argued that credible IT, by anchoring more firmly inflation expectations, helped to dampen the exchange rate pass-through into inflation.

Teles and Zaidan (2010) provided indirect evidence on the anchoring effect of IT. They evaluate the validity of the Taylor principle for inflation control in several MICs that use IT regimes (Brazil, Chile, Colombia, Mexico, Peru, the Philippines, South Africa, Thailand and Turkey). The Taylor principle requires that the nominal policy rate increase sufficiently to ensure that the real interest rate (which affects aggregate demand) increases as well following a positive shock to inflation. In simple New Keynesian models, it is a necessary condition to ensure macroeconomic stability (Clarida, Galí, and Gertler (1999)). The results showed that compliance with the Taylor principle leads to the stationarity of the deviation of the expected inflation from its target in all cases. Furthermore, in most cases, non-compliance with the Taylor principle leads to nonstationary deviation of expected inflation.

Aizenman, Hutchison, and Noy (2011) focused on two factors that they deem critical to the conduct and control of monetary policy in a MIC context: large movements in the real exchange rate and the degree of concentration in commodity exports. Specifically, they focus on the role of the real exchange rate in the policy rule and how this is affected by the countries' exposure to commodity-intensive production (and, hence, terms-of-trade shocks). They argued that the distinction between heavily concentrated commodity-exporting countries and non-concentrated countries is potentially important in how inflation targeters work in practice. This difference accounts for different vulnerability to terms-of-trade

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Box 3. (*continued*)

shocks (see the discussion in the text). Using panel data, they found that (in line with their theoretical model) external variables play a very important role in the policy rule that IT-MICs follow—they tend to systematically respond to the real exchange rate. Moreover, within that group of countries, those with particularly high concentration in commodity exports change interest rates much more pro-actively in response to real exchange rate changes than does the noncommodity-intensive group.

Using data for 20 IT countries (7 of which MICs) over the period 1990–2007, Bleich, Fendel, and Rülke (2012) provide strong evidence that the introduction of IT has changed the behavior of monetary policy authorities. Once a country formally introduces IT, the inflation coefficient in its monetary policy reaction function increases significantly to values above unity for the majority of IT countries, 11 of 20, and 5 of the MICs (Brazil, Colombia, Mexico, South Africa, and Turkey, but not for Chile and Peru). This feature reflects again the Taylor principle. However, Bleich, Fendel, and Rülke are silent on whether central banks indeed successfully stabilized inflation, or as to whether IT countries have done better than other countries.

[a] Rightly, the authors do not include the data for 2008–10 in their sample, given that the global financial crisis may bias the results.

particular responses to inflation and output gaps, but also, in some cases, with respect to exchange rates or asset prices. In most cases, the methodology has involved estimating simple and augmented Taylor-type rules.

A number of recent empirical studies are also summarized in Box 3. By and large, the evidence on policy reaction functions suggests that IT central banks in many MICs have become more responsive to deviations in actual inflation from target—improving, in so doing, prospects for macroeconomic stability. From that perspective, the fact some studies found a positive effect of asset prices and/or exchange rates in Taylor rules, does not necessarily reflect a deliberate attempt to target asset prices or the exchange rate, but rather an indirect response to the impact that these variables have on aggregate demand.

An Assessment

The foregoing discussion suggests that, regardless of the methodology used, most recent studies reach similar conclusions; the adoption of an IT regime in MICs has led to lower average inflation rates and reduced inflation volatility compared to a control group of non-IT countries, and possibly to a lower exchange rate pass-through. Operating procedures of IT central banks have also become more responsive to inflation gaps. Although in achieving these outcomes most MICs benefited from the period of "Great Moderation" in world inflation, as well as from deep structural reforms, the IT regime may have led

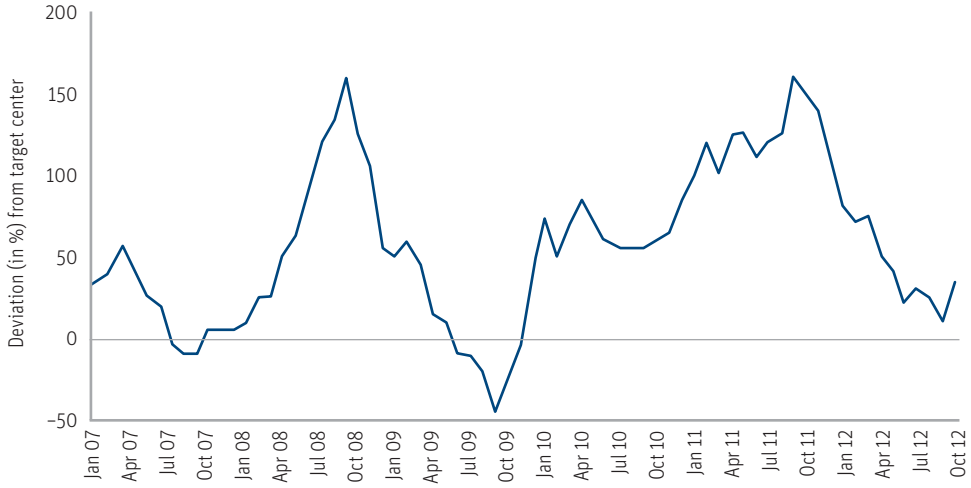
to important institutional changes in the conduct of macroeconomic policy. At the same time, however, even though the volatility and persistence of inflation expectations have fallen over time, and often substantially, credibility has remained "work in progress" in many countries. A possible reason for that, as discussed in more detail later, is the fact that central banks may confuse markets at times by signaling a strong preference for output or real exchange rate stability. As a result, credibility is lost quickly, and restoring it takes time.

Two issues have not been addressed in the existing literature. First, the econometric studies discussed in Box 3 do not capture the fact that not only the *magnitude* but also the *duration* of deviations from inflation targets may matter in terms of their impact on inflation expectations— possibly in a nonlinear fashion. Particularly large (positive) and persistent deviations from targets may have a more significant cost in terms of central bank credibility, imparting as a result greater inertia to inflation expectations than smaller deviations.[2] The stronger the central bank's perceived preference for output—a key parameter affecting the target horizon, that is, the speed at which actual inflation should be brought back to its target value—the larger the gap will be expected to persist, and the lower will be the credibility of the inflation target. In addition, these effects may be *asymmetric*—large "undershooting" of the inflation target does not translate into increases in credibility. As can be inferred from Figures 18 and 19, deviations from the inflation target have been common in both MICs and high-income economies, especially in the run-up to the global financial crisis (2006–2007) and in the immediate post-Lehman recovery, during the first phases of the implementation of unconventional monetary policies in high-income economies. At the same time, it is also quite remarkable that one of the largest "overshooting" from IT targets occurred in a high-income economy with a long tradition of IT, the United Kingdom (Figure 18)—, without apparently raising credibility issues. In MICs this is unlikely to be the case.

Second, as also noted earlier, since the onset of the financial crisis there have been renewed concerns about financial instability and the possibility that a monetary policy regime geared at achieving low inflation may exacerbate these risks. Yet, to this day there has been no comparative empirical study of the consequences of IT policies for financial stability (or proxies for that, such as credit growth). These and other challenges to IT are discussed next.

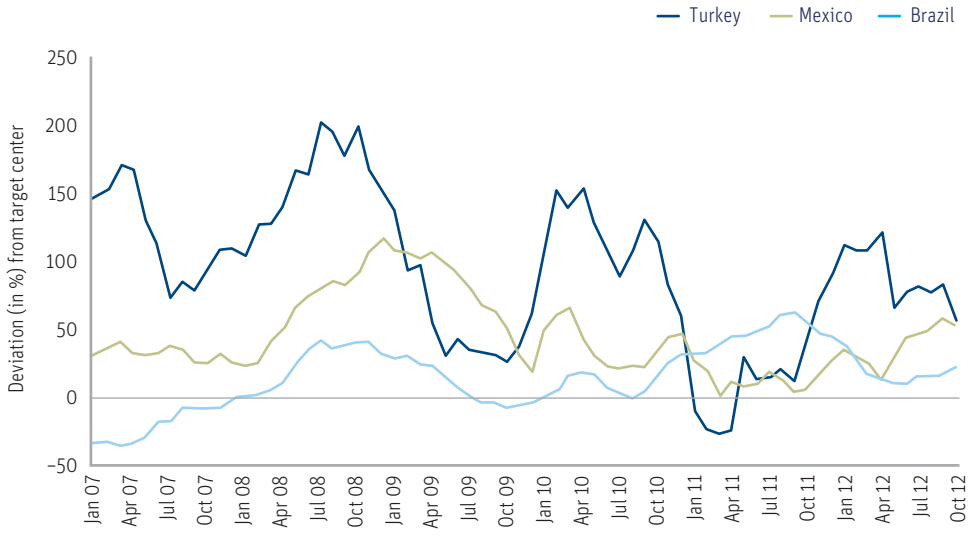
[2] Formally, let π^* denote the inflation target, $\pi(t)$ actual inflation today, and $\pi^e(t+1)$ the expected inflation rate one year ahead; imperfect credibility can be captured by assuming that the expected inflation is a weighted average of actual inflation and the inflation target, that is, $\pi^e(t+1) = \theta(t)\pi^* + [1 - \theta(t)]\pi(t)$, with the weight $\theta(t) \in (0,1)$ being a credibility index. The point here is that $\theta(t)$ is a function not only of the gap between the target and actual inflation, $\pi^* - \pi(t)$, as conventionally assumed in empirical studies (see for instance Nahon and Meurer (2009) and Montes (2013)), but also of *how long* that gap is expected to persist. Schwartsman (2012) makes a related point.

FIGURE 18
United Kingdom: Deviations from Inflation Target, 2007–12
(In percent from target center)



Source: Banco Central do Brasil.

FIGURE 19
Deviations from Inflation Target, Selected Middle-income Countries, 2007–12
(In percent from target center)



Source: Banco Central do Brasil.

Challenges for Inflation Targeting

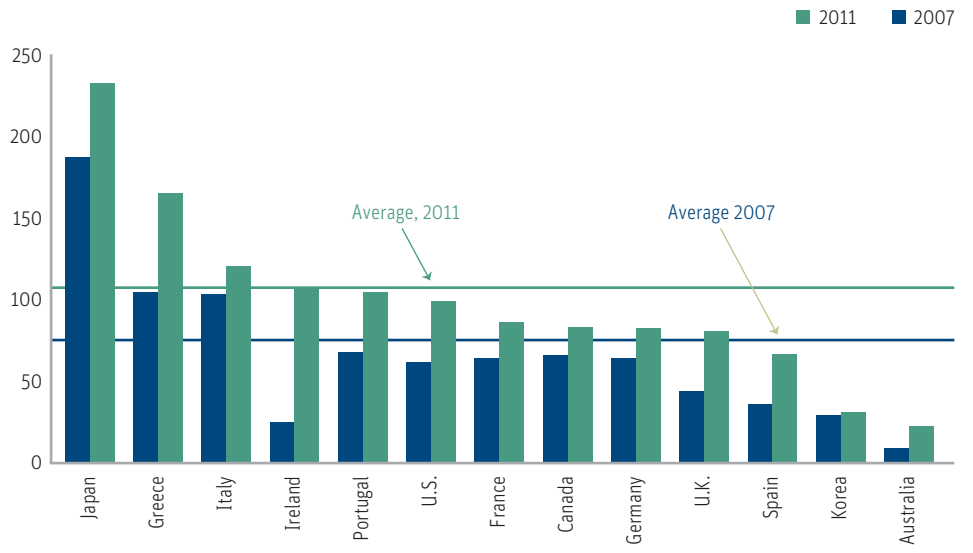
In most countries, IT was initially implemented to address the challenges associated with the difficulty of sustaining exchange rate pegs and money demand instability. But, despite its performance during the past decade, and the continued acceptance that the main medium- to long-run goal of monetary policy is the pursuit of price stability, it faces challenges of its own. In this section we discuss the nature of these challenges in a MIC context: the role of fiscal liabilities, risk premia, and fiscal dominance; the implications of terms-of-trade shocks for monetary policy; the role of exchange rate volatility and "fear of floating;" the difficulty of building and maintaining credibility; and finally the need to cope with financial stability, in a context where the emphasis is on prevention rather than *ex post* resolution.

Fiscal Liabilities, Risk Premia, and Fiscal Dominance

Since the onset of the global financial crisis, large fiscal deficits have fueled a substantial increase in the size of public debt in all major industrial countries (Figure 20). For G-7 countries for instance, the size of public sector debt as a share of GDP jumped from 67 percent in 1990 to 90 percent in 2000 and 107 percent in 2010 (Cecchetti, Mohany, and Zampolli (2011)). These increases will prove difficult to reverse. By contrast, debt ratios have continued to fall in most MICs—despite the fact that some of them relied on countercyclical fiscal policy to mitigate the impact of the crisis on economic activity. In Brazil for instance, the net public debt-to-GDP ratio fell from 60.4 percent in 2002 to 35.3 percent in 2012, a decline of more than 25 percentage points of GDP.

Rapid economic growth has been a key factor in reducing public debt-to-GDP ratios in many MICs. Another factor that has helped them keep public debt under control is the successful implementation of fiscal rules that have contributed to anchoring

FIGURE 20
General Government Gross Debt, Selected Countries, 2007 and 2011
(In percent of GDP)



Source: International Monetary Fund, Fiscal Monitor (September 2011).

medium-term expectations about fiscal policy.[1] Brazil for instance introduced a Fiscal Responsibility Law in May 2000 that prohibits financial support operations between different levels of government (that is, a prohibition on the federal government from financing state and local governments), sets limits on personnel expenditure, and requires that limits on the indebtedness of each level of government be set by the Senate (Araújo, Azevedo, and Costa (2012)). The current framework assumes an annually revised target for the primary fiscal balance as a percentage of GDP. Chile introduced a structural balance rule in 2001 that became law in August 2006. The indicator used nets out the cyclical impact of three variables—the level of economic activity and the prices of copper and molybdenum—that affect central government revenue (Claro and Soto (2012)). In addition, in recent years the share of foreign-currency debt has fallen dramatically in many MICs, and the average public debt maturity has lengthened significantly. As

[1] In general, there are four kinds of fiscal rules (García, Gustavo (2012)): those that mandate balanced budgets or impose limits on fiscal deficits, irrespective of the cyclical position of the economy; those that fix limits on the level of public expenditure, often in specific areas (for instance, discretionary as opposed to nondiscretionary spending) or particular programs; those that impose revenue collection goals; and those based on the structural fiscal balance or adjusted by the business cycle, which allow the operation of automatic stabilizers and possibly provide some room for discretionary policy within the cycle.

a result, gross public debt ratios in many of these countries are expected to continue to fall in the medium term.

However, the absence of current fiscal imbalances, and relatively good prospects for the coming years, does not mean that the specter of *fiscal dominance* has completely disappeared. Population in many MICs is ageing fast; the old-age dependency ratio in some countries may well triple between 2011 and 2040 (Montoro, Takáts, and Yetman (2012)). Moreover, a large part of these populations, currently outside any social security system, has to be ultimately covered by a formal pension arrangement.[2] This may put considerable pressure on fiscal accounts in the future. While the impact of this rise will vary across regions and countries, depending on pension systems, the experience of industrial countries suggests that the share of health and pension expenditure in GDP is likely to rise substantially in many MICs in the next decade.[3]

Public policy reform can greatly reduce the fiscal burden associated with an ageing population; some countries have actually embarked on that path (IMF (2011d)). However, future fiscal liabilities associated with health care and pension spending may have immediate implications for monetary policy, especially in those countries experiencing rapid demographic transition. In other words, the expectation that *future* deficits related to these liabilities may be monetized could affect inflation expectations *today*. Indeed, as shown by Leeper (2011), the possibility of a fiscal limit (in terms of the size of the public debt) is such that an IT regime may fail to anchor inflationary expectations in the periods before the fiscal limit is hit.[4] The fundamental reason for this is that current beliefs about post-limit policy behavior affect current economic decisions. If higher inflation expectations push market interest rates higher today, this could make the fiscal situation worse and limit the ability of monetary policy to manipulate interest rates in downturns. The policy implication is that anchoring beliefs about (future) fiscal policy may be crucial for the conduct and performance of current monetary policy. If governments can reduce uncertainty about their plans for meeting their fiscal obligations and controlling public debt in the medium run, the central bank's ability to manipulate interest rates would be enhanced.

An alternative channel through which fiscal discipline and public debt dynamics may affect the performance of IT regimes in MICs is through the *risk premium channel*

[2] Among MICs Brazil is unique in having only 10 percent of the population over the age of 65, but spending on pensions is already quite high, at about 9 percent of GDP.

[3] Another source of potential liabilities is associated with implicit government guarantees to the financial system. However, strengthening the financial system, and improving financial stability, should reduce the likelihood that these liabilities will materialize.

[4] The impact of uncertainty about future fiscal policy on today's macroeconomic outcomes was highlighted in an important previous contribution by Drazen and Helpman (1990).

analyzed by Favero and Giavazzi (2004) and Blanchard (2005). In an environment where the domestic public debt is high and the average maturity of that debt is short, concerns about debt sustainability may lead to a significant increase in the risk premium. In turn, this would create a problem for monetary policy: a tighter policy associated with higher real interest rates would increase the debt service burden and could actually lead to capital outflows and eventually to a depreciation of the domestic currency, by increasing the risk of default. Then, if the degree of exchange rate pass-through is high, the depreciation of the domestic currency would raise domestic prices. As a result, a "price puzzle" (higher inflation associated with a contractionary monetary policy) may emerge.

This argument therefore relies on the operation of the uncovered interest rate parity condition in a rather unconventional way: as long as there are concerns about debt sustainability, increases in interest rates as part of a tight monetary policy further increase the probability of default and lead to a higher risk premium required by the investors. As a result, capital outflows and currency depreciation are observed, which also worsen price dynamics, especially when there is a high degree of pass-through from exchange rate to prices. Yet, there is some evidence of a risk premium channel, by Zoli (2005) for the period surrounding the 2002 macroeconomic turmoil in Brazil, and by Aktas, Kaya, and Ozlale (2010) and Akyurek, Kutan, and Yilmazkuday (2011) for Turkey after its 2001 crisis. The lesson from these episodes is that when markets are concerned about public sector debt rollover or the sustainability of public debt, policy rate changes can have a powerful unconventional impact on expectations. As such, if interest rates are increased or cuts are delayed, markets may become concerned about debt dynamics and expect future monetization of the public debt. Thus, tighter monetary policy could lead to higher inflation. Put differently, with policy uncertainty, and a weak fiscal position, monetary policy alone also cannot determine expected inflation.

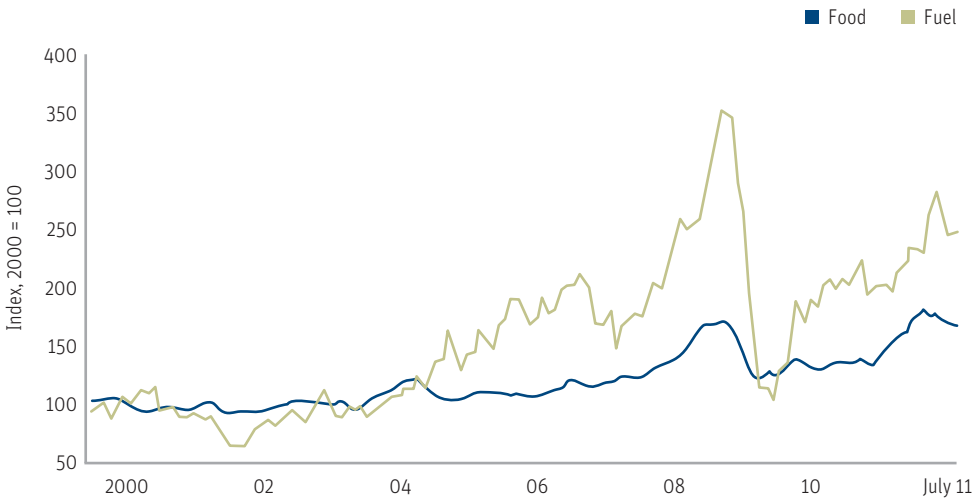
Managing Terms-of-Trade Shocks

During the past few years there have been large and sustained increases in world commodity prices, in part reflecting structural changes in world demand for commodities from the developing world (Figure 21).[5] How to deal with these shocks has been high on the agenda of policymakers all over the world.

From the perspective of monetary policy, the consensus view is that commodity price shocks that are perceived to be temporary should not, just like any other supply

[5] Caballero and Cowan (2008) document the very high volatility in the terms of trade in MICs from 1985–2004.

FIGURE 21
World Commodity Prices, 2000–11
(Index, 2000 = 100)



Source: International Monetary Fund, World Economic Outlook (September 2011, p. 102).

shock, require a policy response. However, recent shocks have proved to be quite persistent, feeding into domestic prices through wage indexation and sustained increases in inflationary expectations. The consensus view has therefore proved to be a difficult option to follow.

To a large extent, the current debate on how to respond to terms-of-trade shocks parallels the initial discussion (in a closed-economy context) on IT adoption in many countries. That debate centered around whether countries should choose headline consumer price index (CPI) inflation or a "core" CPI inflation measure, which excludes or down-weights volatile food and energy prices, to establish their inflation target. The original argument in favor of targeting core inflation is that it is less sensible to transitory shocks and easy to explain. This is because core inflation excludes highly volatile products, which tend to be subject to shocks that are of very short duration. In principle, if headline and core inflation have the same long-run mean, and noncore inflation has no long-run effects on core inflation, then the issue is trivial—countries should opt for core inflation (IMF (2011c) and Walsh (2009, 2011)). Doing so would deliver more stable headline inflation over the medium term and lower output volatility more than the alternative of stabilizing headline inflation in the short term—a policy that would entail countering the first-round effects of (domestic or imported) commodity price shocks.

However, in most MICs, non-core inflation does tend to affect core inflation over time. A key reason for that is that food and energy tend to represent a large fraction of the consumption basket in these countries (Agénor (2002) and IMF (2011c)). If shocks to domestic food and oil prices (induced or not by external developments) display persistence, they may have significant second-round effects, through wages and other cost pressures, that feed into core inflation—thereby generating persistent movements in overall prices. This conjecture is corroborated by the evidence. Using a sample of 46 countries, Pedersen (2011) found that the propagation from food prices to core inflation is higher in developing economies than in advanced economies.[6]

In practice, despite targeting headline inflation, most central banks (in middle- and high-income countries alike) pay close attention to the behavior of various measures of core inflation. However, the previous analysis suggests that in an environment where commodity price shocks are persistent, core inflation measures that exclude all food and energy prices may not perform as well as predictors of future headline inflation. As shown in Figures 22 and 23, this appears to have been the case for Brazil and South Africa in early 2011. A similar result holds for other countries, including Chile.

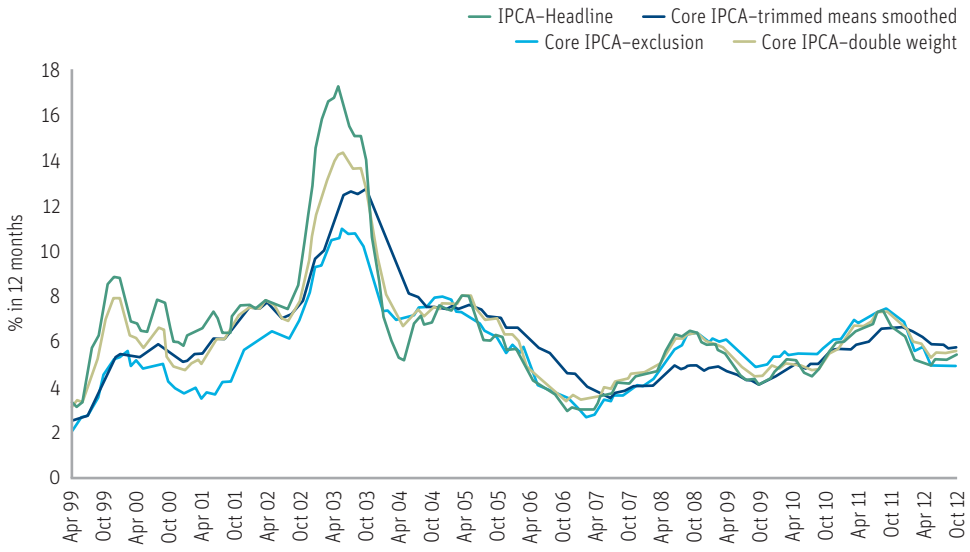
Some observers, most prominently Frankel (2011), have argued that an alternative to core inflation is to focus on product price targeting (PPT).[7] PPT targets a broad index of all domestically-produced goods, regardless of whether or not they are exportable. The main idea is that in a CPI-based IT regime, terms-of-trade shocks may lead to perverse policy responses (see Box 4). In principle, such shocks should be accommodated by offsetting movements in exchange rates, that is, a *deterioration* (improvement) in the terms of trade should be associated with an exchange rate *depreciation* (appreciation). But in a CPI-based IT regime, if the price of, say, imported oil rises in world markets, creating a current account deficit, a CPI-based target would induce the central bank to raise interest rates. By attracting capital flows, this in turn would lead to a currency *appreciation* and a further worsening of the current account. Conversely, with terms-of-trade improvement induced by, say, an increase in the world price of the country's main export commodity, a CPI-based inflation target would prevent the contraction in monetary policy (higher interest rates) that would be called for to generate the required appreciation of the exchange rate and mitigate the external surplus.

By contrast, under PPT, terms-of-trade shocks would be accommodated. Under a target based on a producer price index (PPI), an increase in the world price of imported oil,

[6] He also found that the propagation of food price shocks to core inflation is much larger than that of energy price shocks.

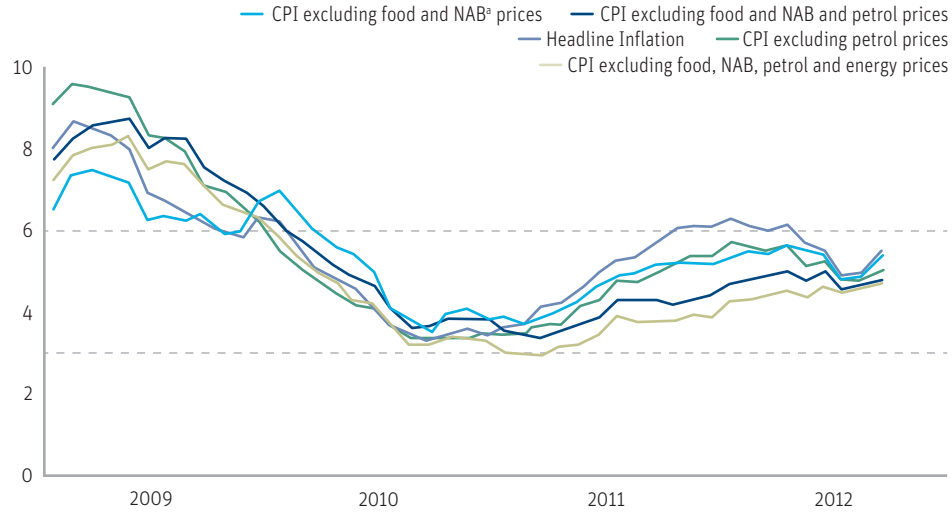
[7] As demonstrated by Campolmi (2012), the practice of central banks of targeting CPI inflation rather than domestic inflation can be rationalized by the presence of sticky wages.

FIGURE 22
Brazil: Headline Inflation and Core Inflation Measures, 1999–2012
(Percentage change over 12 months)



Source: International Monetary Fund, Fiscal Monitor (September 2011).

FIGURE 23
South Africa: Headline Inflation and Core Inflation Measures, 2009–12
(Percentage change over 12 months)



Source: South African Reserve Bank.
Note: CPI = consumer price index' NAB = nonalcoholic beverages.
[a] NAB: Non-alcoholic beverages.

Box 4. Consumer Price Targeting versus Product Price Targeting

Inflation-targeting regimes are typically based on targeting the rate of change of a headline consumer price index (CPI). However, a CPI-based target can lead to anomalous outcomes in response to terms-of-trade shocks. As stated in the text, such shocks should be accommodated by offsetting movements in exchange rates, that is, a *deterioration* (improvement) in the terms of trade should be associated with an exchange rate *depreciation* (appreciation). These movements are essential to maintain domestic and external equilibrium (Agénor and Montiel (2008b, Chapter 2)). But in a CPI-based IT regime with a policy rule that relates short-term rates positively to inflation gaps, a perverse result may emerge. If the price of, say, imported oil rises in world markets, creating a current account deficit, a CPI-based target would induce the central bank to raise interest rates. By attracting capital flows, this would lead to a currency *appreciation* and a further worsening of the current account. This is the opposite of what should happen in response to an adverse movement in the terms of trade. Conversely, with a terms-of-trade improvement, induced by, say, an increase in the world price of the country's main export commodity, a CPI-based target would prevent the contraction in monetary policy (higher interest rates) that would be called for to generate the required appreciation of the exchange rate and mitigate the external surplus. Thus, for countries that are price takers on world markets, and that produce and export commodities subject to volatile terms of trade, such volatility poses a significant challenge to IT based on headline CPI.[a]

An alternative to CPI-based targeting, as proposed by Frankel (2011) most notably, is to use a price index that reflects a basket of goods that the country under consideration produces (thereby including those that it exports), rather than an index that reflects the basket of goods that it consumes (which would include those that it imports). Frankel proposed using a broad output-based price index (a producer price index, PPI), which would reflect the prices of all goods produced domestically, as the anchor for monetary policy. He dubbed his proposal "product price targeting" (PPT).[b]

Compared to a CPI-based target, PPT would help accommodate terms-of-trade shocks. Under a PPI-based target, an increase in the world price of imported oil, for instance, would not induce an increase in interest rates (and thus a perverse currency appreciation), whereas an increase in world prices of the country's commodity exports would lead to higher interest rates and an appreciation—a desirable response. Conversely, if the terms-of-trade shock is a fall in export prices, PPT would allow the currency to depreciate. This would help stabilize the real domestic prices of tradable goods. However, as discussed in the text, implementing PPT is fraught with both conceptual and practical difficulties.

[a] A possible response to the challenge created by price shocks associated with imported food or energy (as opposed to simply explaining them away *ex post*) would be to target core CPI, excluding energy prices. However, few countries set their inflation targets in terms of core inflation. (An exception is Thailand, which targets a core inflation measure defined as headline inflation excluding raw food and energy.) In addition, this would not help in terms of responding to export price shocks.

[b] Frankel (2011) considers some other measures in which prices of export commodities are given substantial weight compared to prices of imports.

for example, would not induce an increase in interest rates (and thus an appreciation), whereas an increase in world prices of the country's commodity exports would lead to higher interest rates and an appreciation, a desirable response.

However, there is a range of circumstances under which PPT may not perform much better, or very differently, from standard IT. Suppose that the imported good

whose price increases (oil) is not only used as a final good but also as an intermediate input in production. In such conditions, the increase in the price of oil will feed not only in the CPI but also in the PPI. Which effect is larger will depend in general on the composition of household spending and the structure of production costs. The point, however, is that under such conditions a PPI-based inflation target would also lead to higher interest rates and an appreciation—a perverse policy response, just like with a CPI-based inflation. Alternatively, suppose that the price of a domestically-produced good increases on world markets, and that the good is also consumed on domestic markets. In response to the increase in the world price, domestic producers may switch supply to foreign markets—implying, all else being equal, a drop in domestic sales and thus higher consumer prices at home. With a CPI-based inflation target, interest rates would increase and the exchange rate would appreciate, which is the correct response. The same would occur with a PPI-based inflation target; the difference between the two regimes would depend again on the structure of household spending and the composition of output.

Implementing PPT involves a host of practical difficulties as well. Although the GDP deflator is one possible output-based price index that could be used in such a regime, it has the disadvantage of being available only quarterly in many countries. It is also subject to lags in collection, measurement errors, and significant subsequent revisions. Implementing such a regime would therefore require a significant investment in data collection and analysis.

In addition, there is a potential for conflict or uncertainty resulting from differences in price movements between CPI-based and PPI-based inflation. Because PPI is not easy for the public to understand and follow, these differences can create communication and credibility problems, particularly in countries with a central bank history that lacks credibility. Under such conditions, a headline inflation target, being more familiar to the public, would make monetary policy more transparent—even if it is subject to some defects in measuring underlying price pressures.

An alternative to PPT is to respond to the real exchange rate. Aizenman, Hutchison, and Noy (2011) for instance argued that for a commodity-exporting country that is vulnerable to terms-of-trade shocks—particularly large real exchange rate shocks that can affect output—a modified version of IT dominates a pure inflation-targeting strategy. This issue is discussed in the next section.

Exchange Rate Volatility, Fear of Floating, and Policy Responses

In an open economy, the exchange rate is an essential component of the transmission mechanism of monetary policy, as it affects the target variables of monetary policy

(inflation and the output gap) through a variety of channels. There is a direct exchange rate channel via the impact of prices of imported final goods on domestic consumer prices with, generally, a relatively short lag. There are also two indirect channels, operating through both aggregate demand and aggregate supply. By altering the real exchange rate, the nominal exchange rate affects aggregate demand, typically with a lag (due to the time it takes to respond to relative price changes). Depending on the strength of the intratemporal substitution effect, this may affect the output gap and, with another lag, inflation. The effects of interest rates and exchange rates on aggregate demand may also depend on the structure of indebtedness of the economy. For instance, in a country with a large foreign debt, exchange rate changes may have important wealth and balance sheet effects, possibly offsetting their direct effects on aggregate demand.

The exchange rate may affect aggregate supply (in some cases fairly quickly) because costs of production include the cost of imported intermediate inputs, and because nominal wages may depend on (actual or expected) changes in consumer prices caused by exchange rate changes. In turn, the exchange rate is affected by interest rate differentials, foreign disturbances, and expectations of future exchange rates and risk premia that depend on domestic factors (such as the size of the domestic public debt or the degree of credibility of the inflation target). The exchange rate is thus important under IT both in transmitting the effects of changes in policy interest rates and in transmitting domestic and foreign disturbances.

In principle, adopting an IT regime requires the absence of any commitment to a particular value of the exchange rate, and therefore letting the currency float freely (apart from smoothing interventions). In practice, however, in many MICs that have opted for a de jure flexible exchange rate, monetary authorities have continued to pay considerable attention to the value of the domestic currency—often adopting a de facto target path or band. There are various reasons for the central bank to be concerned with nominal exchange rate movements, even when its degree of independence (and thus its ability to commit itself only to the pursuit of price stability) is high. As noted earlier, the exchange rate has a direct impact on inflation and plays a key role in transmitting monetary policy shocks to prices. If the pass-through effect is indeed high, the central bank may be tempted to intervene on the foreign exchange market to limit currency fluctuations.

A high degree of nominal exchange rate instability may also be of concern to policymakers to the extent that it translates into a high degree of variability in the real exchange rate and distorted relative price signals to domestic producers. Another important consideration is that in dollarized economies (e.g., Peru and Turkey for instance) large fluctuations in exchange rates can lead to banking and financial instability by inducing large portfolio shifts between domestic- and foreign-currency-denominated assets. Finally, in

countries where the corporate and banking sectors hold large foreign currency liabilities, exchange rate depreciations can have significant adverse effects on their balance sheets.[8] The higher is the degree of financial sector integration with global markets, the higher will be the probability that corporations and banks are able to access foreign currency resources. Despite adequate financial regulation and supervision and the availability of hedging instruments, sudden reversals of flows and exchange rate volatility can have damaging effects on the real economy.

When limiting exchange rate fluctuations is a stated or an implicit policy target, it will usually be difficult for the central bank to convey to the public its intention to give priority to price stability over other objectives of monetary policy in a credible and transparent manner. Private agents are likely to discount and/or get confused by public pronouncements; in turn, lack of credibility will translate into higher inflation expectations. Thus, the absence of an (implicit or explicit) commitment to a particular level for the exchange rate—or, equivalently, giving the inflation target unambiguous priority over other policy objectives—is in principle important for the functioning of an IT regime. In practice, however, this has not been the case in MICs.

Fear of Floating

Almost from the moment they adopted IT, many MICs started to develop a so-called *fear of floating*, which has led policymakers to take deliberate policy actions to stabilize the exchange rate (Calvo and Reinhart (2002)).[9] The reasons for a country to fear floating exchange rates and currency volatility are varied—they include underdeveloped markets for foreign exchange (which limits the availability of hedging instruments), a short history of stable inflation, high exchange rate pass-through (as discussed earlier), adverse effects on competitiveness, the existence of a large debt in foreign currency, balance sheet effects, and the fact that excessive currency appreciation may exacerbate risk-taking behavior by financial intermediaries.[10] The latter effects can be powerful enough to

[8] However, these last two points can also be viewed as calling for adequate regulation and supervision of the domestic banking system, not necessarily as arguments in favor of a rejection of IT as a policy regime.

[9] Put differently, a country exhibits fear of floating when it claims to be pursuing a policy goal that is independent from the exchange rate, but keeps intervening in the foreign exchange market without any clear link with that policy goal.

[10] Fear of floating may also be a concern for industrial countries. The Swiss National Bank currently maintains a policy, reaffirmed in an official statement on September 13, 2012, that involves leaving the minimum exchange rate of the Swiss franc unchanged at SF1.20 per euro. In the statement, the bank reemphasized its determination to enforce this floor. Reasons include the risk of deflation and the possibility that a real appreciation would adversely affect the country's economic performance.

dominate other effects of the exchange rate through more standard channels (see for instance Catão and Pagan (2011)).

There is mixed evidence to support the fear of floating argument. Ball and Reyes (2004) for instance have argued that in the early years of the IT regime in Brazil, although the Central Bank seemed to react strongly to changes in inflation, there was also evidence of exchange rate smoothing, which can be construed as a symptom of fear of floating. At the same time, Nogueira and León-Ledesma (2009) found that the adoption of IT meant a strong movement toward greater exchange rate flexibility in Brazil. In a more comprehensive study, Ball and Reyes (2008) compared IT regimes to the fear-of-floating regime in MICs. They concluded that these are distinctly different regimes and that the IT regimes are more similar (in terms of the behavior of interest rates, exchange rates, and other variables) to floating regimes than to the fear-of-floating ones.

In practice, the identification of fear of floating behavior is far from obvious. In particular, even though exchange rate pass-through may have decreased substantially after the adoption of IT in several MICs (as discussed earlier), a central bank may still choose to smooth short-run exchange rate movements to attain its inflation target. This does not mean that the monetary authority does not allow the currency to adjust to a new long-run equilibrium following a shock, but rather that it will not let this movement interfere with the attainment of their inflation objective (Nogueira and León-Ledesma (2009)).[11] Indeed, as discussed earlier, exchange rate movements affect domestic inflation through a variety of direct and indirect channels that may be separate from domestic demand or supply shocks.

A more general problem with the fear of floating argument is that it implicitly assumes that the optimal policy is always a free floating regime, and consequently that any intervention in the foreign exchange market would lead to a sub-optimal result. However, this is not necessarily the case for MICs. In particular, in countries where the exchange rate pass-through is high, some intervention in the exchange rate may be needed to ensure that inflation targets are attained (Reyes (2007)). Put differently, possible interventions to stabilize the exchange rate should not be seen as fear of floating, but potentially as a required policy for the attainment of inflation targets. This view is consistent with the evidence reported in Berganza and Broto (2012), who found that foreign exchange intervention has been fairly effective at lowering exchange rate volatility in IT countries. Indeed, even though, as discussed in Box 5, the feasibility and effectiveness of sterilization remain in general a matter of debate, a greater weight on mitigating exchange

[11] In fact, Agénor (2002) has argued that the absence of such interventions can be destabilizing.

Box 5. Capital Flows, Sterilization, and Reserve Accumulation

Many middle-income countries have accumulated sizable stocks of foreign assets in recent years. This process has occurred in response to several factors. The first and more traditional one is that reserves may be used to cushion the effects of terms-of-trade shocks on a country's real exchange rate and exports, thereby smoothing the adjustment of the current account. The second is an attempt to mitigate the downside risk of greater financial integration, and provide self-insurance against sudden reversals in capital flows. The third and related factor is that the accumulation of sizable stocks of foreign assets reflects a greater emphasis on mitigating exchange rate volatility associated with capital flows and more intense sterilization operations. The fourth factor is more "political" in nature— sizable stocks of foreign assets allow countries to avoid calling on international financial organizations for support. Lastly, in some countries reserve accumulation has occurred as a byproduct of managing exchange rates to promote exports by (deliberately) undervaluing the domestic currency.[a]

Whether or not driven by precautionary behavior, reserve accumulation may have important monetary implications. When a central bank buys foreign reserve assets, it must decide whether to fund the purchase by increasing the monetary base, which may lead to increased inflationary pressures, or by reducing its net domestic assets, which sterilizes the impact of its operation on the monetary base. Central banks may offset the effects of reserve accumulation on the monetary base in a number of ways, including selling market instruments, such as government bonds or central bank bills, or by using swaps or repurchase operations.[b]

There is some evidence to suggest that reserve accumulation has helped mitigate exchange rate movements. Aizenman and Riera-Crichton (2006) studied the link between reserve accumulation and the real exchange rate in a panel of 80 developed and developing countries over 1971–2004. They found that, for the latter group especially, reserve accumulation helped mitigate real appreciation. This occurred equally in response to terms-of-trade shocks or capital inflows, especially short-term inflows.

MICs have also used sterilized foreign exchange intervention to help guide the nominal exchange rate toward values more consistent with fundamentals and mitigate its volatility. However, sterilized intervention raises several feasibility issues. First, by keeping domestic interest rates higher than they would otherwise be, sterilization tends to magnify the cumulative inflow of capital, especially if there is simultaneous appreciation pressure coming from fundamentals, an improved terms of trade, and/or an ongoing tightening cycle of monetary policy. The higher the degree of capital mobility, the larger the accumulation of reserves associated with sterilized intervention. Second, sterilized intervention entails quasi-fiscal costs because the central bank exchanges high-yielding domestic assets for low-yielding reserves. The magnitude of these costs will be greater the higher the degree of capital mobility and the larger the gap between domestic and foreign rates of return. Thus, the fiscal feasibility of this policy is also at issue. Third, even if sterilization succeeds in limiting domestic monetary expansion, it may not completely insulate the economy from the effects of capital inflows. For instance, if domestic interest-bearing assets are imperfect substitutes, then a capital inflow may be associated with a shift in the composition of demand for domestic interest-bearing assets, as well as with an increase in the total demand for such assets. In this case, unless the composition of domestic assets issued in sterilization operations matches that demanded by creditors, the structure of domestic asset returns would be altered. In turn, this would trigger a portfolio reallocation that, in the presence of wealth effects, may affect aggregate demand and prices.

In the same vein, Garcia, Márcio (2012) argued that by creating an incentive for further expansion of bank credit (e.g., through the provision of highly liquid and secure assets), sterilized foreign exchange

(*continued on next page*)

Box 5. (*continued*)

purchases under IT and a credit channel may increase aggregate demand. He also argued that this is consistent with the recent Brazilian evidence. The implication of this analysis is that IT countries may have another reason to be concerned when conducting foreign exchange sterilized interventions, besides their high cost and effectiveness (or lack thereof) of preventing nominal appreciation: even if sterilized purchases are effective in preventing nominal appreciation, they may stimulate activity and raise inflation, thereby contributing to a real exchange rate appreciation.

[a] See Aizenman (2008) for a review of the factors underlying foreign reserve accumulation and potential externalities.

[b] With foreign exchange swaps, the central bank typically agrees to buy foreign exchange forward, while with repurchase operations, the central bank sells securities with an agreement to buy them back at a certain date in the future. When markets are thin, some monetary authorities rely on nonmarket instruments, such as transferring the deposits of government and public financial institutions from the commercial banking system to the central bank or selling foreign exchange reserves to the government—often to allow it to reduce the external public debt. Monetary authorities may also seek to sterilize the effects of reserve inflows not just on the monetary base, but also on the broader money supply by increasing reserve requirements on bank deposits. This occurred in recent years in China, India, and Morocco, among other countries.

rate volatility may well have been one of the factors inducing central banks to more aggressively sterilize capital flows in recent years (as documented by Aizenman and Glick (2009)).

In Brazil, for instance, the central bank intervened at high frequency through spot and futures markets to mitigate exchange rate volatility associated with capital flows at the end of 2010 and in early 2011. To the extent that they helped stabilize capital flows, the macroprudential measures that were implemented during that time (increases in bank reserve and capital requirements, higher financial transaction tax) also helped stabilize the exchange rate (Pereira da Silva and Harris (2012)). Although the exact contribution of these different policies to exchange rate stability is difficult to ascertain without a more formal analysis, Brazil's experience suggests that foreign exchange market intervention and macroprudential policies may both be of assistance in smoothing exchange rate movements in an IT regime.

An alternative policy response, as discussed next, has been to make the central bank interest rate rule sensitive to exchange rate changes.

Policy Response: Modified Taylor Rules

In addition to fear-of-floating considerations, there is a clear theoretical rationale for monetary policy to react to the exchange rate in MICs that are highly vulnerable to terms-of-trade shocks and have underdeveloped financial systems. In such situations,

stabilizing domestic output in the face of external shocks may prove difficult. Indeed, Aghion et al. (2009) and Aizenman, Hutchison, and Noy (2011) argued that in such environments it is optimal for the central bank to pursue an interest rate rule that accounts for movements in the real exchange rate. Céspedes, Chang, and Velasco (2004), Morón and Winkelried (2005), and Cavoli and Rajan (2006) also suggest that there may be some benefit from including the exchange rate in the reaction function of an inflation-targeting central bank in financially vulnerable economies. Importantly, some of these studies show that, using numerical simulations, the optimal weight on the exchange rate does not need to be very high. In the same vein, Roger, Garcia, and Restrepo (2009) and Garcia, Restrepo, and Roger (2011) found that for financially robust economies, putting a small weight on exchange rate smoothing is beneficial in handling risk premium shocks, with no significant adverse consequences for inflation or output performance. For financially vulnerable economies, some exchange rate smoothing is found to be even more beneficial, largely reflecting perverse effects of demand shocks on exchange rate movements.[12]

The empirical literature on Taylor rules does not provide strong evidence in favor of whether central banks in MICs respond explicitly to exchange rate movements. The reason, as noted earlier, is that a reaction of the policy interest rate to the exchange rate may simply reflect the fact that the central bank reacts to anything that may affect inflation; in a standard IT framework, exchange rate movements are already taken into account indirectly. This is one interpretation of Brazil's experience (Nogueira and León-Ledesma (2009)). Best (2013) found that the central bank of Mexico, through its Taylor rule, has responded consistently to movements in the nominal exchange rate during the floating exchange rate regime. This result is corroborated by Moura and de Carvalho (2010). By contrast, estimates by Sánchez (2010) for the IT regime in South Korea over 1999–2006 did not detect a significant concern for exchange rate variability, and neither did Moura and de Carvalho (2010) for a sample of Latin American MICs. At the same time, the fact that some of the existing econometric studies are unable to detect a *systematic* effect of exchange rate changes on policy rates does not preclude the possibility that central banks react *episodically* to these changes. Indeed, these studies (which are usually based on linear regression techniques) do not capture the fact that policy response may be *nonlinear*, in the sense that the response occurs only when the change in the exchange rate is very large (e.g., compared to a norm set by the central bank).

[12] Pavasuthipaisit (2010) developed a dynamic stochastic general equilibrium model that also concludes that IT regimes should respond to exchange rate shocks under certain conditions.

Building and Maintaining Credibility

The credibility of an IT regime depends on the credibility of a promise to reach the inflation target in the future. Establishing the credibility of an IT regime has therefore proved elusive in some cases—occurring only over an extended period of time, keeping inflationary expectations and risk premia high in the process. In countries where the preference for output and employment stability is perceived to be high to begin with, or to increase significantly when unemployment rises above a threshold level, the credibility of an announced inflation target may be significantly undermined. Lack of confidence in policymakers' commitment to (or ability to maintain) low inflation may be one of the reasons why inflation often tends to display a strong degree of persistence in MICs (Agénor and Bayraktar (2010)). Low credibility tends to impart a strong backward-looking component to inflation expectations.

Indeed, an important lesson of the experience of MICs during the past two decades, as discussed in the previous section, is that uncertainty about the central bank's preferences regarding output and inflation may adversely affect credibility, and that price shocks may have large asymmetric effects on credibility. Overshooting the inflation target (possibly out of excessive concern for limiting short-run output losses) may be highly costly in terms of lost credibility, in contrast to undershooting, that is, inflation below target. In addition, credibility depends not only on the level of deviations from target, but also on *how long* these deviations last. Adopting a target band does not, by itself, solve the problem.[13] The fact that establishing credibility remains a work in progress in some MICs is an important consideration when discussing extending the mandate of the central bank to explicitly account for an additional target—financial stability.

Financial Stability: The Shift from *Ex Post* Resolution to Prevention

The recent global financial crisis was a clear reminder that although financially integrated markets have benefits, they also carry substantial risks with potentially large real economic consequences. Increasing interconnectedness of financial institutions and markets, and more highly correlated financial risks, have intensified cross-border spillovers and led to renewed emphasis on the need to strengthen the prudential regulation and supervision of financial institutions. In many countries, reducing the risk of financial

[13] There is naturally a trade-off between credibility and flexibility in the choice of the optimal target band: the wider the bands are, the more likely it is that the target will be achieved but the less credible the target becomes. Horváth and Mateju (2011) provide evidence suggesting that countries where the macroeconomic environment is less stable tend to establish a wider target range for the inflation rate.

instability requires improvements in microprudential regulation (to reduce the procyclicality of financial markets), accounting standards, and capital requirement rules. At the same time, in a more globalized environment greater coordination between macroeconomic and financial policy is needed, so prudential regulation must acquire a more macro, system-wide, dimension.[14]

As noted in the introduction, some observers have warned that an IT central bank may neglect important information about the build-up of financial imbalances that do not materialize rapidly into consumer price pressures. Many reasons may account for this disconnect between financial and price developments in MICs. Among the usual suspects are the impact of globalization in terms of lower import prices and lower domestic price pressures as well as the consequences of structural changes that have affected the functioning of labor and financial markets over the last two decades. As also noted earlier, some observers have argued that the mere success of IT strategies could have contributed to preventing a proper risk assessment by central banks. Because the anti-inflationary commitment of the monetary authority becomes more credible, and long-run inflation expectations get more firmly anchored around the central bank's objective, the macroeconomic consequences of low interest rates—including credit booms that end up fueling a rise in asset prices—may take more time to show up into higher inflation. As a result, policy rates may not rise sufficiently, and in a timely fashion, to prevent the build-up of financial imbalances. The next section examines if, and how, IT regimes should be adjusted to reflect financial stability considerations.

[14] The crisis has also shown that differences in national regulatory regimes across countries can trigger arbitrage-based behavior; cross-border regulatory arbitrage may lead to sharp swings in capital flows and magnify the international transmission of real and financial shocks. See Agénor (2012) and Agénor and Pereira da Silva (2010) for a discussion of these issues in the context of developing countries, especially regarding ways to reform bank capital requirement rules.

Addressing the Financial Stability Challenge in an Inflation-Targeting Regime

In line with the evidence on credit booms and financial crises reviewed earlier, a key issue to strengthen the financial system and maintain financial stability in MICs is to encourage prudent lending behavior in upturns. In recent years a number of proposals have been put forward toward that end. In particular, it has been argued that by raising capital requirements in a countercyclical fashion, regulators could help to choke off asset price bubbles before a crisis develops.[1] Along these lines, on September 12, 2010 the Basel Committee on Banking Supervision released a new capital framework that not only strengthened the definition of capital but also recommended the implementation of both a capital conservation buffer and a countercyclical capital buffer, with the latter ranging from 0 to 2.5 percent of risk-weighted assets. According to the proposed rule, bank capital should be adjusted in response to excess growth in credit to the private sector (deviation in actual credit growth from a trend value), which is viewed as a reliable indicator of systemic risk (BCBS (2011)).[2]

[1] The Turner Review favors countercyclical capital requirements (Financial Services Authority (2009)) and Buiter (2009). So do Brunnermeier et al. (2009), who proposed to adjust capital adequacy requirements over the cycle by two multiples—the first related to above-average growth of credit expansion and leverage, the second related to the mismatch in the maturity of assets and liabilities. Many of these proposals aim to mitigate the alleged procyclical effects of Basel II capital standards, which were more focused on the microprudential aspects of financial regulation; see Agénor and Pereira da Silva (2010) for a developing-country perspective.

[2] In fact, several countries have chosen to go beyond the Basel III recommendations, and are considering either higher capital requirements or far-reaching structural measures, such as retail ring-fencing. See the report of the Independent Commission on Banking (2011) in the United Kingdom.

At the same time, since the onset of the financial crisis, an issue that has come under renewed attention is the role that monetary policy might be able to play in mitigating financial instability.[3] Specifically, instead of adding a countercyclical component to macroprudential regulation, should policymakers use monetary policy to achieve financial stability? The growing consensus is that macroprudential policy may not be sufficient to address financial stability concerns; monetary policy must play a more active role in that regard. In what follows, and drawing extensively on Agénor and Pereira da Silva (2012b), the various arguments for and against that role are examined.

Macroprudential and Monetary Policy: Complements or Substitutes?

To determine whether macroprudential policy and monetary policy are complements or substitutes in achieving financial stability requires addressing several issues. These include the extent to which Tinbergen's principle applies in this context; the impact of monetary policy on risk-taking; the effectiveness of macro versus sectoral instruments in preventing the development of financial imbalances; the extent to which monetary policy can react to some types of external shocks; and the implications of adding a financial stability objective to the central bank on monetary policy credibility. These issues are addressed in turn.[4]

Tinbergen's Principle

As a general rule, Tinbergen's principle states that to attain a given number of independent policy objectives, there must be at least an equal number of instruments.[5] For the issue at hand, with macroeconomic stability and financial stability being the two objectives, it means that two separate tools are needed—the policy interest rate and a macroprudential tool. Put differently, policymakers necessarily need a tool other than the interest rate—particularly if there are potential trade-offs between policy objectives.

To illustrate, consider a case where the economy is hit by a negative demand shock. In a standard (flexible) IT regime, the appropriate policy response is to lower the policy

[3] Some observers blamed low interest rates for the build-up of real estate bubbles in industrial countries.

[4] The discussion here of macroprudential policy is focused on the extent to which it interacts with monetary policy. For a more general discussion, including coordination issues between these two policies, see Committee on the Global Financial System (2010), Financial Stability Board (2011), Galati and Moessner (2011), and IMF (2011b). See also Schou-Zibell, Albert, and Song (2010) for a practical application of a macroprudential approach to assessing financial stability.

[5] Tinbergen's principle is concerned with the existence and location of a solution to the system; it does not assert that any given set of policy responses will, in effect, lead to that solution. To assert this, it is necessary to investigate the stability properties of a dynamic system.

rate; there is no trade-off between the inflation target and the output objective. However, suppose that the shock has a high degree of persistence, that the central bank is concerned with systemic risk, and that it believes that lowering interest rates for too long will increase incentives to individuals and financial institutions to take on more risk. There may then be a trade-off between macroeconomic stability and financial stability. As discussed later, the way this trade-off is addressed has implications for central bank credibility.

A more elaborate example of a trade-off between monetary policy and macroprudential policy in a flexible IT context can be derived from the analysis in Agénor, Alper, and Pereira da Silva (2012b), in a model where the impact of the "bank capital channel" on loan rates takes two forms: a cost effect (associated with the fact that issuing equity or debt for regulatory purposes is costly), and a monitoring incentive effect (due to the fact that more capital improves banks' monitoring incentives and leads to an increase in borrowers' repayment probability). Consider a negative supply shock, for instance, that lowers output (thereby raising the risk of default) and raises prices. If the central bank raises the policy rate to fend off inflationary pressures and at the same time increases the minimum capital adequacy ratio to promote financial stability, the net effect on the loan rate may be ambiguous. Indeed, the direct effect of a higher policy rate (the marginal cost of liquidity for lenders) is to *raise* the loan rate—as is the effect of the increase in the cost of accumulating capital, which must rise to induce households to hold the additional equity or debt. However, at the same time higher bank capital leads to a higher repayment probability (through the monitoring incentive effect), which tends to *reduce* the loan rate.

With an additional instrument, and in a deterministic environment, the central bank can achieve its targets exactly and continuously (through dynamic rules); the two instruments are necessarily *complements*. From that perspective, the issue of whether monetary policy should respond to financial stability concerns is simply not relevant; it *must* be combined with macroprudential policy, regardless. This is, implicitly at least, the argument put forward by Svensson (2010b). In practice, however, central banks operate in a stochastic world and aim to minimize deviations from their targets, rather than achieving them exactly and continuously. In fact, under fairly general circumstances, full stabilization of inflation and output is not optimal (Rhee and Turdaliev (2012)). And because each instrument, manipulated independently, may affect both targets in the same direction depending on the underlying shocks (thereby reducing volatility in both cases), they may be *substitutes*.[6] This issue is discussed further later.

[6] Cecchetti and Kohler (2012), using a simple macro model, found that interest rates and capital requirements are substitutes for achieving conventional monetary policy objectives; both can also be used to meet financial stability objectives.

Monetary Policy and Risk-Taking

As noted in the introduction, monetary policy—precisely when it is successful at maintaining low and stable prices—may itself induce boom-bust cycles in asset prices. Low interest rates may encourage increased risk-taking, excessive leverage, and promote a "search for yield."[7] If so, there then may be a trade-off between macroeconomic and financial stability. This argument has been used to highlight a contributing factor to the recent financial crisis: that the low interest rates and low inflation associated with the Great Moderation created an environment in advanced economies that encouraged risk-taking—with a switch from a lower yield on safe assets into higher-yielding risky assets, driving their prices up in the process. The environment also encouraged more leveraging, which subsequently led to the development of asset price bubbles.

The possibility that loose monetary policy might have played a part in generating the preconditions for the global financial crisis is illustrated by comparing policy rates with the policy settings generated by a benchmark Taylor rule. As documented by Bean et al. (2010), the Federal Funds rate was very low relative to the Taylor rule from 2001 to 2005 in the aftermath of the collapse of the dot-com bubble. Although less significant, this was also the case in the Euro area.[8] In both cases, the accommodative policy stance may indeed have had a strong impact on asset prices and credit growth. Eickmeier and Hofmann (2012) also found that in the United States monetary policy contributed considerably to the unsustainable pre-crisis developments in housing and credit markets. In a broader study of Organization for Economic Cooperation and Development (OECD) countries, Ahrend (2010) found that, during periods when short-term interest rates have been persistently and significantly below what Taylor rules would prescribe, monetary policy has had a significant effect on increases in asset prices, especially housing prices.

In terms of the direct implications of low interest rates on asset prices, Frappa and Mésonnier (2010) also found evidence for industrial countries that low interest rates under IT may have contributed to the increase in real house prices prior to the global crisis. In a broader study using panel data for 18 OECD countries, Sá, Towbin, and Wieladek (2011) found that interest rate shocks had a significant and positive effect—the magnitude of which being a function of the degree of mortgage market development—on real house prices in industrial countries from 1984–2007. However, these results

[7] See Rajan (2005) for the "search for yield" argument. Bean et al. (2010) provide a brief review of the alternative channels through which loose monetary policy may encourage increased risk taking.

[8] The low interest rates in the euro area may have themselves been the consequence of the low interest rates in the United States, as the European Central Bank tried to avoid a real appreciation of the euro induced by high interest rate differentials.

have been questioned by a number of observers. Both Bernanke (2010) and Svensson (2010b) have rejected the view that the financial crisis was caused by an excessively accommodative monetary policy stance. In a more formal empirical analysis, Jean Louis and Balli (2013) found that, rather than an accommodative monetary policy, lax mortgage rules and financial deregulation were the main causes of the financial crisis in industrial countries.

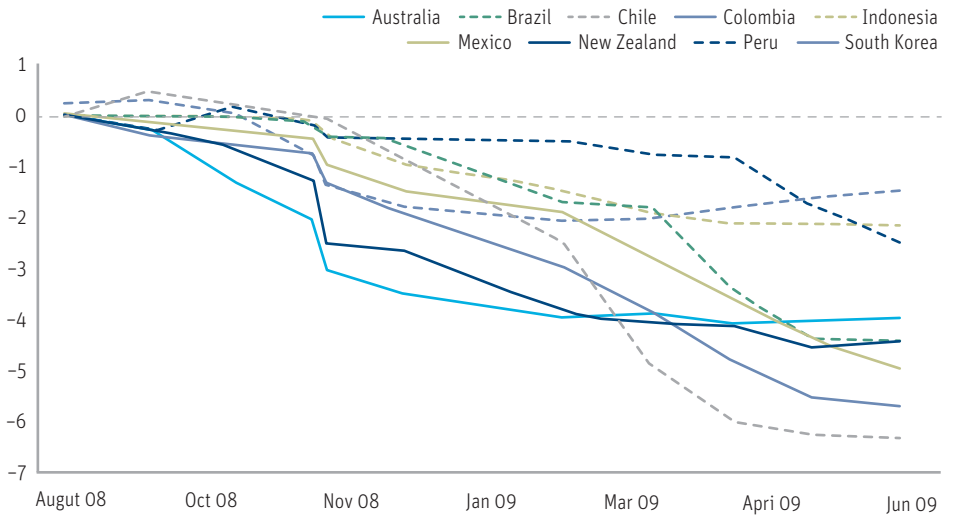
Even if one believes that low interest rates under IT were a key culprit of the financial crisis, this does not mean that monetary policy should respond directly to asset prices and credit growth. If increases in these variables are expected to lead to an expansion in aggregate demand (through wealth and direct effects on private spending), a policy that reacts in standard fashion to the output gap and (expected) inflation would naturally lead to an endogenous policy response. There would be no need to respond directly to any additional variables. Put differently, excessive growth in asset prices and credit (just as is the case of the exchange rate, as discussed earlier) matter only to the extent that they affect the future path of output and inflation. By implication, as argued by some, if indeed there are trade-offs between (future) financial (in)stability and present macroeconomic stability, they should not be addressed through tighter monetary policy, but rather through more targeted macroprudential measures.

What is the evidence on the risk channel for MICs? It is rather mixed. In the same vein, Calani et al. (2011) estimated Taylor rules for seven IT-MICs and found that the reduction in interest rates was more aggressive than the path implied by the estimated Taylor rules up to late 2008. Gaps between actual and simulated Taylor rules in that study are illustrated in Figure 24. In Colombia and Peru, these gaps were particularly large.[9] Hofmann and Bogdanova (2012) found that policy rates have been on aggregate below the levels implied by the Taylor rule for most of the period since the early 2000s not only in advanced countries but also in "emerging markets". However, detailed country results are not reported, so their specific relevance for MICs cannot be assessed.

The implication is that there is no strong evidence to suggest that (loose) monetary policy has been a systematic cause of boom-bust cycles in credit and asset prices in MICs. A possible reason for this is that banks in these countries have for years maintained capital ratios well above those required by international standards, as documented by Agénor and Pereira da Silva (2010) and Fonseca, González, and Pereira da Silva (2010). In a sense, having more "skin in the game" reduced incentives to gamble and

[9] Figure 24 also suggests that one reason why several IT-MICs weathered the recent global financial crisis well may have been because interest rate policy was used aggressively to mitigate output drops. Consistent with these results, de Carvalho Filho (2011) provided evidence showing that IT countries lowered nominal and real interest rates more sharply (controlling for a range of factors) than other countries.

FIGURE 24
Gap between Actual and Simulated Monetary Policy Rates, Selected Countries, 2008 and 2009



Source: Calani, Cowan, and García (2011, p. 288).

may have prevented a weakening of balance sheets through imprudent lending practices. A second reason is the fact that in many countries a variety of microprudential tools were actively used to mitigate excessive risk-taking. In addition, with noncompetitive credit markets (a common characteristic of banking in MICs, as documented earlier), low policy rates may mean higher bank spreads, higher profits, and possibly less risk. Put differently, if there is no evidence that monetary policy has potentially perverse side effects on financial stability, there should be less concern about attributing a financial stability target to it.

In general, in MICs and elsewhere, excessive risk-taking has to do with procyclicality, which is itself driven by optimistic expectations and the inherent tendency of lenders to relax lending standards and underprice risks in good times (especially during episodes of sudden floods). It is indeed well documented that bank intermediation is highly procyclical in MICs (Agénor and Montiel (2008b), Claessens, Kose, and Terrones (2011), and Calderón and Fuentes (2011)). During upturns, credit standards tend to be more lenient, both in terms of screening of borrowers and in collateral requirements. As a result, a greater number of riskier borrowers are able to secure bank loans, whereas the share of collateralized loans tends to decrease. The adverse selection problems created by informational asymmetries between lenders and borrowers are therefore magnified during

boom times. In turn, the weakening of lending standards may increase vulnerability to financial distress when the economy experiences a downturn.[10] In such conditions, monetary policy—possibly in combination with some specific macroprudential tools—could help to mitigate procyclicality and thereby address the time dimension of systemic risk through its effect on the economy-wide cost of borrowing.[11]

Sectoral versus Macro Instruments

While monetary policy should not be used to "prick" stock market bubbles, it could be quite effective at deflating debt-financed bubbles, especially if they are credit-financed—a very likely scenario in MICs.[12] By inducing a direct increase in the cost of borrowing, monetary policy may be more powerful than macroprudential policy under these circumstances.

More generally, both macroeconomic instability and financial instability tend to increase in the lead-up to financial crises.[13] This creates a case for monetary policy to react promptly in normal times to indications of growing financial vulnerability—especially as captured through credit growth. By "leaning against the financial cycle," a more active monetary policy may help to stabilize conventional targets (output and inflation). Under such conditions there may be a *stabilization dividend*. Indeed, a stable and sound financial system can contribute to macroeconomic stability by facilitating the transmission of monetary policy actions and cushioning the impact of macroeconomic shocks through the financial sector. In addition, a stable and sound financial system may decrease the incidence of financial stress and lead to less disruption to economic activity, which in turn contributes to price stability.

However, to the extent that it affects all lending activities (regardless of whether they represent a risk to stability), the policy interest rate may be too blunt an instrument to be useful to address financial stability concerns, which often have a sectoral dimension—such as, for instance, overheating of the housing market or in specific segments

[10] See Dell'Ariccia and Marquez (2006) for a detailed discussion of the various channels through which credit booms may lead to a weakening of lending standards. Jiménez and Saurina (2006) provide evidence of a positive relationship between rapid credit growth and loan losses in Spain. The evidence for MICs is more limited but goes in the same direction, as discussed in various publications by the FSB.

[11] Diamond and Rajan (2012) offer an alternative argument for raising interest rates in normal times, based on the need to maintain the disciplinary role of demandable deposits on banks.

[12] Blinder (2010) and Mishkin (2011) have both emphasized the distinction between credit-fueled bubbles (such as house price bubbles) and equity-type bubbles (in which credit plays only a minor role) in their analysis of post-crisis monetary policy. However, they are fairly agnostic as to whether the central bank should try to limit credit-based bubbles through regulatory instruments or interest rates.

[13] See Demirguc-Kunt and Detragiache (2005) and Agénor and Montiel (2008b) for a review of the evidence for developing countries.

of consumer loans. From that perspective, imposing a cost on the entire economy is not warranted—even though there is evidence to suggest a high correlation between credit growth, which depends on the cost of borrowing and thus the policy rate, and house price inflation (Claessens, Kose, and Terrones (2011)). Because the effect of higher policy rates on bank risk-taking may depend on each institution's initial capital position, the net aggregate effect may be limited. Banks with a low capital base (that is, less to lose) may try to "gamble" by expanding the asset side of their balance sheets through lending to increasingly riskier borrowers, whereas highly capitalized banks may choose to diversify their portfolios toward less-risky assets. In addition, trying to "prick" a developing housing price bubble through a (possibly very large) economy-wide increase in the cost of borrowing could have an immediate adverse effect on the supply side, given the importance (as indicated earlier) of bank credit in financing working capital needs. In turn, this may increase macroeconomic volatility. Under such conditions, sectoral prudential tools—such as changes in loan-to-value ratios, debt-to-income ratios, countercyclical capital requirements on real estate lenders, and so on—may be more appropriate to prevent risk concentration.[14] This, of course, assumes that the sector(s) at the source of financial vulnerabilities can be identified with sufficient confidence.

At the same time, some have argued that strengthening macroprudential rules offers a better alternative to monetary policy. This can be done through the use of both "old" instruments, such as reserve requirements, liquidity or leverage ratios, loan-to-value and debt-to-income ratios, and so on, and "new" tools such as countercyclical capital buffers linked to a measure of excessive credit growth (as envisaged under Basel III) and dynamic provisioning. In fact, both types of instruments have been used in MICs for years. Brazil's Central Bank introduced a capital charge in 2000 through a mechanism that links the deviation of credit growth relative to GDP growth.[15] More recently, dynamic provisioning rules have been introduced in several Latin American countries (Wezel (2010)). In addition to reducing balance sheet vulnerabilities, these instruments have helped to reduce risk-taking and strengthen the financial sector, explaining perhaps in part why MICs were able to weather the recent global financial crisis with limited strain.[16] In the past year Turkey has introduced a reserve requirement tool to manage capital flows and announced that, beginning in 2014, it will relate reserve requirements to bank leverage.

[14] See Crowe et al. (2011) for a discussion of policy options for dealing with real estate booms. However, it is important to recognize at the same time that targeted tools, although they may be less costly than an economy-wide increase in interest rates, could be easier to circumvent than broader measures.

[15] Brazil already has a risk-based, forward-looking provisioning framework (Box 1).

[16] In addition, strict regulations and relatively high returns to domestic banking operations may explain low direct exposure of financial institutions to complex derivatives and subprime-related structured credit products in some countries.

TABLE 2
Macroprudential Measures Undertaken in Latin America, 2009–11

Policy Tool	Country and measure	Motivation – objective
Capital requirements	Brazil (long-term consumer loan market-2010)	Slow down credit growth.
Dynamic provisioning	Bolivia (2008), Colombia (2007), Peru (2008), Uruguay (2001)	Countercyclical tool that builds up a cushion against expected losses in good times so that they can be released in bad times.
Liquidity requirements	Colombia (2008) Peru (1997)	Tools to manage liquidity risk.
Reserve requirements on bank deposits	Peru (2011), Brazil (2010), Uruguay (2009, 2010, 2011)	Limit credit growth, manage liquidity, and complement monetary policy to achieve macroprudential goals.
Reserve requirements on short–term external liabilities of banking institutions	Peru (2010, 2011)	Increase the cost of bank financing with the aim of shifting the funding structure towards the longer term
Tools to manage foreign exchange credit risk	Peru (2010), Uruguay (2010)	Help financial institutions internalize foreign exchange credit risks associated with lending to un-hedged borrowers.
Limits on foreign exchange positions	Brazil (reserve requirement on short spot dollar positions. 2011), Peru (2010, on net FX derivative position (2011))	Quantitative measures to manage foreign exchange risk in on- and off-balance sheet foreign-exchange-denominated assets and liabilities.
Other	Peru (limits to foreign investment by domestic pension funds, 2010)	Measure to facilitate capital outflows and ease pressure on the currency, domestic demand, and consumer prices.

Source: Tovar, Garcia-Escribano, and Vera Martin (2012).

Table 2 summarizes some recent macroprudential measures undertaken in Latin America.[17] As documented in more detail by Montoro and Moreno (2011), Terrier et al.

[17] In June 2010, Korea also introduced a series of macroprudential measures (including a leverage cap on the notional value of foreign exchange derivatives contracts, and a levy on banks' foreign-exchange-denominated liabilities) aimed at building resilience to external financial shocks, especially reversals in cross-border banking sector liabilities, and the associated disruptions to domestic financial conditions. See Bruno and Shin (2012b) for a discussion of these measures and their effectiveness. See also Pereira da Silva and Harris (2012) for Brazil.

(2011), and Tovar, Garcia-Escribano, and Vera Martin (2012), reserve requirements have been used in several Latin American MICs in a countercyclical fashion to smooth the expansion phase of the cycle and to tighten monetary conditions without attracting capital inflows. During the global financial crisis, reserve requirements were lowered in order to rapidly inject liquidity in local and foreign currency and restore market activity affected by sudden reversals in capital inflows.[18] However, it is not obvious that macroprudential policy was all that successful prior to the crisis. Indeed, in several MICs macroprudential measures did not prevent rapid credit growth in the lead-up to the crisis. Figure 2 showed that credit was increasing at alarmingly high rates in Latin America prior to 2007. More specifically, as illustrated in Figure 3, prior to the onset of the global financial crisis, real private per capita credit growth remained high in Brazil, Colombia and Peru. A good question is whether, beyond the structural transformations that explain part of their credit growth, these countries would have faced a crisis even without turmoil in advanced economies.

A broader and more detailed analysis of the performance of macroprudential policy in Latin America is provided by Terrier et al. (2011) and Tovar, Garcia-Escribano, and Vera Martin (2012). Terrier et al. (2011) provide a broader review of microprudential policy tools used or available to policymakers in the region to mitigate the procyclical effects of financial cycles.[19] They conclude that these tools, although mainly microprudential in nature, can prove effective for macroprudential purposes when appropriately calibrated and used in combination over the financial cycle. They could also contribute significantly to addressing systemic risk. Focusing specifically on reserve requirements, Tovar, Garcia-Escribano, and Vera Martin (2012) found that over 2003–11 these requirements had a moderate and transitory impact on slowing the pace of credit growth in Latin America.[20] However, they also note that even if macroprudential measures were to have a muted effect on credit growth, systemic risk could still be reduced by these policies if they translate into changes in the *composition* of credit and/or improvements in the quality of bank funding. However, these effects are difficult to assess, partly because of well-known fungibility problems in banking.

Rather than an argument in favor of greater reliance on monetary policy, this evidence (or lack thereof) may be construed as a call for using macroprudential tools more

[18] Some countries in the region (namely Brazil and Colombia) also resorted to capital controls.

[19] The tools examined include capital requirements, dynamic provisioning, and leverage ratios; liquidity requirements; debt-to-income and loan-to-value ratios; reserve requirements on bank liabilities (deposits and nondeposits); instruments to manage and limit systemic foreign exchange risk; and reserve requirements or taxes on capital inflows.

[20] A study by Glocker and Towbin (2012) based on the dynamic stochastic general equilibrium model is more supportive. The study found that reserve requirements can support the price stability objectives if financial frictions are important and lead to substantial improvements if there is a financial stability objective.

aggressively or for adding new tools to the arsenal of policymakers. Indeed, Colombia (between July 2007 and July 2008) and Peru (in November 2008) both introduced dynamic loan loss provisioning systems in the aftermath of the global financial crisis. But it is important to recognize that some of the "new" macroprudential tools that have recently been implemented (or envisaged under Basel III) are largely untested.[21] There is no clear consensus yet on which tools will work and there is very little evidence on their effectiveness. For instance, regarding the performance of dynamic loan loss provisioning systems, much of the evidence relates to the Spanish case (Saurina (2009)). Yet the conclusion from most studies is that even though these systems may succeed in making banks more resilient, they appear to have limited effectiveness when it comes to restraining credit growth.[22] Similarly, the introduction of countercyclical capital buffers may create significant operational and institutional challenges, especially in MICs where the supervisory environment is weak to begin with. In particular, defining the variables to which buffers should be related during the build-up and release phases remains a matter of debate. Interactions among macroprudential tools also remain poorly understood. A case in point is the interplay between bank capital requirements and dynamic loan loss provisioning systems.[23]

If the effectiveness of (some) existing or potential macroprudential tools is not well established, the potential role of monetary policy to contribute to maintaining financial stability is greater. At the same time, even when effectiveness is well established (as is the case for sectoral tools such as loan-to-value ratios), too much reliance on a particular tool or set of tools may be counterproductive—that is, there may be diminishing marginal returns to using any particular instrument. In particular, if macroprudential policy constrains bank credit availability or leads to higher borrowing costs, it may foster financial disintermediation by promoting the development of shadow banking and the informal financial sector, making it in turn difficult to maintain financial stability. From that perspective, the scope and bluntness of the policy rate could be an advantage

[21] In particular, the long time frame for their full implementation (five to six years) reflects the cautious approach that the BCBS has taken, after performing mainly numerical simulations of their micro and macro effects but without actual empirical evidence about how these new macroprudential instruments would affect credit and capital markets.

[22] As it turned out, the alleged increase in "resilience" of Spanish banks proved to be a mirage, given the severity of the shocks that they faced in the aftermath of the global financial crisis. As for Latin America, several countries have introduced dynamic loan loss provisioning systems in recent years, but their experience is too recent to provide robust conclusions.

[23] The common view is that bank capital should cover for *unexpected* credit losses, whereas dynamic loan loss provisions are intended to cover for *expected* credit losses. However, introducing either one of those regulatory regimes while the other is present may change the behavior of banks and thus the effectiveness of *both types* of tools. This may occur, for instance, if the reason why banks hold (excess) capital buffers is altered by the introduction of loan-loss provisions, and if capital buffers have a signaling role that affects market borrowing costs.

over macroprudential measures, because it is more difficult to circumvent a general increase in borrowing costs induced by a monetary policy contraction in the same way as regulations.[24]

External Shocks and the Scope for Monetary Response

MICs tend to be highly vulnerable to external shocks, and depending on the nature of these shocks, monetary policy may need to be conducted with caution because of potentially undesirable side effects. This is what occurs when a country is confronted with a *sudden flood* of private capital, that is, large inflows induced by changes in external market conditions (Agénor, Alper, and Pereira da Silva (2012a)). Indeed, sudden floods have been on numerous occasions a source of macroeconomic instability in many MICs, having led to rapid credit and monetary expansion (due to the difficulty of pursuing sterilization policies), inflationary pressures, real exchange rate appreciation, and widening current account deficits, as discussed in Boxes 2 and 4. In particular, the surge in capital flows into MICs since 2008 has induced booms in credit and equity markets, real appreciation, and inflationary pressures. It has also raised concerns about asset price bubbles and financial fragility in these countries (Box 2).

Under such conditions, the scope for responding to the risk of macroeconomic and financial instability through monetary policy may be limited because higher domestic interest rates vis-à-vis interest rates in advanced economies may simply exacerbate the flood of private capital. Put differently, monetary policy loses its effectiveness and other instruments must be used to manage capital flows and mitigate their destabilizing effects on the domestic economy. Indeed, if financial imbalances are related to excessive credit growth, and if credit growth is fueled by capital inflows (as is often the case in MICs), a comprehensive policy response could involve the use of both macroprudential tools and—at least temporarily—capital controls, or, to use a more politically correct term now, following the paradigm shift at the IMF (2011a, 2012b), capital flow management (CFM) measures. For instance, in the aftermath of the global financial crisis, several Latin American countries imposed or intensified CFM measures. Brazil for instance implemented a direct tax on fixed income and equity inflows (Pereira da Silva, Sales, and Gaglianone (2012)). Colombia and Peru also imposed taxes on capital inflows. In general, the evidence regarding the effectiveness of capital controls in terms of their impact on the *volume* (as opposed to the *composition*) of capital flows is, at best, mixed (Box 6).

[24] See Dell'Ariccia et al. (2012). Note also that macroprudential policy is more subject to lobbying and political pressure than monetary policy. A case in point is the worldwide reaction of the financial sector to the proposed new Basel rules for higher capital requirements, even though research (see Admati et al. 2011 for the United States) suggests that this policy would likely lead to only a modest increase in the cost of credit.

Box 6. Recent Evidence on Capital Controls

The case for imposing capital controls is often made on second-best grounds (Dooley (1996)). Distortions in the domestic financial system, for instance, may cause resources borrowed from abroad to be allocated in socially unproductive ways in the domestic economy. If the distortion causing the problem cannot be removed, a second-best option may be to limit foreign borrowing.

In general, the efficacy of controls depends on a wide range of factors, including whether controls are imposed on inflows or outflows and whether their coverage is comprehensive or partial. The effectiveness of controls is thus likely to differ both across countries as well as over time, making the task of drawing general conclusions difficult.

The evidence on the benefits of capital controls is mixed. In the 1990s, capital controls were only temporarily able to drive a wedge between foreign and domestic interest rates and reduce pressures on the exchange rate in countries like Brazil, Chile, Colombia, Malaysia, and Thailand (Ariyoshi et al. (2000)). More recent studies include Edwards and Rigobon (2009), Binici, Hutchison, and Schindler (2010), Gochoco-Bautista, Jongwanich, and Lee (2010), Glick and Hutchison (2011), Jongwanich, Gochoco-Bautista, and Lee (2011), Abhakorn and Tantisantiwong (2012), Ostry et al. (2012), and Ahmed and Zlate (2013). Broader reviews are provided in Committee on the Global Financial System (2009), Habermeier, Kokenyne, and Baba (2011), IMF (2011a), and Agénor (2012).

Edwards and Rigobon (2009) found that capital controls in Chile did affect capital flows and the exchange rate. Binici, Hutchison, and Schindler (2010), dwelling on the broader dataset described in Schindler (2009), also found that capital controls may alter both the volume and composition of capital flows. Ostry et al. (2012) used a large cross-country dataset as well and found that both capital controls and foreign-currency-related prudential measures are associated with a lower proportion of (potentially more volatile) portfolio debt in total external liabilities.

Gochoco-Bautista, Jongwanich, and Lee (2010) examined the effects of capital control measures on the volume and composition of capital flows using panel regressions for nine Asian economies (China, Hong Kong, India, Indonesia, Korea, Malaysia, the Philippines, Singapore, and Thailand) over the period 1995–2005. They found that capital controls did affect the composition of capital flows, with a stronger impact on capital outflows. However, restrictions on portfolio inflows appear ineffective in deterring inward flows. By contrast, Ahmed and Zlate (2013), in a study covering 12 MICs from Asia and Latin America over the period 2002–12, found that capital control measures introduced in recent years do appear to have discouraged both total and portfolio inflows.

Jongwanich, Gochoco-Bautista, and Lee (2011) examined the impact of capital controls in Malaysia and Thailand during the period 2000–2010. They studied not only the effects of restrictions on the volume of capital flows (aggregate, inflows, and outflows), but also on particular asset categories of capital flows (portfolio, direct, and other investment flows). They found that restrictions in Thailand had no significant effect on inflows but that liberalization was effective for outflows, particularly foreign direct investment (FDI). This result is consistent with Gochoco-Bautista, Jongwanich, and Lee (2010). In Malaysia, capital relaxation had a significant impact on inward FDI and portfolio inflows. In another study on Thailand, Abhakorn and Tantisantiwong (2012) focused on the impact of the Unremunerated Reserve Requirement (URR). They found that although the URR was successful in reducing the total of net capital inflows and altering their composition toward long-term investment, it was unsuccessful in reducing the accumulation of short-term private external debt.

Other econometric studies on the effectiveness of capital controls covering four MICs during the 2000s (Brazil, Columbia, Korea, and Thailand), as reviewed in Habermeier, Kokenyne, and Baba

(*continued on next page*)

Box 6. (*continued*)

(2011), confirm that controls had mixed success in mitigating currency appreciation.[a] In the same vein, Jongwanich, Gochoco-Bautista, and Lee (2011) found that changes in capital account restrictions had no significant impact on the real exchange rate in Malaysia and Thailand. Abhakorn and Tantisantiwong (2012) also found that the URR in Thailand was not completely effective in stabilizing the exchange rate. Glick and Hutchison (2011) found that capital controls were not very effective at preventing currency crises either.

Overall, the evidence suggests that capital controls appear to have had little effect (or, at best, a small effect) on the overall level of capital flows, although they may have had some success in altering the composition of these flows. More generally, the ability to implement such controls in many MICs remains limited. In particular, in countries that have pursued trade integration but have not sufficiently increased resources spent on monitoring and enforcement of capital controls, the effectiveness of these controls has eroded quickly due to increased opportunities for capital flight.[b]

[1] Habermeier, Kokenyne, and Baba (2011) also found that prudential measures appear to have had more success in stemming credit growth and addressing financial stability concerns than capital controls. However, this view is not shared here, as discussed earlier in the context of the pre-crisis experience in Latin America.
[2] To address this issue, Kawai, Lamberte, and Takagi (2012) advocate a regional approach to capital controls in the case of Asian countries. However, the practical difficulties involved should not be underestimated.

It also appears that the effectiveness of any given measure gets eroded over time, as markets find new ways to circumvent the legislation. Nevertheless, temporary effectiveness may well be all that policymakers need when faced with sudden floods and when neither monetary policy nor macroprudential policy can respond quickly.

In addition, much of the existing literature has explored the use and effectiveness of controls in a context where preventing crises (rather than mitigating instability) is a key policy objective. Some of the recent evidence suggests that capital controls have proved effective, at least to some extent, in improving macroeconomic stability; but the question that remains unanswered is the extent to which they can help to improve financial stability, and if so, under what conditions. Some types of capital controls (e.g., exposure limits on foreign currency borrowing, or reserve requirements on foreign currency deposits in domestic banks) are tantamount to prudential measures—which are especially important when gross capital inflows are intermediated through the regulated financial system.

Financial Stability and Monetary Policy Credibility

Under imperfect credibility, inflation is a weighted average of past inflation and the inflation target. Depending on the relative weight attached to these two components, convergence to the target following a shock that raises inflation can be very slow. A high degree

of inertia may therefore require large and prolonged movement in the policy rate to return expected inflation to target, in the process raising the output cost of disinflation. At the same time, if preference for output is high, convergence would tend to be even slower. If the degree of inertia (the weight attached to past inflation) is itself a function of how long inflation deviates from the target (as noted earlier), a longer convergence period could seriously weaken credibility. In turn, this could impart greater inertia to inflation expectations and further exacerbate the loss of credibility.

Suppose then that, to begin with, the central bank lacks credibility. What is the implication of adding a financial stability objective to monetary policy in that context? It may well confuse markets, weaken the perceived commitment to price stability, and destabilize expectations—thereby making it more difficult to maintain low inflation. Under such conditions, there may be a *stabilization cost* associated with using monetary policy in a proactive manner. Consider again the case where policymakers are faced with a negative demand shock that lowers both output and inflation. In an IT regime, the correct policy response is to lower the policy rate; there is no trade-off between macroeconomic objectives. But if low interest rates promote risk-taking motivated by a "search for yield", a conflict between macroeconomic and financial stability objectives emerges: keeping interest rates high means that the risk of deflation must be accepted.

To address this trade-off, some observers have proposed lengthening the horizon for achieving the inflation target. This is the same response typically advocated in the case of a (persistent) supply shock, which entails a trade-off between output and inflation. However, concerns about systemic risk, which includes both time and cross-sectional dimensions, may be difficult to convey to agents, unlike other worries (e.g., the inflationary impact of an oil price shock). Indeed, even though substantial progress has been achieved in recent years, there is still no consensus on defining "financial stability" and how to measure it in its various dimensions. If so, lengthening the target horizon may have adverse effects on inflation expectations and central bank credibility. Similar reasoning suggests that allowing instead a wider fluctuation band for the inflation target could have equally adverse effects on credibility.

At the same time, however, it is important to recognize that whether adding a financial stability objective may adversely affect central bank credibility depends in part on initial conditions. If, for instance, inflation is initially above target, a rise in the policy rate motivated by systemic risk concerns may actually be beneficial. What the "credibility problem" means is that there are new challenges for central banks in terms of *transparency* and *communication* of its policy decisions, and the indicators upon which they are based. However, the problem is not insurmountable. After all, when some central banks in MICs initially adopted a measure of "core" inflation as opposed to headline inflation as their measure of price stability, they faced significant problems in conveying to the public

the nature of their objective and the reasons for making a particular choice. Over time, with communication improving, these issues became better understood. Today, even in countries where the inflation target is based on a headline consumer price index, inflation reports routinely present and discuss alternative measures of core inflation. There is no reason to believe that the same may not occur with a financial stability target—even though, as noted earlier, there is no consensus yet on how to measure financial stability. A good point of departure would therefore be to begin with a definition of financial stability as a final target. Because the concept has proved elusive, this is not a simple task; a sensible strategy perhaps is to follow an *operational* approach and respond to an *intermediate financial target*, as discussed in the next section.

An Assessment

The foregoing discussion suggests that, under a wide range of circumstances, macroprudential policy and monetary policy should be viewed as complements in affecting macroeconomic and financial stability. Macroprudential tools have at times proven effective in containing booms, and more often in limiting the consequences of busts, thanks to the buffers they help to build. Their more targeted nature limits their costs, although their associated distortions, should these tools be abused, can be severe. Circumvention has often been a major issue, underscoring the importance of careful design, coordination with other policies (including across borders), and close supervision to ensure the efficacy of these tools. Moreover, because the performance of several of the new macroprudential tools is not well established, there is a good case, *if only for a transitory period* (during which a better understanding of these issues can be acquired), to rely also on monetary policy to address financial stability concerns. This implies a need to closely coordinate the use of macroprudential and traditional monetary policy tools. We refer to this new regime as *integrated inflation targeting* (IIT).

More formally, we define IIT as a flexible IT regime in which the central bank's mandate is explicitly extended to include a financial stability objective, the policy interest rate is set (possibly in a state-contingent fashion, to reflect a hierarchical mandate or to minimize policy errors) to respond directly to excessively rapid credit expansion, and monetary and macroprudential policies are calibrated *jointly* to achieve macroeconomic and financial stability. This calibration should be conducted in macroeconomic models that properly account for the fact that macroprudential regimes may alter the monetary transmission mechanism.

Designing and Implementing Integrated Inflation Targeting

This section considers some issues associated with the design and implementation of IIT. The first is the need to strengthen our understanding of the monetary transmission mechanism in MICs, especially with respect to the impact of macroprudential rules (including bank capital regimes). Second, we consider issues associated with the formulation of an augmented Taylor rule in the context of IIT, and the practical implementation of that rule.

The Monetary Transmission Mechanism Once Again

Efforts to understand and quantify the transmission process of monetary policy in MICs have in part been related to the transition to flexible exchange rates and the adoption of IT as a monetary policy framework. It was recognized early on that for an IT regime to work, the central bank needed to establish an inflation forecast and set its monetary instrument so as to steer inflation toward the announced target. To achieve that, the monetary transmission mechanism needed to be better understood. But the foregoing discussion suggests that if multiple instruments are indeed going to be used to achieve macroeconomic and financial stability, renewed effort is needed to understand their interaction in the context of the transmission process of monetary and real shocks. Doing that requires using policy-oriented models that are appropriate for the economic environment of MICs. The reason is that using mispecified models may lead to policy mistakes. This is a fairly broad point. It means that in an IT context, where the policy interest rate is set on the basis of a model-generated inflation forecast, using a model that does not adequately capture the channels through which macroprudential regulation affect the monetary transmission mechanism may generate biased inflation forecasts and may lead as a result to policy errors.

As noted earlier, financial market imperfections remain pervasive in most MICs and cover a broad spectrum. The importance of banks and bank credit means that it is important for policy-based models to account for their macroeconomic role in the transmission of policy and exogenous shocks. In particular, because banks continue to play a dominant role in the financial system in MICs, the use of macroeconomic models that account for credit market imperfections is essential to study the effectiveness of monetary and macroprudential policies and how these policies interact. However, there has been only limited progress in developing models with bank- dominated financial systems.[1]

Box 7 describes an approach to bank-based economies that was developed initially by Agénor and Montiel (2008a, 2008b). It emphasizes the determination of the risk premium and its link with collateral and balance sheet effects along the lines of Bernanke and Gertler (1989) and Bernanke, Gertler, and Gilchrist (2000)—that is, a financial accelerator mechanism. An implication of the type of credit market imperfections described earlier in this study is that a large majority of small and medium-size firms (often operating in the informal sector) are simply squeezed out of the credit market, whereas those that do have access to credit—well-established firms with "traditional" connections with specific banks—face an elastic supply of loans and borrow at terms that depend on their ability to pledge collateral. Thus, credit rationing (which results fundamentally from the fact that inadequate collateral would have led to prohibitive rates) is largely exogenous in normal times. Put differently, this analysis takes an *insider-outsider view* of credit markets; while outsiders have no access to bank credit at all, insiders face a perfectly elastic supply of loans at the prevailing loan rate. However, even with "connected" lending, actual collateral ratios may be quite high. Average collateral values in percent of loans can be well above 100 percent in many developing countries—reflecting perhaps a weak judiciary environment and high recovery costs, as noted earlier. This approach implies an inverse correlation between fluctuations in economic activity and bank lending spreads. In good times, collateral values tend to be high and balance sheets are healthy, inducing banks to charge a lower premium above the cost of borrowing from the central bank. This is well illustrated in Figure 25 for the case of Brazil.[2] Another feature of credit markets in

[1] A variety of analytical approaches, focusing on financial systems in which marginal suppliers of credit are no longer commercial banks and deposits are no longer the most important (marginal) source of funding, have been developed in recent years for industrial countries. Woodford (2010) reviews some of them and concludes in favor of using credit spreads as an additional determinant of the policy rate in the Taylor rule. However, the evidence suggests that broader credit channel variables may be warranted. Some emphasis has also been put on the risk-taking channel (Borio and Zhu 2012). See BCBS (2012a and b) for a broader review.

[2] Using data for corporate bond markets, Mizen and Tsoukas (2012) offer evidence for Indonesia, Korea, and Thailand that balance sheet indicators of creditworthiness affect the external finance premium. Moreover, the premium is more sensitive to firm-level variables during recessions and sudden stops than other periods.

Box 7. Credit Market Imperfections and the Monetary Transmission Mechanism

In many of MICs the "credit channel" plays an important role in the monetary transmission mechanism. A good starting point to understand the role of credit markets and their imperfections in the transmission mechanism is the simple analytical model developed by Agénor and Montiel (2008a; 2008b, Chapter 7). A key feature of their approach is the explicit account of an important source of imperfection in credit markets, namely, the fact that exposure to idiosyncratic shocks makes borrowers' ability to repay uncertain. In addition, Agénor and Montiel account for the fact that weak insolvency laws and inefficient judicial systems hamper the ability of financial intermediaries to enforce the terms of loan contracts in case of default. As a result, lending tends to be highly collateralized, and the borrowers' net worth has a large impact on the terms of credit. Thus, balance sheet effects play a key role in the transmission mechanism of monetary policy, in the tradition of Bernanke and Gertler (1989) and Bernanke, Gertler, and Gilchrist (2000). Collateralizable wealth does not act as a strict quantity constraint on bank borrowing; rather, it affects the risk premium that banks demand from their customers.[a] At the (premium-inclusive) prevailing lending rate, banks provide all the liquidity that firms need. Nevertheless, because the risk premium varies inversely with the price of physical assets, the model allows monetary policy to generate a "financial accelerator" effect, to the extent that it amplifies changes in collateral values.

A bare-bone, closed-economy version of the Agénor-Montiel framework can be summarized by the following equations:[b]

$$
\begin{aligned}
&(1)\quad i_D = (1-\mu) i_R,\ 0 < \mu < 1 \\
&(2)\quad i_L = i_R + \theta_L, \\
&(3)\quad \theta_L = \theta_L(PK_0/L_0),\ \theta_L' < 0 \\
&(4a)\quad Y^s = \underline{Y}^s, \\
&(4b)\quad Y^s = Y^s(P, i_R),\ \partial Y^s/\partial P > 0,\ \partial Y^s/\partial_{iR} < 0 \\
&(5)\quad C = \alpha_1 Y^s - \alpha_2(i_D - \pi^e) + \alpha_3(D_0 + M_0)/P,\ 0 < \alpha_1 < 1 \\
&(6)\quad I = I(i_L - \pi^e),\ I' < 0 \\
&(7)\quad Y^s = C + I.
\end{aligned}
$$

Equation (1) is an arbitrage equation that relates the nominal deposit interest rate, i_D, to the cost of borrowing from the central bank (or refinance rate), i_R, adjusted for the reserve requirement rate, μ. It is based on the assumption of perfect substitutability between deposits and borrowing from the central bank.[c]

Equation (2) defines the lending rate, i_L, as the sum of the refinance rate and a risk premium, θ_L, defined in equation (3) as being inversely related to the value of the firms' assets (given by the stock of physical capital at the beginning of the period, K_0, multiplied by the price of goods, P) divided by the amount of bank borrowing at the beginning of the period, L_0. The supply of liquidity by the central bank is perfectly elastic at the official rate i_R.

Equations (4a) and (4b) define the supply of goods, Y^s. In equation (4a), supply is exogenous at $\underline{Y}^s$, whereas in equation (4b) it is related positively to the price level (an increase in which lowers the real wage under nominal wage rigidity or imperfect wage indexation, and thus stimulates production) and negatively to the refinance rate, which measures the cost of short-term borrowing from banks to finance labor costs prior to the sale of output. As shown below, to illustrate the financial accelerator effect, equation (4a) is sufficient.

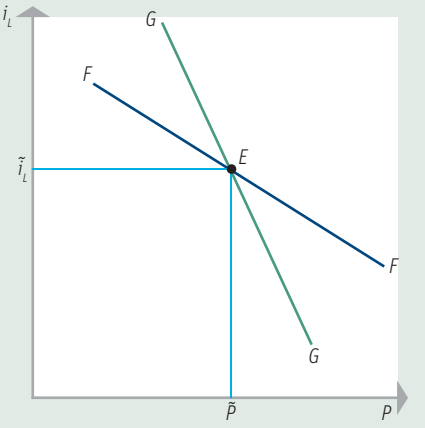
(*continued on next page*)

Box 7. (*continued*)

Equation (5) relates private consumption, C, positively to factor income and real balances (measured by the ratio of the sum of deposits, D_0, and nominal money balances, M_0, held at the beginning of the period, divided by the price level) and negatively to the real deposit rate, given by the difference between the nominal rate and the expected inflation rate, π^e, assumed exogenous. Real balances capture a wealth effect, whereas the real deposit rate captures an intertemporal substitution effect. Equation (6) relates investment, I, negatively to the real bank lending rate, again given by the difference between the nominal rate and the expected inflation rate. Finally, equation (7) equates the supply of goods with aggregate demand (abstracting from government spending).[d]

The determination of macroeconomic equilibrium in this model is illustrated in Box Figure 7.1. Curve *FF*, based on equations (2) and (3), is the financial equilibrium condition in terms of i_L and P. It is downward-sloping because higher prices raise the value of collateral and lower the risk premium. Curve *GG*, based on equations (1) and (4)–(7), is the goods market equilibrium condition in terms of the same variables. It is also downward-sloping because higher prices lower consumption by reducing real balances, which requires an offsetting increase in investment (and thus a lower lending rate) to maintain equilibrium. The intersection of these two curves (at point E) therefore determines the equilibrium values of the lending rate and the price level.

BOX FIGURE 7.1
Goods and Financial Market Equilibrium



Source: Agénor and Montiel (2008b).

Consider an increase in the refinance rate, i_R, and suppose first that output is exogenous. The transmission mechanism is illustrated in Box Figure 7.2. The increase in the refinance rate raises banks' borrowing costs, which induces them to raise the lending rate. As shown in the figure, this leads to an upward shift in *FF*. At the same time, the increase in i_R raises the deposit rate directly, which induces households to save more and spend less today. To maintain equilibrium (given that output is constant) would require therefore a *hypothetical* fall in the loan rate to stimulate investment. Curve *GG* shifts downward.

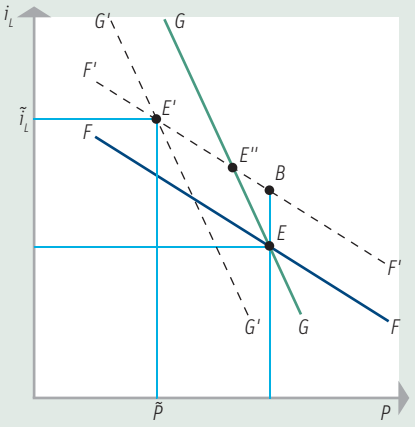
At the initial level of prices, because the *actual* loan rate goes up, the increase in the policy rate lowers both consumption and investment. Excess supply therefore prevails initially on the goods market, and this tends to put downward pressure on prices. During the adjustment process to the new equilibrium, two things happen: first, consumption tends to increase because the reduction in prices creates a positive wealth effect; and second, as prices fall, the value of collateral falls, thereby inducing banks to increase the risk premium and putting further pressure on the loan rate. At the point at which the equilibrium is restored, the loan rate is higher, prices are lower, consumption is higher, and investment is lower. The last two changes exactly offset each other, given that aggregate supply is constant.

(*continued on next page*)

Box 7. (*continued*)

Thus, an important feature of this analysis is that the equilibrium increase in the lending rate can be decomposed into two effects. The first is a direct *pass-through effect*, represented by the movement from *E* to *B* in Box Figure 7.2. The second is a *financial accelerator effect*, represented by the movement from *B* to *E'* in the figure, which results from the gradual increase in the risk premium, itself induced by the reduction in the value of collateral associated with falling prices. Even if *GG* does not shift (which occurs if $\alpha_2 = 0$ in equation (5)), this effect would still be present, as captured by the movement from *B* to *E''*.

BOX FIGURE 7.2
Increase in the Central Bank Refinance Rate



Source: Agénor and Montiel (2008b).

Consider now the case where output is endogenously determined, as in equation (4b). The situation is now more complicated because, in addition to the adverse effects of an increase in i_R on investment (through a higher lending rate) and consumption (through a higher deposit rate), it also lowers output by raising the effective cost of labor. In turn, the drop in output reduces factor income, which compounds the adverse intertemporal substitution effect on private expenditure.

But because both aggregate supply and aggregate demand fall on impact, the lending rate may either increase or fall (at the initial level of prices) to maintain equilibrium in the goods market. Thus, *GG* may now shift either downward (excess supply prevails, as before) or upward (excess demand prevails). If it shifts upward, the net effect is again an increase in the equilibrium lending rate, but now prices will increase, both on impact and during the transition process. Thus, there is now a financial decelerator effect, given that the increase in prices raises collateral values and dampens the initial increase in the loan rate. Nevertheless, output is also lower, implying that a contractionary monetary policy may generate a *stagflationary effect*.

This simple model can be, and has been, extended in a number of directions and used to analyze the impact of reserve requirements, open-market operations, the behavior of asset prices (by introducing land, possibly as collateral), open-economy considerations, dollarization, excess liquidity, and so on (see Agénor and Montiel (2008b, Chapter 6), Agénor and El Aynaoui (2010), and Agénor and Pereira da Silva (2012a)). A dynamic extension, with an endogenous Taylor rule, has also been developed (see Agénor and Pereira da Silva (2011)). In some of these extensions, collateral is measured not in terms of the value of physical capital, as was done earlier, but directly in terms of the fraction of output that lenders can seize in case of default (Agénor and Pereira da Silva (2011), (2012a)). Put differently, these models tend to emphasize a collateral effect, rather than a balance sheet effect per se.

In addition, in the micro-founded, dynamic stochastic general equilibrium (DSGE) extensions of the model (Agénor and Alper (2012) and Agénor, Alper, and Pereira da Silva (2012a, 2012b, 2013)),

(*continued on next page*)

Box 7. (*continued*)

the rate of return on government bonds is endogenous and determined through the equilibrium of the money market. Because the bond rate determines the dynamics of household consumption (through the standard Euler equation), money affects the dynamics of real variables—even under the assumption of separability between consumption and monetary assets in household utility. Thus, compared to the early literature on the New Keynesian model, which often considers only a narrow spectrum of interest rates and ignores the implications of a perfectly elastic supply of central bank liquidity, this approach offers a more complete perspective on interest rate determination and the transmission process of monetary policy.

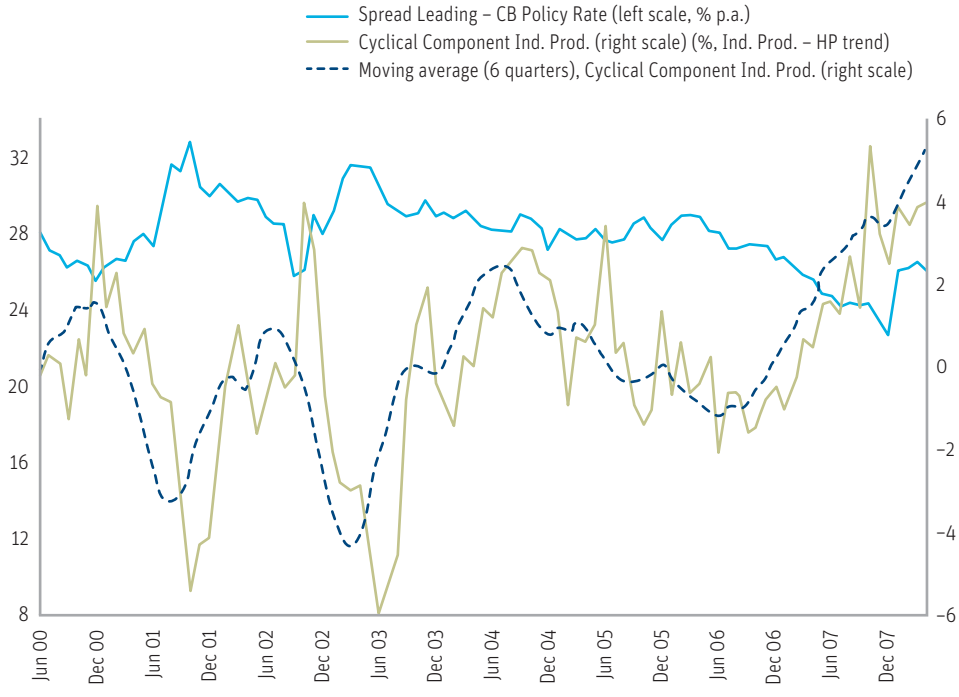
[a] Although *ex post* borrowers do not default, the bank does not know this *ex ante* (because of information asymmetries), and therefore charges a premium.
[b] The aggregate demand relationships considered here, despite being fairly intuitive and consistent with the evidence, are not derived from first principles. As a result, the model is vulnerable to the Lucas critique. However, replacing these empirically-based behavioral relationships by optimization-based, first-order conditions for which knowledge is incomplete or limited does not eliminate the problem. See Caballero (2010) for a more detailed discussion.
[c] Vargas et al. (2010) provide evidence on the impact of reserve requirement rates on market interest rates in Colombia. In particular, they found a positive impact on deposit rates.
[d] The balance sheet of the commercial bank, which is not shown here, is used to residually determine borrowing from the central bank, which in turn (from the balance sheet of the monetary authority) helps to determine the supply of currency. The equilibrium condition of the currency market, which is not shown either, is eliminated by Walras' law. Given that only beginning-of-period monetary assets affect consumption spending (as shown in equation (5)), there is no direct feedback effect from that market anyway in a static setting.

MICs, as also mentioned earlier, is the importance of short-term loans to finance working capital needs, which makes the cost channel an important component of the monetary transmission mechanism.[3] These features are all incorporated in the approach developed in Agénor and Montiel (2008a, 2008b) and its subsequent extensions.

This approach has proved useful to address a number of issues in both closed and open economies. In particular, it has been used by Agénor and Pereira da Silva (2011) to study how reserve requirements and leverage ratios affect the monetary transmission process, and the possibility that they may complement monetary policy when monetary and financial stability goals are at odds with each other.[4,5] It is also used by Agénor, Alper, and

[3] As documented in Agénor and Alper (2012), there is evidence that the cost channel may be significant in some industrial countries as well. See also Fernandez-Corugedo et al. (2011).
[4] As noted earlier, reserve requirements are increasingly used for financial stability purposes, and could be seen as macroprudential to the extent that they help to mitigate liquidity risk.
[5] In a quantitative analysis, Glocker and Towbin (2012) found that a separation of tasks, where the interest rate responds to fluctuations in output and inflation and reserve requirements to fluctuations in loans, appears advantageous, as stabilization losses are small in comparison to a setting where both instruments respond to all variables.

FIGURE 25
Brazil: Interest Rate Spread and Industrial Output Gap, 2000–07
(In percent)



Source: Banco Central do Brasil.

Pereira da Silva (2012b, 2013) to analyze the interactions between monetary and macroprudential policies (in the form of countercyclical capital requirements) in both closed and open economies. The motivation for the open-economy focus is the recognition that the post-crisis global excess liquidity caused by the expansionary monetary policies of advanced reserve-currency-issuing countries has brought to policymakers in many MICs—as well as in small industrial countries like Australia, Sweden, and Switzerland—the challenge of managing large amounts of capital inflows while preserving an independent monetary policy to keep macro and financial stability at home. Indeed, as discussed earlier, sudden floods of private capital have been a source of macroeconomic instability in many of these countries, as a result of rapid credit and monetary expansion (due to the difficulty of pursuing sterilization policies, as discussed in Box 5), real exchange rate appreciation, and widening current account deficits. In particular, the surge in capital flows to Latin America between early 2009 and mid 2011 induced booms in credit and equity markets in many countries and raised concerns about asset price bubbles and financial fragility.[6]

Sustained growth, abundant global liquidity and large interest rate differentials attracted substantial inflows of capital, which led to real appreciation, rapid credit growth, an expansion in economic activity, and pressures on asset prices.[7] At the same time, in many of these countries the scope for responding to the risk of macroeconomic and financial instability through monetary policy was hampered by the fact that higher domestic interest rates vis-à-vis zero interest floors prevailing in advanced economies may exacerbate the flood of private capital. So far, other measures (such as direct taxes on fixed income and equity inflows, and foreign exchange market intervention) have had some success but created other challenges related, in particular, to enforcement of these measures (see Box 6) and the reaction of long-term investors vis-à-vis the overall policy stance.

Box 8, which is based on Agénor, Alper, and Pereira da Silva (2012b), discusses the extent to which countercyclical bank capital buffers can help to preserve macroeconomic and financial stability following a fall in world interest rates. Consistent with the evidence discussed earlier, simulation results show that a sudden flood generates pressure on asset prices and an economic boom—the magnitude of which depends on the degree of credit market imperfections and the nature of the bank regulatory regime. Countercyclical capital regulation, while effective at promoting both macroeconomic and financial stability, exhibits diminishing returns beyond a certain point—essentially because regulatory-induced volatility in capital holdings translates into volatility in lending and other macroeconomic and financial variables. In the end, an aggressive countercyclical capital regulatory rule may not be sufficient to reduce the adverse effects of volatile capital flows. This policy may need to be supplemented by other more targeted macroprudential instruments, such as loan-to-value, debt-to-income, and leverage ratios. Thus, a key issue continues to be to identify short-term policy responses that can help mitigate the impact of external financial shocks, in an environment where the use of short-term policy rates is constrained by the need to balance internal and external stability objectives. Looking at different types of macroprudential tools in this context, with perhaps an emphasis on hybrid expectations formation (as in Gelain, Lansing, and Mendicino (2012) or financial uncertainty (as in Williams (2012b)) should remain a high priority on the research agenda on macroeconomic management in MICs. At the same

[6] Under a flexible exchange rate, growing external deficits tend to bring about a currency depreciation, which may eventually lead to a realignment of relative prices and induce self-correcting movements in trade flows. However, sharp swings in capital flows make it more difficult for the central bank to strike a balance between its different objectives. This in turn may lead to exchange rate volatility.

[7] Episodes of large capital inflows in Latin America and elsewhere have not been systematically associated with upfront increases in inflation. A key reason is that in many cases the deflationary effect of the exchange rate appreciation associated with these inflows (especially when a large proportion of intermediate goods is imported) has been very pronounced. As discussed later, in the model presented here this is an important aspect of the transmission channel of external shocks.

Box 8. External Financial Shocks and Bank Balance Sheets

Sudden floods have been a source of macroeconomic instability in MICs on numerous occasions, having led to rapid credit and monetary expansion, inflationary pressures, real exchange rate appreciation, and widening current account deficits. Many central banks in MICs have been confronted in recent years with a key policy dilemma: responding to large capital inflows by raising short-term interest rates runs the risk of exacerbating capital inflows. A key issue therefore is what other policy instruments can be used to mitigate the impact of external financial shocks.

Agénor, Alper, and Pereira da Silva (2012a) focus on the role of macroprudential regulation in mitigating the macroeconomic and financial instability that may be associated with sudden floods in private capital, in particular foreign bank borrowing. Bank-related capital flows have accounted at times for a highly significant share of cross-border capital movements between industrial countries and MICs. There is therefore a risk that capital flows intermediated directly through the banking system may lead to the formation of credit-fueled bubbles and foster financial instability.

Agénor, Alper, and Pereira da Silva (2012a) dwell on the closed-economy DSGE model with credit market imperfections and a risk-sensitive regulatory capital regime (with changes in repayment probabilities feeding into changes in risk weights, and affecting the cost of issuing capital and bank pricing decisions) described in Agénor, Alper, and Pereira da Silva (2012b, 2013). A key feature of that model is a direct link between house prices and credit growth via the impact of housing wealth on collateral and interest rate spreads. This framework is first extended to consider an open economy where capital is imperfectly mobile internationally—an assumption that accords well with the evidence for developing countries (Agénor and Montiel (2008b)). Domestic private borrowers face an upward-sloping supply curve of funds on world capital markets, and internalize the effect of capital market imperfections in making their portfolio decisions. Thus, unlike many existing open-economy New Keynesian models, the external risk premium depends on the individual's borrowing needs, not the economy's overall level of debt. As a result, the domestic bond rate is determined by the equilibrium condition of the money market, instead of foreign interest rates—as implied by uncovered interest rate parity under perfect capital mobility (Agénor (1997, 1998)).

Second, the model considers a managed float and imperfect pass-through of nominal exchange rate changes to domestic prices. Both features are also well supported by the evidence, as discussed earlier.

Third, banks are assumed to borrow on world capital markets, and their borrowing decisions affect the terms at which they obtain funds. At the same time, domestic agents (namely, producers of intermediate goods and capital goods) borrow only from domestic banks. These assumptions are in contrast to many contributions in the existing literature, where it is usually assumed that firms (or their owners, households) borrow directly on world capital markets subject to a binding constraint determined by their net worth.[a]

Fourth, the model considers the role of bank regulation as a policy to mitigate the adverse effects of sudden floods, under the assumption that monetary policy is constrained to follow a standard Taylor rule. The policy takes the form of a Basel III-type countercyclical rule for bank capital, similar to the rule specified in Agénor, Alper, and Pereira da Silva (2013); that is, capital requirements are positively linked to (risky) credit growth gaps. In a way, countercyclical regulation aims to internalize potential trade-offs between the objectives of macroeconomic stability and financial stability. To measure financial stability three alternative measures are used, based on the volatility of asset prices (house prices and the nominal exchange rate), the credit-to-GDP ratio, and the ratio of bank foreign borrowing to GDP.

Numerical simulations show that a sudden flood in foreign capital, induced by a drop in the world risk-free interest rate, generates pressure on asset prices and an economic boom, the magnitude of

(*continued on next page*)

Box 8. (*continued*)

which depends on bank pricing behavior and the nature of the regulatory regime. Banks borrow more on world capital markets in foreign currency and less from the central bank in domestic currency. The inflow of foreign exchange is such that the monetary base expands, and this requires a lower bond rate to maintain equilibrium in the money market. The drop in the bond rate stimulates current consumption and the demand for housing services. In turn, this raises real estate prices, which increases the value of collateral that firms can pledge, and lowers the loan rate, thereby stimulating investment. Sudden floods may therefore generate an economic boom that is magnified by a financial accelerator effect through the impact of the floods on collateral values, banks' balance sheets, and loan pricing decisions.

In this context, countercyclical capital regulation turns out to be quite effective—at least for the shock considered—at promoting both macroeconomic and financial stability. However, the gain in terms of reduced volatility exhibits diminishing returns beyond a certain point—essentially because regulatory-induced volatility in capital holdings translates into volatility in lending and other macroeconomic and financial variables, including foreign bank borrowing and the exchange rate. In the end, an aggressive countercyclical capital regulatory rule may not be sufficient to reduce the adverse effects associated with volatile capital flows. The results suggest that this policy may need to be supplemented by other, more targeted, macroprudential instruments, such as loan-to-value, debt-to-income, and leverage ratios.

A useful extension of this analysis would be to account for household borrowing from banks. Even though it remains low (in proportion of GDP) compared to industrial countries, this component of lending has increased significantly in MICs like Brazil and Turkey in recent years—partly as a result of domestic factors (notably the expansion of the middle class in Brazil) but also partly as a result of large capital inflows.

In Turkey for instance, the expansion of domestic-currency loans has been closely associated with capital inflows. The reason for this expansion stems from the fact that foreign investors were very involved in swap agreements with long maturities. In these transactions, foreigners typically swap their domestic currency holdings (bought in the first place from domestic residents) with foreign exchange held by domestic banks. Foreigners get a fixed rate of return on domestic currency assets during the duration of the agreement, with domestic banks earning LIBOR on their foreign exchange positions. Thus, domestic banks can hedge the currency and interest rate risk by means of these agreements. This allows banks to extend credit in domestic currency at longer maturities, making mortgage loans more affordable for households. Thus, capital inflows not only provided ample foreign exchange liquidity to banks but also the opportunity to transform these funds into longer-term domestic currency loans.

In recent years, capital inflows have also had an indirect effect on credit to households through their effect on expected interest rates. Because of the perception that lower interest rates abroad and strong capital inflows would persist, domestic banks became convinced that domestic interest rates would not increase substantially over time. This prompted them to take more interest rate risk and resulted in a lengthening of loan maturities—thereby stimulating household demand for mortgages and magnifying the boom in credit and output.

Another useful extension of the analysis would be to analyze the role of controls on capital inflows, for instance by introducing a specific tax on bank borrowing abroad. Capital controls, unlike prudential tools, typically involve discriminating between residents and nonresidents. As discussed in Box 6, the evidence on their benefits is mixed; there is no firm support for the view that they can be effective in preventing financial instability and currency crises. In the model described in Agénor, Alper, and Pereira da Silva (2012a), this could be accounted for by assuming that foreign borrowing by domestic banks is subject to a tax.

[a] See Céspedes, Chang, and Velasco (2004), Choi and Cook (2004), Elekdag, Justiniano, and Tchakarov (2006).

time, a broad lesson of the existing literature—which may be equally relevant for industrial countries—is that understanding how macroprudential tools operate is essential because they may significantly alter the monetary transmission mechanism.

An Augmented Taylor Rule for Middle-income Countries

If indeed the balance of arguments is in favor of a more proactive role for monetary policy in an IIT regime—if only for a transitory period, as noted earlier—in addressing financial stability concerns, what should central banks react to? Specifically, what is the form of the optimal interest rate policy rule, beyond accounting for current (or expected) inflation and output gaps? In principle, the optimal rule should be derived from an optimization problem, involving minimizing a policy loss function, subject to a (reduced form) model of the economy. The optimal rule is then derived from the first-order condition of this optimization problem.[8]

A formal analysis is provided in Agénor and Pereira da Silva (2012c), who show that in a simple model consistent with the approach described in Box 7, if expectations of asset prices depend on credit growth, the optimal interest rate rule takes the form of an augmented Taylor rule involving not only the inflation and output gaps but also the growth rate of credit. Disyatat (2010) establishes a similar result (in terms of the central bank reacting this time to asset prices) if the policy loss function explicitly accounts for a financial stability objective. In addition, as discussed in previous sections, and as formally established by Aizenman, Hutchison, and Noy (2011), the loss function may also involve a concern with exchange rate volatility (which may or may not be related to financial stability concerns), which means that real exchange rate gaps would also appear in the augmented rule with an exchange rate pressure variable—a result that is consistent with the evidence for MICs discussed in Box 3. In addition to these analytical results, the numerical experiments reported in Agénor, Alper, and Pereira da Silva (2013), based on a calibrated dynamic stochastic general equilibrium (DSGE) model for a "typical" middle-income country, support the view that a credit-augmented interest rate rule—possibly combined with a countercyclical capital regulatory rule, depending on the central bank's preference for interest rate smoothing—may be optimal for promoting macroeconomic and financial stability.[9]

[8] See Svensson (1997) and Clark, Goodhart, and Huang (1999) for a formal analysis under different expectational regimes.

[9] In DSGE models for industrial countries, Christiano, Motto, and Rostagno (2007) and Christiano et al. (2010) also found that an interest-rate response to credit growth can mitigate welfare-reducing boom-bust cycles in real and financial variables. Gelain, Lansing, and Mendicino (2012), however, found that although such a response can stabilize some economic variables, it can magnify the volatility of others, particularly inflation. From a broader perspective this suggests that there may be diminishing marginal returns in reacting to credit growth, a point that is further discussed in Agénor et al. (2011).

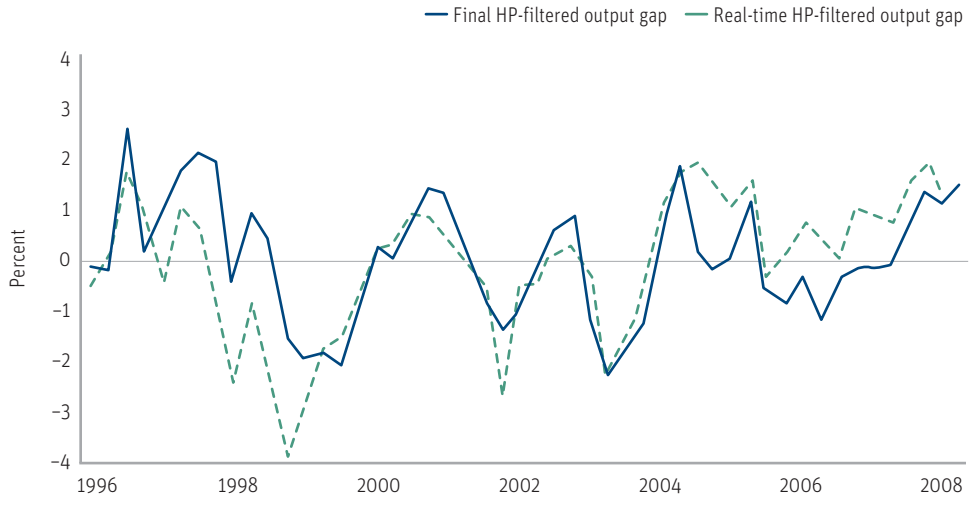
On a practical level, there is much merit in augmenting the interest rate rule in MICs by adding a measure of the *private sector credit growth gap*, defined as the difference between the actual growth rate of that variable and a "reference" growth rate, which needs to be carefully determined as an "equilibrium" rate of credit growth. This would allow monetary policy (which can address only the time dimension of systemic risk) to mitigate accelerator mechanisms that fuel credit growth and inflate asset prices, which are common manifestations of financial imbalances. Excessively rapid credit growth tends to be accompanied by a weakening of lending standards and credit quality, which tends to increase financial fragility in a downturn. Indeed, even though not all episodes of credit booms end up in crises, almost invariably crises are preceded by episodes of credit booms. As discussed earlier in this study, there is indeed robust evidence that credit booms significantly increase the likelihood of an asset price bust or a financial crisis in MICs. In addition, recessions whose origin is the collapse of credit-fueled bubbles— periods during which banks make loans that appear to have abnormally low expected returns— also tend to be more severe and longer lasting than those generated by "normal" monetary policy contractions aimed at curbing inflationary pressures (Claessens, Kose, and Terrones (2011)).

Another important argument for responding to a credit growth gap is that it may be a desirable course of action not only for macroprudential reasons, but also because of the unreliability of real time (preliminary) output gap measures in MICs. By contrast, credit data are readily available and usually subject to only small revisions (if at all) over time. Figure 26 shows output gap measures (with trend output estimated with a standard Hodrick-Prescott filter) based on real-time and final real GDP estimates for Brazil. The figure clearly shows that the differences can at times be quite substantial, with errors going in both directions. Similar results are obtained for other MICs.[10] In the presence of large errors in the measurement of output gaps, it may in fact be optimal to *reduce* the weight attached to that variable in a real time Taylor rule. At the same time, if the credit growth gap is closely related to final estimated output, the weight of that variable should be increased.[11] In practice, many central banks in MICs already pay particular attention

[10] Studies for industrial countries, such as Marcellino and Musso (2011), also find differences in the behavior of revised and unrevised output gaps that can be quite significant, although as argued in that study they are not necessarily due to data revisions.

[11] Scharnagl, Gerberding, and Seitz (2010) made a similar argument with respect to money growth in the euro area. Using numerical analysis, they found that the greater the degree of output gap uncertainty, the greater the benefits of incorporating a money growth response are in terms of reduced volatility in output, inflation and interest rates. They argue that the main reason for this is that real-time data on money growth contain valuable information on the true level of current output growth, which is not otherwise known to policymakers in real time with a sufficient degree of precision.

FIGURE 26
Brazil: Real-time and Final Hodrick-Prescott -based Output Gaps, 1996–2008



Source: Cusinato, Minella, and da Silva Porto, Jr. (2010).

to credit growth in conducting monetary policy—without a doubt because of the importance of banks in the financial system, as discussed earlier.[12]

In a sense, the credit growth gap can be viewed as an *intermediate target*, concerns about which are easier to convey than those about a multi-faceted and hard-to-define final target, financial stability. There appears therefore to be an asymmetry in defining the central bank's policy loss function in an IIT regime, because inflation and output are often presented as final targets. However, stability of both of these variables can be viewed also as intermediate targets that are related to the final target of *macroeconomic* stability. In any case, because of the difficulty of defining financial stability as a final target (at least in the current state of affairs), using an intermediate target that is easier to define may facilitate communication with the public and alleviate, to some extent, the credibility issues mentioned earlier.

Implementing the Credit-Augmented Rule

The practical implementation of this augmented inflation gap-output gap-credit growth (or IOC, for short) policy rule needs of course to be thought out carefully. A first issue is whether the central bank should consider a real or a nominal credit gap, and whether it

[12] The Central Bank of Turkey for instance closely monitors the change in credit in proportion to GDP.

should consider a broad measure of aggregate credit or only a component of total credit. Working capital loans are related to changes in the supply side, not the demand side, of the economy. If the credit growth gap is to be used in part as a substitute for the output gap as a measure of excess aggregate demand, it might be argued that these loans should be excluded from the measure to which the central bank should respond to. However, it may also be argued that working capital loans are substitutes for firms' internal resources (or cash flows), which can now be used to finance longer-term investment—thereby indirectly affecting aggregate demand. This would militate in favor of using a broad credit aggregate. Fungibility and evergreening problems are also important considerations in choosing between narrow and broad measures.

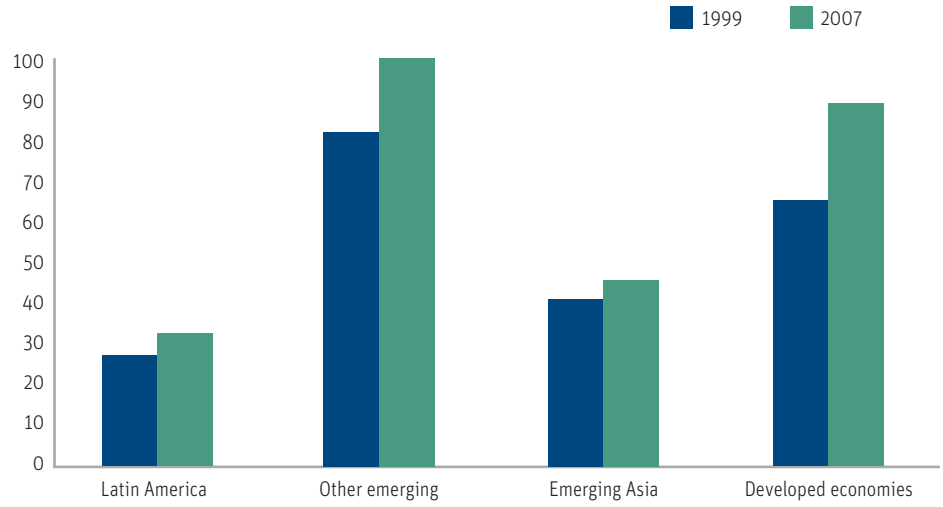
A second issue is whether the "reference" growth rate should be calculated as a trend (as proposed, for example, in the calculation of the countercyclical capital buffer under Basel III, see Basel Committee on Banking Supervision (2011)) or rather on the basis of an equilibrium credit-to-GDP ratio that is related to some fundamental determinants, such as population growth, urbanization, and so on. This second approach may be more appropriate for MICs, because it would help to account for financial deepening and inclusion—an important consideration for many countries where the scope of the formal financial system, and access to credit and other financial services, are limited to begin with. The view here is that financial inclusion, by reducing reliance on the unregulated financial system, and increasing opportunities for risk sharing and consumption smoothing, helps to promote financial stability in the longer run (Hawkins (2006)). As shown in Figure 27, particularly for Latin America, the credit-to-GDP ratio is on average relatively low, implying that a "catch up" phenomenon is to be expected. Using a trend measure would be too crude to determine the equilibrium value of credit growth. As was illustrated in Figure 4, the credit-to-GDP ratio also remains low in Turkey.[13]

At the same time, it is important to keep in mind that the credit growth gap is still a noisy indicator; false signals are inevitable and may raise the risk of policy errors. A policy response should therefore contain an *escape clause* and be contingent on the *magnitude* of the credit growth gap. In so doing, the primacy of the macroeconomic stability objective in "normal times" would be maintained and credibility problems would be mitigated.

A third issue relates (again) to credibility and the possible disruption in the formation of expectations that the introduction of a modified reaction function for the central bank may cause among market participants. The introduction of a new policy regime

[13] To determine equilibrium credit growth, a good starting point could be the econometric framework developed by Guo and Stepanyan (2011) applied not to panel datasets but to individual countries, as in Tan (2012). Fundamentally, therefore, the issue is an empirical one.

FIGURE 27
Credit to Private Sector, Selected Country Groups, 1999 and 2007
(In percent of GDP)



Source: Rennhack (2009).

rule is always a delicate issue because part of the process of anchoring inflation expectations depends on market participants becoming progressively familiar with it, including the monetary authority's reaction function. An important component of this process has been the markets' ability to replicate the central bank's inflation forecasts using their own projection models. Another is the ritual (the Monetary Policy Committee meetings) through which the central bank's analysis and policy stance is communicated to markets. Its periodicity allows markets to conduct their own analysis within a well-known timeframe, absorb policy signals, and use the information available on the state of the economy to feed their own forecasting tools. Credibility is built through this complex interaction when market forecasts of both inflation and the predicted reaction by the central bank match to a significant extent what actually happens. Naturally, the convergence process may be noisy (due to differences in model specification and assumptions, calibration problems, and so on), but for it to occur markets must develop a reasonable understanding by markets of when and how the central bank will react. In that sense the shift to an IIT regime must be accompanied by a significant effort to maintain transparency in the monetary policy process and improve communication with the public.

Summary and Policy Lessons

A key issue on the agenda of policymakers in high- and middle-income countries alike relates to the roles of macroprudential policy and monetary policy in mitigating procyclicality and promoting macroeconomic and financial stability. This study has provided a broad discussion of this issue from the perspective of upper middle-income countries (MICs), where banks continue to dominate the financial system and bank credit plays a critical role both on the supply and demand sides of the economy. As background for the analysis, the study provided a review of financial systems in MICs (with a focus on the role of bank credit), the domestic effects of capital flows, and the link between credit and financial crises. The third and fourth parts of the study reviewed the objectives and evidence on the performance of IT regimes in these countries. The fifth part discussed a number of challenges that IT has faced in recent years, and continues to face, especially with respect to exchange rate flexibility and adding an explicit financial stability objective to monetary policy. The issue of complementarity between macroprudential regulation and monetary policy, in the context of an "integrated" IT (or IIT) regime, was taken up next. The nature of a monetary policy rule in an IIT regime—assuming that a more proactive role is desirable—was discussed from an operational standpoint, in the context of renewed effort in understanding the monetary transmission mechanism.

The main policy lessons of the analysis can be summarized as follows. From the perspective of achieving economic (macroeconomic and financial) stability, monetary policy and macroprudential policy are largely complementary. During episodes of high credit growth, for instance, combining higher capital requirements, loan-to-value ratios, and increases in interest rates may be more effective to mitigate financial risks. On balance, there is a good case for monetary policy in MICs to be more proactive and address the time dimension of systemic risk—if only during a transitory period, as more is learnt about the implementation and performance of the new macroprudential rules that are currently being discussed, as part of the Basel III agreement. Monetary policy

should follow a rule based not only on output gaps and inflation, but also on credit gaps in the context of an integrated IT (IIT) framework. Specifically, IIT was defined as a flexible IT regime in which a) the central bank holds an explicit financial stability mandate; b) the policy interest rate responds directly (possibly in a state-contingent fashion) to excessively rapid credit growth; and c) monetary and macroprudential policies are calibrated *jointly* to achieve macroeconomic and financial stability. At the same time the implementation of an IIT regime requires careful preparation in terms of modelling tools and communication strategies in order not to avoid adverse effects on monetary policy credibility.

There are indeed robust arguments in favor of monetary policy in MICs reacting to a measure of credit growth gap—rather than asset prices—to mitigate systemic risk. The credit growth gap acts as an *intermediate target*. This might require modeling instruments (to determine an "equilibrium" reference growth rate and not just a "trend" obtained by statistical filters) but it is surely easier to explain to the public than the more elusive final target of financial stability. By making the policy response contingent on the magnitude of the credit growth gap itself, the primacy of the macroeconomic stability target in "normal" times would be maintained and credibility problems mitigated. Another important argument for responding to the credit growth gap is the high degree of uncertainty in these countries about real-time estimates of the output gap. In that sense, the credit growth gap may act also as a more reliable proxy for excess aggregate demand. In fact, there is evidence that central banks in MICs have long paid attention to credit growth indicators for that reason.

In countries considering an extension of the mandate of the central bank to officially reflect a financial stability objective, whether hierarchical or concurrent with price and output stability, there is a risk of confusing markets and weakening credibility at first, given the lack of a reasonable consensus around the definition of "financial stability." This cost could be large in countries where the central bank's commitment to low inflation remains fragile. However, the cost does not need to be permanent if sufficient effort is made to explain a) the reason(s) for the change in mandate to the public and the reasons why there should be a more prominent focus on credit growth developments; and b) the contingent nature of the monetary policy response. Improving transparency and communication is thus essential for the performance of an IIT regime. Naturally enough, the change in the official mandate of the central bank, should it be made, should occur in a stable economic and financial environment.

Depending on the nature of economic shocks, some types of macroprudential tools (especially countercyclical capital buffers and dynamic loan loss provisioning systems) can act as complements to monetary policy. This complementarity is particularly important during episodes of sudden floods (large inflows of capital) induced by external

shocks, in which case the scope for raising policy interest rates to maintain macroeconomic stability may be limited. Under such conditions, countercyclical macroprudential tools, as well as capital controls, may be essential to alter the composition of capital inflows away from volatile short-term flows and to prevent the build-up of financial vulnerabilities. More generally, because monetary policy cannot address the cross-section dimension of systemic risk (i.e., how risk is distributed within the financial system at a point in time), a combination of these two policies is inescapable. At the same time, experience with some of the new macroprudential tools that are currently being contemplated (including countercyclical capital buffers, dynamic loan loss provisions, minimum liquidity coverage ratios, and so on), and *interactions* between these tools, is limited and require careful evaluation before being deployed—especially in those MICs where regulatory and supervisory capacity may be limited.

In addition, mitigating exchange rate variability has remained a major concern for MICs—in most cases from the very moment they implemented an IT regime. To alleviate this concern, and because the scope for sterilized intervention has proved limited, there may be a need for the monetary authority to react to real exchange rate changes as well, although perhaps in a more symmetric way. In fact, the experience shows clearly that for the past few years this is precisely what central banks have been doing in MICs, for a variety of reasons—which include concerns with competitiveness and financial stability considerations. At the same time, the magnitude of the coefficients attached to the credit growth gap (and possibly the exchange rate) in the reaction function of the central bank, need to be calibrated jointly (as noted earlier) and carefully, in the context of models that account for financial market imperfections, and for the fact that macroprudential policy regimes may alter the way the monetary transmission mechanism operates. The joint calibration of monetary and macroprudential policies is a key aspect of an IIT regime.

A strong fiscal position is also important for the performance of an IIT regime, for two main reasons. First, as discussed earlier, population ageing and pension needs may put considerable pressure on fiscal accounts in many MICs in the coming years. If adequate reforms are not implemented to mitigate the fiscal burden associated with these liabilities, concerns about public debt sustainability and the extent to which deficits tomorrow may be monetized could affect inflation expectations today—thereby weakening the signaling effect of inflation targets and hampering the ability of monetary policy to anchor inflation expectations. In turn, if higher inflation expectations push market interest rates higher today, this could worsen fiscal imbalances and limit the ability of monetary policy to manipulate interest rates, especially in downturns. Anchoring beliefs about medium-term fiscal positions (through formal fiscal rules, pension reform, independent fiscal councils, and so on) may therefore be crucial for the conduct and performance of monetary policy today. Second, strong public sector accounts may provide some fiscal

space for policymakers to step up and mitigate the risks associated with large and volatile capital flows when needed. In some MICs, the degree of flexibility in budget outlays may be rather limited (given the high share of wages and other nondiscretionary spending), and delays for approving and implementing fiscal policy changes may be unduly long, given their often politically contentious nature. In others, however, there may be a significant scope for a timely, countercyclical response. By helping to reduce aggregate demand and real exchange rate pressures during episodes of booms and downswings (sudden floods and sudden stops), fiscal policy may serve as an important complement to monetary policy.[1] A comprehensive framework that comprises both monetary, fiscal and macroprudential policies might therefore be the best way to secure both price and financial stability in MICs.

Finally, there are several practical operational issues—in addition to those already mentioned, such as communication and transparency requirements, and the need to develop a proper methodology for estimating credit gaps—that need to be addressed to make an IIT regime operational. The first is at the level of the instruments themselves: what macroprudential tools, specifically, should monetary policy be coordinated with? This is a difficult question to answer at this stage because these tools cover a relatively wide range and because some of them (as noted earlier) have not yet proved their effectiveness in terms of mitigating procyclicality of the financial system. In addition, the effectiveness of some of these tools may depend on the state of the economy, the source of instability, or the institutional environment. The best practical combination of tools may thus vary over time and across countries.

The second issue is the institutional setup that would best promote the coordination between monetary and macroprudential policies. Various institutional arrangements are being put in place at the moment, in both high- and middle-income countries, and broad lessons are not yet available. Nevertheless, what is clear is that if monetary and macroprudential policies must indeed be determined jointly, as should be the case under the IIT regime defined earlier, coordination between the central bank (or its Monetary Policy Committee, MPC) and the macroprudential authority (or its Financial Stability Committee, FSC) must be very close and the ritual of their communication to markets carefully thought through. In particular, a ritual similar to that of the MPC for the FSC would help to signal to markets the current stance of policymakers vis-à-vis the objective of financial stability and improve the predictability of the macroprudential regulation

[1] Indeed, in the immediate aftermath of the global financial crisis a number of MICs (especially in Latin America) implemented an aggressive countercyclical fiscal policy, just as in advanced economies. Estimates suggest that the fiscal impulse, measured by the change in the cyclically- and commodity-adjusted primary budget balance, amounted to 0.7 percent of GDP in Brazil and reached more than 5 percentage points of GDP in Chile in 2009. See Daude and Melguizo (2011). *http://voxeu.org/article/fiscal-policy-latin-america-space-manoeuvre*.

regime. The regularity of these meetings, and transparency in their outcomes, would be important for markets to understand and foresee changes in the regulatory stance, as well as their implications for inflation and economic activity.

The third issue is related to the target horizon for price or macroeconomic stability, on the one hand, and financial stability, on the other. In several IT-MICs (such as Brazil, Ghana, and Turkey), inflation targets are set on an annual basis, as a point value plus a tolerance band (see Hammond (2012)). They therefore carry a temporal dimension, which provides some flexibility to the central bank to react to anticipated changes in the process driving inflation or the nature of shocks that may affect it. By contrast, financial stability is a continuous target. A question that arises then is whether such a dichotomy should be maintained in an IIT regime, and if not how costly would be the loss of flexibility that countries would face by moving to two continuous targets.

The fourth issue is how credibility should be measured in an IIT framework. As discussed earlier, common measures of credibility in a standard IT regime are based on the volatility of inflation expectations and the degree of persistence in (actual and expected) inflation over time. However, if financial stability becomes also an objective of the central bank, an adequate measure of credibility should involve also a measure of progress (or lack thereof) with respect to financial stability, not only price stability. In addition, if the financial stability objective is hierarchical as opposed to concurrent with the objective of macroeconomic stability, a proper set of weights— which should presumably reflect social welfare considerations—must be developed to measure overall credibility. These are difficult questions but ones that the profession must tackle head on in the coming years to be able to eventually evaluate the performance of IIT regimes.

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ISBN: 978-1-59782-171-1
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