

Is Inflation Targeting Still on Target? The Recent Experience of Latin America*

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Abstract

This paper reviews the recent experience of a group of Latin American inflation-targeting (IT) nations. We document repeated and large deviations from the standard IT framework: exchange market interventions have been widespread; the real exchange rate has often become a target of policy; and other non-conventional policy tools, especially changes in reserve requirements, but occasionally also taxes and restrictions on international capital movements, have come into common use. As in developed nations, during the 2008–2009 crisis, issues of liquidity provision took centre stage. The emerging modified framework of monetary policy is found to have been generally effective during the crisis but raises several important policy questions.

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I. Introduction

Is inflation targeting (IT) still on target? The system has served many countries well over the last couple of decades, but changes may be desirable – perhaps inevitable – if IT is to be just as useful in the next decade or two. That, at least, is what the recent experience of several developed and emerging economies suggests. The reaction to the recent financial crisis involved repeated and large deviations from the standard IT framework. This paper reviews the recent experience of four Latin American IT nations and concludes that some of those deviations may be here to stay.

A simple summary of received wisdom on IT prescriptions might go like this: (a) inflation is the main (perhaps the only) target of monetary policy; (b) authorities use the short-term interest rate (both its current setting and announcements about its future course) to achieve their inflation target; and (c) the exchange rate floats freely. Furthermore, liquidity and prudential concerns belong in the monetary framework, but more in the background than in the foreground, because other (non-monetary) tools are presumably best suited to deal with prudential issues.

In the recent experience of rich and not-so-rich inflation-targeting nations, most of these precepts were thrown out of the window most of the time. In developed countries, the crisis brought the one-target, one-instrument approach to an abrupt end: liquidity and prudential concerns took centre stage and a vast array of non-conventional tools became crucial to the monetary policy toolkit.

In emerging markets (EMs), an analogous but less-documented transformation has taken place. Exchange market interventions have been lasting and widespread. The real exchange rate has often become a target of policy, though this target is seldom made explicit. A different range of non-conventional policy tools – especially changes in reserve requirements for bank liabilities, but also taxes or restrictions on international capital movements – has come into common use. And as in developed nations, liquidity provision took centre stage during the 2008–2009 crisis.

In this paper, we review the experience of four Latin American countries – Brazil, Chile, Mexico and Peru. All these IT nations deviated from the standard framework, though in different ways and using different instruments. We endeavour to document *what* these countries did and to understand *why* they did it.

Based on the country cases, we advance a tentative evaluation of the emerging modified monetary policy framework. We find that in general terms the new approach was effective, at the very least because the region weathered the crisis reasonably well. At the same time, we put forward questions regarding the optimality and effectiveness of the new policy mix.

In detailing country experiences and synthesizing them, this paper complements – and at points challenges – existing general discussions of the prospects of IT after the crisis, such as those provided by Svensson (2010) and Trichet (2013). The paper not only compares several country cases but also discusses events from 2007 on,¹ so its scope is considerably more comprehensive than that of recent studies of emerging economies focusing on only one country or only the crisis period (e.g., Mesquita and Toros 2010 for Brazil or Quispe and Rossini 2011 for Peru).

II. The Conceptual Framework Behind Inflation Targeting

This section provides a conceptual framework to understand the standard components of IT. It also discusses deviations from that standard that may, in turn, call for modifications or enlargements of the prescribed set of policies.

A. The Canonical IT Framework

The canonical framework behind IT has been most convincingly developed by Svensson (1999) and Woodford (2003). Svensson (1999) considers a central bank that at some time T is instructed to minimize a loss function of the form

$$E_T \sum_{s=0}^{\infty} \beta^s L_{T+s}$$

where L_t is a period loss function, often assumed to be quadratic and to depend on inflation π_t and the output gap \tilde{y}_t , as in

$$L_t = \pi_t^2 + \theta \tilde{y}_t^2$$

where θ is a parameter indicating the relative cost of inflation and the output. This is one formulation but certainly not the only one. More generally, L_t may be assumed to be a quadratic function of a *target* vector Y_t .

Svensson assumes that the central bank is constrained by a linear law of motion of the economy

$$\begin{bmatrix} X_{t+1} \\ E_t x_{t+1} \end{bmatrix} = A \begin{bmatrix} X_t \\ x_t \end{bmatrix} + B i_t + \begin{bmatrix} v_{t+1} \\ 0 \end{bmatrix}$$

¹For a similar discussion of events before the global financial crisis, see Chang (2007).

where i_t is the policy instrument (typically an overnight interest rate), x_t a vector of jumping variables, X_t a vector of states, v_t an i.i.d. sequence of shocks, and A and B both matrices.

This setup implies that the optimal policy is given by a system of equations of the form

$$G_T(Y_T, E_T Y_{T+1}, E_T Y_{T+2}, \dots) = 0$$

This system can, in principle, be solved for $Y_T, E_T Y_{T+1}, E_T Y_{T+2}, \dots$, thus yielding an optimal expected path for the target variables. Then the current and future expected values of the policy instrument, $i_T, E_T i_{T+1}, \dots$, can be derived. Svensson (1999) called this solution *inflation forecast targeting* and argued that it resembles actual IT implementation, in which central bankers periodically announce projections for their policy instrument and the resulting expected path of the economy.

An important implication is that any variable not included in the target vector Y_t can affect the setting of the policy instrument i_t if it affects the expectation of the target variables. Indeed, this is the *only* way in which such a variable can affect optimal policy.

It is crucial for the analysis, therefore, to justify the form of the central bank's loss function L_t , and in particular to determine what variables 'should' be included in the vector of targets Y_t . The current approach to this question is based on Woodford (2003), who showed that in the context of the basic New Keynesian framework, the lifetime utility of the representative agent can be locally approximated with a quadratic function of the inflation rate and the output gap. This result, in fact, implies that zero inflation is optimal since, in the basic New Keynesian model, the aggregate supply function depends only on inflation and the output gap, so that zero inflation is also consistent with a zero output gap. This can therefore be interpreted as saying that IT (with a target of zero inflation) is optimal.

Finally, in the canonical New Keynesian model, control of the policy interest rate allows the central bank to choose a point in the inflation-output gap tradeoff given by the aggregate supply equation. That tradeoff is such that the central bank has the ability to make inflation and the output gap both zero by choosing the policy rate appropriately. This result can be used to justify the view that the *conventional policy*, which consists of controlling a policy interest rate, is sufficient for optimality in an IT regime.

B. Departures from the Conventional Wisdom

Both Svensson and Woodford assumed that the central bank chooses policy at T with perfect commitment. Otherwise the usual *time consistency* problem

of monetary policy appears. In fact, the possibility of time inconsistency provides additional justification for IT: IT can be seen as a commitment mechanism that eliminates the *inflationary bias* of monetary policy. The question of whether and how IT is an effective solution to time inconsistency has faded from academic work, but it arguably underlies much of the actual rhetoric justifying IT. The often-heard argument that IT ‘enhances credibility and transparency’ can be interpreted in this light.

Commitment issues aside, the Svensson–Woodford framework delivers clear-cut support for targeting inflation at zero and the conventional policy of setting an interest rate. But extensions of the basic New Keynesian model easily lead to qualifications of that prescription.

B.1. Cost Push Shocks

If the aggregate supply schedule linking inflation and the output gap is hit by an exogenous shock, then it is generally impossible for the central bank to set its policy rate so as to make inflation and the output gap simultaneously zero. Optimal policy, then, involves a tradeoff, resulting in nonzero rates of inflation and output gaps that fluctuate over time in response to exogenous shocks. (This point is developed in Woodford 2003 and Gali 2008, among others.)

An alternative possibility, not usually considered in the literature, is that the central bank could be endowed with a second policy instrument, which together with conventional interest rate management could restore its ability to deliver both zero inflation and a zero output gap.

B.2. The Loss Function

In the basic New Keynesian model, the representative agent’s welfare depends on consumption and labour effort. Then, in the loss function L_t a nonzero output gap indicates a suboptimal tradeoff between consumption and labour, whilst nonzero inflation leads to costly price dispersion. This suggests that modifications of the economy’s structure may imply that inflation and the output gap do not suffice to summarize the welfare of the representative agent.

In particular, Aoki (2001) showed that if a closed economy has two sectors, one that is subject to price rigidities and one that is not, then a correct approximation of welfare must include a relative price of the two goods in addition to inflation and the output gap. This result has been more significant, perhaps, for open economies, where the relevant price is an exchange rate or the terms of trade. In the model of Corsetti and Pesenti (2001), the central bank has the ability to affect the relative world price of exports and thereby raise national welfare. Hence, an approximation of

national welfare should include the real exchange rate or the terms of trade (e.g., De Paoli 2009). More recently, Engel (2011) has emphasized that, if export prices are set in the currency of the buyer (the 'pricing to market' case), deviations from the Law of One Price will occur, leading to inefficiencies. Consequently, a welfare approximation should include a term reflecting exchange rate misalignments.

Similarly, one might ask whether financial prices or credit spreads should be included in the loss function. This question, which seems particularly relevant after the financial crisis, has attracted considerable attention recently. The most notable effort is by Curdia and Woodford (2009), who modify a basic New Keynesian model assuming that agents can be 'savers' or 'borrowers' according to their marginal utility of consumption. If there is a difference or spread between borrowing and lending interest rates, there will be an inefficient wedge between the marginal utilities of consumption of borrowers and savers, and the approximation of the welfare of the average agent must include a measure of credit spreads.

In short, all of these studies suggest plausible reasons why the conventional loss function, which depends only on inflation and the output gap, may have to be modified to include additional variables, notably the real exchange rate or credit spreads. This, of course, weakens the case for the canonical IT framework and conceivably lends theoretical support to observed attempts to influence these relative prices or other variables.

B.3. Transmission Mechanism

If, as in the Curdia–Woodford model, there are several interest rates, the question emerges as to which one is best assigned as the instrument of monetary policy. The importance of this question became patent during the recent crisis, in which several central banks lowered their policy rates to zero, only to see that other rates, such as bank lending rates, barely moved. This was taken to signal a breakdown in the 'transmission mechanism'.

In fact, similar issues have long been considered in the tradition of models of financial frictions, credit constraints and balance sheet effects starting with Bernanke and Gertler (1989). For a similarly modelled open economy, Céspedes et al. (2004) studied whether it is best to control an interest rate or the exchange rate. More recent studies, including Gertler and Karadi (2011) and Gertler and Kiyotaki (2009), emphasize the interaction between collateral constraints and asset prices. In all of these models, the conventional policy instrument (an overnight rate) can be insufficient to steer the economy towards a desired path.

This line of argument justifies the search for alternative, 'unconventional' instruments. Accordingly, Ashcraft et al. (2010) study the effects of two

monetary instruments, interest rates and haircuts, the latter defined as the willingness by the central bank to accept collateral for loans on terms that are more generous than those prevailing in the market. They find that if borrowing constraints take a certain form, haircuts can affect asset prices and hence real allocations.

Again, these arguments are reminiscent of the real-world policies documented below. Several non-conventional policies were justified precisely on the grounds that the transmission or arbitrage mechanisms had broken down, calling for more direct interventions, for instance in the market for bonds of different maturities or the foreign exchange market.

Before moving on, it is worth stressing the possibility and importance of nonlinearities. A prominent example is the fact that nominal interest rates cannot be negative (the zero lower bound). Moreover, in models with collateral constraints, constraints may bind only at some times. These nonlinearities suggest that unconventional policies are necessary and effective only during abnormal times. In the open economy model of Céspedes et al. (2012a), for instance, domestic banks borrow from the world market subject to occasionally binding collateral constraints. In this setting, unconventional central bank policies, including sterilized foreign exchange intervention, affect real outcomes and improve welfare only when the constraints bind.

III. Case Studies

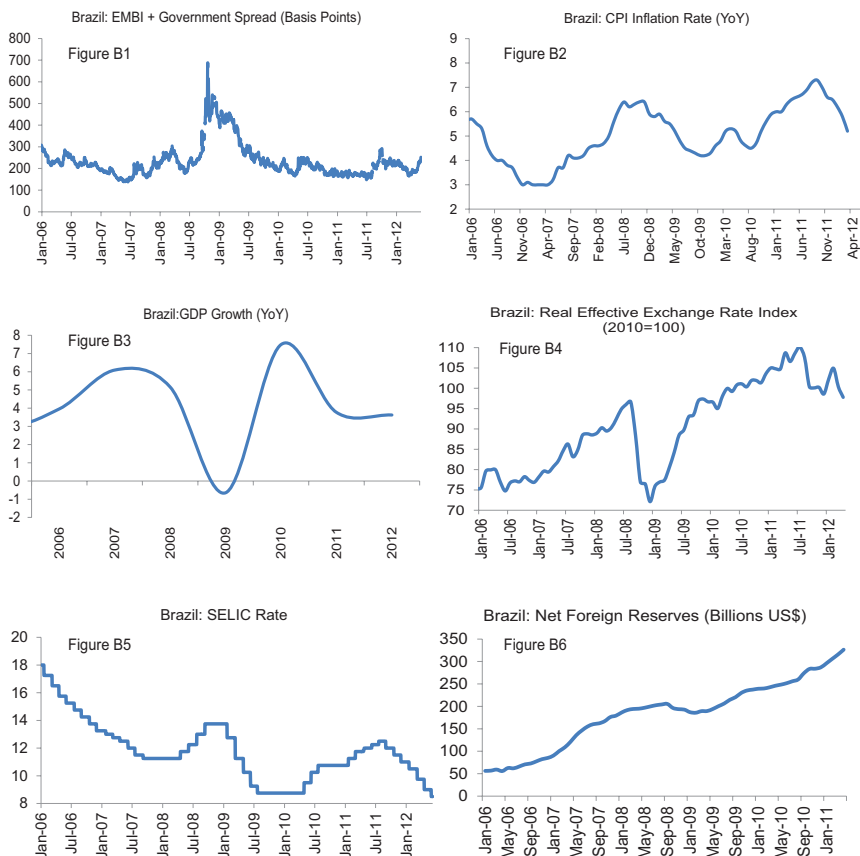
This section describes policy innovations adopted in Brazil, Chile, Mexico and Peru, along with their results. Our sources are monetary policy reports, annual reports, public statements from monetary policy meetings, official press releases, financial stability reports and central banks' databases.²

A. The Experience of Brazil

A.1. 2007 to Lehman

In 2007, Brazil was starting to experience a boom. Brazil international bond spreads (measured by the spread in the J.P. Morgan Emerging Market Bond Index, or EMBI), which had hovered around 400 basis points (bps) in mid-2005, fell to about 200 bps by the beginning of 2007, and kept falling until the middle of 2007, when the global crisis started (Figure B1).

²For a more detailed description of these experiences, as well as the experiences of Colombia and Uruguay, see the working paper version of this study (Céspedes et al. 2012b).



GDP growth in 2006 was 4% and accelerating (Figure B3); it would reach 6.1% in 2007. Investment was strong and foreign capital inflows robust, leading to an appreciating exchange rate (Figure B4). Yet high interest rates pushed inflation down: yearly CPI inflation closed 2006 at 3.14%, exhibiting a clear downward trend (Figure B2).

With a decreasing trend in inflation, the Central Bank of Brazil (BCB) embarked on successive reductions of its policy rate (Figure B5). That short-term policy rate (known as the Selic), which stood at 18% at the beginning of 2006, was reduced in small steps so that it had fallen to 11.25% by September 2007. These Selic reductions were followed by a reversal of inflation trends. Year-over-year inflation began increasing in the second quarter of 2007 (Figure B2).

At the same time, the BCB had engaged in a program of dollar purchases and reserves accumulation since mid-2006, which brought the stock of FX reserves to unprecedented heights (Figure B6). But the impact on the appreciation of Brazil's *real* was insignificant (Figure B4).

Whilst the global turmoil of the first half of 2008 did increase country risk, the effect on Brazil proved to be small. Capital inflows and the appreciation of the *real* continued unabated until September 2008 (Figure B4). Strong activity was coupled with rising inflation (Figure B2 and B3), prompting a reversal of monetary policy. Starting in April 2008, the rate was gradually increased (Figure B5). To discourage capital inflows, a 1.5% tax on foreign purchases of fixed income securities was applied in March 2008; it would remain in place until October 2008. The restriction on fixed income securities signalled the target was short-term inflows, not long-term inflows.

Hence, the BCB adjusted policy interest rates to manage inflation, intervened in the FX market and tried to discourage short-term capital inflows. But at the time of the Lehman collapse, Brazil's inflation was not yet under control, reflecting that policy had not been able to bring down growth and capital inflows to desired levels.

A.2. The Lehman Period

The Lehman collapse resulted in a sudden halt to capital inflows to Brazil. The BCB's main response was to provide liquidity in different ways. The dollar purchases (and reserves accumulation) program quickly became one of dollar sales, both in the spot market and through repo auctions. Since many firms had gone short in US dollar swaps to protect against future appreciation, a sharp depreciation of the *real* jeopardized their financial health. So in October 2008 the BCB announced that it would offer up to US\$50 billion in foreign exchange swaps.

The large war chest available facilitated the BCB's decision to provide ample amounts of dollar liquidity. An October 2008 currency swap agreement between the BCB and the Federal Reserve also helped: although this was not used, market commentary suggests that its availability contributed to calmer markets.

The BCB sought to increase domestic liquidity via a reduction in reserve requirements. This was coupled with incentives in the form of lower requirement ratios for large banks to finance smaller institutions, to battle an observed 'flight to quality' problem.

Furthermore, the BCB changed discount window regulations, extending discount loan maturity and widening the range of acceptable collateral. Finally, it broadened deposit guarantees, which included the creation of guaranteed time deposits.

All of these measures succeeded in reducing market volatility. Notably, the Selic rate was kept unchanged until the start of 2009, when it was reduced gradually.

A.3. Developments Since the Crisis

By the end of 2009, the EMBI spread and the real exchange rate returned to their pre-Lehman levels (Figure B1). GDP growth was -0.3% in 2009 but recovered strongly in 2010, reaching 7.5% (Figure B3). Country risk eased, capital inflows resumed and real appreciation was initially steady: the *real* appreciated by 15% in real terms between the start of 2010 and mid-2011 (Figure B4).

The strong pace of activity was reflected in accelerating inflation, so the BCB raised the Selic rate (Figure B2 and B5). As this fostered the appreciation of the *real*, the BCB reinitiated FX purchases. This proved insufficient once more, and the government reestablished taxes on capital inflows. In October 2009, a 2% tax on foreign purchases of fixed income securities and equities was applied. The tax rate was increased for bonds to 6% in October 2010. And in March 2011, a 6% tax on short-term foreign loans was imposed.

Finally, the BCB raised reserve requirements in December 2010: required ratios jumped from 8% to 12% for cash deposits and 15% to 20% for time deposits.

In 2011, growth slowed down markedly and inflation returned to acceptable levels (Figure B2 and B3). The *real* stabilized, although at a high (appreciated) level (Figure B4).

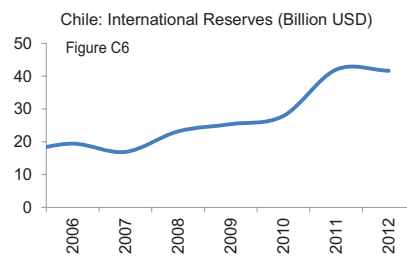
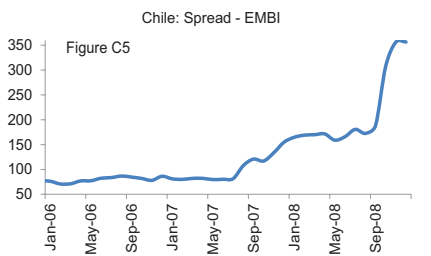
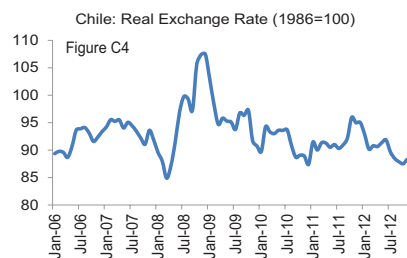
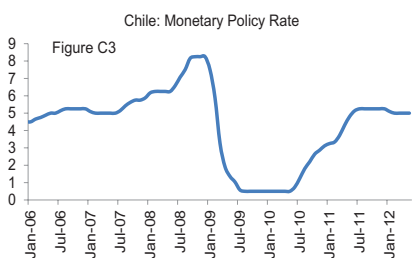
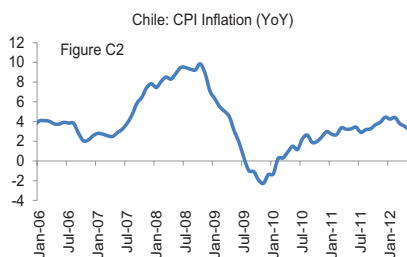
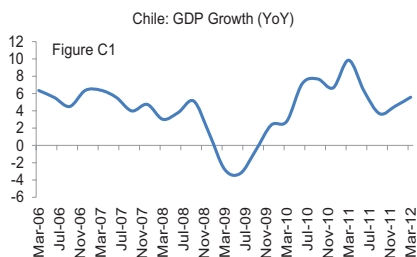
B. The Experience of Chile

B.1. 2007 to Lehman

The exceptional price of copper meant that, at the beginning of 2007, Chile's terms of trade were almost 75% higher than the average for the previous ten years. The economy was growing rapidly: 5.5% in annual terms in the first half of 2007 (Figure C1). GDP growth resulted from expansionary domestic macroeconomic policies and favourable international conditions. The exchange rate appreciated significantly (Figure C4).

At the same time inflation picked up, reflecting increased costs of key imports due to jumps in international food prices and energy prices (Figure C2). The Central Bank of Chile then sought to increase interest rates just enough to avoid second-round effects that could affect inflationary expectations whilst also avoiding additional pressures pushing upward on the exchange rate (Figure C3 and C4). The monetary policy rate was raised by 100 bps in the course of 2007. Annualized inflation, however, went from almost 3% in January 2007 to 7.8% in December 2007 (Figure C2).

With the peso appreciating strongly, in April 2008 the central bank announced a program of international reserve accumulation (Figure C6).



Three months after the announcement, the exchange rate had depreciated more than 12%.

Between January 2008 and June 2008, the monetary policy rate was kept unchanged. Over the same period the annualized inflation rate continued its increase, from 7.5% to 9.5%. At the time of the Lehman panic, inflation therefore seemed like Chile’s main problem.

B.2. The Lehman Period

Starting in late September 2008, the spreads on Chile’s external debt experienced a significant increase, in line with the increase in many other EMs (Figure C5). The squeeze on global banks raised doubts regarding the capacity of the local banking sector to roll over external credit lines. This triggered a sharp increase in demand for liquidity in domestic and foreign currency, which translated into significant domestic interest rate increases. Deposit rates in domestic and foreign currency went up sharply in local markets.

With dollars scarce, at the end of September the Central Bank of Chile announced it would stop accumulating international reserves. It also announced a repo and swap program to provide domestic and foreign liquidity to domestic financial intermediaries. Additionally, the Ministry of Finance transferred assets held abroad to time deposits in local banks.

To ease liquidity pressures on the peso, the central bank complemented these actions by increasing the range of accepted collateral in its domestic currency operations and extending the use of bank deposits as collateral. It also introduced a longer-term mechanism to provide liquidity, based on a line of credit that accepted Treasury bonds, among others, as effective collateral.

These liquidity-provision measures succeeded in reducing deposit interest rates in domestic markets. The interest rate in domestic currency deposits became aligned with the monetary policy rate.

But the policy rate was not reduced (Figure C3). And since domestic financial conditions tightened significantly, domestic demand and investment fell in the first half of 2009. Inflation, which had reached almost 10% in October, dropped quickly as world commodity prices reverted from record highs and the economy slowed down. In less than five months, the inflation rate fell below 2% (Figure C2).

At last, the Central Bank of Chile aggressively cut the policy interest rate during the first half of 2009 (Figure C3). To provide additional monetary stimulus and to align financial asset prices with the path of monetary policy, the bank also created a term liquidity facility for banking institutions and stopped issuing debt instruments of one year or more in maturity.

These measures seemed to have an immediate impact. The swap curve flattened and, with the drop in central bank bond rates, signalled a reduction in the expected monetary policy rate over the relevant policy horizon. Time deposit rates recorded a similar drop.

The economy started to recover rapidly during the second half of 2009. Annualized growth rates reached 7.3% and 8% in the third and fourth quarters of 2009. Financial conditions for households and firms started to normalize.

B.3. After the Crisis

A traumatic earthquake in February 2010 postponed the recovery of the Chilean economy and the central bank initiated a process of normalization of the monetary policy rate in June 2010. The central bank once again announced a process of international reserve accumulation. Unlike during the 2008 intervention, the exchange rate did not depreciate significantly, although the speed of appreciation after the intervention was lower than in the previous months.

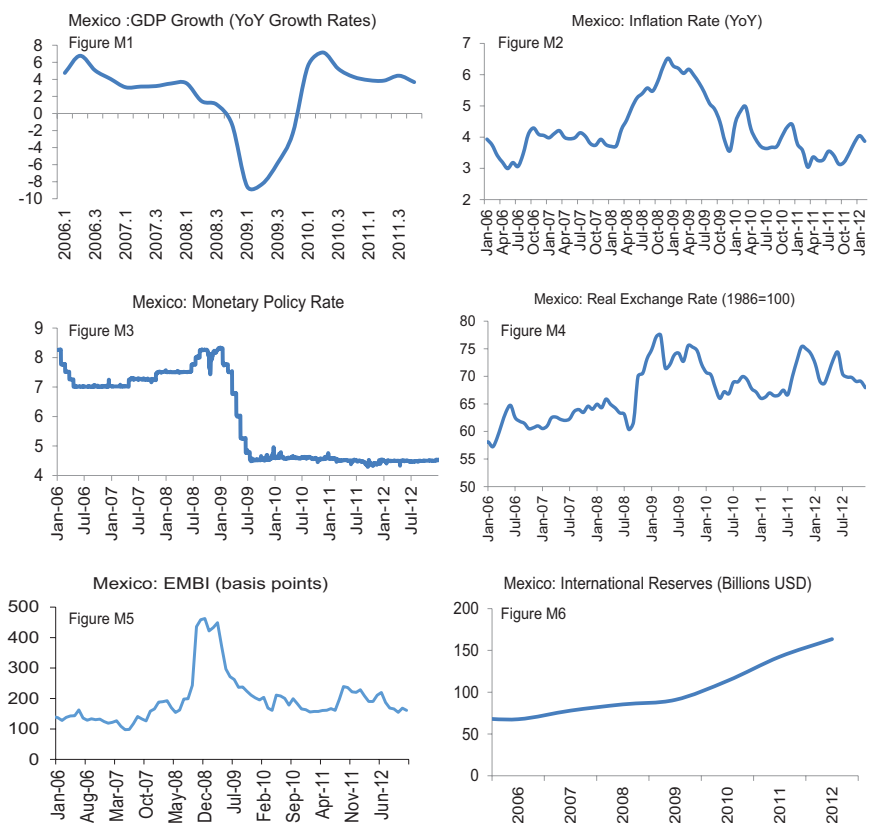
C. The Experience of Mexico

C.1. 2007 to Lehman

By the beginning of 2007 the Mexican economy was decelerating from solid growth in 2006 (Figure M1). Nevertheless, domestic Mexican demand continued expanding at a healthy clip. Inflation, although declining slowly, had surpassed 4%, outside of the tolerance range of Mexico's IT regime (which set a 3% inflation target, with a tolerance band of plus or minus one percentage point) (Figure M2).

Perspectives for 2007 improved around mid-year. To prevent a rise in inflation expectations, Banco de México increased its policy rate (the overnight interbank interest rate) by 25 bps in April and by 25 bps again in October 2007, to reach 7.5% (Figure M3).

But inflation was on the rise. Headline CPI inflation ended the year 2007 at 3.8%, lower than in December 2006. Yet core inflation reached 4%, above the 3.6% in December 2006. This discrepancy clearly reflected a freezing in



the prices of gasoline, gas and electricity decreed by the government in the last quarter of 2007. By June 2008, the inflation rate reached 5.3% in annual terms, up from 3.8% in December of 2007 (Figure M2).

Economic activity only increased 2.8% in annual terms in the first half of 2008, below the 3.8% from the second half of 2007, reflecting the deceleration of the US economy (Figure M1). But the Banco de México considered that the impact on the Mexican economy was limited. Short-run inflation expectations increased, although they remained mostly unchanged for longer horizons. So the central bank kept increasing the policy rate, which had reached 8% by the time of the Lehman crisis (Figure M3).

C.2. The Lehman Period

The uncertainty from the collapse of Lehman Brothers generated a significant increase in long- and medium-term interest rates in Mexico. As investors shifted from longer maturity government bonds to short-term government bonds, the interest rates on ten-year government bonds jumped from around 8.5% to 11.5%.

Foreign currency liquidity dropped significantly in October 2008 due to the strong demand for dollars by institutions trying to meet margin calls or cover their financial exposure. The impact of the shock was magnified by the exposure of large corporations that had engaged in FX derivatives transactions and had open positions such that, in the view of the authorities, a sharp depreciation of the Mexican peso would have caused massive losses.

Fortunately, Mexico had a strong international reserve position as it had been accumulating foreign exchange since 2003 (Figure M6). The authorities could use part of the reserves to curb foreign exchange volatility and reestablish the orderly functioning of financial markets. To reduce the financial stability risks stemming from exchange rate volatility, the (Foreign) Exchange Commission intervened through large-scale and repeated supply of US dollars channelled to the market via auctions. The Banco de México also created new liquidity facilities to support monetary policy by encouraging institutions to transfer excess liquidity to those that lacked it.

The weakening of the world economy, especially in the United States, led to a contraction in Mexican manufacturing exports. The deterioration in the external financial outlook generated uncertainty about the availability of financing for the 2009 current account deficit. To reduce such uncertainty and its effect on the exchange rate market, Banco de México and the government implemented US dollar auctions.

In April 2009, the International Monetary Fund approved Mexico for its Flexible Credit Line facility, making available US\$47 billion for one year. Additionally, the country's central bank began holding US dollar auctions for

Mexican commercial and development banks, tapping into resources from a temporary facility agreed upon with the US Federal Reserve.

As in the other cases reviewed here, Banco de México held its policy rates steady until early 2009. Then, responding to the much-deteriorated outlook for the economy, it began a cycle of deep monetary policy rate cuts, from 8.25% in December 2008 to 4.5% in July 2009 (Figure M3).

After suffering a significant GDP contraction in the first half of 2009, the economy started to recover in the second half of that year. Nonetheless, Mexico ended 2009 with a GDP contraction of 6.1%, the worst performance among the larger Latin American countries (Figure M1). Predictably, in the course of 2009, inflation fell sharply. After peaking at 6.6% in December 2008, inflation in 2009 was just 3.6% (Figure M2).

C.3. After the Crisis

After the significant contraction in 2009, the Mexican economy rebounded strongly, led by the dynamic performance of manufacturing exports and the recovery in US industrial activity at that time. By 2011, domestic demand was starting to pick up as well.

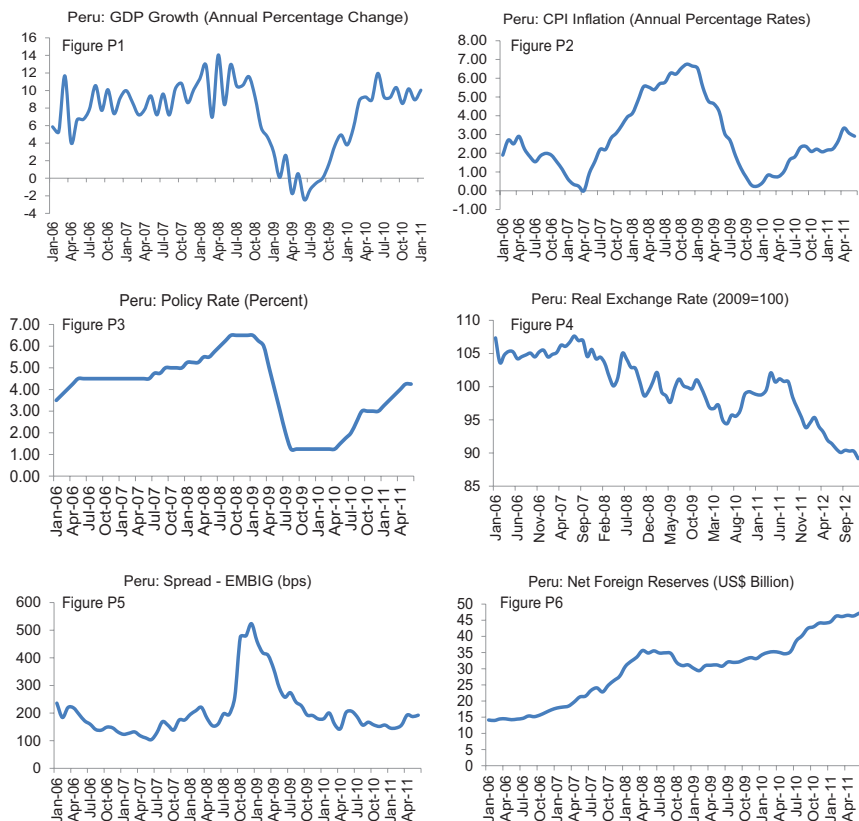
Mechanisms to provide foreign liquidity to the markets were gradually discontinued. In September 2009, the Exchange Commission started to suspend the different US dollar auctions it had put into place earlier.

After years of concerns about the depreciation of the peso, the problem reversed and became one of appreciation. The Exchange Commission decided to intervene in the exchange rate market, announcing the re-introduction of monthly auctions of put options (which entitled holders to sell dollars to Banco de México) in February 2010. The new policy was suspended in November 2011, as sovereign debt problems in Europe caused a nominal exchange rate depreciation of more than 20% between August and October 2011.

D. The Experience of Peru

D.1. 2007 to Lehman

At the beginning of 2007, Peru was experiencing a boom attributable to several factors: a favourable world market for Peru's exports, a reduction in political uncertainty and the continuation of a sound macroeconomic policy environment. The return in confidence was evident from the steady reduction of country risk indicators and a surge in capital inflows. This was a source of several concerns for the country's central bank: the behaviour of credit and the appreciation of the Peruvian sol.



The economy started to display signs of overheating. GDP growth, which had weakened some in 2006, returned to the 8–10% range (Figure P1). The inflation rate also started to increase rapidly (Figure P2).

Peru had an explicit IT regime, with a 2% target. The main policy instrument was the interest rate for overnight interbank loans. But the Peruvian central bank had not refrained from resorting to other instruments, in particular to foreign exchange intervention. Peru's central bank had both accumulated a healthy stock of foreign exchange reserves and felt free to intervene in the foreign exchange market to tame volatility (Figure P6).

The incipient overheating problem at the start of 2007 was met at first with a conventional interest rate response (Figure P3). At the same time, the central bank engaged in a massive drive for reserves accumulation (Figure P6).

Despite the onset of the world financial crisis in the second half of 2007, capital inflows did not abate, but intensified. The central bank then embarked on a three-pronged strategy. The intervention rate continued to be increased, dollar purchases accelerated and the response was to increase

reserve requirements on the banking system, which were raised in successive steps. To compensate for these moves, reserve requirements on long-term foreign obligations of the banks were eliminated altogether.

The impact was limited. Credit growth continued to accelerate, and by the time of the Lehman collapse annual rates of growth were easily over 30%. On the other hand, policy had a noticeable effect on the vulnerability of the economy to a sudden capital outflow, such as the Lehman bankruptcy. The stock of international reserves was a multiple of short-term foreign debt and the increase in reserve requirements for short-term foreign liabilities, coupled with the elimination of such requirements for long-term liabilities, did result in a substantial change in the maturity structure of the banks' foreign debt. In September 2007, only 22% of the banking system's foreign debts were long term; a year later, the percentage was 58%.

D.2. The Lehman Period

Following the Lehman bankruptcy in September 2008, Peru's EMBI spread rose to over 500 bps towards the end of 2008 (Figure P5). The turnaround in capital flows was quite dramatic: whilst the financial account had accumulated a surplus of more than US\$14 billion from the last quarter of 2007 to the third quarter of 2008, the last quarter of 2008 saw a deficit of US\$2.3 billion, clearly driven by short-term capital outflows, which amounted to US\$2.6 billion during that quarter.

Capital outflows reversed the appreciation of the sol: the exchange rate, 2.90 soles per US dollar before the Lehman bankruptcy, closed 2008 at 3.12. The growth of credit came to a halt and would steadily decline, virtually to zero by the end of 2009. The credit crunch was also evident in the behaviour of domestic spreads. The gap between the prime lending rate and the policy rate and the inflation rate, which had been increasing, started to fall, and would become almost zero by the end of 2009.

Remarkably, instead of lowering the policy interest rate, the policy rate was raised by 25 bps, to 6.5%, in September 2008 and remained there until February 2009 (Figure P3). To fight the crisis the central bank relied on 'unconventional' instruments: reserve requirements, foreign exchange intervention and some other liquidity measures. This stance emerged from the belief that the credit crunch was essentially a liquidity shock, and that the policy response should be to ensure the provision of liquidity to markets. The central bank was also concerned with preserving credibility until markets stabilized.

To ease credit conditions, the central bank reversed the increases in reserve requirements that it had enacted just half a year earlier. And to tame volatility in the exchange rate, it sold US\$6.8 billion between September 2008

and February 2009. In addition, the central bank issued US\$3.3 billion in US dollar-indexed certificates.

These moves seem to have been effective. The exchange rate stabilized and the Peruvian sol resumed its appreciation (Figure P4). At that time domestic spreads fell: the difference between the prime rate and the central bank policy rate dropped by 50 bps, to 87 bps, by February 2009 (Figure P3).

Believing that the financial turbulence had abated, and that the global crisis had brought a more lasting recession than originally hoped for, the central bank finally started to reduce its policy rate in February. By August 2009, this rate was 1.25%, a fall of five and a quarter percentage points relative to the beginning of the year (Figure P3).

D.3. After the Crisis

The Peruvian economy suffered from a slowdown and bottomed out around mid-2009. It then recovered quickly and has enjoyed healthy growth until recently (Figure P1). Aside from sound macroeconomic management, perhaps the most favourable factor has been the recovery of its terms of trade, which – led by the prices of copper and silver – have returned to their peak pre-Lehman levels.

Domestic credit growth increased, from annual rates of about 10% at the beginning of 2010 to more than 20% at the end of that year. Aggregate demand and production resumed strong growth rates, and inflation picked up. In response, the central bank continued resorting to conventional and unconventional policy instruments. In particular, to check the accelerating growth in credit, reserve requirements were raised again in the third quarter of 2010.

IV. Learning from These Experiences

The experiences just reviewed suggest clear commonalities in the way monetary and exchange rate policies reacted to changes in the international environment and to the world financial crisis. But these common features were quite different in the upswing (pre-Lehman) versus the downturn (during and after the crisis).

A. Commonalities in the Upswing

Strong capital inflows spurred fast growth coupled with real appreciation, whilst supply shocks, especially those affecting the prices of food and energy, pushed inflation well above targets. To bring inflation back to target, central

banks resorted to the conventional tool: high policy rates. But that move prompted yet greater capital inflows and exacerbated real appreciation.

Instead of allowing the nominal exchange rate to appreciate, the authorities reached for new and additional instruments: foreign exchange intervention, higher reserve requirements and capital controls (taxes on short-term inflows).

This is a policy mix that many emerging nations, not only in Latin America, have adopted when faced with waves of capital heading their way. Using conventional tools to deal with inflation and unconventional ones for everything else is a recipe that deserves serious consideration.³ But the Latin American cases also suggest that this recipe has limited effectiveness. By the time of the Lehman panic, which ended the upswing and prompted a policy reversal, neither inflation nor real appreciation had been brought down to comfortable levels. Moreover, central banks in the region were struggling to maintain credibility when faced with inflation and inflation expectations that exceeded targets in the relevant horizon.

B. Commonalities in the Downturn

The Lehman bankruptcy in September 2008 meant drastic capital outflows and a liquidity/credit crunch, especially in dollars. Central banks responded by providing ample liquidity, both in domestic and foreign currency. Measures included dollar sales, foreign exchange swaps, reductions in reserve requirements, increases in the maturity of discount loans, widening of acceptable collateral for central bank operations and the elimination of controls on short-term capital inflows. In net terms, these measures implied a transfer of dollar liquidity from monetary authorities to the private sector. Central banks could do so because they had accumulated large international reserves.

Using unconventional tools, central banks responded forcefully and swiftly. In contrast, the policy rate was reduced much later, only in early 2009 – though when the time came to act, central banks cut rates in an aggressive fashion.

This policy reaction led to rapidly stabilizing financial markets and an end to capital outflows. A short and mild recession ensued, followed by relatively fast recovery. Inflation quickly fell below target bands in mid-to-late 2009 but tended to return to within the band not too long thereafter.

The outcome was, on the whole, encouraging. The speed of normalization was partially due to ample world liquidity and high commodity prices in the aftermath of the crisis. But it was also due to the speed and boldness of the policy reaction to the outsized external shock.

³See International Monetary Fund (2012), among others.

A question remains, however, as to why the countries under consideration delayed cutting policy rates for several months after the crisis had begun in the United States. The answer hinges on concerns about credibility. Surely central banks at least suspected that inflation would fall with the slowdown after Lehman, but they feared that inflation expectations could become unanchored if they did not appear to respond aggressively to the previous spike in prices. This suggests that central banks did not have (or did not feel they had) the credibility required to carry out IT as prescribed by theory.

C. Tentative Policy Lessons

Both the upswing and the downturn periods led central banks to reach out for policy tools other than intervention interest rates. But the effectiveness of those policies, and our understanding of the channels through which they operate, is markedly different in upswings and downturns. We have a much clearer idea of how and why they work in crisis times; in contrast, there is less reason to be confident about them in non-crisis times. The cases we have presented are consistent with this differentiation.

The cases under study highlight that in emerging economies central banks may be much more concerned about external variables – such as capital flows and exchange rates – and about preserving credibility than are monetary authorities in advanced economies. This emphasis helps clarify the difference between crisis and non-crisis times for EMs.

How concerns about exchange rates differ in downturns and upswings is revealing. In crisis times, capital flows out and nominal and real exchange rates depreciate sharply. The change in relative prices lowers net wealth, destroys collateral and causes borrowing and other financial constraints to bind, particularly in economies with abundant dollar debt and currency mismatches. Arbitrage across assets breaks down. In these circumstances, monetary and exchange policies that deviate from the textbook IT paradigm have a role to play. The experiences reviewed here, which show that central banks had the ability to counter the external shock and keep recessions brief and shallow, confirm this useful role for non-conventional policies.

The situation is very different in the upswing. Real exchange rate appreciation increases the value of collateral, which in turn prompts more capital inflows and yet another round of appreciation. In that context, the role of credit constraints lessens or vanishes altogether. The exchange rate does not get in the way of the normal functioning of financial markets. But it is a problem to the extent that it affects competitiveness and export growth. In such circumstances, non-conventional policies face an uphill battle to be successful – and if they are effective, those effects may be more temporary than lasting.

Central bankers may have been led to search for new policy tools to help attain objectives unrelated to inflation and the output gap. Theoretical work reviewed earlier in the paper identifies circumstances under which it is necessary to include variables such as exchange rates or credit spreads in the central bank's objective function, if that objective is to represent correctly the average citizen's utility function. The cases we have reviewed are consistent with this view. But they also suggest that exchange rates, credit spreads or other additional variables may affect social welfare differently in different circumstances (e.g., the upswing vs. the downswing). Hence whether to use unconventional tools should also depend on the specific state of the economy (see Céspedes et al. 2012a for a model formalizing this view).

D. Inflation Targeting 2.0?

The practice of IT in Latin America seems to be converging to a new configuration that mixes three regimes:

- (i) In *normal times*, central banks follow the conventional IT recipe, perhaps slightly amended to allow for policy to respond to exchange rates or credit spreads, as suggested by recent theory discussed above.
- (ii) In *boom times* of capital inflows and severe appreciation, central banks attempt to curb these developments via unconventional tools. But the effectiveness of tools such as FX intervention seems to be limited to the short run. The central bank is well advised to enlist the help of the fiscal authority when this regime sets in, and to explore the use of taxes and regulations that 'put sand in the wheels' of excessive capital inflows.
- (iii) In *crises times*, when capital flees and exchange rates crash, central banks deploy their complete arsenal of policy tools, with the conviction that comes from relatively well-understood theory and recent experience. In particular, central banks have a clear rationale to act to prevent unwarranted depreciation, and to use unconventional tools for this purpose.

What seems to be emerging is not an alternative regime to IT, but rather an expanded and enriched version. The old IT may no longer be on target, but perhaps a new version soon will be.

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